



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Lindsey M. Affonso</b>	<b>Project Number</b> <b>S1101</b>
<b>Project Title</b> <b>Viability Variables</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my project is to find out exactly what it is that I should refrain from when I Artificially Inseminate (AI) my dairy goats. There is a myriad of beliefs involving sperm and their sensitivity. It is my mission to enhance my knowledge of the potential for unviable sperm resulting from irresponsible handling. I am testing several beliefs and also using substances commonly used in the AI/semens handling process, therefore expanding my knowledge.</p> <p><b>Methods/Materials</b> I tested several substances and environmental variables common to the AI/semens handling process. I exposed sperm to rubbing alcohol, sub-normal thawing temperatures, above-normal thawing temperatures, non-spermicidal lubricant, and fluorescent light.</p> <p><b>Results</b> My results varied, and were quite surprising. As for the rubbing alcohol, the sperm that were exposed to the alcohol experienced necrozoospermia (a complete lack of living sperm). But that was the problem. Virtually none of the sperm were able to be exposed. I was using AI frozen semen, which is treated with several chemicals and antibiotics. These substances reacted violently with the alcohol, creating a barrier of sorts between the main of the semen sample and the alcohol. Therefore, only the sperm on the immediate outside of the sample were affected. The lubricant, on the other hand, had a crippling effect on the sperm. Because of its consistency, it would not allow the semen to move, consequently causing the sperm to be unviable. If the sperm cannot move, it cannot fertilize an egg. Both the above-normal and sub-normal thawing temperatures rendered the sperm unviable. They were not "killed" per say, but the exposure severely limited locomotion: they were extremely lethargic. The fluorescent light had results identically matching the thawing temperatures.</p> <p><b>Conclusions/Discussion</b> My conclusion are that most beliefs about sperm sensitivity are true. A sperm's viability is affected by any variable in its environment. The alcohol, the non-spermicidal lubricant, the fluorescent light, and the differing thaw temperatures were all variables, and all affected the sperm's viability in different ways. My hypothesis was that any and all variables in a sperm's environment will compromise its viability. My hypothesis was proven true.</p>	
<b>Summary Statement</b> Subjecting goat semen to a number of viability affecting factors.	
<b>Help Received</b> Biology teacher supervised the observations in the microscope, mother helped set up the board.	



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<b>Name(s)</b> <b>Autri Chattopadhyay</b>	<b>Project Number</b> <b>S1102</b>
<b>Project Title</b> <b>An Analytical Study of the Effects of iPods on Hearing Loss</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> IPods can produce sound levels as high as 110 to 120 decibels, the equivalent of the sound made at a Rock concert. These decibel levels can cause hearing loss after only an hour of exposure. Increased Battery Life has led to people using their iPods for long periods of time. Therefore, I believe that overexposure to iPods and listening to iPods at high volumes are factors that result in hearing loss for individuals whereas people who do not listen often or do at low volumes are not affected by this.</p> <p><b>Methods/Materials</b> The Materials I used for this project are 1 Apple iPod Video fully charged, 1 Apple Style Apple headphones, and 1 Sony Stereo. The two major parts of the study were the survey and the hearing tests. I passed out a survey asking questions about how long a user listens to his/her iPod, the volumes at which they listen and if they faced any hearing discrepancies following their iPod use. I tested 4 adolescent users and 2 adult users who listened to their iPods at each of the following volumes- 40%, 50%, 60%, and 70% for a threshold shift. To do this, I found the lowest volume at which the person could hear the stereo and still make out the lyrics and at which volume the stereo was inaudible for them. Then the test subjects listened to their iPods for 1hour and 15 minutes and retook the original test to see if there was a change in audible range.</p> <p><b>Results</b> 50 out of the 55 people surveyed owned iPods. 64% of the people listened at volume of 50% or less but the remaining 36% listened at 60% volume or higher. 21 of the 50 people or 42% listen to their iPods for longer than 5 hours a week. Only 11 of them reported any hearing discrepancies. Subjects A and B listened at 40% and 50% volumes and only had a change of .25 volume in their audible ranges. Subjects C and D listened at 60% and 70% volume and had a change of .5 to .75 volumes in their audible ranges. They also faced slight tinnitus.</p> <p><b>Conclusions/Discussion</b> iPod volumes have a direct correlation with hearing loss as threshold shift was greater in people that listened to their iPods at high volumes. Time did not have a direct effect on the subjects hearing. Based on this study, it can be concluded that listening to your iPod at high volumes can directly result in hearing loss, but someone can listen to their iPods for extended periods of time as long as they do not listen at high volumes.</p>	
<b>Summary Statement</b> This study was conducted to see if overexposure to iPods and listening to iPods at high volumes are factors that can directly lead to noise induced hearing loss.	
<b>Help Received</b>	



