



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Audrey L. Carman	Project Number S0401
Project Title What Are the Most Probable Anxiety Disorders in High School Adolescents?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals TO determine the percentage of high school students who have Anxiety Disorders, what the percentage for each disorder, and if the percentage of females is higher than that of males.</p> <p>Methods/Materials 1. 500 students, 2. 500 surveys</p> <p>Results Number of people with a disorder: 255. Number of people without a disorder: 245. Total number of people: 500. Number of guys with a disorder: 83. Number of guys without a disorder: 134. Total number of guys: 217. Number of girls with a disorder: 172. Number of girls without a disorder: 111. Total number of girls: 283. Separation Anxiety: 112. Generalized Anxiety: 145. Selective Mutism: 45. Specific Phobia: 88. Social Anxiety: 134. Panic Disorder: 80. Agoraphobia: 63. Total: 667.</p> <p>Conclusions/Discussion Originally, my hypothesis contained my confidence in the outcome that would discover a strikingly high percentage of high school adolescents having a disorder or more, and that the percentage of females will be approximately 2x higher than that of males. With satisfaction, I can say that I was generally correct with my hypothesis. My data concluded that 51% of people out of the 500 that I surveyed had some type of a disorder, or more. That data falls directly in line with my prediction of the discovery of a strikingly high percentage for those who have a disorder. Similarly, 60.7% of the girls that were surveyed have some type of disorder, or more, while it was only 38% for the males. Technically, the girls had less than 2x the amount of disorders, but they were still 22.7% more.</p> <p>Nevertheless, my data still presents the fact that a remarkably high number of high school adolescents still possess some aspects, if not more, of different types of anxiety disorders. With such data, I believe that it would be in the best interests of the students that the school not only reinvents its teaching, testing, and homework, but that it creates a network of support clubs. Also, there should be the development of annual psych tests to gauge the mental stability of us students. Conclusively, anxiety disorders are dangerously present in high school adolescents, and their needs to be an increase of attention bought to them; I hope my experiment accomplishes the increase of recognition.</p>	
Summary Statement Fueled by my own personal experiences, this project was created to analyze the frequency of students whose lives are affected by Anxiety Disorders	
Help Received None	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Jeffrey Chang	Project Number S0402
Project Title Northern California Vowel Shift: English Phonological Change in Progress	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To investigate English phonological change (California Vowel Shift) in the Bay Area in the past twenty years, and attempt to explain the causes of the sound change and possible intraspeaker variation.</p> <p>Methods/Materials 10 female adult speakers (age 35+) and 10 female adolescent speakers (age 13-18) are recorded. The subjects read a word list containing sample tokens of all vowel classes. Additionally, certain speakers record a sociolinguistic interview for conversational data in a more informal environment. All recordings are manually transcribed and then phonetically aligned with forced alignment tools. Tokens containing vowels of interest are extracted via script, and after hand-adjustment and selection, formant measurements (f1 and f2) of all acceptable tokens are measured at the midpoint of the vowel. These measurements are then normalized via a modified Watt and Fabricius procedure. Finally, a two-sample t-test is performed to compare the mean normalized vowel formant values of the two speaker groups.</p> <p>Results The majority of the vowels involved in the California Vowel Shift have a statistically significant difference between the two age groups, implying that the qualities of the vowels have indeed changed in the past 20 years. Most notable is the fronting of back vowels /u/ and /ow/ in post-coronal environments, and distinct phonological split of the /æ/ in pre-nasal environments. Other developed features, such as the low back merger, are also present, but show no differences between the age groups. Furthermore, within speakers themselves, the quality of certain vowels varies across contexts. While the vowel quality tended to remain consistent for adults between word list and conversational data, for the teens, the vowel shift was more advanced in their conversational data. In other words, social context does have an effect on extent and the quality of vowel shift, especially for more innovative speakers.</p> <p>Conclusions/Discussion The present study demonstrates a significant change in English in the Bay Area over the past 20 years, consistent with prior findings of the California Vowel Shift. It suggests that the change is socially driven, but it is the subject of future research to determine the exact mechanism.</p>	
Summary Statement The present study investigates English phonological change in the San Francisco Bay Area in the past 20 years, pinpoints how certain vowel qualities shift, and attempts to explain why language is evolving.	
