



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Megan G. Cagle</b>	<b>Project Number</b> <b>S0301</b>
<b>Project Title</b> <b>How Does Sleep Deprivation Affect Your Cognitive Abilities?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of my project is to determine if sleep deprivation affects the cognitive abilities of females between the ages of 14-17 years old. I believe that if a person does not get the recommended amount of sleep, a lack of focus, concentration, and decreased cognitive skills will be the result. <b>Methods/Materials</b> I used the 3-D Pentomino Puzzle and the Kohs Block Design Test to analyze cognitive skills. Using these cognitive tests on 15 girls aged 14-17 years old, I compared their performance level on each of the puzzles based on the amount of sleep they had obtained. They were tested after having slept ten hours, eight hours, and six hours. <b>Results</b> The results demonstrated that less sleep will negatively affect your cognitive abilities. As the sleep times decreased from ten to six hours, the puzzle completion times increased by 186% on the 3-D Pentomino Puzzle and by 64% on the Kohs Block Design Test. As more sleep was obtained, the easier it was to focus on the task and complete the puzzles. <b>Conclusions/Discussion</b> My conclusion is that sleep deprivation will adversely affect cognitive abilities. If a person does not obtain the recommended amount of sleep, the result will be a lack of focus and decreased spatial cognitive skills.	
<b>Summary Statement</b> My project proves that sleep deprivation will adversely affect spatial cognitive abilities, including a decrease in concentration and focus.	
<b>Help Received</b> My mother helped me organize and purchase the things needed for my project.	



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<b>Name(s)</b> <b>Kathleen R. Cuschieri</b>	<b>Project Number</b> <b>S0302</b>
<b>Project Title</b> <b>Mirror Mirror on the Wall, What's The Fairest of It All?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective is to find out if the media affects how every day people portray beauty.</p> <p><b>Methods/Materials</b> A survey with 17 questions was given to 120 consenting humans between the ages of 13 and 99. They were organized into 3 different age groups, which were, 13-39, 40-69, and 70+ years of age. There were 40 humans in each age group, 20 females, and 20 males. The survey was written in such a way as to attain a full understanding on what each individual found attractive in a young human female. The questions range from height to eye color to body shape. Images were provided throughout the survey so the individual was able to understand the question fully.</p> <p><b>Results</b> From the results, there were a few patterns and correlations between the data, but overall, the answers to the questions on the survey were mostly different from each other.</p> <p><b>Conclusions/Discussion</b> From the data collected, one can conclude that human beings are generally not influenced by the media's image of beauty. Thankfully, beauty is still in the eye of the beholder.</p>	
<b>Summary Statement</b> My project is about finding out if the media's portrayal of female beauty affects what everyday people find beautiful in a female.	
<b>Help Received</b> Mom helped pass out surveys	



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<b>Name(s)</b> <b>Haleigh Damron; Tyme Good; Jessica Sohn</b>	<b>Project Number</b> <b>S0303</b>
<b>Project Title</b> <b>Driving Distractions</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective is to determine/test which drivers are effected most by different distractions. <b>Methods/Materials</b> Materials: Cones, stop watch, clip board, nine people (two adult men, three adult women, two teen boys, two teen girls), one car, a cellphone, a radio, and nine granola bars unopened. <b>Results</b> Our data showed that the fastest course times were only when the driver had the loud radio and passengers in the back. It also showed that our older drivers were most distracted while texting, and our younger drivers were most distracted while eating or calling. <b>Conclusions/Discussion</b> All drivers fastest times were recorded when they had the loud music and passengers in the back. Adult drivers have more experience with eating and calling, however, young drivers have more experience with texting.	
<b>Summary Statement</b> To observe and test which distraction effects drivers most while driving.	
<b>Help Received</b> Parents helped set up the obstacle course.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Brittany Daws; Cayla Lariosa</b>	<b>Project Number</b> <b>S0304</b>
<b>Project Title</b> <b>Can You Handle It? A Study of How Stress Is Managed under Stressful Situations</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This project will measure changes in physiology and intellectual performance due to stress. Stressed subjects will exhibit measurable physiological changes and decreased intellectual/manipulative performance when compared to an unstressed condition.</p> <p><b>Methods/Materials</b> Subjects were tasked with finishing visual/kinesthetic games under time constraints. To measure the effect of stress on memory, subjects memorized a sentence prior to the test and were asked to recite it at the test's conclusion. Parameters including heart rate, blood pressure, and temperature that reflect physiological stress were measured before (baseline values), during, and post-test. Forty four students were tested and were equally represented between males and females and high school and grade school.</p> <p><b>Results</b> All subjects exhibited increased heart rate and blood pressure during the test. However, there was little difference between baseline and post-test heart rates and blood pressures. During the tests, girls' and boys' heart rate increased 12.9% and 16.7% respectively. Post-test, girls' heart rate remained 4.3% above baseline. Boys' were 2.8% lower. The average high school student heart rate increased by 20.1% compared to the baseline. The grade school students' heart rate increased 9.6% . The high school group remained 2.8% above baseline but the grade school levels was -1.5%. Blood pressure in boys and girls increased during the test but returned nearly to baseline upon completion. Both groups' blood pressure dropped after testing but high school values remained slightly elevated above baseline. In contrast, grade school blood pressure decreased to below baseline. Temperature variation, was an insignificant 0.2%. Only 33% of the participants could recite the "tongue twister" after the test. Some students who said they felt calm yet exhibited elevated blood pressure and heart rates. Subjects who stated that they would performed better in the absence of time limitations, also exhibited physical manifestations of stress and negative effects on their performance.</p> <p><b>Conclusions/Discussion</b> The data support the hypothesis: external stressors cause measurable physical responses in humans. However, the effect of stress on performance is mixed. With the exception of two tests, there is not a strong correlation between decreased performance and physical manifestations of stress. Results will be modified due to continued testing.</p>	
<b>Summary Statement</b> To determine if external stressors affect physical and mental responses within a human.	
<b>Help Received</b> Patti Daws helped make charts used in board presentation and with the use of Microsoft Excel.	