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<b>Name(s)</b> Becky M. Crouse	<b>Project Number</b> <b>S1103</b>
<b>Project Title</b> <b>Mus minimus's Underlying Behavioral Tendencies to Avoid Open Areas and Seek Walls/Corners</b>	
<b>Abstract</b> <b>Objectives/Goals</b> In this experiment mice were tested to see if it is true that they prefer to stay next to walls rather than be in an open uncharted area. Research shows that mice are nocturnal creatures that like to live in groups. They are motivated by exploratory behavior to search for potential resources but hesitant due to threatening things such as predators, sharp objects, running water or a cliff. So, they travel near walls as to protect themselves. Their wall-seeking behavior is considered an asocial behavior because they perform it alone or with other mice. There are many other experimental tests to observe rodent behavior such as the Morris water maze, the Open Field test and the Barnes maze. <b>Methods/Materials</b> For this experiment an area made of plywood was needed. After constructing the arenas the mice were placed in them for three minutes. Every ten seconds they were observed by where they were on the board wall, edge, corner, inner corner or middle, different for different arenas. <b>Results</b> The results show that the mice stayed about 93% of their time near walls, corners and inner corners of the inner corner arena. In the wall arena, the mice stayed 95% of their time away from open areas. On average, mice stayed 75% of their 3 minutes near edges in the no-wall arena. <b>Conclusions/Discussion</b> The data supported the hypothesis by showing that mice preferred corners, walls and edges to the open spaces of the arenas. The data also supports mice having underlying tendencies to avoid open areas. In real life this would help others understand why mice traps are set next to walls instead of the middle of the room.	
<b>Summary Statement</b> This experiment was done to see if mice had an underlying asocial behavior to prefer walls/edges/corners than open uncharted area, and 300 trials with ten different mice show that this is true.	
<b>Help Received</b> mother payed for materials	



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2007 PROJECT SUMMARY**

<b>Name(s)</b> Shay C. Edwards	<b>Project Number</b> <b>S1104</b>
<b>Project Title</b> <b>Correlation of Thermographic Assessment of Vascular Reactions with BMI, Heart Rate, and Stress</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this study is to evaluate if there is a correlation with thermographic assessment of vascular reactions among three distinct groups of participants using BMI, heart rate and stress.</p> <p><b>Methods/Materials</b> To determine if there is a correlation between autonomic vascular reactions, BMI, heart rate and stress levels, a cold stimulation test was performed on 42 participants using a radiometric thermal imager. The participants included diabetics, smokers, and a normal/control group (no known health issues) and were asked to give their height, weight, stress level, and their heart rate was also recorded. The test consists of participants placing their left hand in <math>62^{\circ}\text{F} \pm 2^{\circ}</math> water for 20 minutes while the right hand was placed on a wood surface. The participants were asked to keep the left hand moving while it was submerged in the cool water. Participants were also asked to keep their right hand in a flat comfortable position and to keep movement to a minimum. A thermal image was recorded of the right hand every 5 minutes starting with a preliminary test image.</p> <p><b>Results</b> The anomalies from previous research were now specifically categorized. Through analysis of the data there was no correlation with thermographic assessment of vascular reactions and heart rate and stress, however a correlation was present with BMI. Participants in the normal group with a BMI of 30 or greater had a <math>3^{\circ}</math> degree less change than those with a BMI of 18 to 24.9. The normal/control group's vascular reaction to the test showed a steady decline in surface temperature of <math>8^{\circ}\text{F}</math> (average of <math>6^{\circ}\text{F} \pm 2^{\circ}</math>). In the smoker and diabetic category the effect of BMI was not as significant, with less than <math>1^{\circ}</math> change. The diabetic group regardless of BMI, heart rate or stress had decline average of <math>2^{\circ}\text{F}</math>. The smoker group regardless of BMI heart rate and stress had a decline initially then rising <math>2^{\circ}\text{F}</math> and holding constant until the end of the 20 minute test period.</p> <p><b>Conclusions/Discussion</b> The uses of the participants stress level and heart rate in thermographic assessment of vascular reactions gave a clear picture of the effective use of thermal imagery to assess vascular health. Including the Body Mass Index was the most significant factor in identifying the anomalies that previous research had identified.</p>	
<b>Summary Statement</b> BMI has a significant correlation with thermographic assessment of autonomic vascular reactions.	
<b>Help Received</b> Imager on loan from So Cal Edison	