Help Received Borrowed Dr. Penelope Eckert's microphone	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Emily P. Condon	Project Number S0403
Project Title Moral Judgment and the Principle of Double Effect	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals An online survey was conducted to assess people's moral judgments using the classic trolley problems. I ask: To what extent do demographic characteristics like gender and age influence the consistency of moral judgments? My hypotheses: People will contrast their answers to scenarios because of the principle of double effect, which states that people's moral judgments are often inconsistent when presented with different scenarios that ultimately result in the same outcome. Furthermore, demographics such as age, gender, education, ethnicity, religion, and political affiliation will have little influence on people's judgments because, in part, evolution has created a common, unconscious "moral grammar." Therefore, if I analyze each demographic individually and compare the different groups, then there will be no statistical difference between the observed and expected values.</p> <p>Methods/Materials Procedures: Create and send out an online survey. Collect and analyze data. Use Chi-Square analysis with 95% confidence level, where a p value less than or equal to .05 is significant, via SPSS to determine what, if any, demographic groups are significantly different from each other.</p> <p>Results The total percent of those who did demonstrate the principle of double effect is 68.6%. The significant statistical differences within demographics, calculated with Chi-Square test, showed that certain characteristics mattered in the consistency of moral judgment, as expressed in the principle of double effect. These characteristics included gender, age, education, and religion.</p> <p>Conclusions/Discussion One hypothesis was accepted because the majority of respondents did, in fact, demonstrate the principle of double effect, contradicting their moral judgment by answering "Yes" to Scenario 1 and "No" to Scenario 2 when in both cases the ratio of human life is 5:1 in regards to the greater good. However, the other theory was not accepted because, according to the data gathered, certain demographic characteristics do influence the consistency of moral reasoning. These groups included gender, age, education, and religion. Because of these results, one may question the validity of past studies regarding the idea that a "moral grammar" is hardwired into human brains. My study suggests that there may be a role for learning and an effect of environmental factors, such as society, on moral judgments.</p>	
Summary Statement To what extent do demographic characteristics - like gender and age - influence the consistency of moral judgments?	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Ashlyn L. D'Orazio	Project Number S0404
Project Title The Effect of Personality Type on the Compatibility between Friends	
Abstract Objectives/Goals It has long been a mystery to scientists why people are friends. This project investigates this question by using the Myers Briggs test to assess the personalities of pairs friends to find patterns. The hypothesis for the this experiment was that a pair having 3 or 4 identical letters assigned by the Myers Briggs test will more likely be compatible than a pair having 1 or 2 identical letters. Methods/Materials In this experiment, 124 pairs of friends were gathered, and each participant took the Myers Briggs test. The results of the test for each participant in each pair were recorded. The data was analyzed by calculating the number of identical and opposite letters that were generated by the Myers Briggs test. It was also observed which letters were often opposite or identical. Results Pairs of friends could have 0, 1, 2, 3, or 4 identical letters from the Myers Briggs test. The percentages of pairs having each of these were 4.03%, 31.45%, 38.71%, 20.16%, and 5.65%, respectively. Detailed results cannot be presented in this paragraph, but the matching letters and not matching letters were evaluated to find patterns in friend selection. These included finding introverted (I) and extroverted (E) pairs, sensing (S) and intuitive (N) pairs, thinking (T) and feeling (F) pairs, and perceiving (P) and judging (J) pairs. For some of these letter pairs it was more common that the friends would have the same letters and for others they would have opposite letters. Conclusions/Discussion The hypothesis was proven incorrect. It was most common for the pairs to have two identical letters and two opposite letters instead of having four identical letters as predicted. In fact, it is least likely that a pair will be compatible if they have four letters the same. Furthermore, it is likely a compatible pair will be both intuitive (N) or both perceiving (P). It is very unlikely that people will be compatible if both people are sensing (S) or judging (J).	
Summary Statement This experiment sampled 124 pairs of friends, and drew conclusions about what makes people friends based on each participant's Myers Briggs personality type.	
Help Received My science teacher read over my introduction.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) John P. Drain	Project Number S0405
Project Title BPA: Safe or Not? The Effects of Exposure to Bisphenol A (BPA) from Canned Food on the Learning of Mice	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Most canned food in the U.S. contains the chemical BPA in the lining, and 95% of Americans have a detectable amount of BPA in their urine. I set out in this experiment to see how exposure to BPA through canned green beans affects how well mice are able to learn the Morris Water Maze. I hypothesized the mice that were exposed to BPA would not learn the Morris Water Maze as fast as mice that were not exposed to BPA, because BPA, in low doses, has been found to reduce hippocampal formation, which is important for spatial memory.</p> <p>Methods/Materials In my experiment, I fed one group of mice 1 gram of canned green beans with BPA each at night and regular mouse food in the day, one group of mice 1 gram of BPA free french cut canned green beans each at night and regular mouse food in the day, one group of mice 1 gram of fresh green beans each at night and regular mouse food in the day, and had one control group of mice that received regular mouse food only. Each group had 2 tanks, one with 5 males and one with 5 females. The mice were fed green beans daily, for the entire experiment. All of the mice had unlimited access to regular mouse food throughout the experiment. The mice were tested in the Morris Water Maze on days 7-13 and data was recorded on all of the days to determine how well the mice learned the Morris Water Maze during those seven days.</p> <p>Results I found that BPA from canned food does not affect how the mice were able to learn the Morris Water Maze. The average times for each group to find the platform were not consistent from day to day. The mice that were exposed to BPA did not have significantly longer times to find the location of the platform.</p> <p>Conclusions/Discussion The data from my experiment does not support that the mice's learning was impaired by exposure to BPA. The mice that were exposed to BPA did not take significantly greater times to find the platform. Americans eat canned food on a daily basis and many cans contain the chemical BPA in the lining, which then leaches into the food. Current studies point toward the possible risks of BPA, but no published studies tested the effects from a human food source. My study did not show any possible effects of BPA from canned food on learning.</p>	
Summary Statement This project investigated if the spatial learning of mice was affected by exposure to BPA through canned food.	
