



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Karen E. Ball	Project Number J0301
Project Title Right Eye vs. Left Eye	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I did this project to find out how isolated eyes within a set of eyes process information. I thought the isolated eyes would process information differently because when I am doing vision therapy, my eyes react differently from each other.</p> <p>Methods/Materials Sixteen people, ranging from the ages of 8 to 49, were asked to do 4 activities with an eye patched, beginning with their right eye. The following 2 activities timed each eye with a stop watch. With Alphabet Tracking, people followed a line of letters & circled the alphabet in order. With the Hart Chart, First & Last, people stood 10' from the chart & read the first & last columns, then the second columns from each side, & kept going until the people reached the center 2 columns. The following 2 activities counted the number of successes out of 10 tries. With the Tootie Launcher, people launched a bean bag into the air & tried to catch it. With the Bean Bag Toss, people tossed a bean bag into a bucket from 10' away.</p> <p>Results The overall results from the 4 activities showed that the people did process the information differently with each eye.</p> <p>Conclusions/Discussion Most did better with their left eye with the Alphabet Tracking as it was near activity. Some favored either eye with the Hart Chart, First & Last since it was a far activity. Some people reported blurriness while reading the chart & came closer to see it more clearly. Perhaps the ability to keep the chart in focus at a distance made a difference on how quickly they could read the letters. With the Tootie Launcher, some people had the same amount of catches with each eye, while others had more catches with the left eye. With the Bean Bag Toss, people made more baskets with their left eye. The majority of the people made 4 or less baskets with each eye, as the bucket had no wall in the back for rebounding.</p>	
Summary Statement This project was to see if people processed information differently with each eye.	
Help Received Mom helped with: creating prompts to help student with writing; creating forms to record info during the activities; locating background info from internet; putting together the science board after student created the info cards; filling out CSSF forms. Used equipment from the N. B. Dev. Optometry Group.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Sage L. Barca-Hall	Project Number J0302
Project Title Battle for Tonal Domination: Do Violin Students Have Better Relative Pitch than Piano Students?	
Objectives/Goals My goal was to test my hypothesis that students who play the violin will hear differences in pitch the better than those who play the piano because violinists have to focus on relative pitch more in order to play their instrument in tune. I predicted that pianists would have fairly good relative pitch and that non-musicians would have the least ability to hear different pitches.	
Abstract	
Methods/Materials 1.) I used the computer program Audacity to create twenty pairs of tones, either slightly higher, slightly lower or the same as one another, plus four example tone pairs for subjects to listen to for practice. I burned all the tones onto a CD, one track for each tone pair. 2.) I located three subject pools of similar ages, skill levels and gender: a group of non-musicians, ages 6 and up, a group of trained pianists, ages 6 and up, and a group of trained violinists, ages 6 and up. 3.) I tested one to six subjects at a time, depending on their availability. I made sure they all could hear the CD player equally well. I read each group of subjects the exact same introductory script, including the four example tone pairs. I then played each tone pair, stopping between each track for the subjects to all indicate on their test sheet whether they thought the second tone was the same, lower, or higher than the first. 4.) I compared how many answers were correct on the violinists# test, the pianists# and the non-musicians#. I also looked at the results for boys vs girls, years of study, playing level, and age.	
Results All pianists combined scored an average of sixty-nine percent correct. All violinists combined, all ages, scored an average of sixty-five percent correct. All non-musicians, of all ages combined scored an average of forty-two percent correct.	
Conclusions/Discussion My hypothesis was not fully supported by my results-pianists had a slightly higher average test score compared to violinists. Both sets of musicians scored better than the non-musicians. The results were close between pianists and violinists, but clearly the subjects with musical training had better relative pitch than the subjects with no musical training. I can think of two explanations for this: Either that Relative Pitch can be learned and not just inherited or that people born with relative pitch are more likely to become musicians.	
Summary Statement Does learning to play the violin, which requires the player to adjust his pitch, improve a student#s ear over learning another instrument or no instrument?	
Help Received My teacher, Mrs. Frier, advised me throughout the project; My dad installed Audacity and showed me how to use it; Both my parents reviewed my report and gave helpful comments.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Annelise J. Battles	Project Number J0303
Project Title Do You Recall? Using the Senses to Make Sense of a Dog's Short Term Memory	
Abstract Objectives/Goals My objective was to learn which of a dog's sense of sight, smell, or hearing has the greatest affect on their short term memory (5 minutes or less). Methods/Materials Using four dogs of approximately the same age, I tested each of their senses of sight, smell, and hearing by having them smell, see, or hear an object under one of the three buckets on the ground. I would then take them out of the room for intervals increasing by ten seconds. I would then let them off the lead and back into the room, where they would go to the bucket they remembered the object/toy/treat being under. If they were correct, I would move the object to a different bucket, and they would be taken out of the room for a longer period of time. If they could no longer remember twice in a row, I recorded the last interval of time they could remember for as their final time. Results My hypothesis was correct - the dogs could remember using their sense of smell for the longest period of time. The average times for the four dogs were: smell: 77.5 seconds, sight: 70 seconds, hearing: 42.5 seconds. Conclusions/Discussion In conclusion, a dog's sense of smell has the greatest affect on their short term memory.	
Summary Statement My project is about determining which sense (smell, sight, or hearing) has the greatest affect on a dog's short term memory (5 minutes or less).	
Help Received Parents assisted in testing of the dogs (two people were needed) and in laying out board.	



CALIFORNIA STATE SCIENCE FAIR 2005 PROJECT SUMMARY

Name(s) Jenna T. Belardinelli	Project Number J0304
Project Title Multimedia Presentations: Do They Enhance Reading Comprehension?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Using 4th, 5th, and 6th grade students, my objective was to determine which medium would enhance reading comprehension: a printed magazine article with pictures, a typed article with no pictures, or a PowerPoint presentation with words and pictures. I believed all grade levels would have a higher level of comprehension after reading the PowerPoint because students like videos and games and the PowerPoint would keep their attention more so than the two other reading formats.</p> <p>Methods/Materials I randomly assigned a set 4th, 5th, and 6th grade classes to read a magazine article and answer ten comprehension questions immediately afterward. I randomly assigned another set of 4th, 5th, and 6th grade classes to read a typed essay of the exact same article but with no pictures or maps to help visualize the information and then answer the same questions. I randomly assigned a last set of 4th, 5th, and 6th grade classes to read the same words in a PowerPoint presentation. They students answered the same ten questions. In total, I tested 100 fourth, 100 fifth, and 100 sixth grade students on reading comprehension in one of three reading formats.</p> <p>Results Combining all three grade levels, the magazine averaged the highest reading comprehension at 67.1%, with the article averaging 62.9%, and the PowerPoint averaging 61%. For fourth grade subjects, the most effective medium was the magazine which was 6.3% better than the PowerPoint. In fifth grade, the essay averaged the highest percent correct at 68.26% which was 7.3 percentage points higher than the PowerPoint average. The sixth graders also scored highest with essay at 75.29% but were lowest with the magazine at 61.1%. They averaged 70% correct on the PowerPoint. The sixth grade subjects were the only grade level that showed adequate comprehension on the PowerPoint format.</p> <p>Conclusions/Discussion My hypothesis was wrong. Upper grade students comprehend best using a magazine article with pictures, columns, and a polished, colored presentation. In fact, comprehension was lowest after reading the PowerPoint for 4th and 5th graders. Sixth graders actually scored 9% percentage points higher on the PowerPoint than on the magazine, so PowerPoint shouldn't be used as an instructional tool until sixth grade.</p>	
Summary Statement My experiment indicated that students have much higher comprehension after reading a magazine article with visuals and PowerPoint should not be used for instruction until sixth grade.	
Help Received My teacher taught me how to use PowerPoint and my sister helped prepare the presentation. My parents and teacher gave me feedback. My teacher cut the tag and used the hot glue gun for safety reasons.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Roxanne S. Beltran	Project Number J0305
Project Title Hang Up and Drive: The Effect of Cell Phone Use on Full Stops at Stop Signs	
Objectives/Goals The purpose of the study was to find out whether people talking on their cell phones while driving tend to stop more or less than people without cell phones. I chose this topic because I always thought that people talking on cell phones seemed distracted when driving, and I also noticed that a very small percentage of the population actually make a full stop at stop signs. So I decided to combine the two topics into one. My hypothesis is that people using cell phones while driving will stop less than people who are not using cell phones.	
Abstract This was an observational study where I collected data from 1200 cars at different stop signs in the area around where I live. The materials included a clip board and pencil, and data observation sheets. The procedure was as follows: 1) Look at one car. 2) Check ONE of the following boxes for stops: full stop, stop and go, OR rolling. 3) Check ONE of the following boxes for phones: yes OR no. 4) Check ONE of the following boxes for estimated age of driver: under 50 OR over 50. 5) observe and analyze results	
Methods/Materials Of the 1200 cars I observed, 689 people, or 57% stopped and 511 people, or 43% made rolling stops. Cell phones were used by 182 people, or 15% of the drivers. Of these 182 people, 71, or 39% made stops and 111 people, or 61% did not make a full stop. Of those without cell phones, 618 or 61% stopped, while 400 or 39% did not stop. When analyzed by chi square, these results were statistically significant at $p < .000$	
Results The results of my study support my hypothesis that drivers using cell phones stop less than drivers not using cell phones. I actually had to cut out the "full stop" category during data collection because only 4 of 1200 people made a full stop! Since 43% of people did not stop, these results also show that there is not good compliance with traffic laws at stop signs. I believe that my results show that cell phone use interferes with safe driving. There should be more of an effort made to reinforce laws against using cell phones while driving and to educate people about how dangerous cell phones can be.	
