



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Athman R. Adiseshan	Project Number S0401
Project Title Predicting Real World Characteristics from Virtual Behavior	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In this study, I examined whether and how demographic profiling and personality are expressed in Virtual Worlds (VWs). The purpose of the study was to determine the accuracy rate with which real world demographics and personality traits can be predicted based on virtual behaviors. In this study, I predicted real world demographics such as age, gender, marital status, job status, education level, and nationality, and personality traits from the Big-5 Personality Model for 1,040 players from the US and Hong Kong/Taiwan. I hypothesized that real world characteristics can be predicted from virtual behavior.</p> <p>Methods/Materials Survey data from 1,040 World of Warcraft players, from the US and Hong Kong/Taiwan, containing demographic and personality variables was paired with their VW behavioral metrics over a four-month period. The VW behavioral metrics were gathered by two monitoring systems that tracked the players. From this data, 435 behavior variables were described, extracted, and analyzed.</p> <p>Results I predicted real world demographics such as age, gender, marital status, job status, education level, and nationality for the 1,040 players through machine learning methods. The results showed that one can predict age within +/- 4.7 years in terms of Mean Absolute Error. Prediction accuracy rates of demographic variables are as follows: gender is 73%, marital status is 68%, nationality is 70%, job status is 60%, and education level is 75%. I also predicted the personality traits of players from the Big-5 Personality Model: Extraversion, Agreeableness, Conscientiousness, Emotional stability, and Openness to experience based on the significant positive and negative correlations between the virtual behaviors and the personality factors. Many behavioral cues in VWs were found to be related to personality.</p> <p>Conclusions/Discussion In conclusion, virtual behavioral metrics can be used to provide statistically significant models of a player's personality and demographic profile. This study is relevant in the design of personalized interfaces, system customization, recommender systems, and online predictive analytics/ad supported services.</p>	
Summary Statement I predicted the real world demographics and personality traits of 1040 participants based on virtual behavior, using machine learning and behavioral statistics techniques..	
Help Received Discussed ideas with mentor	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Shruti Aggarwal	Project Number S0402
Project Title Retain to Recall: Which Types of Images Do You Remember in Real-Life Conditions?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to determine which types (categories) of images, excluding those of personal significance, people remembered and the impact of real-life distraction, such as video, on this result. I hypothesized that as distractions increase, image memory shall deteriorate, however the types of images remembered shall remain consistent.</p> <p>Methods/Materials I wrote a software program in HTML and JavaScript to present an image stream (with precise exposure durations and gaps) and to capture the participant clicks. 1) 54 participants were given a Short-Term Memory test with changes to number of objects and features, for 2 exposure durations and instructed to detect repetitions. The Memory Score was plotted against the number of objects for each feature changed. 2) 53 participants took a Long-Term Memory test including 94 images with 24 Candidate images (Gap 48-53 images), 12 Observer images (Gap 3-5 images) to check attention, and Spacers; they were instructed to detect repetitions. The Memory Score was plotted against category (Indoor vs. Outdoor). 3) 56 participants took a test similar to experiment 2 with added video distraction. Finally, results from 2 & 3 were compared.</p> <p>Results 1) Participant scores were near perfect for 1 to 3 objects; they declined at 4, followed by a rapid deterioration. This result did not change with exposure duration, nor with two features changed simultaneously, indicating that visual memory is of the entire object, not just a feature. This was corroborated with the literature and a gap of 3-5 objects was used as Short-Term Memory capacity 2) Memory Score for Indoor images was 23% higher than for Outdoor images. Participants mean score was 19 (SD = 3.15). 3) Memory Score with Video distraction for Indoor images was 36% higher than that for Outdoor images. Participants mean score was 17 (SD = 3.38). Comparison of 2 & 3 showed that Memory Score for Indoor Images decreased by 5% due to distraction, while the corresponding score for Outdoor images decreased by 11%.</p> <p>Conclusions/Discussion My hypothesis was correct. Contrary to popular belief, the experimental results suggest that outdoor images, though aesthetically pleasing, are not remembered as well as indoor images. Further, the reduction of memory scores after distraction with video was more than 50% greater for the outdoor images.</p>	
Summary Statement This project investigates which types (categories) of images people remember and the impact of real-life distraction, such as video, on this result.	
Help Received My teachers allowed me to administer the test in class.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Esra Nur Altun; Sara Hossain	Project Number S0403
Project Title Yummy or Eww?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our goal is to possibly get food companies to change the color of the food. For example a potato chip in the color of something unappealing and broccoli in the colors of rainbows. This might possibly be the start of stopping obesity rates</p> <p>Methods/Materials Materials: * Food that the subjects hate and like to eat; Food coloring; * Stove.</p> <p>Procedure: 1. Get all your materials ready. 2. Pick your food of choice** (Be sure that you picked the foods/drinks that the Subjects don't and do like.) 3. Pick the color of your choice** (I picked red, green, and blue based on the research). 4. Boil the foods one by one and add the food coloring. 5. When the foods are at colors of your choice turn off the stove and get a plate and put the food on it. 6. Test it on the subject ask if they would eat it or not and just for fun you could make them try it. 7. Record Data. 8. You're done!</p> <p>Results What the data show really did surprise a few people. If you go back you would see that milk wasn't usually drank but during this experiment Milk was the only like by all subjects! I was shocked to see the parsley which was colored blue only scored about 40%.</p> <p>Conclusions/Discussion The conclusion of this science project is that color does affect if we eat it or not. And we finally saw the tricks of the food companies and we just came up with a new one. Change the color of food, change peoples objectives to eat.</p>	
Summary Statement Our Project is about whether food color effect if we eat it or not.	
Help Received Mother helped with cooking	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Garrett C. Baltz	Project Number S0404
Project Title The Effects of the Presence of Representative Information on the False Consensus Effect	
Abstract Objectives/Goals This is a study designed to investigate the effects of the presence of representative information on the false consensus effect as measured by the mean score received on a survey where representative information was given or not given. The false consensus effect is an egocentric bias that occurs when people who engage in a given behavior will estimate that behavior to be more common than it is estimated to be by people who engage in alternative behaviors. Methods/Materials A between subjects design was used and participants were randomly divided into an experimental group of 13 (4 males and 9 females) and a control group of 13 (7 males and 6 females). The study was conducted at a high school computer lab with a survey created by the researcher. The survey's questions prompt participants to make a choice between two options and then estimate the choices of a hypothetical subgroup. Participants in the experimental group received information that represents other participants' choices. Participants in the control group received no information. The independent variable was the presence or lack thereof of representative information and the dependent variable was the mean score on the survey. Results A one-tailed t-test comparing the estimations of the control and experimental group demonstrated there was significance at the $p < .0001$ level of confidence with 24 degrees of freedom. At the 99.9% level of confidence, the t-value was 4.737, exceeding the required critical value of 3.745. Conclusions/Discussion This implies that representative information (other participants' choices) nullifies the false consensus effect, showing that when participants are presented with consensus information, they will consider it over their own personal bias.	