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2010 PROJECT SUMMARY**

<b>Name(s)</b> Celine A. Fausto	<b>Project Number</b> <b>S0305</b>
<b>Project Title</b> <b>The Alleviation of Anxiety as a Result of Attention Training</b>	
<b>Abstract</b> <b>Objectives/Goals</b> It has been scientifically proven that attention training alleviates socially anxious individuals with generalized anxiety disorder. I considered the effect of attention training on a high school teenager's anxiety. With this in mind came the creation of my hypothesis: Teenagers among the ages of 16-18 who go through attention training for three sessions will show reduction in their general anxiety. <b>Methods/Materials</b> To obtain a numerical value of all 52 teenagers' anxiety level of Depression, Anxiety, Stress Scale (DASS) Questionnaire was given. Attention training was then given to the experimental group, 26 of the 52 subjects. The attention training consisted of the use of neutral and threatening words. After the three sessions of attention training, a second DASS Questionnaire was given to all 52 teenagers. <b>Results</b> After experimentation, a decrease in the DASS anxiety score was found in 65.38% of the experimental group while 53.85% of the control group had a decrease in the DASS anxiety score. The average percent change of the experimental group was -29.90% while the average percent change of the control group was -22.59%. <b>Conclusions/Discussion</b> Because there was not a big difference between the amount of students who saw a decrease in anxiety score, it cannot be concluded that attention training is the main reason why the students' scores decreased. It can be concluded that attention training does help alleviate anxiety because the experimental group did have a greater percent change.	
<b>Summary Statement</b> This project looks at the effects attention training has on anxiety and sees whether or not attention training can reduce anxiety.	
<b>Help Received</b> Used students from period 3 and period 4 of Michael Cavanaugh's chemistry class	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Melissa Fineman</b>	<b>Project Number</b> <b>S0306</b>
<b>Project Title</b> <b>Extracurricular Activities vs. Academic Performance</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Several studies demonstrate a positive association between school performance and participation in sports. In fact human and animal studies demonstrate that physical fitness and activity have positive effects of cognition. However, several lessons associated with sports participation, such as work ethic, time management, organizational skills, and goal achievement, may also be taught during non-sport extracurricular activities. Therefore, the objective of this study was to determine if there is a positive correlation between time spent on extracurricular activities and academic performance, and to determine if this correlation is dependent upon the type of activity. <b>Methods/Materials</b> A 3 page survey was distributed to non-freshman students of 3 Marin County public high schools. The survey determined the types of extracurricular activities performed, hours per week spent on these activities, seasonal variation of these time commitments, and academic performance as determined by weighted GPA. A password protected database was developed (MS Access) that includes all the variables in the survey. The independent variable was the amount of hours each student did extracurricular activities, and the dependent variable was their grades. Statistical analysis included the unpaired t-test, uni-variant and multi-variant analysis. <b>Results</b> Over 900 surveys were distributed and 200 were completed and analyzed. I found that participation in extracurricular activities was associated with better academic performance, independent as to whether the activity was physical or non-physical. In fact, a linear regression model demonstrated a significant correlation between GPA and average hours of activities per week, with a coefficient of 0.034 per hour of activity per week. <b>Conclusions/Discussion</b> Participation in extracurricular activities is associated with better academic performance, independent as to whether the activity is physical or non-physical. In fact, there is a strong association between increasing hours spent on extracurricular activities and increasing GPA. Limitations of this study include reporter bias and self-reporting with no validation method.	
<b>Summary Statement</b> I tested the hypothesis that time spent doing extracurricular activities, independent of the type of activity, taught students skills, such as time management and organizational skills, that would result in improved academic performance.	
<b>Help Received</b> Father's friend helped me with the set up of the database and the data analysis.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Lily C. Goldman</b>	<b>Project Number</b> <b>S0307</b>
<b>Project Title</b> <b>The Effect of Chewing Gum on Concentration and Short Term Memory Ability</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I craved to discover whether chewing gum actually had any effect on short-term memory or concentration ability.</p> <p><b>Methods/Materials</b> For my experiment subjects played a simple memory game on the computer that involved matching shapes and required the use of the short-term memory. The independent variable was whether or not the subject was chewing gum. The dependent variable was his/her resulting score on the simple computer memory game, which was calculated based on the amount of time it took him/her to complete the puzzle and how many attempts s/he made. I used the score the subject obtained without chewing gum as the control. Each subject was instructed to play the game once as a practice, to familiarize him/herself with the procedure; the data for the trial runs was not incorporated into the averages. Each subject played the game twice with gum and twice without, but not consecutively. After each game, scores were recorded. Before playing the games with gum, subjects were instructed to chew the sugar-free stick of Orbit Wintermint gum for 30 seconds. All subjects were seated at a desk in a quiet room with fluorescent lighting. They received uniform instructions and played the same memory game. Every test was conducted in the morning on a weekday between 9:00am and 11:30am. Although subjects were merely observed, with no physical contact involved in the tests, informed consent was obtained.</p> <p><b>Results</b> My data tables and graphs of girls and boys ages 14-18 show very similar patterns, leading me to a conclusion that gender has little to no effect on this activity and area of brain function. Within both groups, 70% of those tested used less time and fewer attempts, receiving better overall scores. Concordantly, there was only a minor fluctuation of the non-improving percentile.</p> <p><b>Conclusions/Discussion</b> The data supported my hypothesis, proving that the majority of subjects performed faster and needed less attempts to complete the memory game when they were chewing gum. The results also show that those subjects who did not improve merely scored around the same. Learning that chewing gum is effective is a helpful breakthrough in our community at school. I regard my discovery as a productive piece of advice and knowledge that could be published around the community to benefit schools.</p>	
<b>Summary Statement</b> My experiment is designed to test whether chewing gum can indeed improve short-term memory and concentration ability	
<b>Help Received</b>	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Haesoo Han; Yun Jung Kim</b>	<b>Project Number</b> <b>S0308</b>
<b>Project Title</b> <b>Do First Impressions Affect Voting Results?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The Hypothesis of our experiment was to determine if first impression affects voting results (senate election, in particular).</p> <p><b>Methods/Materials</b> Our project was conducted under two experiments. For the first experiment, we prepared 25 slides, consisting of 2 different senate candidates. From slides 1-20, each slide contained 2 previous senate candidates, one elected and one non-elected, from the same year and state. Slides 21-25 were designed to test the consistency of the subjects' decision. We repeated the pictures from the previous slides among 1-20. The second experiment was designed to test whether facial expression of a person would affect the voting result. We prepared 10 slides, each containing 2 pictures of different candidate with different facial expression. The slides in both experiments were shown to different age groups and gender, and they were required to mark their answers on the answer sheet. The subjects were not informed that our experiment was based on first impression, but that our project was to test how people respond to different images. Materials: PowerPoint Slide Show, computer, projector, answer sheet, writing utensil.</p> <p><b>Results</b> 158 people had participated in our experiment. Experiment 1 had resulted with males over the age of 10 having 64.0% of accuracy from the real senate election results; females having 62.9%. Males had more consistency in their decisions. Males had a percentage of 66.7%, while females had a percentage of 59.7% in measuring consistencies. The results show that elections can be affected by one's looks. In other words, whether one seems to have more leadership or not does affect the voting results. However, the results from the subjects under the age of 10 had a relatively low accuracy of 50.97%, showing that these young participants had less ability to distinguish which appearances should be considered to have more leadership. In Experiment 2 participants under the age of 10 had the highest result, in which 79.5% of the time the picture with a smiling face won. The age groups from teens through 40s also had a high tendency to choose the picture with a smile, 75.7%. However, participants over the age of 50 had a lower percentage in their tendency to choose the picture with a positive facial expression. The results had an overall result of 76.5%, which indicates that images with a positive facial expression are significantly more favored.</p>	
<b>Summary Statement</b> Our experiment was to determine if first impression affects voting results (senate election, in particular).	