Help Received My parents provided me with some of the supplies for my experiment, and allowed me to test the mice in our house; Ms. Fisher provided me with some of the supplies for my experiment; Jeff Rawson helped me to correctly determine the gender of the mice.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Ruwanthi N. Ekanayake	Project Number S0406
Project Title Effects of Avatar-Based Virtual Reality on Veracity Perception and Kinetosis	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose was to investigate correlations between presence, immersion, perceptual modality, stress and kinetosis in vision-dominated virtual reality (VR) compared to limited-submersion virtual reality.</p> <p>Methods/Materials Subjects received virtual reality experiences in different VR settings, in either high or low stress environments, and took two surveys to place them into a perceptual modality category and to determine their relative levels of kinetosis, immersion, and presence.</p> <p>Results The subjects displayed a high correlation between immersion and presence in both the vision-dominated and limited-submersion VR settings, with correlations of 0.42689 and 0.4564, respectively. There were negligible correlations between presence and kinetosis and immersion and kinetosis. There was an increase in kinetosis with visual and kinesthetic VR participants, as well as with high-stress participants.</p> <p>Conclusions/Discussion Contrary to the hypothesis, this study suggested that presence and immersion have less to do with experienced kinetosis; rather familiarity of sensory input and stress levels contribute more in a virtual reality setting. This provides important information for the use of virtual reality as an educational tool, as well as one used in military and cooperative circumstances.</p>	
Summary Statement My project is about the factors that affect kinetosis in various virtual reality mediums.	
Help Received Received guidance and used equipment from UCLA mentors	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Sarah K. Erickson	Project Number S0407
Project Title Preschool and Prejudice: An Observation of Preconceived Ideas of Racism in Children Ages 3 to 8	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to observe ideas of racism in children ages 3 to 8 who are presented with identical dolls of different races and to determine if children ages 3-4 exhibited opinions similar to those of children ages 5-8.</p> <p>Methods/Materials The materials used for the project were: four identical dolls, each of a different race (African, Asian, Caucasian, Hispanic), and two tests. Forty six children (23 ages 3 to 4 and 23 ages 5-8) were presented with the four dolls and asked a series of questions regarding the dolls. Before the tests were conducted, each child was asked to identify the race of each doll. Test 1 consisted of both positive and negative descriptions (nice vs. mean, smart vs. dumb etc.) in which each child was asked to identify the doll that best fit the adjective. Test 2 was used to record what each child's overall doll preference was and why. The answers and age of each subject were recorded and analyzed.</p> <p>Results The results show that 65% of children ages 3 to 4 chose the Asian and Caucasian dolls when presented with a positive trait and 75% of children ages 3 to 4 chose the Hispanic and African dolls when presented with negative traits. The results also show that 59% of children ages 5 to 8 chose the Asian and Caucasian dolls when presented with a positive trait and 48% of children ages 5 to 8 chose the Hispanic and African dolls when presented with negative traits. When asked which doll the child would most want to play with, 39.1% of children ages 3 to 4 chose the Caucasian doll, 21.7% of children chose the Asian doll, 21.7% of children chose the African doll, and 17.4% chose the Hispanic doll. Within the children ages 5 to 8, 34.7% of children chose the Asian doll, 34.7% chose the Caucasian doll, 17.5% chose the African doll, and 13% chose the Hispanic doll.</p> <p>Conclusions/Discussion The data support both the hypotheses. Based on the data collected, children in each age group did display preconceived ideas of racism. The most favored dolls overall were the Asian and Caucasian in both age groups and the least favored dolls were the Hispanic and African. The children ages 3 to 4 generally exhibited opinions of races similar to those of children ages 5 to 8.</p>	
Summary Statement An observation of preconceived ideas of racism in children ages 3-8.	
Help Received None	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Nahomy Pinedo; Edhel Marie Joseph	Project Number S0408
Project Title Pay Attention Now or Pay the High Price Later: The Most Common Distractions that Lead Students to an Unsuccessful Future	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment was to determine the effect of the use of social devices on student academic achievement. Since the earning and unemployment rates are determined by educational attainment, students must not get distracted in their educational environment. To eliminate distractions, it is essential to identify what is preventing students from their complete potential. The study determined the severity of social media as a distraction among other learning distractions.</p> <p>Methods/Materials Informed consent was obtained from through quantitative surveys of over a thousand middle and high school students. In the survey, student performed a self-assessment of nine learning distractions on a likert scale ranging from 0 being the least frequent and 10 being the most frequent. The prefrontal cortex controls two sides of the brain, capable to multitask on two things, or more. One experiment was done manually; the student was timed for 1 minute to answer 1-20 questions, while counting the amount of colored paper squares they placed in their hand at the same time. The other experiment was done technologically; the test utilized a DSI XL and a stylus. A student completed calculations; meanwhile, the student kept count on how many figures were in a house, as shown in the multitasking game.</p> <p>Results The most common distraction was chatting with someone, which results with an average rate of 5.7. According to the manual experiment, students with a 4.0 GPA counted the number of squares correctly or were either off by 1-3 squares from the number of squares they counted over the average of 13 questions. In addition students with a 2.0-2.9 GPA were off by 1-15 colored squares from the number of squares they counted over the average of 16 questions. On the technological experiment, students with a 4.0 GPA missed 1-5 questions and an average time of 2 minutes and 25 seconds. Students with a 3.0-3.9 GPA missed 5-15 questions and have an average time of 2 minutes and 10 seconds.</p> <p>Conclusions/Discussion In conclusion, the results found that students who had higher GPA tend to multitask more efficiently than those with a lower GPA. The results for the survey did not completely support the hypothesis, being that the most common distraction was chatting with a classmate. The action plan entailed encouraging teachers to re-arrange seating charts in order to minimize distractions. As well, encouraging students to strategically focus on one classroom assignment at a time to alleviate the outperformed prefrontal cortex of the brain. This type of distraction can not only affect your academic life but also your personal life and your career in the future.</p>	
Summary Statement Identify the most common distraction during class, how distractions affect students future, to demonstrate the effects of multitasking on grades, and how to solve the problem.	