Summary Statement The Effects of the Presence of Representative Information on the False Consensus Effect	
Help Received My high school IB Psychology instructor	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Sabrina Belen; Katherine Lott	Project Number S0405
Project Title Primary or Secondary Speakers: Does It Matter?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In today's world, there is a conception that foreign students are more intelligent than American students. The purpose of this project is to evaluate whether or not secondary English speaking students test as well as primary English speaking students on simple English tests.</p> <p>Methods/Materials Participants were split into two groups, primary English speakers (Group1) and secondary English speakers (Group 2). 50 high school students of each group were tested. To be considered a secondary English speaker, the participant must speak English as a second language. ESL students take the CELDT yearly to determine English level efficiency. The 11 questions were taken from a California English Language Development Test or CELDT tested the students' knowledge of spelling, grammar, and comprehension. Both groups were given the same test, in the same classroom environment.</p> <p>Results 100 individuals from grades 9-12 were tested. The average primary English speaker scored a 90.5% while secondary English speakers scored an average of 80.3%. Both groups had a Standard deviation close to zero. (Approx. 0.13 for both)</p> <p>Conclusions/Discussion The data did support the hypothesis. Primary high school English speakers tested approximately 10% higher than secondary high school English speakers. This result could be due to the amount of time primary English students spend in studying English. Although there are human variables such as the amount of sleep, food consumption, and boredom, the scores show that California English Language Development Tests are reliable in testing ESL students. Taking an English test by primary English speaking students may have appeared easy, merely because the students speak English on a daily basis. While ESL students may study English as much as several times a day to as little as a few times a week or may speak English at school but their primary language while at home. This project concludes that primary high school English-speaking students test superiorly than secondary high school English-speaking students.</p>	
Summary Statement The purpose of this project is to evaluate whether or not secondary English speaking students test as well as primary English speaking students on simple English tests.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Casey M. Campos	Project Number S0406
Project Title Will Using Natural Environment Teaching Methods Improve the Transferability of Learning for Students with Autism?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project was to discover if Natural Environment Teaching (NET) is more effective than traditional Discrete Trial Teaching (DTT) methods used to educate children on the autistic spectrum.</p> <p>Methods/Materials I contacted the Central California Autism Center at the local university, met with the project coordinator to discuss this project, and then learned how to collect data on the trials. The Center provided a station with bean bags, rugs, balls, books, toys, etc. for NET, and a DTT station with a desk, chairs, and flashcards for one-on-one learning between therapist and student. I focused on three students with similar learning needs, and therapists individually taught them the objectives using methods according to whether they were in a NET or DTT station; students spent 30 minutes at each station. As therapists conducted trials, I observed and collected data in my logbook which indicated correct, incorrect, or prompted responses. I collected data for 11 days over a two-month period then compiled and analyzed it. In addition, I compared my data to therapists' data to further support my findings.</p> <p>Results The more effective teaching method was NET which had better results over DTT for two of the three students. The average number of correct NET responses from my data was 82.8% out of 232 trials, and the average from the therapists' data was 82% correct responses out of 1,215 trials. The average number of correct DTT responses from my data was 79.9% (388 trials) and from the therapists' data was 78% correct responses (1,558 trials).</p> <p>Conclusions/Discussion The NET methods were more effective than traditional DTT methods. My project contributes data to support that autistic children are more receptive to NET methods and that they are more successful in their ability to generalize and transfer knowledge. It is also important to note that there was a dramatic difference in the children's behavior at each station, with several tantrums occurring in the DTT station.</p>	
Summary Statement My project compares traditional discrete trial teaching (DTT) and natural environment teaching (NET) methods to discover if NET will improve generalization and transferability of learning for children on the autistic spectrum.	
Help Received Observed at Autism Center at CSUF under the supervision of Kellee Chi/Dr. Adams; Parents helped with display	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Patrick Casebolt; Charley Huang	Project Number S0407
Project Title Exploring the Correlation Between Cerebral Aptitude and Varying Motivational Stimuli	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our goal in conducting this experiment was to explore possible ways to improve student test grades through psychological means. Essentially, we are aiming to determine if there are conditions that can induce confidence thereby improving scores. Our hypothesis is that telling students a test is harder will improve performance. Also, we hypothesized that telling the test was timed relatively short, that scores would improve.</p> <p>Methods/Materials In order to test our hypothesis, we devised two different tests pertaining to basic math and memory skills. The math test is 3 pages, each filled with 120 randomly distributed, simple math problems(i.e. 13-5). Each subject did as many problems as able within a 2 minute period. However the subjects were led to believe that each portion was timed differently. A similiar design was used for the memory test. We randomly generated 20 common nouns for each of three pages. For this test, subjects were given equal amounts of time for memorization of the words and for writing down those they remembered on each page. However subjects were led to believe that the pages consisted of words of varying difficulties. All time was recorded using a stopwatch and were completed in a quiet test area. The order of the pages was also randomized. Subjects were also given a survey asking for basic information such as age and gender.</p> <p>Results We found that our hypothesis is partially correct. We have determined that telling that a test is easier will improve scores. Likewise, telling that less time is given will also improve scores.</p> <p>Conclusions/Discussion Through this result, it can be concluded that if teachers want to improve test scores, they can tell students prior to the test that the test is less challenging but must be completed in a small time period. The logical explanation for this result is that an "less difficult" test instills confidence in the subject, and a "shorter" test will probably motivate more vigorous completion of the test. This method of teaching can potentially be used to improve scores on all tests, whether standardized or teacher specific.</p>	
Summary Statement This project focuses on determining the conditions in which students will be most motivated, thereby improving scores on tests and other classwork.	
Help Received Parents paid for materials	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Dania P. Cortes	Project Number S0408
Project Title Does "Gender Affects Frustration" Change During Teen Growth?	