Conclusions/Discussion	
Summary Statement I observed 1200 cars to see if people using cell phones while driving stopped at stop signs at the same rate as people not using cell phones.	
Help Received none	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Dustin J. Byer	Project Number J0306
Project Title Manipulation of Memory	
Abstract Objectives/Goals The objective is to determine whether or not it is possible to plant false memories into the brains of unsuspected individuals, through creative methods, like the process of suggestive questioning. Methods/Materials Collected 551 points of data from the entire eighth grade class at my school. Blanket permission was received from teachers before hand. A video clip was shown. In this video clip my teacher was wearing a pink hat. As soon as the video ended a survey was given to everyone in the class. One survey was designed to plant the false memory into the subjects minds. I attempted to do this by placing false information into one of the questions, IE, Mr. Spandikow was wearing a green hat, what song was he singing? An unaltered survey was given to the other half of the classes. Twenty four hours later a second survey was administered, this survey asked, what color hat was Mr. Spandikow wearing. This data was analyzed; it did not support my hypothesis either way, so I decided to collect more data in a separate test. A new video and new surveys were made, alterations to these surveys were made. I administered the surveys the same way as I did before, but with a larger sample size. Results In the final test 47.15% of the subjects in the test group were susceptible to the false memory. (55.68% answered incorrectly in test group, 8.53% in control). Only 44% of the subjects in the test group answered correctly compared to the large majority of 91% that were in the unaltered control group. This shows that a dramatic amount of people can be affected by suggestive questioning and be victims of false memory. Conclusions/Discussion False memory has gained attention in the judicial system. In the recent years there have been many cases involving psychiatrists patients suing their psychiatrists for tampering with them mentally. Many have been accused of planting false memories, and creating them, not drawing out repressed memories. There have also been cases dealing with murder and using false memory and outside induced schizophrenia as legal excuses for murder. With all of this risen concern I believe that the data I have collected can be used to combat against the unjust actions that are occurring to the victims of false memory. The data that I have collected suggests that it is indeed possible to plant false memories into the minds of the unsuspected.	
Summary Statement This project is about manipulating the memories of events in the minds of the unsuspected after the event has taken place.	
Help Received Mr. Spandikow for being in video; Ms. Shannon helped to create clip; neighbor helped to build board	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Sarah A. Cole	Project Number J0307
Project Title Learning Styles: The Key to Life	
Abstract Objectives/Goals I am trying to find how people study according to their strengths. I believe that learning styles play a very large, important role in people's lives, for they are the bases for learning, and people must study accordingly. Methods/Materials Each test subject was given a learning style test to determine their styles. They were then to study for 3 minutes according to their styles- one person from each group (a kinesthetic, auditory, visual learner) studied kinesthetically by moving notecards physically, one person from each group (a kinesthetic, auditory, visual learner) studied visually by reading and testing themselves with notecards, one person from each group (a kinesthetic, auditory, visual learner) studied auditorily by being read the notecards out loud and by orally speaking the answer, and one person from each group (a kinesthetic, auditory, visual learner) did not study at all for the control. They were then tested with a country and capital test. Results The people who studied with their own learning style received a better score on the test while those who did not study at all did not score as well as those who did study. Also, visual learners were the easiest to find. Conclusions/Discussion Studying according to one's learning styles helps people to do better in memorizing and learning information.	
Summary Statement This project demonstrates how learning styles affect studying.	
Help Received No help was received in doing this project.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Josefa S. Coons	Project Number J0308
Project Title Piaget's Conservation	
Abstract Objectives/Goals Piaget said that 6&7 year old children were able to conserve number. My objective was to find out if 50% or more of 6&7 year old children conserve number. Methods/Materials I showed each child two rows of 8 checkers. They determined that the rows were equal. While the child watched, I spread out the top row of checkers and asked if the rows were still equal. I arranged the checkers in the original configuration. The child agreed that the rows were equal. I then moved the checkers in the bottom row together and asked if the rows were still equal. Results After analyzing the data for 135 children I found that 36% were able to conserve number and that 64% were not able to conserve number. Conclusions/Discussion My hypothesis was incorrect. Less than 50% of the children conserved number. Piaget began his studies on conservation of number in the 1920s. The kinds of activities children did then were very different than the activities children do today. I wonder if this might be why my results are different than Piaget's results.	
Summary Statement My project is about Piaget's conservation of number task.	
Help Received Mother and mentor helped develop idea	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Alexander J. Crawford	Project Number J0309
Project Title Soy vs. Animal: Who Can Tell the Difference?	
Abstract	
Objectives/Goals To see if people can tell the difference between a soy based food product and an animal based food product.	
Methods/Materials	
Materials	
<ol style="list-style-type: none">1. Alta-Dena 1% Cow's Milk2. Horizon Organic American Cheese Slices3. Boar's Head Pork Bacon4. Wholesome Farms Chocolate 1% Milk5. Horizon Organic Egg Nog6. Pearl Organic Soy Milk7. Silk Nog8. Smart Bacon9. Goodslice American Style Cheese10. Vitasoy Chocolate Milk11. Dixie Cups12. Blindfold	
Methods	
<ol style="list-style-type: none">1. Pour approximately 0.5 ounces of each liquid into Dixie cups2. Cut all solids into half-inch by one inch slices3. Blindfold test subject4. Give test subject one sip of a similar soy liquid and animal liquid (i.e. soy milk and cow's milk) or give them a bite of similar soy solid and animal solid5. Write down test subject's guess as to which is which6. Repeat	
Results 77.5% of the people tested were able to tell the difference between soy and animal food products.	
Conclusions/Discussion Of all the food products I tested, most people were able to tell the difference between the soy derived food items and animal derived food items except for the two chocolate milks.	
Summary Statement I wanted to see if people could tell the difference between soy derived and animal derived food products.	
Help Received Mother helped design display board.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Dionne E. Dettmer	Project Number J0310
Project Title Sound Location	
Abstract Objectives/Goals I tried to find out in which areas the human ears best locate a given sound. I chose 12 different areas around the person being tested. Methods/Materials For each test I beeped a timer 5 times in one location. With the person being tested having her eyes closed, she tried to find the sound by touching the timer. I did two different types of tests. My general inaccuracy tests only measured how close the middle finger came to the sound. The second type of test measured vertical inaccuracy, which is how much lower or higher the middle finger was from the timer, and depth inaccuracy, which is how close or far away horizontally the guess was. Results I averaged my inaccuracy results, and displayed them on graphs. Conclusions/Discussion The most accurately located sound was in the middle front area. For my depth inaccuracy in the middle area, everyone guessed the sound was closer than it really was. I found certain patterns in the vertical and depth inaccuracy. I also found what I call a "blind spot". This is when the person being tested is completely confused and cannot determine if the sound is coming from the low front area or the high back area. Almost everyone tested has this blind spot in her hearing. I believe all my test results can be explained by the shapes of the outer ears of the person being tested.	
Summary Statement Determining how well human hearing can locate the source of a sound	
Help Received Mother and father read my report to make sure it was understandable. Father helped glue materials onto display board.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Emily L. Dolson	Project Number J0311
Project Title Out of Synch: Perceiving Delay between Visual and Auditory Input	
Abstract Objectives/Goals My project aims to determine how individuals differ in their ability to detect delays between visual and auditory input, and whether this ability can improve with practice. This is an important issue for the design of multimedia playback systems. Methods/Materials An automated test of individual sensitivity to delay was developed on a PC, using JavaScript to control Windows Media Player. 51 Junior High school students with parental permission were tested over four weeks, with video presented on a CRT monitor, sound played through headphones, and a two-alternative forced-choice presentation. Subjects were divided into two groups. All subjects took a pre-test in the first week and a post-test in the final week. Subjects in the second group also took the test twice in the intervening weeks, with feedback on each trial as to whether their answer was correct. Results Three original results were obtained: (a) control group sensitivity varied randomly from pre-test to post-test with no change on average, (b) training group sensitivity improved an average of 34 msec between pre-test and post-test (statistically significant at the 0.10 level), and (c) the training group averaged an additional 32 msec improvement when they received real-time feedback on their accuracy (statistically significant at the 0.005 level). Conclusions/Discussion My hypothesis that asynchrony detection thresholds could be lowered with training is supported. Additionally, I found that people could detect smaller delays when given immediate feedback on their response. This suggests that current estimates of individual sensitivity to delay may be misleadingly high.	
Summary Statement My project studies individual sensitivity to asynchrony between visual and auditory stimuli.	
Help Received My Dad suggested the problem to me and helped me with planning my experiment, programming my PC, and analyzing my data.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Andrew L. Dorne	Project Number J0312
Project Title How Does Physical Exercise Affect Short-Term Memory?	
Abstract Objectives/Goals The goal of this project was to determine what affect strenuous exercise had on short-term memory. Methods/Materials A computer program was constructed to test and record how subjects scored on a short-term memory test. Each day the computer allowed the subjects to take the test once before a high intensity swim workout and once after. The test consisted of 10 computer generated random two-digit numbers. Subjects were given 60 seconds to memorize the numbers, and then 60 seconds to recall them. The computer recorded the results in a database at the completion of each test. Volunteers were asked to perform the tests as often as possible during the study period. Results Five subjects participated in the memory study. There were 3 boys and 2 girls. They ranged in age from 11 to 13 years. They were all members of the Irvine Novaquatics gold level age group competitive swim team. The five subjects performed a total of 42 pairs of before exercise and after exercise memory tests. Tests scores ranged from 0 to 100%. The average pre-exercise test score was 74.3%. The average post-exercise test score was 63.6%. Four out of the five subjects more frequently scored worse on the post-exercise tests than on the pre-exercise tests. Conclusions/Discussion This study found that subjects scored higher on memory tests before vigorous exercise than they did after.	