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<b>Name(s)</b> <b>Danica A. Frye</b>	<b>Project Number</b> <b>S1105</b>
<b>Project Title</b> <b>Heart Fitness and Jump Height</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My original question was whether or not improving the fitness of one's heart would allow an Irish dancer to jump higher at the end of their dance, when they were tired. From there, I hypothesized that an increase in heart fitness would lead to an increase in the height of jumps after exercise.</p> <p><b>Methods/Materials</b> I chose twelve girls who were all sixteen years old and at a similar level of Irish dance and heart fitness. At dance class, they measured their resting heart rates before dancing. Then, each girl did three jumps before dancing, then danced the same minute and a half long dance, and then did three jumps after dancing. They also measured their post-dancing working heart rates. Then every day they practiced the same minute and a half long dance twice in a row without stopping, as to increase their heart fitness. Once a week for the next two weeks they did three jumps, danced, and then did three more jumps, and I also recorded their resting and working heart rates</p> <p><b>Results</b> From the analysis I discovered that my hypothesis was proved to be correct; an improvement in heart fitness leads to an increase in the heights of jumps after Irish dancing. Each girl who I tested did result in a slight improvement of their heart fitness, limited to the length of the testing period and the availability of the motion detector. Not only was there a decrease in their working heart rate, but there was also a small decrease in their resting heart rate. As the girls trained, the difference between their rates decreased slightly, implying that heart fitness had improved. And as this difference decreased, the heights of post-dancing jumps increased slightly as well.</p> <p><b>Conclusions/Discussion</b> Building up one's heart fitness has a direct connection to other aspects of a sport. This was seen in my experiment, as the girls I tested could jump higher at the end of their dances as their heart fitness increased. After just one week of training, the girls jumped, on average, .0174 meters higher after they finished dancing than they could the week before. As their heart fitness improved by week three, the girls could jump an added .0208 meters after dancing. Since the girls I tested trained every day without fail, their heart fitness increased and they could jump higher after dancing. Therefore, the hypothesis which I formed proved to be true; as heart fitness increases, the height of jumps after Irish dancing will also increase.</p>	
<b>Summary Statement</b> My project is about the impact of improved heart fitness on the height of Irish dance jumps after a person has finished dancing and is fatigued.	
<b>Help Received</b> The girls who participated in the experiment; Nana helped me glue the board; science teacher loaned me the motion detector.	



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<b>Name(s)</b> <b>Keith Hines; Robert Thurman</b>	<b>Project Number</b> <b>S1106</b>
<b>Project Title</b> <b>Ballin': The Effect of Hand and Eye Dominance on a Subject's Free Throw Percentage</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Athletes in all sports are constantly trying to find an advantage over the competition. Some athletes work hard to become better while others are naturally gifted. The purpose of the project is to test the effects of a person's hand and eye dominances on how well they can shoot free throws. Hypothesis- If the shooter has crossed hand and eye dominances then they will have a higher free throw percentage than one who has uncrossed hand and eye dominances.</p> <p><b>Methods/Materials</b> First, the subject's eye dominance is tested using the Miles test: the subject focuses on a distance object, creates a triangle with their index fingers and thumbs centering the focal point, and closes one eye to see if the object moves from the center of the triangle. Then the subject states what hand is the dominant hand for free throws. After testing the subject's eye dominance, the subject shoots 10 free throws.</p> <p><b>Results</b> The average free throw percentage for the 24 subjects with uncrossed hand and eye dominances is 27% with a standard deviation of 14%. The average free throw percentage for the 16 subjects with crossed hand and eye dominances is 34% with a standard deviation of 15%.</p> <p><b>Conclusions/Discussion</b> The data do support the hypothesis of crossed hand and eye dominances with a total average free throw percentage of 34% have a higher free throw percentage than uncrossed hand and eye dominances with a total average free throw percentage of 27%. When the subject shoots a free throw, their dominant shooting hand covers their corresponding eye, which will cause uncrossed eye and hand dominant subjects to cover their dominant eye and leave the crossed eye and hand dominant subjects' dominant eye uncovered. The results possibly could have been affected by the technique and the athleticism of each subject. The standard deviations being so close together (14% for uncrossed dominances and 15% for crossed dominances) shows that while the athleticism could have had an effect, the free throw percentages of each subject deviated from their average free throw percentage by a simliar amount.</p>	
<b>Summary Statement</b> The project studied the effect of eye and hand dominances on a person's free throw percentage.	
<b>Help Received</b> Mr. Hinton and Mr. Day (Desert High School PE teachers) for providing the gymnasium for testing.	