Abstract Objectives/Goals Last year, concluded that gender affect the reason of teen frustration.As a result of last year's project, I decided on investigating if this precise stress not only is different, but also increases or decreases throughout the years differently. In addition, I wanted to know if this change occurred at different rates depending on gender. So this became my goal. My goal is to know if there is a difference in the amount of stress from each of the areas I previously tested, and compare if this difference varies depending on gender. Methods/Materials For testing my project,I made surveys to 100 teenagers from each sex from ages 17, 18, and 19.The teenagers were asked to answer 16 questions, which each was about asking them if they were stressed about a particular situation.Each of the situations represented one of the main causes on teen stress.Once they were all answered, I compared the results with the surveys from the 13, 14, and 15 year old teenagers that I had already tested to determine the change.Finally I compared the change result for each gender and compared them. Results My results were that stress levels from both genders rises in all the categories except for stress in the area of physical appearance, which reduces in large quantities. My results also showed males in their late teen years have higher frustration level in categories that involve the protection of people surrounding them, and females in their late teenage years, have the greater frustration ranking in categories referring to the way they handle relationships in society. In addition, there was indeed a greater amount in evolutionary impact on female results. Conclusions/Discussion My hypothesis was supported by my conclusion because I predicted that stress changes,and that gender determines the way stress evolves during teenage years.My results proved that in general, stress levels from both genders rise as a teen grows, except for physical appearance which decreased, especially for females who scored 50 % less than in their early teen years.Females scored higher increasing rates in categories related to the way they satisfy society Males scored higher in categories relating to other#s protection.As for the comparison between genders, there was a greater amount in evolutionary impact on female results because their evolutionary growth is more constant in each category.	
Summary Statement My project is about investigating the changes in stress from an early to an elder teenager, and analyze if gender is a factor to this.	
Help Received Students from different Imperial High Schools helped me by answering surveys; Biology Teacher helped me think of ways to expand project; Mom bought all my materials and gave me rides from one high school to another;Dad helped wire board;	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Jenna M. Docher	Project Number S0409
Project Title Encouragement and Discouragement: Are Your Tests Really Standardized?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to test whether and how encouragement and discouragement affect student performance on standardized tests. It was hypothesized that encouragement would improve performance, while discouragement would worsen performance.</p> <p>Methods/Materials A test was formulated with three sections, each prefaced by written instructions: one with neutral instructions, one with encouraging instructions, and one with discouraging instructions. Each of the three test sections contained two each of language arts, mathematics, science, and history questions, all of the same level of difficulty. Informed consent was obtained from 72 students, ranging from seventh to ninth grade. The students were given half an hour to complete the test during their study hall period.</p> <p>Results It was found that encouragement and discouragement do have an effect on performance on academic tests, independent of student mastery of the tested material. Discouraging instructions more dramatically impacted performance than encouraging instructions. Forty-four percent of students answered fewer questions incorrectly with encouragement than with neutral instructions, while 35% answered more questions incorrectly. Seventy-two percent answered more questions incorrectly with discouragement than with neutral instructions, while 12% answered fewer incorrectly.</p> <p>Conclusions/Discussion The hypothesis that encouragement would improve performance was partially supported by the data, while the hypothesis that discouragement would worsen performance was strongly supported by the data. This suggests that the way a test is presented may impact the level at which students perform, since variables such as encouragement or discouragement may affect the attitude and confidence of the test taker. Based upon this, one may conclude that "standardized" tests might not purely reflect how well students comprehend material, because instructions that may be perceived as encouraging or discouraging, as well as other possible factors, can influence performance.</p>	
Summary Statement This project examines how encouragement and discouragement affect student performance on standardized tests.	
Help Received My mom drove me to the middle school where I administered my tests, and several teachers were kind enough to allow me to administer the test to their study hall classes.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Shabnam Z. Eghbali	Project Number S0410
Project Title The Effect of Age on Attention via Word and Color Recognition	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Age progression is known to have adverse affects on the brain, but does it affect all aspects of the brain? With this contemplation, I sought to determine the effect of age on attention via word and color recognition.</p> <p>Methods/Materials Seven tests, the Stroop test and variations of the Stroop test, were used as a means of measuring attention capabilities. Ten people (5 male and 5 female) in each of the 6 age groups were tested: preschool (3-4), elementary school (8-9), middle school (12-14), high school (16-18), adults (21-55), and elders (63+). The accuracy, time, and reading rate were determined for each person.</p> <p>Results In terms of the average reading rate of the tests among all the groups, the high school group performed the best. The average reading rate (words/minute) for tests 1, 2, 3, 4, 5, 6, and 7, respectively were 61.2, 117, 140, 77.9, 130, 145, and 140. For the tests that required naming the color, the lines of the graphs were steeper whereas the lines of the graphs for the tests that required reading the words were smoother. The elder group had the greatest discrepancy among the tests.</p> <p>Conclusions/Discussion The results of the experiment partially support my hypothesis because the high school group in fact had the fastest reading rate for all of the tests. The overall trend of the average reading rate for each of the tests was increasing from preschool and peaking at high school and then decreasing thereafter through adulthood and elder age, but the reading rate for the elder group never fell below the rate of the preschool and elementary groups. This reveals that attention abilities are still developing during the preschool and elementary school stages therefore making it harder for the younger children to complete the interference tasks. Contrary to my hypothesis, the elders group had the greatest discrepancy among the tests. This is because the elders group had high reading rates for tests that required reading because they have experience and thereby more active neuronal pathways, but for the tests that required naming words and extensive use of attention, the elders did significantly poorly due to the limited use of that segment of the brain combined with water loss and decreased glucose use. Through this project, we have more knowledge about the intricacies of attention at different age levels and we can adapt this knowledge to improving our education system and attention capabilities.</p>	
Summary Statement This project aimed to uncover the varying attention capabilities, via word and color recognition, at different ages and determine whether age hinders or enhances attention capabilities.	
Help Received School officials at different educational institutions provided the students to be tested.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Noah M. Fields	Project Number S0411
Project Title The Effects of the Growth Mindset on Academic Success and Happiness	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to see if there is a correlation between the growth mindset (defined here as perceiving intelligence as a changeable attribute, especially by effort--contrasted with the fixed mindset, which sees intelligence as determined and set in stone) with academic performance and happiness among high school students.</p> <p>Methods/Materials I distributed a short, voluntary, confidential survey among 108 sophomore students, all taking Chemistry Honors at my school, Thousand Oaks High School. The sample selected had 56 boys and 52 girls. The first part of the survey identified the student's mindset by having them circle the statement they agreed with most: "You can learn new things, but you cannot truly change how smart you are" (representing the Fixed Mindset) or "You can always change how smart you are" (representing the Growth Mindset) or "Don't Know." The second part assessed students' academic performance by requesting their semester 1 grades in the Chemistry class. The third part was a 16 question survey, loosely inspired by positive psychologist Martin Seligman's "Authentic Happiness Inventory Questionnaire," used to evaluate students' overall happiness level.</p> <p>Results I found that the mean happiness composite score of the growth mindset group was significantly higher than that of the fixed mindset group ($t=2.652$, $df=99$, $p=.009$). In fact, the growth mindset group outscored the fixed mindset group on virtually every single question on the Happiness survey. Beyond happiness, the growth mindset was also found to significantly impact academic performance. Within the Honors Chemistry class, students with a growth mindset were over 12% more likely to have an A: 73.3% of students in the growth mindset group had an A in the first semester, while only 61.0% of students in the fixed mindset group earned an A. Overall, my data was very consistent internally, with a Cronbach's Alpha of .892, a near-perfect reliability coefficient. Furthermore, the results were repeated when each gender was examined separately.</p> <p>Conclusions/Discussion To conclude, I found a significant positive correlation between growth mindset, student academic performance, and overall happiness. The next step is to explore how easily the growth mindset can be taught to high school students, and whether adapting a growth mindset would improve a student's academic performance and happiness level.</p>	
Summary Statement In this experiment, I found that the growth mindset was significantly positively correlated with both academic performance and happiness among high school students.	