<b>Help Received</b> Participants in Santa Catalina in Lower and Upper School.	





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<b>Name(s)</b> <b>Tauna Hincker; Miranda Moog</b>	<b>Project Number</b> <b>S0309</b>
<b>Project Title</b> <b>Oh So Subliminal</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of our project is to see whether or not teenagers are influenced by subliminal messages.</p> <p><b>Methods/Materials</b> 100 teenage test subjects, were asked to pick a drink color, while everything around the display/drink booth was the color blue. This means we used blue tablecloths, cups, napkins, chairs, and we were even wearing blue, to subliminally suggest the color blue.</p> <p><b>Results</b> We have found that with the blue subliminal messages, the participants chose blue, and without them, they chose the red drink. From that information we have concluded that the subliminal messages did work.</p> <p><b>Conclusions/Discussion</b> We have found out that teenagers were affected by the subliminal messages, contrary to what we had previously thought. But we have also thought that the participants could have selected their items by personal preference.</p>	
<b>Summary Statement</b> The effects of subliminal messages on teenagers.	
<b>Help Received</b> Mother helped with display ideas; Science teacher Erin helped proof read.	



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<b>Name(s)</b> <b>Zachary Hogan; Allan Krinsky</b>	<b>Project Number</b> <b>S0310</b>
<b>Project Title</b> <b>Facebook, The New Virtual Reality: Social and Academic Effects</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Facebook is widely seen as a miracle in the networking world and as a phenomenon between virtual social societies. The predominant motive behind this project is to discover the negative and positive of Facebook usage. This study shows how participating in Facebook can lead to negative effects in both the social and academic aspects of one's life.</p> <p><b>Methods/Materials</b> Conducted experiment with surveys that were handed out to over 200 students.</p> <p><b>Results</b> Validity of the presumed negative effects of Facebook are suggested through the results given by a series of surveys handed out to 208 high school students. Results show how Facebook is significantly affecting the average (Facebook-using) high school student's academic hobbies such as outdoor activities and reading. Also affected by Facebook is GPA. Students that use Facebook seem to have a higher GPA than those that do not.</p> <p><b>Conclusions/Discussion</b> Academic hobbies are incredibly essential for a healthy lifestyle as a student. They create a balance that allows a student to perform well in and out of school. If this balance is affected by some outside force, such as Facebook, the student will be affected socially and academically. When studying the reasoning to the odd finding of Facebook raising GPA we discovered that it may be due to economic standing. If a student has a Facebook, they will have a computer and therefore live in better economic standing and have a better academic environment.</p>	
<b>Summary Statement</b> This experiment was conducted to find positive and negative social and academic consequences of Facebook.	
<b>Help Received</b> My partner and I did the entire project ourselves.	



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<b>Name(s)</b> <b>Chrystal Johnson</b>	<b>Project Number</b> <b>S0311</b>
<b>Project Title</b> <b>The Bystander Effect: In Which Grade Level Is It Worst?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This study seeks to compare in which grade level - elementary, middle school, or high school is the Bystander Effect in its worst given that a choreographed argument/ fight will occur in the campus.</p> <p><b>Methods/Materials</b> The procedure involved planning the whole scenario involving the actors, observers who recorded how long it took for the staged fight to be reported to a school security guard, administrator, or a teacher. I also conducted a survey after the incident asking students to check the reason why they did not report the incident; what is their usual course of action in events like this; and if they are aware of the bystander effect phenomenon.</p> <p><b>Results</b> Results showed that only 10% of the high school students; 2% of middle school and 0% of elementary school students are aware of the bystander effect. "I don't care", is the number one reason why high school students do not report such incidents to school authorities. Regarding the answer to question number two as to what students usually do when an incident like this occurs, it was inconclusive since it was an even 40% for walking towards the commotion and walking away from it. 20% of students answered, doing neither.</p> <p><b>Conclusions/Discussion</b> From this data, I draw the conclusion that the Bystander effect is at its worst in high school. After reaching 9th grade, students no longer care about victims of on-campus violence, or even approach the situation. This doesn't seem to coincide with the believed cause of bystander apathy, which leads to the assumption that either people undergo a second change of viewpoint on violence after high school, or the real cause of bystander apathy is desensitization to violent events.</p>	
<b>Summary Statement</b> The Bystander Effect is more prevalent in high school than in middle or elementary school because as students grow older they become more self-centered and thus, less responsive to their surroundings.	
<b>Help Received</b> My classmates for helping me record the data; the principals who granted their permissions for me to conduct the survey; and Ms. Adriatico for her guidance.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Jotthe Kannappan; Isheetta Madeka; Natasha Patel</b>	<b>Project Number</b> <b>S0312</b>
<b>Project Title</b> <b>The Six Secluded Smarts</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Our objective is to discover whether the intelligence type of high school students gradually narrows into the scope of only mathematical and linguistic intelligences.</p> <p><b>Methods/Materials</b> We used surveys as well as 240 test subjects (60 freshmen, 60 sophomores, 60 juniors, and 60 seniors)</p> <p>Method</p> <ol style="list-style-type: none"><li>1. Contact school administration in order to obtain permission to conduct the experiment</li><li>2. Modify Walter Mackenzie survey</li><li>3. Print 240 copies of survey in order to distribute to specific teachers/ classrooms.</li><li>4. Hand out surveys.</li><li>5. Explicitly explain the execution processes for the survey.</li><li>6. Collect completed surveys for tabulation.</li><li>7. Tabulate results.</li></ol> <p><b>Results</b> As grade level increased, tendencies toward mathematical and linguistic intelligences decreased, while all others increased. The expression of intelligences among females and males seemed relatively equal other than in the two fields of mathematical (male inclination) and linguistic (female inclination) intelligences.</p> <p><b>Conclusions/Discussion</b> Several viable interpretations stood as possible explanations for the results of our experiment. An explanation for this type of data could be concluded through the taboo-effect. It could be perceived that because mathematical and linguistic intelligences are so heavily weighted in the public school system that students are beginning to develop adverse effects. Also, in order to correctly evaluate the data, we must understand that this experiment looks for subjective self-evaluation whereas the government evaluates through a numerical method. Through our self-evaluation we measure how much they believe they have learned. The true root of such beliefs links us back to the confidence of the students in themselves. The external factors may have played a role in deciding the results. Factors may include the No Child Left Behind Act of 2002, which promotes teachers to focus their teaching methods towards mathematical and linguistic areas. The gender comparison graph expressed several different conclusions as well. The graphs show that the six intelligences, except mathematical and linguistic, have similar results between males and females. The</p>	
<b>Summary Statement</b> Our project tests whether the intelligences of high school students narrow into mathematical and linguistic as a result of environmental influence.	