Help Received Thanks to Salinas High School for lending internet access, and assistance during the week before the science fair. Special thanks to Ms. Merchant our chemistry teacher who offered support, time, supplies, and access to her classroom. Thanks to Ms. Chu who helped brainstorm ideas for our science fair project.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Do Hyun Kim; Taha Taka	Project Number S0409
Project Title Exploring and Comparing the Effects of Reward and Punishment	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment is to understand the level of motivation to cheat in students when offered extra credit and to determine whether extra credit is the ideal form of motivation for students. We hypothesized that students who are presented with a test that counts against their grade would be more motivated to cheat than those who are presented with a test that counts for extra credit.</p> <p>Methods/Materials We asked randomly selected teachers to provide exams for their students under certain circumstances. Some students took the test believing that the test could potentially lower their grade; other students took the test believing that the test was only being offered for extra credit and could only improve their grade. We created the exams, which were comprised of approximately four to five questions, with assistance from the teachers.</p> <p>Results About 55% of the students who believed they were taking a real test admitted to thinking about or trying to cheat, whereas about 76% of students who were offered extra credit admitted to thinking about or trying to cheat. In both circumstances, a majority of the students admitted to thinking about or trying to cheat.</p> <p>Conclusions/Discussion The results did not support our hypothesis. The results suggest that students who are offered extra credit are more prone to cheating and have higher motivation to perform better. Through our research, we learned that extra credit definitely has its short-term benefits, one of which is that they tend to become more motivated in their studies, which is supported by our experiment. However, we also learned that extra credit has its long-term drawbacks; for instance, we have seen first-hand that students can become too reliant on extra credit to pass their classes. Weighing both options, we decided that the ideal situation is for teachers to offer extra credit sparingly, enough to keep students motivated but not enough to make them dependent.</p>	
Summary Statement Our project was designed to explore the effects of extra credit on students' levels of motivation.	
Help Received Teachers who consented to allow us to conduct our experiment in their classrooms.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Samuel R. LeFevre	Project Number S0410
Project Title The Effects of Video Games on Cognitive Function	
Abstract Objectives/Goals My objective was to determine if video game play before a test can improve test scores. Methods/Materials Nintendo Wii U console Super Smash Bros. for Wii U Mystery Case Files: The Malgrave Incident Results I conducted three trials. In the first, the average score on the critical thinking (or "paper") test was greatest in the control group (58%), and lowest in the action group (40.8%). The scores on the reading quiz were highest in those who played the puzzle game beforehand (62.8%), and the reflex times were fastest in the group that played the action game (0.293 seconds). In the second trial, the highest paper test score was from those who played the puzzle game first, averaging 44.6%. Both the action and puzzle groups scored the same on the reading quiz (61.6%), which is much higher than the control. Like Trial 1, the highest average reflex time was found in the action group (0.2946 seconds). In the final trial, the control scored the highest on the paper test, with 53.2%, and on the reading quiz, with 65%. The action group once again got the fastest reflex time, with 0.3022 seconds. Conclusions/Discussion My results were inconclusive. Reflex times consistently got faster in the action group, but test scores varied between trials. I have concluded that video games can be beneficial for test scores if played in moderation	
Summary Statement I investigated the effects video games can have on logic and reading comprehension.	
Help Received Parents helped discipline participants	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Anish Neervannan	Project Number S0411
Project Title Comparing Crime Rates in Various Communities Using K-Means	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment was to compare the extent to which various factors affected the crime rates in communities throughout the country, using the K-Means clustering algorithm.</p> <p>Methods/Materials The experiment used a combination of the K-Means clustering algorithm and a regression analysis to account for all outliers. A sample code for K-Means, found online, was edited and compiled to suit the needs of the analysis. A data set was used for this experiment, where only the variables required were used and the communities with unknown data points were eliminated. The data was formatted to an excel file, the program was run on that data and the cluster centroids results were graphed. The best type (polynomial/logarithmic) line of fit was chosen depending on the data set trend.</p> <p>Results It was found that low number of police units per 100,000 people was the biggest contributor to crime rates, followed by high poverty rates, low high school graduation rates, high homelessness rates, and high unemployment rates. The relationship between the number of police units per 100,000 people and the crime rate was that the crime rate went down as the number of police units per 100,000 people went up. However, the relationship between the unemployment rate and the crime rate showed that the crime rate only went down marginally as the unemployment rate went down.</p> <p>Conclusions/Discussion The hypothesis was partially supported; the order in which the factors affected crime rates was only partially right. For example, unemployment rates were not the second largest contributor to high crime rates; they were the smallest contributors. A possible explanation for this was that the use of the K-means clustering algorithm produced results different from those of previous experiments.</p>	
Summary Statement This project compared the extent to which various factors affected the crime rates in communities throughout the country, using the K-Means clustering algorithm.	
Help Received None	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Olivia R. Pearson	Project Number S0412
Project Title The Effects of Computer Based Note-Taking or Longhand Note-Taking on Memory Recall Using SAT II Standardized Test	
Abstract Objectives/Goals This experiment is an investigation into the effect of note-taking style, typed or handwritten, on memory recall as measured by the test scores on a practice SAT# II Biology Subject Test. Methods/Materials The participants were an opportunity sample that was randomly allocated into two equal groups of 12 students each of both genders between the ages of 16-17, and were predominantly Caucasian, English-speaking students from a rural high school in the North Western portion of the United States. A between-subject design was used; both groups watched a biology lecture, accompanied by a power point, and took notes while using either a laptop or a writing utensil and paper, based upon their group. The independent variable was the note-taking style used by the participants while watching the lecture. The dependent variable was the score on the test taken after the lecture. Results A one-tailed t-test was used to analyze and interpret the data, and the t value was -0.4181 which failed to meet the critical t value of 1.717 for a 95% significance level. Conclusions/Discussion The null hypothesis was accepted, implying that note-taking style does not affect memory recall as measured by test performance, which is relevant in education.	