Summary Statement This project showed that strenuous exercise had a negative affect on short-term memory.	
Help Received Father helped program computer. Mother helped decorate display board.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Mark W. Ennis	Project Number J0313
Project Title They Can Be Taught: The Long Term Memory of Carassius auratus auratus (Common Goldfish)	
Objectives/Goals The purpose of this experiment was to determine if goldfish have long-term memory abilities and that they have the ability to remember colors, and therefore able to learn simple behaviors and respond to a stimulus to produce a desired behavior.	
Abstract Methods/Materials Five common goldfish were deprived of food for 48 hours. Beginning on day three, twice a day, the fish were corralled to one side of the fish tank. In the morning a blue plexiglass sheet, with a two inch hole cutout was inserted into the tank. No food or reward was given at this time. In the afternoon, a red plexiglass sheet was inserted into the tank. After 15 seconds, food was dropped into the tank, on the side where no fish were located. Times and reactions of the fish were recorded.	
Results After researching the principles of operant conditioning and classical conditioning, as well as the anatomy and intelligence of fish, the results were studied. By the fifth day of training, the majority of fish went through the red hole in under 30 seconds, looking for a food reward. By the sixth day, all five fish went immediately through the red hole in response to the stimulus, looking for the food. In the same period of time, all five fish learned that there was no positive reward associated with the blue sheet, so by the fifth day, the fish stopped going through the blue hole to investigate.	
Conclusions/Discussion The data shows that goldfish do have the ability to remember information for a long period of time. The goldfish learned through operant conditioning, to complete a simple routine, by swimming through a red hole to receive food, and did not respond to the blue color because they learned that there was no positive reward. The fish were trained very quickly and followed social training, due to their "schooling" instincts. The project is appropriate to help increase fish reproduction rates in fish farms and in open waters.	
Summary Statement Testing if goldfish have long-term memories and have the ability to learn simple behaviors and respond to a stimulus to produce a desired behavior.	
Help Received Mother helped type report; older brother showed how to graph data; PETSMART supplied the goldfish	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Kelly E. Gomez	Project Number J0314
Project Title Memory Matters: Who Has a Better Memory: Elementary or Middle School Students?	
Objectives/Goals My science fair experiment was to measure the differences in the ability to memorize numbers, images and lists from elementary aged students to middle school students. In order to measure memory in these students, I recruited volunteers from ages 6-9 (elementary students) and ages 10-13 (middle school students) and ran them through a series of tests.	
Abstract Methods/Materials The first three tests were on memorizing a series of numbers. The last two tests were on memorizing a list of words and series of images. When I tested them, they were to study numbers for 15 seconds, I then had them hold up their pencils for 15 seconds to allow the same amount of time to pass. This time was used to allow the students to store the information in their short term memory. Then they were asked to write down what they remembered. When they viewed a list of words that contained ten words and a series of images that contained nine images, I had them study and store information for 30 seconds.	
Results I will refer to the elementary aged students as Group A and I will refer to the middle school students as Group B. In test #1 a two digit number was viewed. Group B had a 100% recall rate and Group A a 81% rate. In test #2 a four digit number was viewed. Group B had a 100% recall rate and Group A had a 81% recall rate. In test #3, the students were shown a six digit number. Group B had a 43% recall rate and Group A had a 18% recall rate. In test #4, the students were shown nine images. Group A had a 61% recall rate, Group B a 71% recall rate. In test #5, students viewed a list of 10 words. Group B had a 70% recall rate and Group A had a 60% recall rate.	
Conclusions/Discussion The test results reflected what my background information had suggested. The older students, when the results were averaged out, were able to recall numbers with more digits more readily than the younger students. The older students, when the results were averaged were able to recall a larger number of words and images than the younger students. My question was answered. The brain capacity does grow from elementary aged students to middle school students, therefore middle school students have better memory than elementary students.	
Summary Statement My project tested and measured the short term memory of elementary and middle school students.	
Help Received My mother helped with editing and photography; Extended care students at San Carlos school participated in memory tests.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Elaine R. Gray	Project Number J0315
Project Title Hang Up and Concentrate: Cell Phone's Effect on Reaction Time	
Objectives/Goals The objective of this project was to discover if cell phone's increase a person's reation time. The goal of this project is to relate the data to driving, and to show how much a person's reaction time can be effected negatively while on a cell phone, and how that would relate to a situation like driving.	
Abstract Methods/Materials 29 teens and pre-teens ages 10-14, and 22 adults ages 35-70 wwere gathered to act as test subjects. A reaction test program was obtained, this program worked on a computer with a floppy disk drive. What would happen during the course of the program was that 16 random trials would occur. Any of the trials consisted of either a grey square appearing in the center of the screen, or an audible beep. When either of those things happened, the test subject would press the space bar key as fast as they could. Each subject took this reaction test twice. Once free of distraction, and the second time while talking on a cell phone. To do this, another person would call them from another room and ask questions such as "What did you have for dinner last night?".	
Results Without a cell phone the average visual reaction time of a teen/pre-teen was .603 seconds. While on a cell phone, it jumped up 2.2% to .616 seconds. They had an average auditory reaction time of .405 seconds while not on a cell phone, and on a cell phone that time went up 80.1% to .730 seconds. When not on a cell phone teens/pre-teens had a combined average time (the visual and auditory time averaged) of .504 seconds. On a cell phone, the teen/pre-teen combined average time went up to .673 seconds, a 33.5% increase. Adults had a visual time of .642 seconds, this went to .788 on a cell phone, a 22.7% increase. Without a cell phone, adults had an auditory reaction time of .400 seconds, this went up to .671 seconds with a cell phone, a 67.6% change. When not on a cell phone, adults had a combined average reactiont iem of .521 seconds, this went up to .729 seconds on a cell phone, a 40,0% change.	
Conclusions/Discussion From this experiment, it can be concluded that cell phones do, in fact, effect reaction time by quite a lot. A 33.5% or 40.0% increase is quite significant, especially while driving when one needs to be aware of anything that is happening around them. A cell phone would greatly hinder one's ability to do this. This data suggests that there should be some kind of legislation made about using cellular phone's while driving.	
Summary Statement This project is about discovering if cellular phones have a negative impact on reaction time in teenagers and adults.	
Help Received Father helped get tests and proofread report; Teacher helped get test subjects and obtain program; Mother helped put together board; Sister helped get test subjects; Rich Baker got program.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Rianna E. Isaak	Project Number J0316
Project Title Determining the Effects of Aging, Gender, and Education on Brain Hemisphere Communication	
Objectives/Goals My objective is to determine if age, gender, and education, affect brain hemisphere communication (BHC).	
Abstract Methods/Materials I made a PowerPoint presentation of 20 slides with the following words printed one per slide: red, yellow, blue, black, and green. Each word appears in a font color other than its own name. I tested five females and five males in three categories: 20-year-olds, 50-year-olds, and 80-year-olds. In the first test, I timed how long it took the participant to read each of the 20 words. In the second test, I timed how long it took the same participant to identify the font color of each of the 20 words. The absolute value of the difference between test #1 and test #2 is calculated as the participant's BHC score.	
Results I found as age increased, so did the average BHC score (20-year-olds = 6.59; 50-year-olds = 8.75; and 80-year-olds = 12.26). The older we get the more dramatically our brain hemisphere communication slows down. With respect to gender, I found that males had a lower average BHC score than females (20-year-olds: Males = 5.19 and Females = 7.98; 50-year-olds: Males = 5.61 and Females = 8.89; 80-year-olds: Males = 9.49 and Females = 15.72). This means that the older people get, the larger the gap between BHC scores of males and females. With regard to the influence of post-secondary education, I found there to be no definite correlation between years of education and the BHC score.	
Conclusions/Discussion Age and gender both have definite effects on brain hemisphere communication. As age increases so does average BHC score. The older we get the more dramatically our brain hemisphere communication slows down. In each age group, males had a lower average BHC score than females. Furthermore, brain hemisphere communication slows down to a greater extent with age among females compared to males. Post-secondary education appeared to have no correlation to BHC scores.	
Summary Statement My project determines if age, gender, and education, affect brain hemisphere communication (BHC).	
Help Received Mother drove me to test each of my participants; Father helped with the board	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Joanna S. Jacobs	Project Number J0317
Project Title Read My Lips?	
Abstract Objectives/Goals This experiment was conducted to see if certain words are more easily identifiable through lip reading than others. The hypothesis was that some words formed on the lips are more articulated and easier to recognize while others are more guttural. Guttural sounds, such as the "nk" in the word "monkey", are produced in the back of the mouth and throat. Articulated sounds, such as those made in the word "football", involve primarily lip and mouth movements. Methods/Materials The lip reading skills of 96 subjects in grades five through eight were tested. Each of the 96 subjects watched a silent video of a male speaker pronouncing 20 words. The speaker said the words one at a time (without sound). The subjects wrote the words. The words the subjects wrote were scored for correctness against the word list. Results According to the results, some words were easier to lip read than others. Correct responses for each word ranged from one correct response for the word "virus", to 86 correct responses for the word "water". The fifth graders averaged only 7.52 words out of 20 correct. The sixth graders averaged 8.65 words correct. Seventh graders averaged 9.52 words correct, and the eighth graders averaged 11.2 words correct out of 20. The females (all grades) averaged 9.75 words correct which was 18% higher than the average male score (8.27 correct). One of the words in the word list was repeated (given twice). Subjects recognized the same word more accurately the second time it was given than when it was first presented. Conclusions/Discussion In general words with more oral articulation were easier to recognize than words with more guttural sounds. According to the results, the ability to lip read consistently improved with age. In this test, females seemed better able to identify words through lip reading than males.	