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<b>Name(s)</b> <b>Austin Humphrey; Umar Khan</b>	<b>Project Number</b> <b>S1107</b>
<b>Project Title</b> <b>Age vs. BMI</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The experiment was conducted to figure out whether or not there is any correlation between a child's age, BMI, and their heart rate's response to exercise. Hypothesis: The hypothesis is that BMI of a child will have more of an affect on his/her heart rtae more than age because kids with abnormal BMIs will have higher heart rates because they are less fit than those with normal BMIs.</p> <p><b>Methods/Materials</b> Materials: 36 children, 24 note cards, heart rate monitor, measuring tape, paper, pencil, scotch tape, weight scale, pen. Procdeure: 1) Find children that are willing to have their BMI calculated and are willing to run. 2) Use scotch tape to tape the measuring tape to the wall. 3) Then set up a place where you can weigh each child. 4) Measure height of each child (record on individual note cards or paper), then weigh each child (record on individual note cards or paper). 5) Measure out the distance for each run. 6) Take heart rate before the run (record on individual note cards or paper). 7) Have child run the distance and take heart rate again (record on individual note cards or paper). 8) Continue procedure for each child. 9) After taking measurements calculate BMI. 10) Check whether or not there is any correlation between a child's age, BMI, and Heart Rate after exercise.</p> <p><b>Results</b> Overall people with normal BMIs had heart rates higher than those with abnormal BMIs before and after the run. Only a few measurements of people with abnormal BMIs were higher than those with normal BMIs. This result proved half of our hypothesis wrong. The other half was right becasue we had predicted that BMI would affect heart rate more than age and that was correct.</p> <p><b>Conclusions/Discussion</b> On result depended on many things including how much effect the children put into their run. Also the food the children eat can also affect their BMI and their ability to run when we take their heart rates. These two things will be looked into more closely next year as we continue this study to learn more about the relationship between food, BMI, and the aging process.</p>	
<b>Summary Statement</b> Our project is about figuring whether age has more of an affect on a child's heart rtae's response to excercise or does BMI have more of an affect	
<b>Help Received</b> Our parents took us to Lincoln Alternative Elementary School to test students there. They also got supplies for our project. We recieved permission from Lincoln Alternative's Assistant Principal Mrs. Peardon. The teachers Mrs. Curly and Mrs. Marting also gave us permission. Lincoln Alternative's school	



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<b>Name(s)</b> Marc P. Hyman	<b>Project Number</b> <b>S1108</b>
<b>Project Title</b> <b>Dogs and Their Sense of Smell</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> to see the ability of my dog in picking out, and telling the difference between objects due to their sense of smell.</p> <p><b>Methods/Materials</b> I take three different balls all with seperate smells. I hide the balls and get my dog to pick a specific ball out of the three depending on the smell I showed him. I continue this each time switching the arrangment of the balls.</p> <p><b>Results</b> procedure one was successful, with the three balls covered Rocky was able to smell out the certian ball 3 out of 4 times. on the second attempt Rocky went for the look alike but corrected himself. In procedure two Rocky was able to find the certian ball 3 out of 4 times. on attempt one he went for the previous ball, attempts 2 through 4 were most successful. procedure three i used three tennis balls all exactly the same exept each one had a specfic smell on it. on the first trial Rocky had no trouble picking the specific smelling ball. the second trial when i asked for the meat smelling ball he had trouble, over all he was successful 3 out of 4 times. he was successfull getting the none smelling ball 3 out of 4 times.</p> <p><b>Conclusions/Discussion</b> with the different tests i put my dog through i feel it helps to prove dogs can tell the difference between objects due to smell. even with the different smells around rocky he was able to still use the smell of the specific ball to locate it when it was hidden. the smell of other balls didnt throw rocky off allowing him not to find the ball. i feel my hypothesis was correct, as for Rocky mainly was attracted to his favorite ball. also like i said other smells around him didnt throw him off from finding the objects.</p>	
<b>Summary Statement</b> seeing whether or not dogs can discriminate between different smells	
<b>Help Received</b>	