Summary Statement It was about how note-taking style affects memory recall.	
Help Received none	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Zachary Peterson; Daniel Pham	Project Number S0413
Project Title Using Mobile Technology to Aid Those Afflicted by Color Vision Deficiency	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of our project was to develop a mobile application that aids color vision deficient people in identifying colors and helps children learn color vocabulary.</p> <p>Methods/Materials There were four phases of this project: storyboarding, building, testing, and data analysis. We developed the application using HTML5, JavaScript, and CSS3. We also used Phonegap, Dojox, iScroll5, and Node.js, which are open source JavaScript libraries. We created the application in the Android Studio workspace. Once the application was laid out, arrays of 133 Crayola crayon colors, 1,438 Sherwin-Williams paint colors, and 1,341 Pantone C colors were used in the Identify tab of the application and an array of ten basic colors was used in the Game tab of the application. We tested our application on five color vision deficient people and five normal color vision people by having them attempt to determine which of two Crayola crayons best matched a solid-colored piece of paper. Each test subject was tested ten times: five times without the application and five times with the application.</p> <p>Results The chi-square of the data collected from the color vision deficient test subjects was 2.3969 and the p value of the t-test of that data was 1. The chi-square of the data collected from the normal color vision test subjects was 1.1024 and the p value of the t-test of that data was 0.3052.</p> <p>Conclusions/Discussion From the chi-squares and the p values of the t-tests, no significant improvement could be shown when the test subjects used the application, meaning that neither the null nor the alternative hypothesis could be accepted. We concluded that natural lighting dramatically increased the accuracy of the test subjects' ability to identify colors.</p>	
Summary Statement The goal of our project is to improve the lives of color vision deficient people and provide a color-teaching tool for children through mobile technology.	
Help Received Father helped answer questions when we ran into coding errors we were unable to solve.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Clarice Poblete; Jineava To	Project Number S0414
Project Title React to the Fact	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Reaction rate of human subjects will be tested to observe if talking on a cell phone and texting will increase their reaction time.</p> <p>Methods/Materials Important materials include a meter stick, coin, chair, calculator, notebook, writing utensil, and at least two cell phones with messaging and texting enabled. Each subject will go through three different trials where he/she will try to catch the meter stick with their dominant hand while the tester drops it. For each trial, they will be tested three times. The length of the meter stick which their index finger is at will be recorded for every test. First, he/she will be tested for his/her baseline reaction while concentrating on the task. The other two trials will include texting and talking on a cell phone. One hand will hold the cell phone and the dominant hand will attempt to catch the meter stick which will be in his/her peripheral vision. A coin will be tossed to determine if texting or talking on the cell phone will be tested next. Using the formula, $d=1/2at^2$, where acceleration is 9.8 m/s, the averaged length collected over each trial will be input into d to get the reaction time(t) in seconds.</p> <p>Results Based on the data collected, the first treatment where the subject concentrated on catching on the meter stick had the fastest reaction time at 1.316 seconds. Texting and talking varied on which had the slowest reaction time, but on average talking caused a slower reaction. Average texting rate was 2.124 and the average talking reaction rate was 1.822 seconds.</p> <p>Conclusions/Discussion On average, the subjects were strongly influenced by the use of cellular devices because the experiment showed an decreased reaction rate. The information gathered explains talking and texting are exclusive because the same part of the brain is used to focus on the phone conversation and the meter stick. When talking or texting, subjects withdraw their attention from the meter stick in order to formulate responses. Because the brain cannot focus on two sources of input at once, usage of a cellular device distracts the brain and delays an immediate response. Based upon the collected data, the reaction times of subjects increased by at least half of a second. Therefore, the usage of a cellular device certainly influences both human reaction rate and time.</p>	
Summary Statement Human reaction rate is affected by many outside factors and cell phone usage, texting and talking, may cause a delayed reaction.	
Help Received Other subjects besides the one being tested helped interact to the tested subject on a separate cell phone.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Madeleine A. Powley	Project Number S0415
Project Title Are You Happy and You Know It? The Effects of Recognizing Happiness and Thankfulness on a Daily Basis	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective in the project was to discover whether students who kept gratitude journals over a 10 day period showed a more positive outlook on life and performed better in school than students who did not keep gratitude journals over the same 10 day period. Two hypotheses were tested. The first hypothesis predicted that those who recorded in gratitude journals showed higher scores in positive framing on a survey. The second hypothesis predicted that regardless of whether or not the students wrote in the journals, those with high performance in school had a higher subjective well-being.</p> <p>Methods/Materials Sample- 105 high school students Psychological Construct Survey Gratitude Journals and Daily Activity Journals Student Grades (independently obtained) Students were assigned into three groups: Control, Neutral and Experimental. The control group did not obtain the journal, and the neutral group obtained the journal but only wrote daily events. The experimental group wrote thoughts of gratitude in the journal. An identical survey for all groups was distributed before and after the 10 day period. The data was then gathered and analyzed.</p> <p>Results For hypothesis one, there was no major difference between the groups and the assignments for the journals. It is unclear whether the manipulation in the experiment worked. If this project were to be continued, more variables and manipulation checks would be added. In the second hypothesis, the students with higher performance did show higher personal satisfaction. Females showed higher subjective well being, especially if they were low performers. Students who also showed low performance gained a positive outlook on life if they studied for any amount of time.</p> <p>Conclusions/Discussion High school students ranging in grades 9-12 completed a survey before and after a 10 day period and filled out a journal according to their group assignment. Results show that regardless of the journal assignment, no change was seen in the students' subjective well-being and outlook on life. However, those who performed lower in school improved their subjective well-being if they studied. This trend was especially seen in females.</p>	
Summary Statement This project measured the subjective well-being and school performance of students who kept a gratitude journal versus those students who did not keep a gratitude journal.	