Help Received Dr. Nikki Malhotra provided feedback and guidance from conception to presentation; Dr. Gary Katz of CSUN helped me interpret my data using SPSS. However, all of my research and report was ultimately done solely by me.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Lindsey E. Greenwood	Project Number S0412
Project Title How Childproof Are Childproof Medicine Bottles?	
Abstract Objectives/Goals The objective of my project is to determine if childproof medicine bottles are actually childproof. Methods/Materials Informed consent was given by parents of 20 kindergarteners. Each subject was given 5 different types of medicine bottles, and given 1 minute to attempt to open bottle without being shown. Then without verbal prompt each subject was shown how to open each different bottle, and given another minute to attempt to open bottle. (1 minute per bottle given) Success was measured in male vs. female and success of opening after being shown. Materials included: stop watch, 20 subjects, 5 different medicine bottles. Results Childproof medicine bottles are not childproof and a child can get a childproof medicine bottle open in less than 1 minute. Out of the 5 different types of childproof containers, Children's Motrin was the the most childproof. Males had a higher success rate in opening the bottles without being shown. Success rate for both male and females went up after being shown how to open. Longs Drugs was the least childproof, Children's Motrin brand was the most childproof. Conclusions/Discussion Childproof medicine bottles are not childproof and a child can get a childproof bottle open in less than 1 minute. Out of the 5 different type of childproof bottles, Children's Motrin brand bottle was the most childproof. Males had a higher success rate in opening all bottles without being shown. All medicine bottles should be kept out of reach of children.	
Summary Statement This project was performed to determine if childproof medicine bottles are actually childproof.	
Help Received Father helped glue items to board, mother typed report, and Mr. Whittington advised on project.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Jazmin Jones	Project Number S0413
Project Title The Effects of Different Learning Modalities on Reading Comprehension	
Abstract Objectives/Goals This experiment, based on the Dual-Coding theory, was designed to investigate the effects of different learning modalities such as auditory, visual, and visual with auditory on reading comprehension as measured by the mean score received on a comprehension test. Methods/Materials The experiment was a between design, and was carried out during three class periods. The control group was asked to silently read a passage from <i>The Prince</i> by Niccolo Machiavelli and take a comprehension test based on the passage. Experimental group 1 was asked to listen to the audio recording of the passage and take the same comprehension test. Lastly, experimental group 2 was asked to silently read and listen to the audio recording of the passage simultaneously and take the same comprehension test. The dependent variable was the mean scores on a comprehension test. Independent variable was the modalities of learning the participants received. Results A one-tailed ANOVA demonstrated that at the $p < .05$ level, there was no significance. Thus, the different modalities of learning had no influence on the scores of the comprehension tests at the 95% level of confidence. Conclusions/Discussion This implies that dually coding different modalities of learning will not make a difference on reading comprehension. Students do not need both modalities present to acquire reading comprehension.	
Summary Statement The Effects of Different Learning Modalities on Reading Comprehension	
Help Received My high school IB psychology instructor	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Jake H. Kuli	Project Number S0414
Project Title The Password Paradox: "Rememberability" vs. "Guessability." Entropy and Human Factors in Password Creation	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine whether there is a connection between the human factor in password composition/usage and the relative entropy of the password.</p> <p>Methods/Materials No tangible materials were used. However, the following web based software utilities were used to create webpages and store data: -cloud-based Linux web server including: --PHP scripting language --Limesurvey authoring application -cloud-based Database server including MySQL database server I created a webpage for the purpose of collecting email addresses and passwords. Participants were sent an email message requesting their participation in the project. The message included a link to the webpage which asked the participants to register using an email address and password. Three weeks later, a second email message was sent to participants who registered in the first step. The message included a link to a second webpage incorporating a 5 question survey regarding the participant's password.</p> <p>Results Passwords were collected from 281 initial participants and survey results were collected from 170 returning participants. With regard to strength of the 281 initial passwords, entropy values ranged from 0 to 82.72 bits. Average entropy was 36.69 bits. Median entropy was 36.19 bits. 11% of all passwords consisted of 6 lowercase letters. Furthermore, 41% of all passwords consisted only of lowercase letters. 33% of all passwords consisted of lowercase letters and numbers. Only 1 of the 281 passwords consisted of the maximum sized character set, including uppercase letters, lowercase letters, numbers, and special characters.</p> <p>Conclusions/Discussion With regard to frequency, there were only 9 instances of recurrence. With regard to "rememberability," 134 of 170 returning participants thought they remembered their passwords, but only 72 of those 134 actually remembered. With regard to how people remembered their passwords, of the 170 returning participants, 16 wrote them down somewhere, 127 used the same password that they have used on other websites, 19 used passwords that they associated with this project, and 12 used some other mnemonic device. With regard to relative password strength, most people did not estimate their password strength correctly. In relation to my hypothesis, I concluded that the initial set of passwords did exhibit low</p>	
Summary Statement The effects of human factors on "rememberability" and "guessability" (calculated entropy) of passwords.	
Help Received Father helped organize data and solicit participants. Mother helped with project display board and also solicited participants.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Liza O. Mansbach	Project Number S0415
Project Title The Effect of Body Mass Index on Ability to Estimate Caloric Values in Foods	
Abstract Objectives/Goals Based on the assumption that being overweight is related to lack of knowledge about caloric needs, the purpose of this study was to examine if weight status was related to a teen's ability to accurately estimate caloric content and if the relationship differed by gender. Methods/Materials A sample of Redwood High School freshman (n=96) were asked to estimate the calorie content of five foods displayed on plates : a bagel, a chocolate chip cookie , ½ cup of peanuts , a large apple and a medium size movie size popcorn and to record their height, weight , sex, and birth date. Students were categorized into four BMI categories ≤18.5; 18.6-21.9; 22-24.9 and ≥25. Results Most students underestimated calories. There were no differences across BMI groups in estimating the number of calories for any individual foods (all p-values >0.05) or for the totals across all foods (p=0.55). There was however a gender difference. Males were more likely to underestimate total calories than females (p=0.058). Conclusions/Discussion Students, regardless of gender or weight on average underestimated calories, especially for foods like peanuts that they perceive to be healthy but are high in calories. Education about calories and caloric needs may help improve a teen's ability to accurate estimate calories in foods commonly eaten.	
