



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jennifer K. Benthale	Project Number S1001
Project Title The Effect of Commercial Ultrasonic Transmitters on Rats	
Abstract Objectives/Goals Rats inhabiting attics and garages bother many homeowners. There are commercial ultra sonic transmitters sold that "promise" to irritate the rats and cause them to flee. At issue is whether these devices cause the desired result. Methods/Materials Procedures 1) 30 trails, each 5 minutes in length were conducted under the following 3 conditions: - Ambient light and noise only, (10 trials). - Introduction of a single ultra sonic transmitter suspended overhead in the center of the enclosure providing non-directional noise, (10 trials). - Introduction of 3 ultra sonic transmitters into the enclosure. One on the back wall and centered. 1 on each of the side walls 1 foot off of the back wall providing directed noise, (10 trials). 2) Each trial was conducted with 3 rats placed centrally inside the enclosure for exactly 5 minutes. Their behavior and movements were recorded at 1minute intervals. The tests were conducted over 6 days. Materials 4 pieces of 4'x 2' heavy duty peg board, assembled into a 4'x 4'x 2' enclosure, simulating a garage. 6 common pet rats, mixed sex, 6-8 weeks of age. 3 ultra sonic transmitters rated above 27,000 KHZ. Shredded newspaper and shredded cotton, providing simulated materials found in garages. 1 shoebox, providing a safe harbor. Peanut butter as a food source. 1 blanket for flooring material. 3" high rubber barrier for extended room outside of the enclosure to contain the rats should they try to flee. Results The results did not support the advertising claims that the rats would flee. The data demonstrates that the ultra sonic noise had minimal impact on the rat's behavior or movements. Within minutes, the rats were demonstrating the same behavior and movement as under the ambient (control) conditions. Conclusions/Discussion The data indicates that the use of commercial ultra sonic transmitters alone do not meet the claims made by the advertising. As long as there was sufficient "hiding" areas, nesting areas, and food sources the rats overcame the nuisance factor of the transmitters. At best, they were made nervous until they became accustomed to the noise.	
Summary Statement This study measures the accuracy of the advertising claims that commercially sold Ultra Sonic Transmitters will drive rats out of one's home.	
Help Received My father helped me construct the simulated garage. He was my adult supervisor while I conducted the study.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Shannon N. Fine	Project Number S1002
Project Title The Habituation of Captive Orangutans to Novel Enrichment Item Placement	
Abstract Objectives/Goals This study was done at the San Diego Zoo in San Diego, California on a total of seven individuals: two Bornean, four Sumatran, and one hybrid cross orangutans. Experiments were done to test the hypothesis that when enrichment items are placed in the same manner and location for periods of five to seven days they will cease to be novel and enriching for the animals Methods/Materials The group varied from two to four orangutans out per day, but there were always at least the same two orangutans out every day. The four orangutans who were regularly out in the same exhibit were observed. The browse was hidden in the same location, a place the orangutans could not initially see when they were let in to the enclosure. The orangutans were observed from the time they were let out in the morning until one showed interest in the mock termite mound which incorporates the use of the browse branches to extract the treat inside (usually honey, mustard, or some other soft food). Time was measured by the following: time began when the orangutans entered the exhibit; time was noted when the orangutans passed by or picked up the browse; time was recorded and stopped when an orangutan removed the browse from the location and transported it to another part of the exhibit. Results Over time the Orangutans habituated to the new location of browse placement. there was no difference between the first exposure of the scent enrichment to the second exposure after a week of no exposure. Conclusions/Discussion The data showed that as the days passed the orangutans spent less time interested in browse. The first day of both browse studies the orangutans immediately noticed that the browse was not in its usual place, and thus they began to search for it. The next day they checked where it had been the day before. In the following days the orangutan who initially found the browse acknowledged its presence but passed by it to find something more entertaining. T-tests comparing the time of acknowledgement of the browse and the time of removal of the browse showed with a 95% confidence level that there was a significant difference for the period of time in between the acknowledgement and removal of the browse. The first days were more enriching than the following because the novelty of the placement began to wear off over time.	
Summary Statement In order to determine if Pongo pygmaeus pygmaeus and Pongo pygmaeus abeli habituate to the manner in which an enrichment item is presented, a group of Bornean and Sumatran orangutans were observed for many consecutive days at the San Diego	
Help Received The San Diego Zoo, Kathy Myers in setting me up with people, Kim Livingstone for coordinating everything, Cheri Davis and all the keepers for setting out the enrichment, Valerie Hare for information on enrichment.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Megan E. Hamilton	Project Number S1003
Project Title Listen to This!	