<b>Help Received</b> Our psychology teaches helped us edit the Walter Mackenzie survey.	



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<b>Name(s)</b> <b>Sylvia A. King</b>	<b>Project Number</b> <b>S0313</b>
<b>Project Title</b> <b>Are You Overindulged?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My goal was to find out what percent of teenagers is overindulged and the prevailing differences between the indulged and the non-indulged teens.</p> <p><b>Methods/Materials</b> I created a 43 question survey, including 8 questions strictly characterizing overindulged teens. Teen girls and boys, ages 13 to 19, completed the survey anonymously and on a voluntary basis. Using the questions strictly characterizing overindulged teens, I separated the subjects into three groups: non-indulged, somewhat indulged, and overindulged. After seperating the subjects, I determined their predominant traits.</p> <p><b>Results</b> 53% of my subjects classified as overindulged. Charter schools students (26.54%), private school students (31.28%), and public schools teens (34.12%) had similar percentages of overindulged teens, but the Independent Studies schools had only 8.06%. More overindulged teens reported having an A point grade average (15.94%) than the non-indulged teens (12.35%). More overindulged teenagers reported having a D/F G.P.A (11.59%) than the non-indulged teens (4.94%). This may be explained by the fact that more overindulged teens(62.8%) reported being involved in one or more risk-taking behaviors than the non-indulged teens (37.1%). Overindulged teens reported greater abuse suffered at home (34.60%) than the non-indulged teens (23.08%). 76.92% of the non-indulged teens reported never having been abused at home. A greater number of overindulged teens reported having parents with addictions (40.76%) than the non-indulged teens (24.85%); 75.15% of the non-indulged teens reported having parents with absolutely no addictions. As expected, 69.51% of the non-indulged teens reported receiving praise/gifts only when deserved, and 47.55% of the overindulged teens reported the same. A higher percentage of the overindulged teens (15.20%) reported receiving praise/gifts even when not deserved.</p>	
<b>Summary Statement</b> My project is about overindulged teens and the negative side effects.	
<b>Help Received</b> A statistician helped me with the statistical report.	



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<b>Name(s)</b> <b>Revanth S. Kosaraju</b>	<b>Project Number</b> <b>S0314</b>
<b>Project Title</b> <b>A Study in Understanding and Usage of the English Language through Probabilistic Modeling and Frequency</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Theories of language acquisition differ significantly in their treatment of the extent of abstractness in language. Nativist theories emphasize language acquisition as an abstract, innate process, whereas others suggest it is based on prediction-and-error. This study explores the issue of abstractness versus predictability in English and proposes a new probabilistic model for clarifying the issue.</p> <p><b>Methods/Materials</b> It was determined that abstractness could be equivalently studied using the concept of frequency, a term denoting how often a word or phrase occurs in the English language. Four probabilistic models for frequency were studied. Three widely used models (Markov, general construction, and independent probability) represented abstract learning. A new chunk model which determines frequency based on the occurrence of entire sequences of words was developed by the researcher and was used to represent prediction-and-error learning. To compare the theoretical predictions of each model with real-life language processes, 31 children between the ages of 3 and 4 were tested for proficiency of repetition and comprehension using 28 pairs of high and low frequency expressions. Length of the expressions, the grammatical structure of the expressions, and the individual words making up the expressions were controlled variables, and the frequency of the expression was the independent variable studied. The repetition/comprehension accuracies and delay times were recorded. This data was analyzed for statistical significance and was subsequently compared with each of the four probabilistic models individually to determine the most valid model.</p> <p><b>Results</b> A standard t-test conducted on the data from the child study determined that repetition accuracy for the chunk model was the sole significant measure (<math>t\text{-stat}=2.18, p&lt;0.05</math>). Proficiency of repetition was greater for high-frequency expressions than for their lower frequency counterparts, but comprehension was not affected by frequency. Through a formula of correspondence established by the researcher, the chunk model was deemed 73.5% correspondent with the data from the child study</p> <p><b>Conclusions/Discussion</b> The validity of the chunk-based model showed that language is prediction-and-error based, rather than being completely abstract and suggested more effective ways for teaching methods of English, in accord with the prediction-and-error processes by which children learn.</p>	
<b>Summary Statement</b> This project was an investigation into the mechanisms by which children acquire language; it revealed that prediction-and-error processes play a huge role in language acquisition as opposed to pure abstract learning.	
<b>Help Received</b> Used Stanford University's data base for recruiting children for the study; Dr. Ramsar introduced me to Probabilistic modeling concept and assisted in data analysis	



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<b>Name(s)</b> <b>Zachary A. Kukoff</b>	<b>Project Number</b> <b>S0315</b>
<b>Project Title</b> <b>TruantToday</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My project, TruantToday, is a website for schools that allows them to use text messages and emails to contact parents in realtime when a student is marked truant. The website, however, is just a means to an end -- the project is using the website to see if increased awareness of student behavior leads to parents forcing a change in that behavior. The goal of my project was to raise the amount of students who came back to school after being reported as truant for the day.</p> <p><b>Methods/Materials</b> I build a web-based program using PHP that checks a mySQL database. What this means is that a school can log-in securely from any computer (Mac, PC, or Linux) and still access the TruantToday program. For the experiment, I took a group of highly truant students at Port Richmond High School in New York and compared their rates of truancy before using the program and during the program's use.</p> <p><b>Results</b> Results are still coming in from Port Richmond, but early conclusions show that a good number of students are coming back to school after their parents have been notified of their absences.</p> <p><b>Conclusions/Discussion</b> In my experience, there is a huge need for TruantToday (as a product, not a sociological experiment) in the school system. The majority of schools currently lose funding (anywhere from \$20-40 per student per day) as a result of truant students. My experiment has shown that the best way for schools to regain funding (and for students to have the opportunity to learn) is through increased, realtime communication with parents.</p>	
<b>Summary Statement</b> My project, TruantToday, allows schools to communicate via text message or email with parents and reclaim lost funding at a rate of \$20-40 per student per day while giving students the opportunity to learn.	