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<b>Name(s)</b> <b>Joe Kummerfeld; Brian Spain</b>	<b>Project Number</b> <b>S1109</b>
<b>Project Title</b> <b>In the Blink of an Eye</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> In the continuation of our former project, In the Blink of an Eye, we are investigating the question: After working on the computer does the vision of adult subjects worsen more than teenage subjects? Last year we tested just teenage subjects and found many did not have changes in vision after working on the computer even when they wore contact lenses. We thought it would be interesting to research if older eyes were more prone to dry eye syndrome and worsening of vision than younger, teenage eyes. Our hypothesis is that the vision will be worse in adults compared to teenagers. We believe that older eyes will be more prone to Dry Eye Syndrome, and performing an activity such as working on the computer will cause the eyes to dry out even more.</p> <p><b>Methods/Materials</b> The procedures we followed involved testing our subjects vision using the Rosenbaum Pocket Vision Screener. This vision test was done at the start of the study and after working on the computer for ten minutes. We performed 5 trials on 12 control subjects, all between the ages of 13-18, and 12 experimental subjects all between the ages of 36-53. Each of the subjects was tested at the same time of day and played the same game of solitaire on the computer. Because of last years study showing that contact lenses can influence the development of dry eye syndrome, we decided to test subjects with and without contact lenses. Six of our teenage subjects and six of our adult subjects wore contact lenses and equal numbers did not.</p> <p><b>Results</b> In the 12 adult experimental subjects, we found all but 2 had changes in their vision. The same number of adult contact lens wearers had changes in vision as non-contact lens wearers. In our control teenage subjects only 4 had diminished vision, 3 of these wore contact lenses.</p> <p><b>Conclusions/Discussion</b> The results of the experiment supported our hypotheis that vision decreases after working on the computer in the majority of adults, whether or not they wore contacts. This information is important since many people work on computers and should know that prolonged work can lead to diminished vision due to drying of the eyes when they do not blink enough. There is a variety of things that can be done to prevent vision deterioration such as using artificial tears, consciously blinking, looking away from the screen, and lowering the computer screen.</p>	
<b>Summary Statement</b> Our project investigates the effect on vision of working on the computer, especially in causing dry eye syndrome and diminished vision in adults.	
<b>Help Received</b> We worked as a team equally on this project. We received guidance from our science teacher, Mrs. Hamilton. We interviewed three eye doctors for information on dry eye syndrome.	



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<b>Name(s)</b> <b>Jereen Kwong</b>	<b>Project Number</b> <b>S1110</b>
<b>Project Title</b> <b>Just Add Weight: The Relation between Upper-Extremity Weight-Bearing and the Development of Thumb Opposition in Infants</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Human infants are not born with the ability to move their fingers independently or rotate the thumb so that the pad of the thumb is opposed to the pad of the index finger. From 6-12 months of age, infants' grasping patterns improve rapidly and become increasingly precise, primarily due to increased involvement of the thumb. This study investigated whether the specific experience of repeatedly weighting the hands when crawling on hands-and-knees facilitates the development of thumb opposition in infants 9.5 and 10.5 months of age.</p> <p><b>Methods/Materials</b> The sample included 42 infants who had been crawling for different lengths of time. To determine the area of weight-bearing (pressure) on the hands, the undersides of infants' hands were videotaped as they crawled across an elevated Plexiglas surface. Weight-bearing was defined as the total area of pressure in mm<sup>2</sup> on the right and left hand/total area of the two hands during maximum weight-bearing. Thumb opposition was assessed individually for each hand by examining thumb involvement as the infants grasped and lifted an alphabet cube.</p> <p><b>Results</b> As predicted, a one-way ANOVA revealed a significant positive association between total area of weight-bearing on the hands and finger/thumb opposition score. Further work is needed to determine if the link between weight-bearing and thumb opposition is causal. A Chi-square analysis revealed significant positive association between weeks crawling and finger/thumb opposition score. In contrast, an analysis of the relation between age and finger/thumb opposition score did not reach significance. Although it is possible that brain maturation could account for both crawling and thumb opposition in this sample, similar scores between 9.5- and 10.5-month-old infants suggest that this explanation is unlikely. Taken together, these findings suggest that the experience of weighting the hands repeatedly over many weeks may facilitate the development of finger/thumb opposition and infant hand development</p> <p><b>Conclusions/Discussion</b> Finger/thumb opposition is essential to the precision with which we grasp. Although weight-bearing is currently used as a treatment technique by pediatric physical and occupational therapists to improve hand function in children, this study is one of the first to provide evidence that the technique may have value.</p>	
<b>Summary Statement</b> The longer infants have been crawling (regardless of whether they are 9.5 or 10.5 months of age) the higher their finger/thumb opposition scores, suggesting that weight-bearing experience may facilitate the development of thumb opposition.	
<b>Help Received</b> Beginning in June of 2006, I have participated as a high school intern in Stanford University Neurodevelopmental Laboratory. My project is part of a larger study on infant motor development. Dr. Kermoian taught me how to develop my research idea into testable hypotheses, conduct statistical	