Summary Statement This experiment was conducted to see if certain words are more easily identifiable through lip reading than others.	
Help Received Darlene Katz for proof reading and editing; Robert Jacobs for general help and speaking on the videotape; Shawn Tubbs, an audiologist, for helping with the word list used to test subjects; Mrs. Hunker for supervising the whole project	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Jorel Jassy	Project Number J0318
Project Title Sensory Confusion Creates Neuropathic Pain: Phase II	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine if your mind will confuse skin sensations of hot and cold to produce a false sensation of pain (neuropathic pain).</p> <p>Methods/Materials I did two experiments. In experiment 1, I showed that when a cold knife handle, with a warm knife handle on either side was placed on the subject's finger they experienced neurological confusion (a false burning sensation). In experiment 2, the same temperature knives were placed in the same order on the subject's lower forehead, they had sensory confusion. The subjects were 20 people, ranging in age from 8 years old to 56 years old.</p> <p>Results In these experiments I showed how the experiences of spatial summation and the thermal-grill illusion both made a false burning sensation happen. Spatial summation is a blending of sensations over a large area of skin and the thermal-grill illusion is when fast nerve fibers that carry cold sensations are weakened by warm sensations then the slower nerve fibers that signal pain are left over.</p> <p>Conclusions/Discussion This science project demonstrates how neuropathic pain can be caused by the sensory confusion of the thermal-grill illusion and spatial summation. I hope that this science project will help people understand and care about all the millions of people who are suffering from neuropathic pain.</p>	
Summary Statement To show how your mind confuses skin sensations of hot and cold to produce a false sensation of pain.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Anika C. Kuesters Smith	Project Number J0319
Project Title Screech! What Makes Particular Sounds Irritating?	
Objectives/Goals My project was about irritating noises. I wanted to see what combinations of two tones were perceived as irritating by a human subject. My hypothesis was that high pitched combinations and a pair of tones close to each other in frequency would be most irritating.	
Abstract Methods/Materials I obtained consent for testing from 20 subjects, ages 9-58. I generated the sounds in a computer programming system called Mathematica. I did two sets of experiments. All experiments required listeners to evaluate the irritation level of the tones played. In the first experiment, one tone stayed at 1000 Hz, the other started at an octave below, and in increments of 1/3 chromatic steps, went to an octave above the stationary tone. The subjects rated the sounds on a scale of 1-10. In the second set (four experiments), subjects rated the sounds by comparing one tone pair to another. The first of these experiments was to verify whether what I had found in the first set (the steady upward trend) was true, by presenting a set of sounds ranging over 5 octaves, but in random order. The other three experiments were more detailed studies about listener responses to closely-spaced tones.	
Results Subjects found higher pitched noises more irritating. In terms of tone combinations, subjects found tones close in frequency pleasant with the level of irritation growing until the tones were separated by about two chromatic steps. For tone pairs occurring at harmonically related intervals, the minor third, fifth, and unison points stood out. The fifth was pleasant. The minor third was pleasant, which is interesting considering that the major third didn't stand out. The unison was, unexpectedly, relatively unpleasant. See below, in Discussions.	
Conclusions/Discussion My hypothesis proved to be partially correct in that the high pitched sounds were the most irritating. But, contrary to what I had expected, combinations of tones that were very close to each other in frequency turned out to be pleasant. The evaluation of certain harmonic intervals as irritating or pleasant sounds was not included in my hypothesis; I added it on later. It turned out that the fifth, minor third and octave were all pleasant. I feel my results answered my question well. This project only focuses on a small aspect of irritating noises, but it is a start to answering a broader question, What makes a noise irritating?	
Summary Statement How irritating are particular combinations of tones?	
Help Received My dad/advisor helped define the experiment, assisted me in setting up the sound producing hardware and showed me how to produce the sound pairs using Mathematica.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Chloe S. Lalonde	Project Number J0320
Project Title The Effects of Environmental Complexity and Exercise on Learning in Mice	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Previously, I have done projects concerning human behavior. I found people to be difficult subjects to use because the many variables involved with them. I moved into a subject I could better control: mice. During reference studies, I found that there is an ongoing discussion between animal welfare proponents and animal researchers about laboratory animal housing conditions. The animal welfare proponents want lab animals to have access to enrichment in order bring out more natural behavior. Researchers are worried that this will affect comparisons to all previous data. I chose to base my project on an aspect of this debate. My goal was to find what effects environmental enrichment has on the learning of young mice.</p> <p>Methods/Materials 20 BALB/c mice were separated into four groups. The Control group was housed in a standard cage, the Exercise group had a running wheel, the Complexity group had a house, and the Additive group had a wheel and a house. Housing conditions were otherwise identical. The mice lived in these conditions for six weeks and were then tested in a Morris Water Maze. The object of the test was to find the relief of a platform submerged in a baby pool. The mice had to learn to associate a visual cue with the location of the platform. The mice were introduced to the task by entering the pool directly across from the platform. After repeated trials the task was made more complex by changing the location of the platform, and/or where the mice entered the water. Time to reach the platform was used as a measure of performance.</p> <p>Results The times of the individual mice as well as the group averages were analyzed. Results indicate that the best performing group was the Complexity group followed in order by the Exercise, Control, and Additive. It is difficult to tell whether the mice were learning by association or navigating by some other method.</p> <p>Conclusions/Discussion Results showed that some enrichment has a positive affect on learning in mice. Surprisingly, there seems to be a limit to this, as shown in the Additive Group. This study suggests that too much enrichment detracts from learning. Returning to the debate between the researchers and the animal welfare proponents, this experiment suggests that providing enrichment does seem to alter learning behavior in mice. This could affect comparisons to previous data if enrichment becomes standard housing for mice.</p>	
Summary Statement In this project I explored the effects of environmental enrichment on the learning of mice.	
Help Received I received help in obtaining the articles in the reference studies. My mice were donated to me by Charles River Laboratories. I received help in obtaining the housing materials. I also discussed my experimental procedure with an expert in the subject, Dr. Mary Wolff. I received assistance in the graphing of my data.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Warren J. Laufer	Project Number J0321
Project Title Which Improves Cognitive Function More, Gum Chewing or Exercise?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This experiment tests whether gum chewing and exercise improve performance on a simple math test, and if they do, which improves performance more?</p> <p>Methods/Materials Methods: Read instructions; administer first math test; read instructions for next test; pass out gum; students read for five minutes while chewing gum; administer second test; students throw out gum; students go to P.E., run a lap, and do ten jumping jacks; return to class; administer third test; collect tests. Materials: 1) Test packets with cover page, three tests of 24 addition and subtraction problems, two #stop# sheets. There are #A,# #B,# and #C# versions of tests, which rotate order in each packet. 2) Instructions. 3) Sugar Free Gum 4) Stop Watch 5) 28 sixth grade GATE students.</p> <p>Results Subjects completed 46% of the problems correctly in the control, and 50% correctly in the gum chewing trial. After exercising, they completed 52% correctly. With each successive trial, the number of problems completed and the number completed correctly increased. The percentage of problems completed correctly from the number attempted remained at 96%.</p> <p>Conclusions/Discussion A simple math test was given to sixth graders in three different trials. The first trial was a control to find base scores. Manipulated variables were the tasks performed during the second trial, gum chewing, or the before the third trial, exercise. The responding variables were the number of math problems that were attempted and the number completed correctly. This study suggests that chewing gum and exercise both improve test performance. In the second and third trials, the subjects showed improvement over the control trial in both the number of problems tried and the number of problems completed correctly. In the third trial, subjects attempted and completed correctly more problems than they did in the second trial. This suggests that exercise improved performance on the tests more than chewing gum, indicating that the improved oxygenation of blood, which comes from increased heart rate, is the reason that gum chewing improves cognitive performance. However, because test performance improved with each trial, it is possible that the results were caused by a practice effect. Still, addition and subtraction are not new skills for sixth grade GATE students, and practice may have no effect on performance any more than spelling a familiar word increases spelling ability. Further research is needed.</p>	
Summary Statement In this project, I investigated what causes the "gum chewing effect" by comparing cognitive function after chewing gum and after exercise.	
Help Received I'd like to thank my teachers, Mrs. Rolfe and Mrs. Schmidt, for letting me test my class. I'd also like to thank my class for letting me test them. I'd like to thank my sister, Allison, for helping me with my graphs, and my mom for getting the test packets copied for me, and for helping me with the typing.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Forrest K. Lighthart	Project Number J0322
Project Title Pythagorean vs. Equal-Tempered Tuning	
Abstract Objectives/Goals My objective was to see whether or not people today prefer the Pythagorean system of tuning to the currently used Equal-Tempered system. The Pythagorean system, or slight variations from it, were used from the days of Pythagoras through the late eighteen and early nineteen hundreds, when the Equal-Tempered system came into dominance and has remained there until today. Methods/Materials I took about sixty people and divided them into categories of with and without musical experience. I then played a major triad, minor triad, and major seventh chord to them in both tunings. They chose whichever chord they believed to be most harmonious, and had a third option they could choose if they could not hear the difference. It required use of computer generated chords, a CD, and a CD player to test, as well as results sheets where subjects could record their responses. Results The results were both contradictory and supportive of the initial hypothesis that subjects would prefer the Equal-Tempered chords on all but the minor triad. Instead, on all three chords, those without musical experience almost unanimously preferred the Equal-Tempered, whereas those with musical experience tended to prefer the Pythagorean chords. Conclusions/Discussion The conclusions I drew from the testing and results is that people without trained ears prefer the Equal-Tempered system because they can't hear the slight dissonances in it. People with musical experience and knowledge preferred the Pythagorean system because they heard the major dissonances as unusual new chords rather than unpleasant familiar ones. Judging by this, and also by increasing experimentation by composers for synthesizers to use new systems of tuning in their music, it may be time to reconsider the dominant system of tuning in today's music.	