Summary Statement My project was to find out if teenagers knew the amount of calories in commonly eaten foods.	
Help Received Mother helped me interpret my statistics.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Ryan Mead; Johnathan Vuong	Project Number S0416
Project Title Warped Words and the Stroop Effect	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The delay in recognizing words printed in various colours is a well-documented phenomenon known as the Stroop effect. This particular anomaly is more prevalent with words to represent colours. In a variation on traditional Stroop testing methods, this experiment also tested modifications to how the words were shaped # forming the words into a clockwise circle, for example # to document any differences in recognition of the Stroop effect. The purpose of this experiment is to find if word shape lessens or compounds the Stroop effect. The aim of our testing is to see if it is possible to completely eliminate the Stroop effect in unbiased testing.</p> <p>Methods/Materials For our experiment, we gathered five groups of twenty people and tested them with seven word charts - two common Stroop tests, and five "warped word" variations. We asked our subjects to read the colour of each word on the chart as quickly as possible, without making a mistake. We timed each subject for their completion of each chart, and averaged their scores per chart into their respective groups of twenty.</p> <p>Results All of the tests with colours matching words - tests 1, 3, 5, and 7- show both little variation in completion time and relatively low completion time. Tests 2, 4, and 6, the non-matching tests, show a good deal of variation in completion time and relatively high completion time. The range completion for this data set is more than a minute # a full 67.7 seconds. This clearly documents the delay present in the Stroop effect. Warping the words in question reduced the Stroop effect by roughly 25% in all five of our tested data groups.</p> <p>Conclusions/Discussion Warping words definitively reduces the reaction of the Stroop effect. The effect created by the warping process shifts your mental priority to identifying the colour before identifying the word, thereby making it possible to circumvent the Stroop effect and greatly reduce the time it would otherwise add to colour recognition. While our results make clear that we did not completely remove the Stroop effect, they still show a visible reduction in its effect.</p>	
Summary Statement In our project, we changed the shape of words to see if it will reduce or eliminate the Stroop Effect.	
Help Received Advice from William Schlegel, inspiration from www.sciencebuddies.org	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Nidhi A. Navaratna	Project Number S0417
Project Title Confusion of the Senses: Exploring Cross-Modal Plasticity and the Elevated Recall Ability of Grapheme-Color Synesthetes	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This study explored the visual recall implications of grapheme-color synesthesia, a neural phenomenon in which the viewing of letters and numbers leads to the perception of certain colors. The cross-activation of two occipital and temporal areas- the V4 (color processing) and PGTA (graphemes)- induces the "seeing" of colors upon the sight of a grapheme stimulus, resulting from a possible genetic mutation prompting deficiency in synaptic pruning. Individual case reports claim synesthetes harbor above-average memory recall abilities. Due to the proven bi-directionality of grapheme-color synesthesia, and the involvement of memory-controlling mechanisms (limbic system) during synesthetic experiences, I hypothesized grapheme-color synesthetes possessed a greater visual recall ability compared to non-synesthetic controls.</p> <p>Methods/Materials Seven female grapheme-color synesthetes and seven matched controls (sex, age, years of education, handedness) were each administered a standard memory test (Brown, 2007) containing forty-eight slides with various grapheme combinations through the online sharing program Skype. Each slide was shown for five seconds. At the conclusion, subjects were instructed to record their recalled grapheme combinations as well as log any specific reasons for remembrance (the synesthetes' reasons mostly involved color associations). Delayed recall was measured with the same procedure after a thirty-minute period of delay.</p> <p>Results The findings showed that synesthetes as a group displayed consistently greater average recall compared to the controls. Synesthetes recalled 53% more combinations than controls for immediate recall, and 49% more combinations for delayed recall. Effect sizes (d) were >0.8, showing a large magnitude of difference between the groups, and t-tests showed p-values >0.05, greater than the statistically significant <0.05, likely attributed to the relatively small synesthete sample size (simulations of a sample size of 30 showed p<0.05).</p> <p>Conclusions/Discussion Taken as a whole, these findings show that grapheme-color synesthetes display significantly elevated visual recall ability, furthering knowledge concerning sensory perception, cross-modal wiring, and brain development.</p> <p>Being a grapheme-color synesthete myself, this has provided deeper insight into mine and fellow synesthetes' cognitive abilities.</p>	
Summary Statement People with the neural condition grapheme-color synesthesia possess greater visual recall ability than non-synesthetes.	
Help Received Dr. Brittany Stevens provided help at school; Mr. Sean Day, Mr. Brian Alvarez & Dr. Ed Hubbard gave insight through email.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Aurora O'Greenfield; Mateo Rudich	Project Number S0418
Project Title Color Attraction	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our goal was to learn whether or not age or gender have an affect on what colors 6th through 12th graders are most attracted to.</p> <p>Methods/Materials We tested 5 girls and 5 boys from each grade (6, 7, 8, 9/10, and 11/12). We set out play-dough in front of them (using colors red, orange, dark green, light green, blue, purple, and pink) and recorded the colors they picked up and in what order.</p> <p>Results We found that in this group, gender does seem to make a difference, while age does not. We also found that girls were more attracted to red and pink, and boys were most attracted to light green.</p> <p>Conclusions/Discussion Our findings supported our hypothesis for the most part. We had hypothesized that gender would have an affect, but age would not, which ended up being the case. We were correct in guessing that girls would be more attracted to red and pink, and boys were more attracted to light green. However, we had guessed that everyone would be more attracted to blue due to previous studies finding that nearly everyone preferred blue. Our findings did not support this. And boys were not as attracted to dark green as we thought they would be. Knowing which colors middle- and high-schoolers are attracted to expands our knowledge of their minds.</p>	
Summary Statement Our project was to determine whether or not age/gender have an affect on which colors 6-12th graders are attracted to.	