Help Received Parent helped with statistical measurements, printout of poster at Naval Postgraduate School, school teacher providing population of subjects	



CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s) Roshini N. Ravi	Project Number S0416
Project Title Gender Bender: A Study on Teacher Gender, Student Gender, and Academic Achievement in STEM	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose was to examine the relationship between teacher gender, student gender, and performance in STEM.</p> <p>Methods/Materials Two large counties in California, Alameda and Los Angeles, were selected via Simple Random Sample. Data on male and female performance on the 8th grade CST Life Science Exam was collected for every middle school in Los Angeles and Alameda County using the online STAR database. Each school was contacted to acquire data on teacher gender. Based on the genders of 8th grade Life Science teachers, each school was categorized into five main categories: Male(M), Majority Male(mM), Equal(E), Majority Female(mF), Female(F).</p> <p>Results Based on the 2-Samp Z test comparing the average test score of all 8th grade males and all 8th grade females on the CST Life Science exam, there is a significant difference between the two scores ($z=8.3843$, $df=464$, $p=2.5807 \times 10^{-17}$). The 2-Samp Z tests comparing the average test score of males and females within each category (M, mM, E, mF, F) verified this conclusion. Males consistently outperformed females. There was also a significant difference in student performance within each category, that is both male and female performance differed greatly based on the gender of the instructor. The ANOVA test comparing the average score of males in each category indicated a significant difference in male achievement based on the gender of the teacher ($F=8.143$, $df=4$, $p=2.38 \times 10^{-6}$). The ANOVA test comparing the average score of females in each category also indicated a significant difference in female achievement based on the gender of the teacher ($F=8.025$, $p=2.93 \times 10^{-6}$). Robustness tests conducted on the results verified the accuracy of the values.</p> <p>Conclusions/Discussion A thorough statistical analysis of the data exhibits that in general, males outperform females in STEM subjects. The study also suggest that students tend to perform better when instructed by a teacher of the same gender, i.e. females perform better when taught by females while males perform better when taught by males. Despite the results of this study, further experimentation is necessary before considering gender based classrooms and promulgating such findings.</p>	
Summary Statement The project is an examination of the relationship between teacher gender, student gender and STEM performance.	
Help Received Mother helped collect data. Father helped with board.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Amanda M. Richno	Project Number S0417
Project Title Gender Response to Frustration	
Abstract Objectives/Goals This research explores gender as an influencing factor in ones reaction to frustration; can behavior be predicted by a subject#s gender? Based on literature, the hypothesis is that males will react more violently than females. Additionally, females will have a more inward response. Methods/Materials Volunteers of roughly the same age, 12-15, were selected. They were asked to magnetically attach paperclips onto an electromagnetic grid in a particular pattern posted on the grid. Every 10 seconds the grid was switched off causing the clips to fall. Reactions were recorded as volunteers pursued the task. Results In a post-manipulation survey subjects were asked to rate their happiness a scale of 1-7 (1 being the happiest and 7 being the most frustrated) before they began the test and then after. On average subjects experienced a 2.89 increase in frustration on the scale. Males showed an average increase of 2.44 on the scale, while females showed an increase of 3.33. The majority of males started out the task focused then they either stayed focused though the entire test of shifted to a violent and angry response. Females however tended to start with an angry response , usually in the form of blaming, as opposed to the males angry reaction which more heavily involved cussing and hitting the table, they then progressed to a more reassurance seeking response. The research proved the hypothesis and that males did react more violently to the manipulation. Conclusions/Discussion This experiment found that males shifted from non-violent, while females shifted from violent to non-violent. Genders do have specific ways in which they tend to show emotion. When presented with a difficult task, males looked internally for support in their focus, and then shifted to outward violence when they did not succeed. Females, however, showed low focus when they found the task was difficult and then sought external motivation when the task did not go their way. This information is extremely helpful for teachers when framing difficult tasks for students. Teachers can present things differently based on gender. Furthermore, teachers can use this information to differentiate motivation techniques for students.	
Summary Statement This project examines a correlation between gender and frustration when presented with a difficult task.	