Summary Statement Testing the difference in human preference between two systems of tuning musical instruments.	
Help Received Mother and Father helped understand material. Teacher directed me on how to write the research paper and format the notebook.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Shannon L. McCarthy	Project Number J0323
Project Title Who Has the Upper Hand?	
Abstract Objectives/Goals The brain is transfused so that left-handed people are right-brained and right-handed people are left-brained. It has been a controversy between scientists whether there is a correlation between the two hemispheres of the brain, and the ability to have an advantage in mathematics. It was my goal to see whether there is an advantage for left-handed students as thought by some scientists, or whether this is a common myth. Methods/Materials For this project, the students were given 20 min, for 20 problem test, which is a short amount of time to see which problems the students would try to solve in that time. I used 80 students, 20 left-handed girls, 20 left-handed boys and the same amount for the genders of the opposite hand. Results When the left-handed girls compared to the right-handed girls, the lefties got about 4 problems more correct per test whereas for the boys, the right-handed boys did better than the left-handed boys by about 1 problem. When looking at the two handed students altogether (without gender comparison) the lefties did better per test by about 1 problem. Observing how the two handed subjects completed their tests, the left-handed students did the problems in order, which was clear because of the limited amount of time they were given. All of the problems they did not solve were at the end. The right-handed students did the problems out of order, completing the problems with similarities between them first. Conclusions/Discussion In conclusion, it was clear that the left-handed subjects had a slight advantage as a whole, but what was amazing was the difference in test scores between the girls. It was also clear that left-handed students learn mathematics in a different way than right-handed students. This was seen because left-handed students learn whole concepts, whereas right-handed students learn chunks of information at a time. This may influence the way that math is taught by teachers in schools.	
Summary Statement Whether handedness correlates with an advantage in mathematics.	
Help Received Math teachers helped to distribute tests to students; Science teacher helped to find students to test	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Jaron A. Mercer	Project Number J0324
Project Title Eye Dominance in Depth Perception	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my experiment was to determine whether the dominant or recessive eye is better in depth perception. After background research, I learned that based purely on sight abilities, neither eye is necessarily better than the other. Though I learned that both eyes were the same, I ended up hypothesizing that the dominant eye would have an advantage in depth perception because it would be more accustomed to being used alone.</p> <p>Methods/Materials I constructed a testing box to actually measure depth perception. The box consisted of two poles that could slide back and forth (students would attempt to align them with one eye closed) and rulers on either side (to measure depth perception and put it into numbers). The test consisted of two steps: determining the dominant and recessive eye, and gauging the depth perception abilities of each one.</p> <p>Results After compiling all of the data, my test said that the recessive eye had better results than the dominant. The recessive eye, on average, was 2.3 cm off on the alignment, where the dominant was about 3.1 cm.</p> <p>Conclusions/Discussion In the end, I concluded on matters I never anticipated my project would involve. I could not find a scientific explanation as to why the recessive eye would be better at depth perception, but I did notice that nearly all the subjects chose to use their dominant eye first. Then when asked to use their recessive eye, I believe they were more practiced with the test itself and performed better. This suggests that perhaps depth perception can actually be practiced, learned, and improved. I also noticed another pattern in the data: the older and more mature the subjects grew, the better their results. This seemed to note that possibly, if the subject range was expanded, the data may show an increase in the ability of depth perception in subjects as they matured, and then a gradual decrease as they aged. Before the day of the state fair, I will expand my subject range to include 2nd and 3rd grade.</p>	
Summary Statement I initially set out to see if the dominant eye was better at depth perception, and ended up discovering that perhaps depth perception can be learned and improved.	
Help Received Parents helped gather materials for box; Teachers at Julian Elementary School allowed me to pass out permission slips and test students during school.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Garrett Morgan; Luis Orozco	Project Number J0325
Project Title Blood Pressure: Boys vs. Girls	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Whose blood pressure will increase more after doing an exercise, boys' or girls'.</p> <p>Methods/Materials</p> <ol style="list-style-type: none">1. Select ten males and ten females.2. Take the student's blood pressure.3. Record the results of the blood pressure.4. Have student jump rope for one minute.5. Take blood pressure again.6. Record results.7. Compare the change in blood pressure differences between the sexes, before and after exercise. <p>Materials</p> <ol style="list-style-type: none">1. Jump rope2. Blood Pressure Pump3. Ten volunteers from each sex4. Log Books and pencils <p>Results</p> <p>The average systolic blood pressure for the girls before they jumped rope was 97. The average systolic blood pressure for the boys before they jumped was 99.5. The average diastolic blood pressure for the girls before they jumped rope was 63. The average diastolic blood pressure for boys before they jumped rope was 70.7. The average systolic blood pressure for the girls after they jumped rope was 113. The average systolic blood pressure for the boys after they jumped rope was 133. The average diastolic blood pressure for the girls after they jumped rope was 67.3. The average diastolic blood pressure for they jumped rope was 77.7.</p> <p>Conclusions/Discussion</p> <p>Our question was whose blood pressure will increase more after doing an exercise, boys' or girls'? Our hypothesis was that boys' blood pressure would increase more than girls'. Our hypothesis was correct; boys' blood pressure increased more after doing exercise.</p> <p>The only problem in our project was that the blood pressure pump didn't always work. We could have had a backup pump. If we were to change something, we would have changed the exercise.</p>	
Summary Statement We tested the blood pressure between boys and girls before and after they exercised.	
Help Received None	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Michou Nguyen	Project Number J0326
Project Title Is a Picture Really Worth a Thousand Words?	
Abstract Objectives/Goals Is recall from short term memory influenced by how the information is presented? Since access to information from short-term memory depends on how well information is encoded, my hypothesis is that subjects with the most elaborate encoding of information will have the best recall. I predict that the tactile group will perform the best, followed by the visual group, and lastly, by the auditory group. Methods/Materials 40 middle school students randomly assigned to 4 different groups: T(tactile, or copying), V1(words), V2(words and pictures), and A(auditory). All subjects are asked to study the same list of 20 words and recall as many as possible. The constant is the list of words. The variable is the way the words were presented. Results V2 performed the best with an average of 14 words correctly recalled, V1 had 12.4, T had 10.9, and A came in last at 10.4. V2 had an outlier of 19/20, T had an outlier of 4/20. Conclusions/Discussion Recall from short term memory does depend on the way information is presented. Recall is also affected by what type of learner one is, one's condition at the time of testing, and one's motivation.	
Summary Statement Recall from short term memory depends on the way information is presented.	
Help Received The subject idea was suggested to me by my oncologist. All classmates participated in my science project and my parents helped me thoroughly rehearse the material.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Ketaki M. Panse	Project Number J0327
Project Title Audio vs. Visual Learning	
Abstract Objectives/Goals The purpose of this project is to determine what kind of information, audio or visual, is easier for students to remember. Methods/Materials The materials I used were computer paper, a tape recorder, audio tapes, a computer, a printer, a copy machine, and a Language Arts book. I tested thirty students. First I had them read three articles and then answer comprehensive questions. Then I played a tape with three articles on it and had the students answer questions. I graded all the tests to see if visual cues or audio cues are easier for students to remember. Results The average percent correct was 72% for the visual group and 53.7% for the audio group. Out of thirty students, twenty-five did better on the visual tests, two did better on the audio tests, and three did equally well on both tests. Conclusions/Discussion My project showed that audio information is easier to remember than visual information. This proves my hypothesis correct.	
Summary Statement I tested thirty students to see what kind of information, audio or visual, is easier to remember.	
Help Received Mrs. Snow let me test her class. Mr. Post (my teacher) helped me make my data table and write my procedure and conclusion. My parents helped me paste everything onto my display board and organize my notebook.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Karlye M. Petersen	Project Number J0328
Project Title Is A Picture Really Worth 1,000 Words?	
Abstract Objectives/Goals Memory is an amazing aspect of the human brain that is used everyday for many different tasks. People use their ability to recall different things on a daily basis from students studying for tests, to mothers trying to remember a grocery list. But what is the best way to remember a set of items? The researcher wanted to find out just that; what the best way to remember a set of items is. Methods/Materials The experimenter made three different PowerPoint presentations; one with pictures of random objects, another with the corresponding words, and a third with the picture and the word together. She then showed three different classes of students the different presentations, and one week later, tested them on how much they could remember. Results When the combined test scores were looked at, the researcher saw that the presentation with only pictures and the presentation with both pictures and words had average percentages within 1% of each other. The presentation with only words had a much lower percentage, so further analyzing of it was not necessary, however, the experimenter wanted to further analyze the other two presentations to see if there was a difference between them. The data was analyzed with other graphs, including a pie graph comparing the scores 50% and above to below 50% for each test and a bell curve graph to look at the distribution of the test scores. Later, more testing was done and when combined with the previous data, it was found that there was a difference between the presentations with only pictures and both pictures and words. Conclusions/Discussion From this experiment, after both studies were completed, it can be concluded that the best way to remember a set of items is to see a picture and a corresponding word at the same time, and the second best method is in a visual context.	
Summary Statement This project tested to see what way of remembering a set of items results in the best ability to recall; pictures, words, or a combination of both pictures and words.	