Help Received Mrs. Rudich supplied Play-dough, Danza (our art teacher) supplied paint for our board decorating, Erin (our science teacher) provided advice and help with scheduling.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Victoria B. Peet	Project Number S0419
Project Title All that Meets the Eye: The Success Rate of Change Detection Based on Objects and Colors	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The presence of change blindness in humans is indisputable. However, what has yet to be studied is which factors of an image can improve the success rate of change detection. This experiment investigated whether the removal of an object from a scene is easier to identify than the change of a color of an object in a scene. It was hypothesized that the removal of an object from a scene would be detected more often and in less time than the color change of an object.</p> <p>Methods/Materials Informed consent was obtained from 60 people to participate as a subject in the experiment. These observers were asked to detect a change between seven pairs of images, with each pair shown in succession. In three pairs, images were varied by the removal of an object. In the three remaining pairs of images, there was a color change of an object. The seventh pair was a control pair and contained no change between the pre-change and post-change images. The amount of time needed to detect the change and whether the observer was correct in their identification of the change was recorded.</p> <p>Results Results showed that the detection of changes in image pairs containing an object removal had a 56% success rate, while a color change of an object had a 48% success rate. Additionally, the average time needed to correctly identify changes revealed that object removals needed about 5 seconds and were distinguished in less time than color changes, which needed about 8 seconds to be correctly identified. However, the standard deviations of these times indicated that the time differences were not statistically significant.</p> <p>Conclusions/Discussion This experiment confirmed part of the initial hypothesis. This study revealed that when detecting changes, the removal of an object from a scene is detected more often than the color change of an object. This provides further evidence that objects and their relationship to other objects are more clearly discriminated and encoded by the brain than color. The differences in the amount of time needed to correctly detect changes of an object removal or color change were not significant enough to draw any conclusions. The standard deviations of the times demonstrate that when a change is detected, the time needed to detect the change does not vary widely.</p>	
Summary Statement This study investigated which change to an image is easier to identify: a removal of an object or a change of a color of an object.	
Help Received Biology teacher reviewed assignments and provided suggestions for revisions.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Daniel L. Polyakov	Project Number S0420
Project Title The Nose Knows: A Study of the Effect of Olfactory Stimulation on Memory Function	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The project objective was to determine if the smell of strong, pleasant odors can improve the ability of a subject to memorize and recall information through the stimulation of the olfactory system?</p> <p>Methods/Materials I tested the memory of the subjects randomly placed in four different groups, with the group having no odor during the memory and recall phase being the control group. The other groups had odor present either during the memory phase, the recall phase, or both. The memory phase was timed at 3 minutes, with the subject being presented with one of six different memory cards. The next phase called for the subjects to read a passage from Treasure Island. The recall phase involved the subject writing down on an answer sheet as many items it could recall from the memory card. Materials were scented aerosol air fresheners with orange, cinnamon or French vanilla scent; a stopwatch; six different laminated memory cards; six pages with an excerpt from Treasure Island, written by R. L. Stevenson; answer sheets; pencils; and a chart to maintain the data</p> <p>Results First, I looked at whether an odor had an effect on memory as compared with no odor. Group No. 1 (odor present during memory and recall phases) averaged 17.04 correct out of a possible maximum score of 25 correct. Group No. 2 (odor present during the memory phase and not during the recall phase) averaged 15.81 correct answers. Group No. 3 (odor present during the recall phase only) had the worst average score of only 14.18 correct answers. Group No. 4 (the control group, no odor present at either phase) averaged 14.71 correct answers. Further, the results revealed that orange scent produced the highest average score. The lowest scores were obtained by the groups that had either the vanilla or the cinnamon scent present during the testing phase only.</p> <p>Conclusions/Discussion The results confirmed that simultaneously stimulating the olfactory system during the learning process improves memory. Introducing an odor during the learning process improved average scores on the memory test by almost two standard deviations. Improvement in memory is accomplished when odors were presented during learning and memory phases, and also that not all odors have the same effect on memory. It was demonstrated that internal processes that initially appear unrelated, such as smell and memory, are actually interconnected within the brain.</p>	
Summary Statement Whether memory can improve by simultaneously stimulating the olfactory system during the learning and recall phases.	
Help Received Father helped buy supplies, my friends and family members volunteered to be the subjects in the experiment	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Brean E. Prefontaine	Project Number S0421
Project Title Does Line of Sight and the Ability to See Affect the Dizziness Felt by a Figure Skater After He or She Performs a Spin?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project was to determine if a figure skater experienced more dizziness after performing a spin due to vision (open or closed eyes) and the line of sight (head position in the different spins). I believe that spins performed with the eyes open and a normal, or level, head position will produce less dizziness in the figure skater.</p> <p>Methods/Materials Twenty-five figure skaters, both male and female, at or above the Juvenile level were asked to participate. The level requirement was to ensure that each skater could easily perform all of the spins. Each skater performed six different spins: three different positions where performed twice (once with his/her eyes open and once with his/her eyes closed). The three spins were the scratch (or upright) spin, the sit spin, and the lay back spin. The three different spin positions provided different head positions that allowed the skater to experience a different line of sight with each spin. The skater responded after every spin with a number of how much dizziness was felt that correlated with my 1 to 5 scale.</p> <p>Results The spins done with eyes open proved to provide the least amount of dizziness. Also, the "easier" spin, or the spin with the normal head position, proved to have the least amount of dizziness for the "line of sight test."</p> <p>Conclusions/Discussion I have concluded that a figure skater will experience less dizziness if a spin is performed with his/her eyes open and with the head in a "normal" position. This has helped me with coaching younger children on how to spin and helps me personally when I am learning a new, difficult spin.</p>	
Summary Statement I set out to determine if vision and the line of sight effects how much dizziness a figure skater feels while spinning by surveying thirty skaters with a simple test consisting of six spins.	
Help Received The thirty skaters that I tested assisted by volunteering to complete the test and sharing their personal results.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Tara S. Rezvani	Project Number S0422
Project Title Relative Importance of Facial Features Assessed by Teenagers' Accuracy of Subject Identification	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goals of this project are to identify: the facial feature (eye, eyebrow, nose, lips and chin) which is most prevalent in facial identification, differences between recognition of male and female features, differences between male and female perception of faces, and retention differences between facial features of a stranger versus a familiar face.</p> <p>Methods/Materials I had teenage test takers participate in a facial feature recognition test that I created by having them identify: celebrities by viewing one facial feature at a time (ie: eye, eyebrow, etc), the gender of facial features, and a stranger's facial feature out of a group of 3 options. The test takers began the test by studying the chosen celebrities faces for 5 minutes. Participants were provided with a blank answer sheet, a list of celebrities, writing utensils, a laptop with the test in a PowerPoint format, and a quiet working space.</p> <p>Results The eye, nose, and lips prevailed as the most prominent facial features with respective 54.20%, 52.62% and 48.30% accuracy of totaled male and female scores. Women were more accurate than men in identifying these features. There was no significant difference in male test takers identifying male and female celebrities, scoring 69.70% and 65.91% respectively. Female test takers exhibited a similar yet more accurate pattern on identifying male and female celebrities, scoring 82.05% and 82.70% respectively. Overall, female test takers were significantly more accurate in identifying the gender of random, noncelebrity facial features scoring 82.31%, compared to the male score of 68.18%. Females were only moderately more accurate than males at identifying a stranger's features than that of a known person, scoring 60% and 52.7% respectively.</p> <p>Conclusions/Discussion This experiment demonstrates that the eye, nose, and lips are the majorly identifiable features of a human face, whereas the chin and eyebrows are insignificant in distinguishing human faces from one another. Recent research that shows that men and women use different parts of the brain for human identification supports the results in this experiment, revealing the female mental approach as more astute in facial recognition than that of males.</p>	
Summary Statement The purpose of this project is to identify which human facial feature is most prevalent and to reveal any patterns or differences between male and female accuracy in facial feature perception.	