<b>Help Received</b> Advisor taught me to code	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Max Lan</b>	<b>Project Number</b> <b>S0316</b>
<b>Project Title</b> <b>Altruistic Mindsets and Their Effects on Prosocial Behavior</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Social psychology is a major science applicable to almost every city on the planet, a subject of intense research over the past few decades. Prosocial, or helping, behavior, although commonplace, remains a mystery: what factors influence helping? My experiment measures the impact of a helpful mindset on prosocial behavior. <b>Methods/Materials</b> Participants were asked to watch a series of 3 videos. One group watched videos unrelated to helping; the other viewed two unrelated videos and a clip on helping others. The helping video was selected to instill a more altruistic mindset in the subject. My hypothesis was that volunteers who had watched the helping video would be more likely to aid someone else. After each participant watched the videos, an associate dropped books near him, whether the volunteer helped the associate or not determined the effect of the videos. <b>Results</b> The results showed that people who watched the helping video helped 30% more of the time than people who did not; however the probability of this as a random occurrence was 15%. <b>Conclusions/Discussion</b> A more definitive conclusion could be reached with more subjects. However, the results are promising, indicating the possibility that helping behavior can be induced in people, or that behavior is highly related to the general mindset at the time.	
<b>Summary Statement</b> My project reveals the correlation between a helping mindset and actual prosocial behavior.	
<b>Help Received</b> Dr. Schafer helped with general project requirements, Dr. Jensen helped with formulating actual experiment (both at the Harker School)	





# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> Grace I. Ng	<b>Project Number</b> <b>S0317</b>
<b>Project Title</b> <b>Perception vs. Reality: Is Your Teen Driving You Crazy?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Teen auto accidents are among the top killers of teenagers today. Teenagers seem unaware of the reasons why their peers and/or they themselves crash frequently. Whether or not they truly know the top reasons for these accidents is debatable and subjective. This research is attempting to determine if teenagers of different age groups and genders know the top reasons for teen auto accidents.</p> <p><b>Methods/Materials</b> Research the top ten reasons for teenage auto accidents. Develop a questionnaire complete with directions to collect the following information: subject's gender, subject's top five choices before reading the stories/statistics, and the subject's top five choices after reading the stories/statistics. Randomly select subjects from middle schools, high schools and colleges. Comparisons were made to the chosen five before and after subjects read the stories/statistics.</p> <p><b>Results</b> Before the participants read the stories and statistics; 22.4% of all participants were able to identify the top five major causes of auto-accident involving teen drivers. After the subjects read the stories and statistics, the number of participants who were able to identify the top five major causes went down to 8.2%.  23.5% of middle school students achieved a perfect score before reading the stories and statistics. After reading, none of the middle school participants managed to get all five correct. Meanwhile, 21.2% of high school students attained a five out of five before reading the stories and statistics while only 16.7% were able to after. 24.4% of females were able to identify the top five causes and 32.7% of males could do the same. After, 11% of females and 3.8% of males achieved 100%.</p> <p><b>Conclusions/Discussion</b> As a whole, participants were affected by the stories and statistics. Depending on grade level and gender, subjects were affected differently. All subjects, middle school or high school, male or female, did worse after an educational intervention. This happened because participants changed their reasoning from what they knew through common sense, to whatever type of story or statistic spoke most to them, even though the stories and statistics were unbiased. Thus, correct answers were adjusted through the absorption of new facts to different, perhaps incorrect, answers.</p>	
<b>Summary Statement</b> Teenagers' perceptions of the top reasons for teen auto accidents.	
<b>Help Received</b> Thanks to my family for support, my participants for taking the time to complete my questionnaire, and Mrs. Armstrong for giving me valuable class time to conduct my survey.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>McKenzie L. Pantana</b>	<b>Project Number</b> <b>S0318</b>
<b>Project Title</b> <b>Pinch Me. Am I Dreaming?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> All humans require sleep, but do all humans dream while sleeping? Research shows that the longer one sleeps the more REM sleep they obtain. REM is the stage when most dreams occur, and dream recall takes place. This project tested if sleep quantity affects dream recall. The hypothesis tested if a human sleeps for a longer period, then they will experience dream recall. <b>Methods/Materials</b> 62 volunteers were tested; 15 middle schoolers, 29 high schoolers and 18 adults. For 31 days, each subject recorded their quantity of sleep and if they experienced dream recall on a calendar. Weekly reminders were sent via text messages/phone calls. Fifteen random subjects from each age group were chosen as a sample group. Of the fifteen, 5 male and 5 female subjects were randomly chosen to represent gender differences in dream recall. <b>Results</b> Peak of most recalled dreams: # Middle School (9-10hrs) 13% dream recall o Male (9-10hrs) 14% dream recall o Female (8-9hrs) 19% dream recall # High School (8-9hrs) 12% dream recall o Male (7-8hrs) 8% dream recall o Female (8-9hrs) 14% dream recall # Adults (6-7hrs) 11% dream recall o Male (7-8hrs) 14% dream recall o Female (6-7hrs) 15% dream recall <b>Conclusions/Discussion</b> Overall, the data collected supported the hypothesis. The results showed that more sleep hours result in increased dream recall. The data showed that high schoolers tend to remember dreams more often than middle schoolers or adults despite the number of sleep hours. High schoolers recalled their dreams a total of 245 times, while middle schoolers and adults recalled their dreams a total of 200 times or less.	
<b>Summary Statement</b> With increased sleep hours increased dream recall will result.	
<b>Help Received</b> Mother helped make graphs.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Tae Park; Gregoire Phillips; Vianey Torres</b>	<b>Project Number</b> <b>S0319</b>
<b>Project Title</b> <b>Body Language as a Form of Communication</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Our project was designed to test the intricate and essential importance of body language to the reflection of comprehension in human interaction. Our experiment tested a broad selection of cultures in seven different languages as well as a diverse range of ages and levels of education within American Society. Our goal was to observe a positive correlation between body language expression and results on the O.C.E. (Overall Comprehension Evaluation), revealing that body language plays a major role in the comprehension of human interaction and positive communication.</p> <p><b>Methods/Materials</b> Due to the reliance of our experiment on the all-essential human variable, our materials were limited to notebook paper, social ingenuity, and the carefully trained eye. Prudently selecting two subjects from each of the ten cultures, we administered hidden uniform conversational pieces and observed the body language of each individual in order to accurately assess just how much these signals and responses revealed comprehension and interest in six criteria. Upon observing the body language responses of our subjects, we held these results to each individual's results on an overall comprehension evaluation administered orally following the conversation and sought correlations in results within individual cultures as well as within all subjects.</p> <p><b>Results</b> As expected, our results confirmed our hypothesis, exemplifying that interpretation of body language exhibiting comprehension correlates with standardized evaluation of understanding. In simpler terms, the unconscious physical expressional signals of our participants paralleled their performance on the standardized evaluation of the material presented to them.</p> <p><b>Conclusions/Discussion</b> These results reflect that body language traverses cultural, linguistic, and educational boundaries in displaying comprehension. Also noteworthy were the areas of strength within each culture as well as the dominating importance of categories across all ethnicities in the interpretation of comprehension, notably the universal importance of eye contact, posture, and hand positioning. Such generality expresses the universal importance key to the confirmation of our hypothesis. Similarly, educational results reflected the same correlation, with body language consistently reflecting comprehension.</p>	
<b>Summary Statement</b> Our project focuses on the central role body language plays in communication and human interaction within differing ethnicities and educational and developmental stages.	