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<b>Name(s)</b> <b>Jeannie J. Lee</b>	<b>Project Number</b> <b>S1111</b>
<b>Project Title</b> <b>Does Age Affect the Time It Takes Cone Cells to Fatigue?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The object of this experiment is to determine whether age affects the time it takes for cone cells to fatigue. When an image strikes the retina, cone cells absorb the colors of the given image. After exposure to a colored image for a prolonged period of time, the cone cells become fatigued. Because of this, the cells can no longer respond to those colors, and, therefore, substitute the opposite color. This phenomenon is called retinal fatigue, and what is seen is an afterimage. My experiment will prove whether age is a factor in the duration of retinal fatigue.</p> <p><b>Methods/Materials</b></p> <ol style="list-style-type: none"><li>1. Ask the test subject to focus on one of the given images for 30 seconds.</li><li>2. Test subject should shift his or her gaze from the image of a colored bird to the image of an empty cage, in which he or she will see an afterimage.</li><li>3. Time how long the test subject sees the afterimage.</li><li>4. Repeat this process for each of the three different colored images.</li></ol> <ul style="list-style-type: none"><li>- random sampling of 50 test subjects (25 test subjects who are 40 years old or younger &amp; 25 test subjects who are older than 40 years)</li><li>- three 6x6 inch white foam boards with 2x2 inch red, blue, and green colored silhouettes of a bird on each</li><li>- 6x6 inch white foam board with a drawing of an empty bird cage</li><li>- stopwatch</li></ul> <p><b>Results</b> For Group 1 (younger group), M-cones (green) were fatigued for 7.65 seconds; L-cones (red) were fatigued for 11.23 seconds; the S-cones (blue) were fatigued for 11.29 seconds. For Group 2 (older group), M-cones (green) were fatigued for 12.51 seconds; L-cones (red) were fatigued for 16.77 seconds; S-cones (blue) were fatigued for 15.09 seconds.</p> <p><b>Conclusions/Discussion</b> The results of my experiment proved that there is a correlation between the fatigue period of cone cells and age. The cone cells, including all three types, of older people are fatigued for a longer period of time than that of those who are younger. Specifically considering the periods of fatigue for the three cone cells, the M-cones (green) were fatigued for the shortest period of time for both the young and the old compared to the other cone cells.</p>	
<b>Summary Statement</b> The object of this experiment was to determine if age affected the period of retinal fatigue; the results of The Bird in a Cage test proved that older people have a longer duration of retinal fatigue than those who are younger.	
<b>Help Received</b> Dr. Steven Yoo, my optometrist, helped me set up the testing methods.	