Abstract Objectives/Goals The objective was to determine whether or not teenagers experience a temporary hearing loss after being exposed to loud music. Methods/Materials I picked a song and tested it for its decibel level using a sound meter. Then, prior to listening to the music, I tested the subjects' hearing using tuning forks of 256Hz, 512Hz and 1024Hz. After the subjects listened to the music, I tested their hearing again with the same tuning forks. The independent variable was the 20 subjects and their ages; the dependent variable was the reaction to the tuning forks after listening to the music. Results After listening to the music, 60% of the subjects tested were unable to hear the tuning fork with the highest frequency (1024Hz). The remaining 40% of the tested subjects were able to hear all of the tuning fork sounds after listening to the music. Conclusions/Discussion Loud music can cause a temporary hearing loss in many teenagers.	
Summary Statement I tested the hearing of teenagers after listening to loud music and found that many suffered a temporary hearing loss.	
Help Received My mother helped me prepare the display.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Kylise J. Hare	Project Number S1004
Project Title How Many Parents Does Asante Really Have? Colobus Allo-Parenting	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study was to determine if and how the San Diego Zoo Angolan colobus monkey troop allo-parented. Allo-parenting is a behavior where an animal other than the biological mother temporarily cares for the infant.</p> <p>Methods/Materials Behavioral data were taken from 8:00 to 10:00 a.m. and/or 2:00 to 4:00 p.m. on 23 days between July 9 and August 31, 2001. During each session three types of data were recorded, all-occurrence of some behaviors (troop), 1 min. point sample (infant behavior and location), 30 min. location point sample of troop location. Comments about the infants# development and any other interesting observations were recorded.</p> <p>Results The mother, Lu Lu, remained significantly closer to Tamu when Tamu was allo-parenting than she did with any other monkey. Tamu was not one of Lu Lu#s own children and was the youngest troop member. Tamu#s success rate of taking the infant was significantly lower (24%) than that of any of the other juvenile allo-parents (range 43 to 52%). Lu Lu#s success rate was 99%.</p> <p>The father and dominant male was occasionally seen stopping allo-parents from taking the infant when he was on his mother resting or nursing. The infant chose to be on Spike, his eldest brother, significantly more than any other juvenile monkey (0.4/hour).</p> <p>Conclusions/Discussion The Zoo#s troop did allo-parent, all members other than the father allo-parented, chiefly the juvenile males. The mother was mostly in control of who allo-parented the infant, she likely chose allo-parents based on their age and relationship to her. Occasionally, the adult male and the infant himself may have had control over who allo-parented.</p>	
Summary Statement This study is about the Zoo troop#s allo-parenting behavior and who was in control of where the infant was.	
Help Received Primate keeper LeeAnn Anderson provided me with information about colobus monkeys and the Zoo#s troop. Behaviorist Valerie Hare helped me with experimental design and data analysis.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Charmaine Joy Jacobe	Project Number S1005
Project Title Jump to the Heart Beat	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal was to determine which gender had the greatest effect on their blood pressure when they did jumping jacks.</p> <p>Methods/Materials To find the blood pressure, I used an Omron Automatic Blood pressure monitor. 52 girls and 52 boys, ranging in age from 14-16 years, were used in this project. All the boys were between 110-130 pounds and all the girls were between 110-120 pounds. All of the people that I used had no athletic ability. That is, they were not involved in a sports team. In addition, I tested in the same time and place for each person.</p> <p>Results Jumping jacks had a greater affect on the boys# average systolic blood pressure. The systolic pressures of the boys increased greater than the girls#. However, the boys# and girls# average diastolic pressure had no significant change.</p> <p>Conclusions/Discussion My hypothesis was partially correct. With the 52 girls and 52 boys that I used in this experiment, I found that exercise produces a greater change in the systolic pressure of the boys.</p>	
Summary Statement This project was to determine which gender produced the greatest amount of change in blood pressure when they did jumping jacks.	