<b>Help Received</b> none	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Ishan S. Puri</b>	<b>Project Number</b> <b>S0320</b>
<b>Project Title</b> <b>Linguistic Creativity and the Zipfian Distribution: An Entropic, Stylometric, and Computational Analysis</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> For almost five decades, linguists have actively pursued the questions: What is "creativity", how do we think, and where does meaning lie in our communication? Combining fundamental linguistic theory with information and source theory, a novel and critical mathematical relation is derived that sheds light on what creativity is and how it can be measured mathematically. Language representation is important practically in the world of communication (e.g. cell phone industry), and academically (e.g. bioinformatics, computer science, astrophysics). The paper reaches to the core of science: how do we think and how are thoughts translated into writing?</p> <p><b>Methods/Materials</b> After several months of investigation into papers on Zipf's Law, studies of entropy, Huffman encoding, and mathematical linguistics, a relationship between Zipf's Law and entropy was considered. First, using 5 corpora from last year's study (32,574 words each, reviewed eight times independently and finally for statistical significance) I wrote several Python programs to measure Huffman encoding size and entropy to see empirically if such a relationship was possible. After seeing a positive correlation, using Shannon's and Sayood's fundamental theorems I mathematically showed a relationship between entropy and the Zipfian coefficient <math>k</math>. A bigram model was later considered to verify results empirically with a linear regression and a MATLAB model was employed.</p> <p><b>Results</b> Initially, an empirical evaluation was developed via programs in Python, Cygwin, and packages that allowed calculations of the Levenberg-Marquardt linear regression of the compressed sizes of the corpora. A direct relationship was found between compression size through Huffman encoding and the Zipfian coefficient. Then a novel formula was derived linking total entropy of a natural text to the Zipfian coefficient. The results were verified mathematically and graphically with MATLAB and a bigram Python model.</p> <p><b>Conclusions/Discussion</b> Mathematically we have come closer to understanding fundamentally where meaning lies in a text, how we interpret the idea of "creativity", and how a text is "surprising" (<math>i(A)=\text{surprisal}</math>). These ideas have great implications in all of science and most notably in linguistics, psychology, and sociology. This novel relationship can be used in mainstream linguistic analysis as we have shown with the much-improved bigram model.</p>	
<b>Summary Statement</b> I derived a novel mathematical formula that brings us closer to understanding linguistic creativity, empirically verified with Python programs and MATLAB, and showed wide implications in practical and theoretical fields.	
<b>Help Received</b> Dr. Stabler, professor of linguistics at UCLA, gave me introductory books and papers to read.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Shubha S. Raghvendra</b>	<b>Project Number</b> <b>S0321</b>
<b>Project Title</b> <b>Analysis of Unwarranted Variation in Healthcare Costs and Delivery</b>	
<b>Objectives/Goals</b> Unwarranted variation, a phenomenon in the healthcare sector, refers to wide ranges of discharge rates, Medicare payments, and, most crucially, care delivery. Unwarranted variation costs patients hundreds of days in hospitals and the US billions of dollars yearly. The research aims to establish causes of unwarranted variation within supply-sensitive (limited by facility) and effective (by-the-books) care, which account for 76% of all unwarranted variation. Hypotheses: 1. A large number of providers increase the complexity of a system, compromising care. 2. A large number of resources increase the complexity of the system, compromising care. 3. The more "complex" (doctor numbers, beds, hospital size) a healthcare system gets, the less effective it gets at covering the basics (eg. Pneumonia or heart attack care) 4. Effective care is unrelated to socioeconomic factors.	
<b>Abstract</b> <b>Methods/Materials</b> Hypotheses were evaluated through statistical analysis of existing databases of rates of supply-sensitive and effective care on the HRR (Hospital Referral Region) level. Databases were obtained from the Dartmouth Atlas of Healthcare, the Census, and Medicare agencies. SQL macros written in Access allowed "joins" over multiple databases, and enabled running linear, multivariate, and logistic regressions on many data sets. The most difficult step of my procedure was quantifying the "complexity" I was trying to measure. Based on preexisting research, composite numbers to describe this concept were created.	
<b>Results</b> 1. There was an R <sup>2</sup> of .636 between "resource inputs" (doctors, spending, etc.) and system complexity, demonstrating a strong correlation between the two. 2. Provider and hospital bed increases lead to higher per capita Medicare spending (R <sup>2</sup> =.548). 3. This result was reinforced by a high Spearman's rho of .438 between specialist providers and spending (p value < 0.001). 4. Low R <sup>2</sup> values on regressions indicated that the relationship between complexity factors (such as Medicare spending, etc.) & effectiveness of care delivery is not correlated. 5. Delivery of effective care is becoming more standardized compared to previous years.	
<b>Conclusions/Discussion</b> My hypothesis was not completely validated: while resource inputs are tied to complexity, system complexity has no conclusive impact on care. Socioeconomic factors were tied to education-based effective care, but not to procedure-based effective care.	
<b>Summary Statement</b> In healthcare systems, system complexity does not impact care quality, though increased resource inputs (like doctors, spending) are correlated with system complexity.	
<b>Help Received</b> Mother helped with presentation; Father helped with learning about SQL	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> Sterling Ripley-Phipps; Jameson Schwab	<b>Project Number</b> <b>S0322</b>
<b>Project Title</b> <b>Cognitive Scaffolding as Measured by Varying Question Difficulty Order on Math Test Performance</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This is an experiment designed to investigate the effects of cognitive scaffolding, demonstrated through the item order of standardized test questions, on the score received on a math test.</p> <p><b>Methods/Materials</b> The experimental (n=33) and control groups (n=30) consisted of 16-18 year old, predominately Caucasian male and female students, from a rural high school in central California. All were acquired through an opportunity sample. The experiment was carried out during two class periods with two separate math tests composed of the same ten problems. In the first test on cognitive scaffolding, the questions presented were ordered from high difficulty to low difficulty. In the second test, the question order was exactly reversed to present cognitive scaffolding to the participant; the questions were ordered from low difficulty to high difficulty. The independent variable was the order of the questions based upon difficulty, and the dependent variable was the score received on the math test.</p> <p><b>Results</b> A one tailed t-test demonstrated that there was significance at the <math>p &lt; .005</math> level, showing that test scores were positively influenced by the presence of cognitive scaffolding.</p> <p><b>Conclusions/Discussion</b> In conclusion, the research hypothesis was supported. A test with cognitive scaffolding is more likely to receive a higher score than a test without it. The implications of the experiment's results are that exams with item order from easy to difficult receive higher scores than those progressing from difficult to easy.</p>	
<b>Summary Statement</b> The Effect of Cognitive Scaffolding on Math Test Performance.	