Help Received Teacher helped gather supply's and a friend helped build the electromagnetic grid.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Adriana G. Rivera	Project Number S0418
Project Title The Effect of Stress on Impulsivity Levels in Adolescents	
Abstract Objectives/Goals The objective of this study was to learn about whether or not students who were stressed, whether it be about money or school, would also have higher delay discounting rates, or impulsivity levels. Methods/Materials A two part questionnaire was administered to 49 juniors and seniors at a local high school. The first part of the survey asked the students to rate how stressed they were on a scale of 1-10 when it came to school, GPA, college, etc. The second part of the survey was the Kirby monetary choice assessment (1999), which helped to give students a k-value, or discount rate parameter. The higher the k-value, the more impulsive the individual. Results After analyzing the data, a significant Pearson r correlation was found between the students that were stressed, and delay discount rates, or k-values. Therefore, students who claimed to be more stressed in their daily lives also tended to have higher impulsivity levels. Another positive correlation was found between students who were stressed about money and higher k values. Conclusions/Discussion My results supported my hypothesis because students that attested to having more stress in their lives also had higher impulsivity levels. This research is important because similar assessments can be used in real high schools to help students. Since high stress can be linked to being susceptible to high risk behaviors such as substance abuse, knowing which students are at risk is useful. This way, teachers and counselors can reach out to these stressed students and assist them.	
Summary Statement This project looked at high school students and their stress in order investigate their impulsivity levels, information that also tells us about whether or not individuals are susceptible to high risk behaviors.	
Help Received A class at the Center for Advanced Research and Technology allowed me to use their students as test subjects.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Katrina J. Skender	Project Number S0419
Project Title Decreasing Sexual Risks and Diagnosing HIV in Teens	
Abstract Objectives/Goals The objective of this project was to determine Ventura High School students' sexual activity, condom use and interest in getting an HIV test at school. This information will be used to hold a #Cover It# campaign to offer sex education, condom pledge, condoms and HIV tests for VHS students. Methods/Materials A paper survey was given to students throughout various classes at VHS. The survey data was entered into an XL Spreadsheet and results were analyzed. In addition, multiple sources were sought to try and get donations for the #Cover It# campaign. Results 552 VHS students were surveyed. Overall students were not very sexually active at 28.6% of total students (30.6% of males and 26.2% of females, 100% transgenders) and seniors (59.9%) were more active than lower grades. 70.3% of those sexually active used condoms and 80.3% of all students were willing to use condoms in the future. Of the total students surveyed, 67.9% were willing to get an HIV test on campus. Public health department is willing to support the #Cover It# campaign. Conclusions/Discussion Students were less sexually active than I predicted and more likely to use condoms. Consistent with my hypothesis, they are willing to get an HIV test on school campus. These results suggest students will come to my #Cover It# campaign and because of this the Director of HIV Services at Ventura County Public Health Department is willing to donate condoms, HIV tests and his staff to run the tests. On a broader spectrum, my study indicates the willingness of high school students to be open towards other teens about their sexual behaviors and HIV testing, suggesting teen peers may be the best sex educators.	
Summary Statement A survey of high school students to determine sexual activity, previous/future use of condoms, and willingness to get an HIV test on school campus.	
Help Received uncle printed "cover it" campaign logo t-shirts	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Kelsi M. Stieler	Project Number S0420
Project Title The Effects of Instant Messaging or Video Messaging on Reading Comprehension Using an ACT Standardized Reading Test	
Abstract Objectives/Goals This experiment is an investigation into the effects of instant or video messaging on student's reading comprehension. Methods/Materials An opportunity sample of 39 students containing both genders between the ages of 17-19. The participants were predominately Caucasian, located in the North Western portion of the United States. A between-subjects design was used. Participants read an ACT# Standardized Reading Passage while receiving different distractions. The independent variable was the distraction, such as an instant or video message that each participant received during the test period. The dependent variable was their score on the ACT# Standardized Reading Test. The research hypothesis states that the students would perform better with no distractions when compared to instant messaging while reading and engaging in a video message while reading. Results Using a one-tailed ANOVA, students who received no distraction while reading performed worse than those that received a distraction. However, overall scores and performance did not vary significantly between groups. The mean scores of each group were all the same, therefore causing a probability of .04 and causing the researcher to accept the null hypothesis. The use of technology and engaging in multiple things at one time shows no difference on reading comprehension. Conclusions/Discussion The experiment was not significant; this researcher accepted the null hypothesis with a 96% confidence. Therefore, the difference between instant messaging, video messaging, and no distractions was completely random and not significant. This was due to the fact that the experimenter did not test what was originally intended to test and the Reading Comprehension Quiz was too difficult.	
Summary Statement Electronic messaging and reading comprehension	
Help Received none	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Edward A. Trimble	Project Number S0421
Project Title EEG Usage to Indicate Mental Imagery	
Objectives/Goals I did this project to see if left-brain and right-brain hemisphere activity could be recorded on an EEG to indicate (left brain) mental imagery/preparation and transition to (right-brain) physical execution of a shot with Olympic clay target shooters under physical stress as a diagnostic tool.	
Abstract Methods/Materials Two Olympic athletes were #wired# by a technician with a simple 4 lead setup that would record activity on the left-brain and right-brain hemispheres. The shooters were then told to run through a mental imagery program with the EEG started. The shooters would execute shots and then return to the mental program in a sequence of 25 shots. After, the EEG data was captured and downloaded onto a notebook computer and later printed onto a left-right brain hemisphere tape. This would be used as a control for the project. For the test, the shooters were asked to perform 10 minutes of rigorous physical activity. Finally, the EEG process was repeated again for this part.	
Results When the athletes began their routine, with no physical stress, there were theta and delta waves on the left-brain hemisphere indicating a more meditative subconscious routine. The second the shooters performed the physical execution of the shot, the less active gamma waves on the right-brain hemisphere abruptly turned into more active beta waves and activity on the left-brain hemisphere generally continued in a more meditative theta wave mode. In the test where physical stress was included, most of the wave frequencies were the physical beta waves showing that little to none mental imagery was going on resulting in a decline of performance.	