Help Received Mrs. Gross helped with brainstorming for an idea; Ms. Sondreal edited all written work; Parents helped analyze the data; Students who participated made the experiment possible.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Taylor S. Pulbrook	Project Number J0329
Project Title Wheel-O-Vision	
Objectives/Goals I notice that many emergency lights and warning lights are not directly in a persons line of sight and I wanted to determine what color will yield the fastest reaction times when viewed by a person's peripheral vision.	
Abstract Methods/Materials METHOD-Qualified subjects were seated in front of a light wheel with 4 lights (blue, green, red and yellow) that were positioned to make a 60-degree angle for all 4 lights. With subject looking directly into the center of the wheel, the testor would randomly select a light on the board depress a button, which activated the light and a timer. Subject upon recognition of the light would depress a button stopping the timer. Reaction times were recorded for all 4 lights at all 4 positions (up, down, left and right)for 25 subjects. MATERIALS-Rotating circular wooden light board with 4 different colored lights of equal wattage (red, blue, green, and yellow) spaced 40 cm from the center of the wheel.1 metal chin cradle.1 hand control for the testor and 1 hand control for the subject.1 stop watch that measures to the hundredth of a second. 25 subjects between ages of 10-20.	
Results The reaction times by color were in this order (in ten thousandths of a second): Green-.2948, Yellow-.2952, Red-.2960, and Blue-.3000. The overall times by position were (in thousandths of a second): Up-.309, Down-.295, and tied for best is Left and Right-.291	
Conclusions/Discussion Green light provided the best reaction times, but the percent of difference between the best and the worst times (worst being blue as in this case) was only 1.7%. This is because of a dramatic reduction of cones as the viewed area moves further from the center of the eye (called the fovea). Time variation between colors was small, and I believe that this is because of the subject reacting more to the light than to the color. For peripheral vision the factor of color is possibly less important than the position of the light. My experiment showed that there was a more significant difference in reaction times, based on the position of the light (i.e. up, down, left and right) rather than the color of it. With position impacting reaction times more than color, I think that for maximum efficiency of emergency and warning lights, they should be placed peripherally to the left or right side, instead of above or below, to get the fastest reactions time when recognition is critical.	
Summary Statement To determine what color light provides the quickest reaction times at a persons peripheral vision.	
Help Received Ramon Fonseca for helping me put together my testing apparatus, Dr. Steve Simpson for his insight on human vision, Mr. Post for his guidance, My parents for being there to help me with my board.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Christine K. Renschler	Project Number J0330
Project Title To See or Not to See, That Is the Question: The Impact of Light Intensity and Color on Visual Acuity	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my experiment was to determine if visual acuity is affected by the color and intensity of light.</p> <p>Methods/Materials I set up visual acuity tests on a laptop computer to resemble a standard Snellen chart eye test, but using two light intensities, bright and dim, and four colors: blue, red, green and grey. Subjects took ten vision tests sitting 20 feet from the laptop in a dark room after their eyes had adjusted to the dark for 5 minutes. They were first tested for color blindness. Then they took nine visual acuity tests, a standard eye test in black and white, followed by the bright red, green, blue and grey tests and then the dim red, green, blue and grey tests, all displayed on a black background.</p> <p>Results 15 subjects had an average visual acuity of 7.9 lines, equivalent to 20/20 vision on the standard Snellen test. Three subjects were color blind, but their results were similar to the other subjects, so their scores were kept. Visual acuity in brighter colors were approximately one line worse for red (7.1 lines), green (6.9 lines) and grey light (7.1 lines), and almost 2 lines worse for blue (6.3 lines). Average visual acuity was much worse with the low light intensities: red 5.8 lines, green 6.3 lines, grey 6.1 lines and blue 4.0 lines, equivalent to 20/50 vision.</p> <p>Conclusions/Discussion Color and intensity of light affect visual acuity. Visual acuity is greater with higher light intensities than with low light intensities, and at low intensities, worse with blue letters than with red, green, or grey letters. At high light intensities, cones are responsible for vision. At low light intensity, rods are responsible for vision. Cones are found in the fovea of the retina at a much greater density than rods, which probably accounts for the greater visual acuity with brighter colors than with dimmer colors. Blue light may not be absorbed as well by the rods as green and red light, which would explain my results.</p>	
Summary Statement My experiment determined that human visual acuity is affected by color and intensity of light.	
Help Received Father helped to setup the project (i.e. measuring out the 20ft.); Uncle provided idea to use a laptop for the testing.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Colette V. Roblee	Project Number J0331
Project Title Can You Teach a Dog to Read?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I investigated whether dogs are intelligent enough to recognize visual and scent queues the way they understand verbal queues. I also wondered which sense they respond better to: sight, scent, or both.</p> <p>Methods/Materials Three sets of non-verbal queues were used to get my pet dog Terra to obey each of three different actions: sit, down, and shake. The queuing methods were: 1) a blank sheet of paper with a unique scent for each command, 2) the same scents on lettered paper for each command, and 3) the same lettered paper with no scents for each command. Each of the three sets of paper queues was shown to the dog three times a session for each of the three actions for a total of 27 measurements a session. We had a session almost every day for 17 days.</p> <p>Results There are four major findings from my experiment: 1) There is much scatter in the data from day to day. This is probably due to several factors, but one important thing we noticed was that Terra had quickly learned to #guess# by trying all three tasks in a row. This made it difficult to judge success, and it was hard to keep a regular standard. Some nights I went a little soft, and other nights I was stricter. 2) She was least successful on the #down# command. She only succeeded for all of the #down# queues an average of 63% of the time over the 17 days. She had a success rate of around 75% to 80% for the other two commands #sit# and #shake#. I think this is because it was the most difficult for her to do. 3) There was a slight but steady increase of Terra#s average success rate over time. Over the first 5 days, she had an average success of about 5.7 out of 9 attempts. By the final 5 days, she had about a 7.2. This shows that she gradually learned how to recognize some of the symbols, and with more work and practice, Terra may be able to master this skill. 4) There was virtually no statistical difference between success rates for the sight, scent, and combined queues. The global average success rate for over the entire period was about 73% for all 3 methods of queuing. This was the biggest surprise of the experiment, and I don#t know why. My best guess is that she guessed.</p> <p>Conclusions/Discussion The overall conclusion is that, at least for our dog, it would take a lot longer than 17 days for her to catch on to #reading# (recognizing written symbols or scents).</p>	
Summary Statement I investigated whether dogs are intelligent enough to "read" visual and scent queues the way they understand verbal queues and found out that dogs are good guessers.	
Help Received Papa helped with spreadsheets and typing.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Nicole M. Rothschild	Project Number J0332
Project Title Are Musicians In Their Right Mind?	
Abstract Objectives/Goals My Project tested to see the brain type of musicians. My hypothesis stated that musicians would be left brained because of the left brain functions used to be a musician. Methods/Materials 165 people were used in this test ranging from ages 11-14. Those people were then broken down into 3 categories: Non-musicians, vocalists, and instrumentalists. A written test consisting of pictures and phrases was used to find their brain type, along with a survey to reduce the variables. Results It was found that 54% of the general population of 11-14 year olds was left brained. 31% was right brained and 15% was balanced. The instrumentalists were 46% left brained, 31% right brained, and 23% balanced. The vocalists were 40% left brained, 40% right brained, 20% balanced brain Conclusions/Discussion The instrumentalists were less left brained, and more balanced brained when compared to the general public. Surprisingly, the vocalists had an even more dramatic result. As a group, they were equally left and right brained, however, when compared to the general public they were far more right brained. The vocalists demonstrated this the most because they were not utilizing successive physical coordination like reading music, the procession of their fingers and other actions needed to make a sound out of the instrument. This proves that music does affect the mind and does make you more creative or right brained, which proves my hypothesis wrong.	
Summary Statement This project determines if being a musician affects right and left brain functioning.	
Help Received Mother helped cut posterboard, buy supplies and drive me to the fairs.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Lee C. Rubinoff	Project Number J0333
Project Title The Magic Eye II	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine if visual acuity with and without corrective lenses affects the perception of hidden 3-d images.</p> <p>Methods/Materials Potential subjects were screened. Those without corrective lenses, over the age of 45, or colorblind were eliminated. Informed consent was obtained from 18 test subjects. The subject's age and gender were recorded. The subject was then tested with the Snellen acuity chart to define his or her acuity. Warm-up exercises were presented to the subject to view to clarify if the subject could perceive hidden 3-d images. After, a simple hidden 3-d image with subject's corrective lenses off was shown. The subject was asked if he/she saw the image as being concave or convex. Then, a simple hidden 3-d image was shown with subject's corrective lenses on. The subject was asked once again if he/she saw the image as being concave or convex. The above steps were repeated for the three image tests of increasing difficulty.</p> <p>Results Of the 18 subjects tested, three subjects could not perceive hidden 3-d images. For all other 15 subjects, if the subject could perceive the hidden 3-d image, then he/she perceived it the same way with and without the use of corrective lenses.</p> <p>Conclusions/Discussion From this study with a limited number of subjects, it appears that the use of corrective lenses does not affect the perception of hidden 3-d images. A broader study with hundreds of subject would give more conclusive results.</p>	
Summary Statement My project is about the change in the perception of hidden 3-d images with corrective lenses on and off.	
Help Received Snellen Chart provided by Dr. Sneag.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Danielle N. Shepherd	Project Number J0334
Project Title The Nose Knows the Taste	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose is to study whether the sense of smell in children ages 8-12 causes their taste perception to change.</p> <p>Methods/Materials 24 subjects, males and females, age 8-12 a blindfold 1 cup of water 5 small cut up pieces of apple 1 piece of an onion, green pepper and tomato 4 bland crackers binder to keep all pre-made charts, pencils, paper and other recording materials in camera for helper to take photos of testing a watch for timing the experiment</p> <p>Results The various scents affected the taste perception of 65% of the subjects tested. 85% of all subjects said their perception of "LIKE" of the same item was impacted differently by the various scents.</p> <p>Conclusions/Discussion The relationship between taste and smell has been tested and there proved to be a connection. There is a definite relationship between taste and smell.</p>	
Summary Statement The project was implemented to determine if there was a definite relationship between taste and smell.	