<b>Help Received</b> No more than instruction in classroom	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sharona A. Silverstein</b>	<b>Project Number</b> <b>S0323</b>
<b>Project Title</b> <b>A Longitudinal Study of Volunteerism and Attitudes in Pre-Dental Students: Year 2</b>	
<b>Abstract</b> <b>Objectives/Goals</b> This project examines the longitudinal effects of volunteering on humanitarian missions and in a free clinic on pre-dental students' attitudes. It is hypothesized that pre-dental students who volunteer will have more positive attitudes toward themselves, more caring attitudes toward others and will be more likely to attribute poverty to societal causes after as compared to before volunteering and that these attitudes in volunteers will be stable over time. <b>Methods/Materials</b> Subjects were 146 members of the UCSD Pre-Dental Society who completed surveys assessing attitudes toward self (self-esteem, life satisfaction, satisfaction with dentistry as a career, happiness); caring attitudes toward others (empathy, commitment to help others and work with underserved, poverty concern); and attributions for poverty; 65 completed the survey twice. <b>Results</b> Subjects were divided into five groups: NEW-HM and NEW-CV who responded before and after volunteering on a humanitarian mission or in the clinic; OLD-HM and OLD-CV who responded twice but were humanitarian or clinic volunteers prior to Time 1; NON-VOL who responded once and did not volunteer. Comparisons using paired t-tests showed that within the NEW-HM group and the NEW-CV group, scores on self-esteem, life satisfaction, satisfaction with dentistry, happiness, empathy, commitment to help others and work with underserved, poverty concern, and attributions for poverty to societal causes were significantly higher after as compared to before volunteering ( $p < .05$ ). Correlations showed that the greater the amount of time volunteered, the more attitudes changed. Time 1 scores of NEW-CV subjects were similar to those of NON-VOL ( $p > .10$ ) suggesting that volunteering led to increased scores at Time 2 for NEW-CV group. There were no differences between Time 1 and 2 scores of OLD-HM and OLD-CV subjects ( $p > .10$ ). <b>Conclusions/Discussion</b> This study shows that volunteering on humanitarian missions or in a clinic leads to positive changes in attitudes. Pre-dental students who volunteered became more positive in their attitudes toward themselves, more caring in their attitudes toward others and were more likely to attribute poverty to societal causes. The more time volunteered, the more positive the changes in attitudes, and these attitude changes were stable over time. My hypotheses were confirmed.	
<b>Summary Statement</b> This project shows that volunteering leads to positive changes in pre-dental students' attitudes toward themselves, caring attitudes toward others and attributions for poverty, and that these changes are stable over time.	
<b>Help Received</b> Parents bought supplies and provided useful comments, student leaders of the UCSD Pre-Dental Society helped with data collection.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Sarah R. Siskind</b>	<b>Project Number</b> <b>S0324</b>
<b>Project Title</b> <b>Milgram Revisited: The Effect of Communication on Obedience</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Just how communication contributes to obedience is an underdeveloped area of psychology. One may obey an order due to an enlarged prefrontal cortex or due to societal pressures. It is hard to quantify just what makes a stick in the mud become just another brick in the wall. By understanding the components of compliance we can develop better parenting techniques, explain historical phenomena, and expand our knowledge of social interaction.</p> <p><b>Methods/Materials</b> 3 groups of 20 students were ordered to read a packet of questions to a confederate in an adjoining room via cellphone. The subjects were not told the purpose of the experiment. The confederate insisted she had to leave to create a form of resistance to the subject's task. The number of questions provided a quantifiable measurement of the participant's obedience. I used 3 carefully monitored communication styles as the independent variable: Authoritarian, Authoritative, and Permissive. My demeanor as the experimenter varied from group to group. As the Authoritarian experimenter, I dressed formally and communicated in a commanding tone. As the Authoritative experimenter, I dressed ordinarily and explained details, incorporating the subject. As the Permissive experimenter I dressed informally and gave vague directions. To control all extraneous factors, both the confederate and I acted from a script and I conducted the experiment in relative seclusion with strangers.</p> <p><b>Results</b> The data supported my hypothesis. Ultimately, Authoritarian communication engendered the most obedience with 75% of the group reaching the final question. 55% of the group under Authoritative communication completed the packet, while only 30% of the Permissive group completed the packet.</p> <p><b>Conclusions/Discussion</b> Simple changes in volume, posture, or wardrobe fostered different reactions; after strong eye contact, subjects were prone to obey. Additionally, though the Authoritative group did not complete the packet as frequently as the Authoritarian group, since the subjects required much less insistence, they were more obedient per individual command. From these findings, we can determine the appropriate way to assert authority. Clear Authoritarian dialogue could expedite productivity and effective communication in the classroom would yield educational advantages. Finally, by examining our own propensity to obey, we can learn how to resist.</p>	
<b>Summary Statement</b> This study, a reconstructed version of Milgram's notorious 1961 experiment, determines the effect of various communication types on obedience.	
<b>Help Received</b> Teacher, Mrs. Cota, advised on the format and helped with research; Participants were taken from Mrs. Haugen's history class at Oakland Technical High School.	





# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Jonathan G. Swenson</b>	<b>Project Number</b> <b>S0325</b>
<b>Project Title</b> <b>How Quick Are You? A Study of Reaction Times</b>	
<b>Objectives/Goals</b> This experiment examines whether visual or auditory prompts lead to a shorter reaction time, and whether age, gender, video game playing experience, or driving experience improve or worsen reaction times. It involves two kinds of tests: one where a subject must simply react to the prompt by pressing a key and one where a choice must be made based on the prompt to press one of two keys. The hypothesis is that reaction times will be faster overall with the auditory tests than with the visual tests. Additionally, younger subjects and those with video gaming experience are expected to perform better than other subjects.	
<b>Abstract</b>	
<b>Methods/Materials</b> The experiment is conducted over the web, using a subject's web browser. Data are collected from the browser and sent to a server where they are stored in a database for later analysis. The web application invites the subject to participate in four tests: visual with no choice, visual with choice, auditory with no choice, and auditory with choice. The choice tests involve selecting the correct key based on the prompt, whereas those without choice simply require pressing a single key when the prompt occurs. Visual prompts are based on a color change from white to either red to blue. The auditory prompts are based on either a low tone or a high tone.	
<b>Results</b> Results from the experiment show, however, that visual prompts elicit faster reaction time than auditory prompts. While subjects with greater video gaming experience do have faster reaction times than those with limited or no experience, the relationship between age and reaction times is less direct. Teens and subjects in their early twenties show a better reaction time than younger children and older adults. Males outperform females by a negligible margin, but no relationship between driving experience and reaction times is apparent.	