Help Received Sister helped recruit test takers	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Celeste J. Romano	Project Number S0423
Project Title The Effect of Sleep Deprivation on Students' Ability to Discern Facial Emotions	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project was to investigate the effect of sleep deprivation on students' ability to discern facial emotions. Previous research has shown contradictory results, with some studies demonstrating activation of the area of the brain involved with social interactions, and others showing impairment. A 2009 study performed a sleep deprivation experiment using "Pictures of Facial Affect" (POFA) by Paul Ekman. I designed a similar experiment, with the hypothesis that if high school students obtain less than six hours of sleep, it will reduce their ability to accurately recognize facial emotions. I also hypothesized that female students would show a greater difference of scores in a sleep deprived state than male students. Finally, I hypothesized that I would see an increase in the time it took students to complete the test while in a sleep deprived state.</p> <p>Methods/Materials The POFA images were organized by emotion (happy, sad, anger, disgust, fear, surprise, neutral) and level of difficulty into two folders, Test 1 (rested) and Test 2 (sleep deprived), for a total of 25 images per test. The images were uploaded to Test 1 and Test 2 on Quizstar.com, and each test was assigned to a class folder. Thirty students (15 female and 15 male) participated in the study. Participants performed Test 1 at 7:30 a.m., after sleeping for a minimum of six hours the night before. Participants performed Test 2 at 5:00 a.m. five days later, after a minimum of 22 hours of sleep deprivation in a supervised setting. Both tests were performed under supervision.</p> <p>Results Between Tests 1 and 2, there was a mean score difference of -0.20 for females and a mean score difference of -0.13 for males. A two-tailed T-test concluded that these differences were not significant. There was a mean time difference of 51 seconds for females and a mean time difference of 16 seconds for males. A two-tailed T-test concluded that these differences were significant.</p> <p>Conclusions/Discussion In conclusion, high school students' ability to discern facial emotions in a sleep deprived state is not significantly different from their ability to discern facial emotions in a rested state. However, the time it takes them to analyze facial emotions is extended.</p>	
Summary Statement I studied the effect of sleep deprivation on high school students' ability to discern the seven major facial emotions.	
Help Received Project advisor helped recruit participants; Mother and project advisor supervised sleep deprivation setting; Parents provided suggestions for paper	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Elizabeth P. Rose	Project Number S0424
Project Title How Does Villa Park High School Learn Best?	
Objectives/Goals The purpose of this experiment was to find how the students at VPHS can learn information the best: in a visual, auditory, or kinesthetic way of learning.	
Abstract Methods/Materials I created three stimuli that test the visual, auditory, and kinesthetic memory. I had students from different classes remember three different number sequences with seven digits each. The students looked at a board with a number sequence, listened to me calling out another number sequence, and copied my hand movements that showed another number sequence. After each stimulus was given to the students, they wrote down what they could remember from their sensory memory on an answer sheet. The answer sheets were graded and I recorded how many wrong answers each student gave.	
Results A high proportion of the tests had no wrong answers. The test could have been too easy for some students, but the rest of the data had enough variability to show more interesting results. The mean number of wrong answers for the visual tests (0.911) was lower than the mean of the auditory test (1.424) and kinesthetic test (2.245). The visual learning style was proven the most effective or preferred and the kinesthetic learning style was proven the least effective. The two additional math classes strengthened the results from the first round of testing. Gender did not play a role in the test scores in either rounds of testing. There was a difference in the Freshman Seminar class test scores and the test scores of the other four classrooms tested. The Freshman Seminar auditory test had the most wrong answers whereas in the other classes the kinesthetic test had the most wrong answers.	
Conclusions/Discussion The data show that a higher number of students attending Villa Park High School were more successful with the visual learning style rather than an auditory or kinesthetic way of learning. This result was the same for all classrooms tested. The data did not show there was any difference in a learning style preference between the genders nor between honors and non-honors classrooms. This data can be applied to teacher's lesson plans and student's study strategies as well.	
Summary Statement My science fair project is about how students at Villa Park High School learn best, specifically with visual, auditory, or kinesthetic learning styles.	
Help Received My uncle Elliott G. Smith, a PhD psychologist, helped me with the statistical analysis of my data by running the raw data through the SPSS (Statistical Package for Social Sciences) regression analysis and teaching me how to interpret the output of the analysis.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Sayoni Saha	Project Number S0425
Project Title A Doll That Looks Like Me: A Study of Self-Concept in Children with Down Syndrome	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The study primarily attempts to explore: 1) which specific factors such as chronological age, gender, and developmental level are associated with the construction of self-concept in children with Down Syndrome (DS); 2) which doll do they prefer; 3) which qualities and attributes do they associate with each doll; and 4) how do they view themselves in a social context. By encouraging participants to actively compare the two dolls, this research hopes to elucidate more about self-concept in children with DS and can potentially serve as a foundation for further studies among developmentally disabled or physically distinct populations.</p> <p>Methods/Materials This study is the first of its kind to assess the self-concept of children with Down syndrome (DS) by analyzing their responses towards two dolls, one with a "typical" appearance and one with features of DS. Forty-one children with DS participated in a play session with both dolls and were then interviewed to assess doll preference, resemblance, and attribution of specific qualities. To characterize the sample, all participants were assessed on two measures of intellectual functioning, completed a simple self-recognition test and had demographic and history questionnaires completed by a participating parent.</p> <p>Results We found that regardless of age, awareness of their condition, gender, or level of functioning: 1) children with DS preferred the typical doll over the DS doll; 2) the majority thought the typical doll most closely resemble themselves; and 3) attributed more positive qualities to the typical doll than to the DS doll. In addition, the participant was more likely to assign a positive attribute to the doll that he or she thought most closely resembled them. We also found that compared to boys, girls were more likely to indicate the DS doll was smarter than the typical doll and the older participant was significantly more likely to indicate the dolls appeared different.</p> <p>Conclusions/Discussion The significant preference for the typical doll may reflect internalized stereotypes of DS. The relationship between such societal views of DS or developmental disabilities and the self-concept of children with DS should be further explored.</p>	
Summary Statement My project explored self-concept in adolescents with Down syndrome through the use of dolls and found this population preferred and attributed positive qualities to the societal norm rather than to themselves.	