Help Received none	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Paul Smith; D.J. Taylor	Project Number J0335
Project Title Oops... I Forgot!	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Objectives: Our objective was to determine if the elaborative encoding process can improve the short term memory of Junior High students.</p> <p>Methods/Materials Methods: A sample of 120 7th grade students were divided into 4 class periods. They were given 2 tests in this experiment. In each test students looked at an overhead transparency of 20 objects for 2 minutes. They then listed as many objects as they could remember. In Test 1 they used no memory techniques. In Test 2 students used the elaborative encoding process to help them remember as many objects as possible. Test 2 displayed 20 new objects. Scores were tabulated and averaged.</p> <p>Results Results showed that the elaborative encoding process increased the short-term memory 17% on average in junior high students.</p> <p>Conclusions/Discussion In a sample of this size we believe a 17% increase in test results is significant for this age group. The short term memory of junior high students did improve when using the elaborative wencoding process. Our results suggested that the brain does hold onto information better when it makes meaningful connections. In future studies questions that could be asked include: Does the elaborative encoding process improve the long term memory in junior high students? Can it improve the short term memory of Alzheimers patients?</p>	
Summary Statement Our project investigated the effects the elaborative encoding process has upon short term memory in junior high students.	
Help Received Teacher Mike Huckert helped make transparencies for our tests and supervised the actual tests. DJs mother helped in the typing of our report.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Melinda S. Speckmann	Project Number J0336
Project Title Comparing Diets to See Behavioral Changes in Mice	
Objectives/Goals How effective are different diets if tested on mice?	
Abstract Methods/Materials mice,cages,pine shavings,bottle caps,steak, hamburger, salami, chicken, turkey, hot dog,celery, lettuce, carrot, green beans,pear, cherry, apple,high fiber cereal or grape nut flakes,water,camera,pad of paper, pencil, clock, plates,gram/ounces scale,measuring spoons,knife,Cutting board,Duck tape,wood	
1. Put pine shavings into cages. Then tape a piece of wood down the center of each cage to create a wall; 2. Then put 2 mice into each cage one on each side of the wall; 3. Then make a list of what to feed the mice; 4. Then cut the food and measure it with the spoons on a cutting board. The Atkins should get a vegetable and 2 types of meat and the Nutritional mice should have a type of cereal, vegetable, fruit (sometimes), and meat. Each mouse gets their own amount of food; 5. Put each mouse's food on one of the plates; 6. Put the two nutritional plates with the two nutritional mice and the two Atkins plates with the two Atkins mice; 7. Then fill each bottle cap up with water and put it on each plate; 8. Weigh the mice on the gram/ounce scale one at a time and record their weight; 9. Wait 15 minutes for the mice to settle and the watch them for about 10-15 minutes. Record what happens on the pad of paper; 10. Feed them either twice or once everyday, depending on how much they eat. Weight the mice every other day and clean the cage every other day. Do experiment for a month.	
Results The only weight change my mice showed was the growth of one baby nutritional mouse, who weighed .5 ounces/14 grams. The mice remained 1 ounce/28grams the rest of the experiment. The Atkins mice started fighting with each other, we then separated them. Males were basically aggressive and females were very passive.	
Conclusions/Discussion The sex difference of my mice caused problems with the results of the behavior. The problem with the mice not having a weight change was due to their metabolism and their genes and the fact that mice don't over eat. With the research I found out, even though it didn't show in my experiment I can say that the Atkins diet is a bad diet because of the risks involved of the heart. The results of my initial testing were inconclusive causing me not to be able to know if my hypothesis was right or wrong. The questions this project did make me think of were, why and how do mice not gain weight due to the gene and protein perilipin.	
Summary Statement Testing the Atkins diet and a Standard Food Pyramid diet on white feeder mice to see weight and behavior changes.	
Help Received My mom helped clean the mice cages; Mrs. Thorburn (science teacher) helped check my project when I was done; Mrs. Kaur (super visor) is helping me with guidelines for state.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Quinton J. Steele	Project Number J0337
Project Title It's Catching!	
Abstract Objectives/Goals A driver, talking on a cell phone, encounters an unexpected situation: another driver, coming down the wrong side of the road. How should the driver be alerted? I tested reaction times resulting from visual, auditory, and tactile stimuli. I hypothesized that subjects would react fastest to the auditory stimuli. A follow-up study measured the effect of distraction. Methods/Materials I built a device out of PVC piping, with an optionally activated LED and buzzer. At the top, a rod is hangs from an electromagnet until a remote switch drops it to start the reaction-time test. When the subject catches it the hand position on the rod is noted. I calculated the distance that the rod would fall each ten milliseconds and labeled each rod with a #time ruler# from which the reaction time could be read. I controlled the electromagnet and other functions of the device (an LED and buzzer) through a switch box out of the subject#s view. Five tests were performed with varying stimuli. Three visual: LED turning off, striped rod falling, and blank rod falling. Tactile: the subject catches when they feel rubber tubing attached to the rod hit their hand. Auditory: subject catches when the buzzer turns off. Each test was repeated four times. Results My hypothesis of auditory superiority was unsupported. I found that the tactile reflexes were nearly 100 ms (54%) faster compared to all the other stimuli, which had averages within 6 milliseconds of each other. Conclusions/Discussion I suspect that the tactile stimuli was fastest because it could be reacted to as a spinal cord reflex, without involving the brain. I did a follow-up experiment with a similar procedure, using verbal word reversal puzzles to distract subjects while catching the rod. I read three- and eight-letter words to them, which they spelled backwards. I hypothesized that reaction times would worsen with the distraction, and that the more difficult eight-letter task would be worst. My hypothesis was weakly supported by the results, with higher variability apparent. Experienced subjects behaved as expected, but some inexperienced subjects improved on each successive test. The first experiment randomized the order of tests, while the follow-up did not, allowing a #learning# effect to weaken the result. In the future, I think that the second project could be redone with a randomized test order and larger subject pool to improve the significance of the result.	
Summary Statement I asked people to catch a falling calibrated rod to find whether they reacted fastest to auditory, tactile, or visual stimuli.	
Help Received Father helped build device and wire controls; Father helped revise abstract.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Claire E. Tirapelle	Project Number J0338
Project Title Determining the Effect of Font Type and Size on Mathematical Computation Ability	
Abstract Objectives/Goals I wanted to determine if font type and size of math problems makes a difference in a person's ability to answer math questions correctly. Methods/Materials I used a computer in making the tests myself. I used the following fonts:Times, Helvetica, and Brush Script MT. I used the following sizes of font: 8, 12, and 16. I tested 100 students (50 female/50 male) and collected all the tests. I corrected all the tests and compared all of my results to the control. Results I found that when math problems are printed in Brush Script MT size 8, students had the highest percentage of questions answered correctly. The lowest were the problems printed in Brush Script MT size 12. The control, Time size 12, was the third lowest percentage out of all nine sections. Conclusions/Discussion When math problems are seen in font and font sizes that students are unfamiliar with and are hard to read, they must focus in on what they are doing and really think about the math problem in order to come up with the correct answer.	
Summary Statement I am trying to see if there is a correlation between font and font size and a person's mathematical computation ability.	
Help Received Mother helped assemble board.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Andy Tran	Project Number J0339
Project Title Who Can Learn Music Faster, Adults or Children?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Adults and children learn at different rates in life. For example, adults have more life experiences; therefore they take more responsibility in their own learning. The researcher wanted to determine whether adults or children learn faster in piano music. Likewise, the researcher plans to discover the aspects or behavior of an adults' and child's understanding of music. The researcher's hypothesis was that adults would learn 25% faster than children. Adults are also capable of knowing what to expect in a learning environment, and they are enabled adapt to the subject being taught at a faster rate.</p> <p>Methods/Materials To conduct this experiment, the researcher taught a sample size of 35 adults and children all together. The researcher carried on the following steps to prepare the experimentation: 1. The researcher set up lesson plans for a four- week term of teaching adults and children by designating a particular time and day for the students to participate in the experimentation. 2. The subject that was taught is basic piano theory and music performance. 3. Created four tests consisting of a written, verbal, visual, and music-playing test. The researcher gathered his data in the following procedures: 1. After teaching each lesson, the researcher recorded the behavior and attributes of the students' learning for the day. 3. The researcher then graded all of the tests and recorded the scores on a bar graph. The researcher conducted the experimentation for each student four times each. Using the data that was given, the researcher had to determine whether his hypothesis was proven correct or incorrect.</p> <p>Results The key results that the researcher discovered are that both adults and children performed better on their visual and verbal test. Therefore, the students did not perform well on their written and music-playing tests. To determine these results, the averages of each test were calculated and compared.</p> <p>Conclusions/Discussion From this study, the researcher showed that adults performed better than children, judging by their averages. Also, adults learn approximately 26.4% faster than children. This key information could help determine whether adults or children learn faster in learning the skill of piano music.</p>	
Summary Statement The central focus of this project, was to determine whether adults or children learn faster than the other in the field of music.	