<b>Summary Statement</b> This experiment examines whether visual or auditory prompts lead to a shorter reaction time, and whether age, gender, video game playing experience, or driving experience improve or worsen reaction times.	
<b>Help Received</b> Father helped deploy finished application on Amazon Web Services (AWS).	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Henry W. Treadway</b>	<b>Project Number</b> <b>S0326</b>
<b>Project Title</b> <b>Missing the Pitch? A Study of Age and a Person's Ability to Hear Higher Sound Frequencies</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective was to find out whether, as people age, their ability to hear high frequencies decreases or increases.</p> <p><b>Methods/Materials</b> After having each participant sign an informed consent form, I tested 76 people with a frequency generator. I played a frequency for the subject and then increased the frequency by 1000 Hz. until he or she was unable to hear the sound. Then I lowered the frequency in 1000 Hz. increments to the next highest level that the subject could hear. I then increased the frequency by 100 Hz. increments until the subject could not hear the sound. The subjects were of varied ages and genders. The materials included a frequency generator, a wire, a speaker, and informed consent forms.</p> <p><b>Results</b> As the age of my subjects increased, with a few exceptions, the frequency the subjects were able to hear decreased in value. I found that women, generally, can hear higher frequencies than men of the same age. I also found that the between the 5-10 age group and the 11-20 age group, the percentage drop was 40.42 percent, an extremely large drop.</p> <p><b>Conclusions/Discussion</b> As people age, their ability to hear high frequencies decreases as a result of the cochlea's (a part of the ear that receives a vibration after the ear drum or tympanic membrane is vibrated) hair cells decreasing in number because of sound waves traveling into the ear. This makes the results seem to be plausible because a younger person, ideally, would be exposed to a smaller amount of sound than an older person would have over their respective lifetimes. However, this may not always be the case, since, for example one person may listen to more music or other "loud sounds" than another. Thus, the results would not be perfect. A larger sampling than what I got would be needed for a more conclusive finding.</p>	
<b>Summary Statement</b> My project is to find a relationship between a person's age and his or her ability to hear high frequencies.	
<b>Help Received</b> My father helped me attach the wire to the frequency generator, My teacher loaned me a frequency generator	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Michael J. Vredenburg</b>	<b>Project Number</b> <b>S0327</b>
<b>Project Title</b> <b>Pharmaceutical Safety: Risk, Perception, and Drug Adherence</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> In 1996, Congress passed a law stating that medications must be accompanied by "meaningful" written information. Patients' perception of a drug's risk can determine whether or not they read the form, or how much of it they choose to read. There is strong evidence supporting the importance of expectations on warning efficacy. Specifically, warning effectiveness tends to increase as a function of perceived hazardousness and likelihood of injury. One of the most dangerous commonly prescribed medications is Warfarin, which has a low, or narrow therapeutic index. This means that even a small excess of two to two and a half times normal can be fatal in 50% of the population. A primary aim of this study was to evaluate how the format of information sheets influences risk perception and drug adherence.</p> <p><b>Methods/Materials</b> I created an experimental information sheet for Warfarin for this study by reformatting existing sheets to comply with results of my prior science fair research and compared it to 2 existing sheets (one commonly used by pharmacy chains and one by the U.S. Food and Drug Administration [FDA]) using a comprehension test that I developed for the study. I used 2 Likert-type scales to evaluate risk perception, and likelihood of injury.</p> <p><b>Results</b> I compared 2 existing information sheets to my experimental sheet using a repeated measures ANCOVA (using age as a covariate). I found that as the perception of risk increased, performance on a test increased when the information sheet was difficult to use. I also found that more than a third of the participants did not even realize that the information under the heading "precaution" was warning information. Results indicate that participants underestimated risk for all formats, which could potentially result in serious injury or death. Moreover, participants felt that the likelihood of injury using the drug was even lower than their perception of how dangerous it was.</p> <p><b>Conclusions/Discussion</b> Since seniors use significantly more drugs, and the more drugs taken the greater risk of injury, it is critical that these sheets are redesigned to accurately convey risk to seniors, and all population groups. Warnings research indicates that the two factors affecting warning compliance are likelihood and severity of injury; these factors were evaluated to be moderate by all groups studied.</p>	
<b>Summary Statement</b> My research evaluated why people fail to read information sheets provided with prescription medications. I examined their risk perceptions of a dangerous drug and the accuracy of these perceptions.	
<b>Help Received</b> Pharmacist Philip Anderson (UCSD) provided pharmaceutical expertise. Michael Kalsher (RPI) helped with statistics and let me collect data in his classes. Family Dr. Randy Cohen provided medical expertise. A senior housing facility allowed me to collect data at their facility.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Tiffany X. Wei</b>	<b>Project Number</b> <b>S0328</b>
<b>Project Title</b> <b>Music in Work</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to see whether or not different genres of music had an effect on a person's work accuracy and work efficiency</p> <p><b>Methods/Materials</b> First, give the person a worksheet with no music whatsoever, and time them to see how long it takes them to finish it and how many answers they get right. On a table, place the headphones with the music device already loaded with all five songs in the order of rock, classical, pop, techno, and lastly rap. Once the person is ready, start the song and start the timer. When the person is done with the worksheet, they will raise their hand and that is when you stop the timer. Write down the time it took them to finish the problems and correct the worksheet to see how many they got correct and how many they missed. Give the person a break to relax before beginning on another genre. Repeat this process for the rest of the genres. I tested 10 people between the ages of 13 and 15 who had passed Algebra 1,2 with a B average. I used 6 different algebraic problem worksheets with 15 problems on each (one for each genre of music). I also used 5 different songs from 5 genres of music and also tested a no music test as my controlled variable.</p> <p><b>Results</b> While testing people, depending on the genre of music, people either disliked the music being played or enjoyed it so much that they began singing along with it. The beat of the songs had a huge affect on people. If the pace of the music was upbeat and fast people tended to get easily unfocused. When the pace was soft and peaceful people finished the problems quicker and more accurately. Classical music allowed people to work the fastest and the most accurate. Rap, pop, and techno slowed the majority of people down and their accuracy also went down.</p> <p><b>Conclusions/Discussion</b> To make this experiment better next time, I would change some of the things in my procedure. I found that listening to one or two songs over and over again became very dull and not interesting to those taking the tests. I would add more variety of songs from the genre, so that the songs were not repetitive. I would also separate the people farther away from each other when they take the test. I found out that some people in my experiment would grow impatient and would start talking nonstop and this messed up many of the other people taking the tests too. Distractions would need to be eliminated to run a smooth experiment. The only thing needed would be music.</p>	
<b>Summary Statement</b> Music does have an effect on a person's work accuracy and efficiency depending on the specific genre.	
<b>Help Received</b>	