Help Received My dad helped me print out the titles for my board; Mr. Callaway helped me with the calculations	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Nirayl W. Kuba	Project Number S1006
Project Title Reflexes	
Abstract Objectives/Goals The objective of this project is to find the difference in your reflex abilities at different times of the day. My hypothesis was that during the middle of the day your reflexes will react with the most agility. Methods/Materials I tested this by gathering ten subjects, holding the ruler over there hand, dropping it unexpectedly and measuring at what inch they caught it. I did this three times a day (8:30 a.m, 2:30 p.m and 8:30 p.m) for three days. I then did another trial with the same ten subjects for three more days. Results On average the subjects caught the ruler more quickly (or in less inches) at 2:30 p.m. Conclusions/Discussion The fact that the subjects caught the ruler quicker at 2:30 p.m shows that they were more awake and conscious in the afternoon. I think that this is a result of the fact that they had eaten within the hour and that they weren't tired from the day or drowsy from the night. In the end my hypothesis was proven to be true.	
Summary Statement My project is the study of how fast your reflexes are at different times of the day.	
Help Received Colin Matheson and Sunny LeMoine helped edit my report.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Zhi-Ren K. Liang	Project Number S1007
Project Title Let the Music Begin!	
Abstract Objectives/Goals The objective of my project was to determine the effects of playing music after a vigorous exercise on the human body's heart rate and blood pressure. My goal is to establish which genre of music will have the most influence on the rate of decrease of blood pressure and heart rate. Methods/Materials I gathered willing volunteers from various age groups, and took their blood pressure and heart rate before any exercise. The subjects then were requested to do 40 jumping jacks in order to raise their heart rate and blood pressure. The subjects were then seated and rested for five minutes while listening to a certain type of music. This procedure was repeated six times, each time with different music. I recorded the difference between the initial blood pressure and heart rate and the resulting blood pressure and heart rate to see the affect of music on each type of music. Results Rock music tended to influence the rate of decrease of blood pressure and heart rate the most. Although not beneficial, the rock music tended to keep the blood pressure and heart rate at a higher level for a longer period of time. On the other hand, though not as influential, helped to lower the heart rate the quickest. Conclusions/Discussion Contrary to my hypothesis, the data leaned toward rock music as being the most influential in rate of decrease of heart rate and blood pressure. With the varied results of each type of music, the data suggests that sound therapy is indeed medically beneficial.	
Summary Statement My project investigates the effects of various music types on human heart rate and blood pressure.	
Help Received Mr. Easton (Honors Math Analysis teacher) helped with the mathematical analysis aspects of my project; Dr. Rajasingham, M.D. (specialist in pediatric cardiology) helped to understand the various factors influencing blood pressure; Mr. Levy (AP Biology teacher) main mentor with various degrees in science,	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Patrick K. McCabe	Project Number S1008
Project Title Does Function Follow Form in Club Swimmers?	
Abstract Objectives/Goals The purpose of this investigation was to determine if anthropometric measurements of competitive, teenage club swimmers predicted their best performance in the four basic strokes - that is, does function follow physical form. Methods/Materials Informed consent was obtained from 25 members of four nationally ranked club swim teams. Anthropometer, anthropometric tape, skinfold caliper, strain gauge digital scale, and measuring tape were used for 24 measurements and calculations per swimmer (termed the restrictive anthropometric profile). The swimmers' best events were determined by comparing their times with the time standards in the Pacific Swim Guide (USA Swimming). Student t-test was used to analyze the results. Results Of 120 comparisons, only seven were statistically significant ($p < 0.05$). Breaststrokers had smaller supraspinale and abdominal skinfold measures, backstrokers had larger gluteal skinfolds, and butterflyers were heavier and had greater flexed arm and relaxed arm girths, and greater iliac crest skinfolds. Conclusions/Discussion Only seven measurements differed significantly by a standard statistical criterion. Six measurements would be expected to differ by chance alone, using $p = 0.05$ as the arbitrary cut point, and so little confidence can be placed in the predictive value of these measures. Another study of a similar group of swimmers is needed to validate these even measures. The most conservative interpretation is that the restricted anthropometric profile of a relatively homogeneous group of very competitive swimmers is not predictive of performance, and that other factors, such as motivation or efficient muscle function, are likely determinative.	
Summary Statement Using the restricted anthropometric profile, I tried to determine if certain physical characteristics of teenage club swimmers could predict their best strokes.	