Help Received Mother helped with supplies; Neighbors and friends helped by being test subjects; Participant in the GSDSEF	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Katherine R. Tuttle	Project Number J0340
Project Title Optical Illusions Left and Right	
Abstract Objectives/Goals The goal was to determine if people perceive unstable optical illusions differently based on hand-dominance, eye-dominance, age and gender. The hypothesis was that hand dominance would reveal a pattern of perception distinct from eye dominance. Methods/Materials Each of 20 subjects was queried and tested to determine hand dominance, short-distance eye dominance, and long-distance eye dominance. Then the subject was shown a series of unstable optical illusions and asked, without any prompting, to describe what s/he saw. The final illusion required asking the question, "Which face looks happier?" The experiment used five printed unstable optical illusions, measuring sticks for the eye dominance tests, and specially constructed data sheets for recording responses. Results Only one significant pattern emerged. With the "half faces" illusion, 80% of the left-handed subjects chose the left face as happier, while all the right-handed subjects chose the right face. No other significant patterns were detected with any of the illusions. Conclusions/Discussion The hypothesis was mostly disproved. As for the "half faces" illusion, I believe that it might demonstrate that left-handed people process faces differently (by looking at one side of the face instead of the other) than right-handed people. Further studies could reveal more on this topic.	
Summary Statement This experiment tests neural/optical differences between left- and right-handed people, in comparison to other variables such as eye-dominance, age, and gender.	
Help Received My teacher, Mrs. Nickols, guided me through the milestones of this project. My optometrist, Hai Tong O.D., provided valuable information. My father helped with data entry, creation of bar charts using Microsoft Excel, and writing the abstract.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Emily P. Uffenheimer	Project Number J0341
Project Title Smart Start: Do You Miss Out in Learning When You Miss Breakfast?	
Abstract Objectives/Goals Students are often encouraged by parents and teachers to eat a healthy breakfast before taking tests. This study attempted to determine if eating a good breakfast improves a student's ability to perform scholastically. Methods/Materials 19 sixth grade students were given a test containing grade level appropriate mathematical and reading comprehension components. Students had not eaten breakfast before taking this test. Following the test, students were served a healthy breakfast and allowed a period for digesting their food. Finally, a second test of equivalent difficulty was given to these same students. Results Correlation of test scores showed that there was an 8% average improvement in scores for the tests taken after eating breakfast, versus those of the tests taken when students had not eaten breakfast. Conclusions/Discussion From this study it appears that academic performance is improved following a healthy breakfast. Encouraging students to eat healthily before taking a test can enhance their ability to perform mentally.	
Summary Statement Eating a healthy breakfast improves students' ability to perform academically.	
Help Received Mrs. Seigrist, my science teacher, provided her time and classroom for this study. My mother helped prepare and serve breakfast. 19 sixth grade CT English students gave their time and efforts to assist in this project (at 8 AM on a Saturday morning).	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Molly K. Vorwerck	Project Number J0342
Project Title Do the Eyes Have It? Do Your Pupils Reveal Your Real Feelings? The Effect of Emotional Stimuli on Pupil Size	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Does pupil size change when a person looks at visual stimuli with positive, negative, or neutral emotional content, compared to control stimuli? Which type of stimulus - positive, negative or neutral - will produce the biggest change in pupil size? Which type of stimulus will produce larger pupils (dilation) and which will produce smaller pupils (constriction)?</p> <p>Methods/Materials In a lighting controlled test area, seven subjects (4 females, 3 males) were shown 6 randomly ordered test (variable) pictures, 2 each with positive, negative or neutral emotional content. Each test picture was preceded by a matching control picture, a nonsense pattern equal in luminance to its test picture. An introductory non-test landscape picture was also shown first to counteract the "first picture effect". For each of the 12 control and test pictures, a digital photo of the subject's pupils was taken after 3 seconds and a back-up photo after 8 seconds. Subjects viewed each picture for 10 seconds. Pupil photos were calibrated and printed so that the print size equalled actual size. Pupils were measured and size changes between the control picture and the test picture were calculated (control size minus test size).</p> <p>Results Emotionally positive pictures caused the biggest pupil changes, an average of 14.75% larger (dilation). The negative pictures produced pupil dilation for females, 8.25%, but pupil constriction for males, -5.45%. The neutral pictures produced very small (2.9%) pupil size increases.</p> <p>Conclusions/Discussion Knowing that a person's private emotional response to something can be judged merely by looking at their pupils could be useful in lots of areas. Advertisers could tell whether people like their products, researchers could test infants' responses before they can talk, psychiatrists could use pupil information in treating mentally ill patients, and politicians could determine their real popularity, to name a few examples. Although some research on pupil size was done in the 1960's, very little has been conducted recently. It was surprising that emotionally negative stimuli produced opposite responses in males and females. More research on gender differences, as well as to sounds or smells (good/bad) or mental work (easy/hard) would be particularly interesting and informative.</p>	
Summary Statement Independent of physical response to light, a person's pupils dilate when shown emotionally positive stimuli, constrict (males) or dilate (females) when shown emotionally negative stimuli and dilate slightly when shown neutral stimuli.	
Help Received My mother loaned me her digital camera and showed me how to use it, and helped me calculate how to adjust the print size in Photoshop so that the print size equalled the actual pupil size. She also drove me to the university library for research.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) E. Andrew Whittington	Project Number J0343
Project Title The Led Zeppelin Effect	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to determine how different types of background music affect memorization skills of high school students. A prior study involving only classical music (#The Mozart Effect#) suggested that classical background music helps memorization skills. I wanted to expand this study and try to draw conclusions that might apply to normal studying habits.</p> <p>Methods/Materials Five memory tests, using the placement of cards, were done on ten high school students, ages fifteen to seventeen. The tests were identical with the exception of different types of background music playing on the second, third, and fourth tests. No background music played during the first and fifth tests. Mozart (classical) was played during the second test, The Eagles (easy listening) during the third, and Led Zeppelin (hard rock) during the fourth. The subjects tried to memorize the placement of fifteen playing cards mounted on boards during each test, and their correct scores were recorded.</p> <p>Results When the high school students listened to Led Zeppelin, their memorization skills were best. When listening to Mozart their memorization skills were second best. When they listened to The Eagles they scored third best. Interestingly, when the subjects did not listen to any background music, their memorization skills were the worst.</p> <p>Conclusions/Discussion My conclusion is that the hard rock music of Led Zeppelin appeared to increase the memorization skills of high school students over other types of music, and no background music at all. I call this conclusion #The Led Zeppelin Effect#.</p>	
Summary Statement This project examined how different types of background music affect memorization skills of high school students.	
Help Received My Dad assisted me in conducting the tests by keeping the timer and helping count the correct scores.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Bryan A. Williams	Project Number J0344
Project Title Times = Arial > Comic > COURIER: Which of These Fonts Can Be Read Out Loud the Quickest?	
Abstract Objectives/Goals I was trying to see if there was an easiest font to read out loud. There are so many fonts that there would be no easy way to test them all. I decided to test three of the most common fonts and one unusual font, comic. Methods/Materials I carefully selected four paragraphs that were the same length when read. The way I determined that was to count the number of syllables and spaces in an excerpt and look for ones of the same length. I created four unique packets for my test subjects to read that had one different paragraph of each font with each paragraph on its own page. I instructed my test subjects to read the paragraphs each out loud at their normal pace and I timed and recorded each paragraph they read individually. I entered the data from my log book into my computer to process the data in a spreadsheet. Results Of the four fonts that I tested Arial and Times performed similarly and were the fastest being read out loud. Comic was on average about two percent slower than Arial and Times. The last font I tested was Courier in all caps and it was the slowest, by four percent. Conclusions/Discussion Although Arial turned out to be the fastest font, it wasn't faster by very much. Of the four fonts I tested there didn't seem to be very much difference. This small difference would only make an impact when reading large amounts of text like a long speech.	
Summary Statement I tested four fonts to determine which could be read out loud the quickest.	
Help Received My dad asked me lots of questions to keep me on task and helped me submit this online application form.	



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) William M. Wright	Project Number J0345
Project Title Music to My Ears	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My purpose is to try to find out which type of music, Jazz or Classical, is better for aiding in mathematical performance. I am testing this by isolating two factors that those two types of music each have (chord progressions and backbeats), and that dictate the style of the music. In addition, I mixed the two factors to see if a mixed combination is actually better for studying than the actual style of the music. Using only these two factors helps to eliminate the many inconsistent factors music ordinarily contains, and allows more strict controls to be put into place.</p> <p>The pieces that I chose to break down were: a Mozart piece for classical and a basic stereotypical Jazz-Blues progression. These pieces allowed me to touch onto the highly studied work of Mozart and the Blues progression to which much of Jazz music is made of.</p> <p>Methods/Materials My experimental method was to give the subjects a series of simple math tests which consisted of simple facts of addition, subtraction, multiplication, and division. While they were taking these tests, they had in the background the computer generated chord progressions and backbeats. Then, I calculated the average seconds it took them per correct problem. The materials that I used were a computer, Finale music writing program, math tests designed by me, and the human test subjects.</p> <p>Results My results were that Jazz progressions w/ Jazz backbeats was the best, followed closely by Jazz progressions w/ Classical backbeats. The Classical progressions w/ Jazz backbeats was 3rd and Classical progressions w/ Classical backbeats was the worst of the musical combinations. Silence was the worst of all, and all other music types outperformed silence by at least 9%.</p> <p>Conclusions/Discussion In my testing, I found that the Jazz combination was the best. This contradicts the Mozart theory, but still supports the studies that show that music aides mathematical performance, as all of the combinations still did significantly better than silence. My results show that, based on the factors I tested, the performance of students during test taking could be increased by simply quiet Jazz or Classical music in the background.</p>	
Summary Statement Finding which combination of chord progressions and backbeats will enhance mathatical performance the most.	
Help Received I participated in the Cunha Science Fair Tutorial to get my ideas organized and I got help from the band teacher, Ms. PS on learning Finale music program.	