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<b>Name(s)</b> Camden K. Louie	<b>Project Number</b> <b>S1112</b>
<b>Project Title</b> <b>The Effects of Different Liquids on the Vocal Pitch of Homo sapiens</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of my project is to measure the change in vocal pitch of Homo sapiens caused by drinking different liquids. <b>Methods/Materials</b> The informed consent of ten musically trained teenagers was obtained prior to testing. First I recorded the pitch accuracy of the singer with a Seiko ST757 chromatic tuner by having them sing one note for two seconds before drinking any of the test liquids (and after having not consumed any liquids for 90 minutes prior to the experiment). Then the singer consumed one cup of a test liquid. I then had the singer sing the same note for two seconds immediately after drinking the liquid and then at two-minute intervals for ten minutes. <b>Results</b> When the subjects were given water, there was little to no change in pitch accuracy. When the subjects were given milk, an immediate change in the pitch occurred from singing on pitch to singing flat (below the pitch). About eight minutes later the subjects returned to being on pitch. When the subjects were given coffee or Coke, there was a gradual change in pitch accuracy from being on pitch at two minutes to being sharp (above the pitch) at ten minutes. <b>Conclusions/Discussion</b> My conclusion is that pitch accuracy is dependent upon the type of beverage that one has before singing. Drinking milk makes a singer's pitch flat for a few minutes before returning to a consistent pitch, drinking Coke and coffee makes one's pitch sharp after a few minutes, and drinking water does not affect the pitch accuracy of a singer.	
<b>Summary Statement</b> My project was about the effects of different liquids on the vocal pitch of Homo sapiens.	
<b>Help Received</b> No help received.	



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<b>Name(s)</b> <b>Rhea A. Morais</b>	<b>Project Number</b> <b>S1113</b>
<b>Project Title</b> <b>Does Dog (Canis familiaris) Saliva Create Stains?</b>	
<b>Objectives/Goals</b> My goal was to find out if dog saliva has any effect on whether materials stain cloth or not. The scientific question I was trying to answer was: Does dog saliva set and create stains when mixed with other materials? My hypothesis was that it would.	
<b>Abstract</b> <b>Methods/Materials</b> Materials: 1 dog (male black Labrador Retriever), dog drool, 16 pieces of white cotton fabric, milk, apple juice, turquoise Easter-egg dye, 1 Sharpie marker, ketchup, chocolate syrup, grass, 1 pear Methods: Get dog to drool on half of the strips of clean white material by slowly feeding him cheese or popcorn. Pour one potential staining agent (milk, ketchup, apple juice, etc.) on each cloth with dog drool on it (one potential staining agent per cloth on the spots of dog drool). Next, pour the same materials on the other half of the white fabrics without dog drool on them. Label each fabric in order to remember what stain is what. Take photos of soiled cloths showing the results of the staining process. Wash the cloths to see if any of the stains come out. Observe results.	
<b>Results</b> My hypothesis was only true in some cases. I found out that it depends on what the materials were. The answer to my question, "Does dog saliva set and create stains when mixed with other materials?" is: occasionally. It depends on what materials, and it also depends on if you wash the cloth or not (like with the apple juice, it did leave a mark when mixed with the saliva until I washed the cloth). It also depends on how you dry the cloth in some cases (exposure to sunlight affected some, such as the grass). For some things, the opposite of my hypothesis was true (for all the non-food items before being washed).	
<b>Conclusions/Discussion</b> All the non-food items I tested (dye, grass, and the Sharpie) had less of a stain when mixed with dog drool than they did without the drool. All the food items (ketchup, chocolate syrup, milk, apple juice, and pear) had a variety of results. The fruit items (apple juice and pear) were opposites in results. The pear/dog drool mix had less of a stain than just the plain pear, and the apple juice/dog drool mix had more of a stain than plain apple juice. However, the food items that weren't fruit had the same results. All of those stains were the same, both with and without the drool.	
<b>Summary Statement</b> To see if dog saliva sets and/or creates stains when mixed with various materials.	
<b>Help Received</b> Mother helped give ideas of variables to test and helped test them.	