Conclusions/Discussion My hypothesis was not completely supported and the results of my project revealed that physical stress greatly leaves a negative impact on athletes. This puts more emphasis on how an EEG could even be used as a diagnostic tool to unveil how different athletes perform under physical stress and if more mental training is needed in that particular area to increase cognitive choices.	
Summary Statement Project examines if left-brain and right-brain hemisphere activity could be recorded on an EEG to indicate (left brain) mental imagery/preparation and transition to (right-brain) physical execution of a shot with Olympic athletes.	
Help Received EEG devise was on loan from a technician who also assisted in the recording. All other work was my own.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Amrita Venkatraman	Project Number S0422
Project Title Building a Smartphone Application to Test Alertness before Drivers Take the Wheel	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals According to the National Highway Traffic Safety Administration (2013), more than 10,000 people die each year in alcohol-impaired and drowsy driving crashes. To prevent such fatal accidents, my goal is to create a smartphone application to check mental agility and motor skills BEFORE a person takes the wheel. The app identifies key biometrics that measure the sobriety/drowsiness of drivers and maps them to smartphone features for instant and accurate detection of alertness.</p> <p>Methods/Materials The app analyzes 3 biometrics: vocal, cognitive, and balance abilities. It then compares the results to pre-recorded baseline data and suggests whether a person should drive. To test for balance, I devised an algorithm to check the balance of a person walking 9 steps heel to toe. It uses the OrientationSensor on the Android phone to collect motion data along the 3 coordinate axes. I tested this 1) when the user was alert 2) when the user wore goggles simulating inebriation 3) when the user was drowsy. For cognitive ability, I coded a game to test the subject's reflexes. I tested on subjects 1) while sober 2) while wearing "inebriated" goggles 3) while drowsy. To test for voice, I conducted two tests--one to measure slurring with the Google Speech Recognition API, and one to detect the volume of a person's voice using an algorithm integrating the AudioRecorder and FFT libraries. I tested on subjects 1) while awake 2) while drowsy. To test the impact of inebriation on voice, I used the ALC Corpus database, which provided voice samples of sober and intoxicated persons. I ran these samples through the same voice algorithm.</p> <p>Results I found that a person's balance was 3x as worse when "inebriated" than "sober." Also, 90% of my subjects deviated from their balance by 44% more than they did when drowsy. The reflex test showed that 75% of my subjects scored worse while "inebriated." 60% of my subjects scored worse on the reflex test while drowsy. From the slurring and volume tests, I found that pronunciation accuracy decreased by 40% for all subjects while volume decreased by about 20%. After testing samples from the ALC Corpus, I found that 66% of these samples showed a decrease in volume when inebriated.</p> <p>Conclusions/Discussion This experiment was successful in identifying the right biometrics for measuring inebriation/drowsiness through an intuitive smartphone app.</p>	
Summary Statement This project uses smartphone capabilities to analyze the impact of inebriation or drowsiness on its user to detect alertness before driving.	
Help Received Advised and guided by John Shelby (Computer Science Dept Chair at Homestead), friends and family that I tested on, ALC Corpus Database for inebriation samples, parents for purchasing hardware and testing goggles	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Nicholas G. Wong	Project Number S0423
Project Title What Factors Influence Public Participation in Currency Bill Tracking? Application for Monitoring Population Movement	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Where's George is a non-profit website (wheresgeorge.com) set up for hobbyists to track the natural flow of currency by entering a bill's information, spending the bill normally, and then waiting for another person to enter the bill again at a later time (a "hit"). Users often write or stamp the website on their bills to increase the number of "hits." The main goal of this study is to observe what factors such as stamp color and position can influence the number of "hits." A secondary goal is to investigate if the city that the bills are spent in can influence the number of "hits" and whether a study can track the movement of bills from that city.</p> <p>Methods/Materials Dollar bills were marked 3 different ways using 2 different types of rubber stamps containing information about the Where's George website. In addition, these bills were stamped with red, blue, or black ink to give a total nine different combinations of being marked along with an unmarked control. Sets of bills which contained each of the ten possible combinations were spent (or exchanged with others) in 4 different cities in California (Sacramento, Davis, Monterey, and San Francisco). For 10 months, these bills were monitored for "hits" using the Where's George website.</p> <p>Results The combination of using red stamps on both the front and back of the bills had a "hit" rate 70% higher than any of the other 9 combinations. City comparisons showed that bills spent in Sacramento had the highest percentage of "hits" followed by Davis, Monterey, and San Francisco. However, bills spent in Monterey and San Francisco tended to travel greater distances over time. For Davis and Sacramento, a majority of the bills spent stayed within each respective county.</p> <p>Conclusions/Discussion Bills marked on the front and back with red ink are the best for maximizing the number of "hits." Bills spent in San Francisco and Monterey had very few hits compared to Davis and Sacramento but the pattern of distribution indicates that perhaps many of these bills were being transported by non-locals and tourists. Bills spent in Davis tended to either stay within the county or distributed to very far locations which might be indicative of the university population. Bills spent in Sacramento migrated slowly to neighboring counties in a Northeast direction toward Nevada.</p>	
Summary Statement Discovering the best way to mark a dollar bill with a website so that others will notice it and then allow researchers to track where it goes over time to study population movement patterns.	
Help Received Parent's, parents coworkers, relatives, teachers, classmates who exchanged money with me for the marked bills and then spent them normally	