Help Received I was the lead researcher of the project at the University of California Irvine and was mentored by Mr. Eric Doran and Dr. Anne Tournay	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Divya Siddarth	Project Number S0426
Project Title Mood and Other Health Benefits of Yoga, Tai Chi, and Aerobic Exercise	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This study investigated differences in mood, fatigue, sleep, and mental health measures among middle-aged and older adults who participated in community-based classes - either mind-body exercise, such as yoga and Tai Chi, or aerobic exercise.</p> <p>Methods/Materials Forty-two participants (mean age 64.6 (SD = 13.6) years) were recruited, 20 who routinely participated in a yoga or Tai Chi class and 22 who routinely participated in an aerobic exercise class. In addition to demographic data, mood, general health functioning, sleep, and pain levels were assessed for all participants, using standardized instruments. The two groups were compared on all outcome measures using unpaired t-tests. Regression analyses were used to ascertain the impact of duration and frequency of the class on the outcome measures.</p> <p>Results The yoga/Tai Chi group performed better in all outcome measures compared to the aerobic exercise group. Participants in yoga/Tai Chi classes had significantly greater levels of Vitality and lower levels of Tension, Depression, Anger, Confusion, and Fatigue ($p=.0001-.04$). Further, they showed significantly higher Mental Health Composite Summary scores ($p=.0001$), and less sleep problems ($p=.008$), compared to the aerobic exercise group. Physical Health Composite Summary scores ($p=.3$) and pain levels ($p=.7$) were not significantly different between the two groups. Length or duration of class did not significantly impact reported mood, sleep, and mental health measures.</p> <p>Conclusions/Discussion This study shows that participation in mind-body exercise is associated with improved mood, mental health functioning, and better sleep in older adults compared to aerobic exercise. It is remarkable that the mind-body exercise group performed better on all mental health measures, even in a relatively small sample, thus underscoring the significant health benefits that can be obtained in an aging population by participating in such activities.</p>	
Summary Statement Older adults who participated in yoga/Tai Chi classes reported significantly better mood, mental health, and sleep compared to participants of similar age in aerobic exercise classes.	
Help Received Dr. Lavretsky from the UCLA Department of Psychiatry helped with selecting and obtaining the instruments used in the study.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Sharona A. Silverstein	Project Number S0427
Project Title Sleep Patterns and Psychological Health in Pre-Dental and Dental Students, Year 2	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to examine binge sleeping # the practice of sleeping shorter durations on week nights and longer durations on weekends, in pre-dental and dental students. It was hypothesized that (1)binge sleeping would be associated with poorer psychological health as shown by higher scores on negative moods and lower scores on positive moods; (2)exercise would mitigate these associations; (3)sleep patterns would be stable over time; and (4)changes in binge sleeping over time would be associated with changes in moods.</p> <p>Methods/Materials 214 students were surveyed for sleep patterns, exercise, negative moods (negative affect, hostility, sadness, fatigue, stress), positive moods (positive affect, joviality, attentiveness, life satisfaction, optimism, happiness, empathy); 60 were re-surveyed an average of 7 months later.</p> <p>Results Hours binge sleeping (=hrs slept on weekends#hrs slept on week nights) ranged from 0-8 (mean=1.6, SD=1.4, prevalence=77%). Binge sleeping was associated with higher scores on negative moods and lower scores on positive moods (p's<.05). ANOVAs showed those with 3 or more hours binge sleeping had the highest scores on negative moods and lowest scores on positive moods; the reverse was found for those who did not binge sleep. Comparisons after grouping by binge and exercise behaviors showed that within high bingers, high exercisers had less negative moods and more positive moods than low exercisers. There were no differences (p's>.10) in sleep characteristics over time, but changes in binge sleeping were positively associated with changes in negative moods and inversely associated with changes in positive moods.</p> <p>Conclusions/Discussion Binge sleeping is a common pattern of inconsistent sleep durations and is associated with poorer psychological health as evidenced in a variety of moods. Effects of binge sleeping are similar to those reported for sleep deprivation and may be somewhat mitigated by exercise. Results of this scientific study confirms the hypotheses, augments the existing anecdotal literature, and suggests that dental schools and pre-dental programs at undergraduate colleges should counsel students about the importance of maintaining consistent amounts sleep.</p>	
Summary Statement This project is about the cross-sectional and longitudinal associations of binge sleeping, a common pattern of inconsistent sleep durations, with psychological health as shown by moods.	
Help Received Student Directors of the Pre-Dental Society and two former pre-dental students now in dental school helped distribute surveys; parents gave helpful comments and paid for the supplies used.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Michelle Xie	Project Number S0429
Project Title Sonification: A Novel Approach to Data Representation, Year Two	
Objectives/Goals As technology flourishes, the production of copious amounts of multidimensional data has revealed limitations in visual forms of data representation. Due to these limitations, novel forms of data representation, such as sonification, have emerged. Sonification conveys information through non-speech audio. Before it can be implemented, however, sonification must be further investigated in order to ensure that the methods used rest upon a solid scientific foundation. The purpose of this project is to investigate the parameter within parameter-mapping sonification that most improves understanding of sonified data as well as the effect of culture on one's ability to interpret multiple streams of data. Along with these two variables, the experiment seeks to determine the highest number of data channels a person can accurately track using the specific sonification methods and sound waves of the experiment.	
Abstract Of the different methods of parameter-mapping sonification, rhythm and frequency (pitch), as well as a combination of the two, were compared. The effect of the familiarity of sounds was considered by comparing instrument sound with synthetic sounds. Finally, subjects were tested using 2, 4, 6, and 8 data streams. An online survey was launched to gather data. The survey asked subjects to listen to sound clips and answer multiple choice questions based on the sound clips.	
Methods/Materials Of the different methods of parameter-mapping sonification, rhythm and frequency (pitch), as well as a combination of the two, were compared. The effect of the familiarity of sounds was considered by comparing instrument sound with synthetic sounds. Finally, subjects were tested using 2, 4, 6, and 8 data streams. An online survey was launched to gather data. The survey asked subjects to listen to sound clips and answer multiple choice questions based on the sound clips.	
Results Data analysis showed that the "frequency" and "combination" method of sonification facilitated the differentiation and comprehension of multiple data streams more than the "tipping bucket" method (rhythm), that culture did not significantly impact one's ability to understand sonified data, and that the trials with 6 streams produced the most accurate responses.	
Conclusions/Discussion The "tipping bucket" method of sonification most likely decreased performance in comparison to "frequency" and "combination" due to auditory masking, and the "synthetic" and "instrument" sounds probably performed equally well due to the presence of synthetic sounds in contemporary music.	
Summary Statement The project focuses on the psychoacoustics branch of sonification, specifically, the differentiation of multiple data streams.	
Help Received Mr. Joachim Gossmann and Ms. Wendy Slijk advised me; Dr. Tzyy-ping Jung gave me the numbers I sonified to create sound files for the experiment.	