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Emily Nardoni; Hayley Perkins</b>	<b>Project Number</b> <b>S1114</b>
<b>Project Title</b> <b>The Carbon Dioxide Effect</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The goal of our project was to observe the effect of varied levels of carbon dioxide on the respiration rate of two case studies.</p> <p><b>Methods/Materials</b> Our materials were a turntable (an old record player), and airtight bag with a tube attached to breathe in and out of, a cup, a cylinder, a marker, and paper to record our data. We positioned the cylinder with connected sheets of paper wrapped around it on our turntable. The airtight bag was placed next to it, with the cup holding the marker in place at a 90 degree angle to the cylinder. Therefore, when one breathes in and out of the tube, the marker will record the respiration rate on the revolving paper, allowing us to visually see our results and creating a home-made kymograph. We tested 2 people in 2 different conditions: first under normal conditions and second after 4 minutes of jumprope.</p> <p><b>Results</b> With the cylinder revolving at 10 revolutions per minute, Case Study 1 was able to complete only 9 pages of data under normal conditions. Our results graph shows struggle in her breathing by the 6th page of data, due to the increased levels of carbon dioxide she was breathing in. In her second test, after 4 minutes of jumprope, she was only able to complete 3 pages of data, all of them strained with a noticeable struggle by the 2nd page. Case Study 2 was able to complete only 6 pages of data under normal conditions, with great difficulty by the 5th page, and 3 pages after the jump rope. Specific wavelengths and the graphs themselves are displayed on our board.</p> <p><b>Conclusions/Discussion</b> As the case studies breathed in and out of the bag, the percentage of carbon dioxide in the bag increased as the person breathed in oxygen and breathed out carbon dioxide. The changes in these percentages are clearly displayed on our results graphs by the variations in the wavelengths recorded. After exercise, very little carbon dioxide intake was able to be sustained by both case studies due to the increased demand for oxygen. This demonstrates the practical and environmental importance of the fixed gas percentages in the air, and the dangers of different levels of carbon dioxide intake under different conditions.</p>	
<b>Summary Statement</b> Our project was created to demonstrate and test the effects of varied levels of carbon dioxide on respiration rate.	
<b>Help Received</b> Our teacher, Mr. Rufus, gave us the first, general idea for the project, and we figured it out from there. Materials were provided by Mr. Nardoni, while everything else was found as a household object.	



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sargis Pogosjans</b>	<b>Project Number</b> <b>S1115</b>
<b>Project Title</b> <b>Effect of DCG-IV on Antidromic Population Spikes in the Hippocampal CA3 Region</b>	
<b>Objectives/Goals</b> <b>Abstract</b> Past Research has shown that DCG-IV, a group II metabotropic glutamate receptor (mGluR) agonist, presynaptically inhibits the activity of the CA3 region of the hippocampus. It logically follows that the CA3 should exhibit well correlated population spikes amplitudes whether the drug is present or absent. By stimulating the Schaffer Collaterals in rat hippocampus slices and recording the antidromic response for each scenario (drug present in extracellular environment and drug absent) can be compared to determine the effect of DCG-IV on the antidromic excitation of CA3.	
<b>Summary Statement</b> To Further the Understanding of the Hippocampus and it's Antidromic Behaviors.	
<b>Help Received</b> Used lab equipment at USC under the supervision of Dr. Ted Berger.	



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Karis R. Tang-Quan</b>	<b>Project Number</b> <b>S1199</b>
<b>Project Title</b> <b>Determining Stroke Core using CT Perfusion: a Faster, More Cost-Effective Modality than MRI</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Diffusion-weighted magnetic resonance imaging (DWI MRI) is the current imaging modality of choice in the acute evaluation of ischemic stroke. Computed tomography perfusion (CT perfusion) is a newer modality that is cheaper and more readily available in the emergency room. This study compared CT perfusion to DWI in the evaluation of the stroke core in 30 patients with ischemic stroke.</p> <p><b>Methods/Materials</b> CT perfusion and DWI scans were co-registered. CT perfusion maps were made using four different thresholds: one absolute threshold and three relative thresholds. The stroke core volume on both the CT perfusion maps and DWI images were calculated.</p> <p><b>Results</b> It was found that the volume of the infarction core measured by CT perfusion correlated well with that measured by DWI. Moreover, relative cerebral blood volume (CBV) maps had a stronger correlation than absolute CBV maps.</p> <p><b>Conclusions/Discussion</b> Previously, an absolute CBV threshold of 2.0 cc/100 g, rather than relative CBV thresholds, was asserted as the optimal threshold for calculating the volume of the infarction core. However, this study showed that relative CBV thresholds are more accurate in determining stroke core in a heterogeneous population. The correlation between CT perfusion and DWI suggests that CT perfusion, with its wider availability, can complement or even replace DWI in the diagnosis of acute stroke, allowing timely therapeutic intervention. Furthermore, these findings have led to the use of CT perfusion maps in ongoing trials of stroke diagnosis and treatment.</p>	
<b>Summary Statement</b> CT perfusion maps correlate with the accepted standard of MRI in calculating the volume of the stroke core, and, therefore, should be implemented in the clinical setting.	
<b>Help Received</b> I learned the methodology at Massachusetts General Hospital.	