Help Received Dave Cademartori, Senior Account Manager at Pacific Bell and a former United States Olympic swimmer, helped me use statistical functions on Microsoft Excel.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Hans H. Nielsen	Project Number S1009
Project Title Visual/ Motor Coordination between Hemispheres	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project investigated whether the two hemispheres of the brain are synchronized (sending signals to the motor pathway at the same time) when initiating a motor reaction as a result of a visual cue.</p> <p>Methods/Materials To acquire data, an automated test program was written for a PC. The program directed subjects to focus on an object and react when a cue was displayed in the center of their vision or in their peripheral vision. The order and response time for each index finger when clicking a mouse button was accurately recorded. For each subject, the timings and position in which pictures were displayed were randomized. Hand and eye dominance, age range and gender were recorded for each subject.</p> <p>Results The results showed that there was no significant difference between the times for the left and right responses and no correlation between which side responded first and subject characteristics or cue position. Oddly, the left side responded first 70% of the time. Also, subjects responded fastest to visual cues on their left. Responses to cues showing up in the center were 50 ms slower. Cues on the right were 100 ms slower.</p> <p>Conclusions/Discussion The order and response times of left versus right index fingers showed no correlation to cue position. The hemispheres synchronized motor actions no matter which hemisphere the cue was sent to. The subjects response times had no correlation to their dominant hand, dominant eye, gender, or age, but they consistently reacted faster to the cue on the left.</p>	
Summary Statement This project investigated whether the two hemispheres of the brain send signals to the motor pathway at the same time when initiating a motor reaction as a result of a visual cue.	
Help Received Father gave coding tips and helped analyze results.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Cora Peeler; Sarah San Nicolas	Project Number S1010
Project Title How High Can Guys Fly?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The Purpose was to determine if any of our three variables: dorsiflexion (flexibility of the achilles tendon), navicular (height of arch), and arch (length + width), effect how high people can jump. Many athletes today are required to jump at a certain level, for them to enter at least a Division I college. We hypothesize thats guys that jump higher will have a more flexible achilles tendon and larger (wider and higher) arches, and guys that jump lower will have less flexibility and smaller arches.</p> <p>Methods/Materials Research began three months ago and continues through today. We did not know that testing people on their verticals would be so difficult. We had to make sure that our variables were controlled and we had to double and sometimes triple check everyone's information so we could be as specific and accurate as possible. We have collected data on all three variables and the participant's verticals.</p> <p>Results Out of 71 people that we used, we found that our hypothesis was correct, only when using the data from the five highest and five lowest jumpers comparing it to the three verticals.</p> <p>Conclusions/Discussion In conclusion, we found that a person's Achilles tendon flexibility and arch size will determine how high a guy can jump. If a person has a more flexible Achilles tendon and a larger arch then they will be able to jump higher than a person with flat feet, or almost no arch, and an inflexible Achilles tendon.</p>	
Summary Statement In our project we were trying to find out if a guy's flexibility of their Achilles tendon and size of arch determines how high they jump.	
Help Received Used Desert High Volleyball vertex, Mom and dad help wire board	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Denise N. Pham	Project Number S1011
Project Title Hamster Findings	
Objectives/Goals My project was designed to test the senses of hamsters, especially their senses of smell and sight. I believe that with the addition of color on the maze the hamster will move much quicker to find the food in the maze.	
Abstract Methods/Materials Two syrian female hamsters were used in this project. One of the syrian hamsters was a normal female while the other one was a syrian hamster with a missing paw. Two glass tanks were used to house the hamsters. The hamsters were fed the same foods and each were given an equal chance to run through the maze. Four days a week, for about three weeks the hamsters were set in the maze at the same starting point to find the food in the maze. The first week the hamsters ran through the maze without any markings on the maze. The last two weeks the hamsters ran through the maze with a green line that marked the floor of the maze.	
Results By the end of the first week the hamster with the missing paw (her name is Patches) averages about 9 minutes, the second week she averaged 8 minutes and the last week she averaged about 2 minutes. In contrast the nomral hamster (her name is Snowball) took about 10 minutes the first week, the second week she averaged about 9 minutes, and the last week about 3 minutes.	
Conclusions/Discussion My conclusions are the hamsters' sense of smell seemed to be more dominant than their sense of sight while running through the maze. The hamsters did not pay much attention to the bright green line drawn on the maze while they were running through it. In the end not only was the sense of smell more dominant over their sight but another revelation was made, the "abnormal" hamster worked much harder than the normal one. One reason could be that since she has a missing paw she works twice as hard to get what she wants and to go where she wants.	
Summary Statement This experiment was conducted to test the senses of hamsters, specifically their sense of smell and sight.	
Help Received Dad helped build maze, Teacher helped take care of hamsters, and mentor aided in project	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Christina C.C. Yeung	Project Number S1012
Project Title What Do You Prefer?	
Abstract Objectives/Goals To see if mice have a familiarity preference and/or a sense preference (between the sense of sight and the sense of smell). Methods/Materials In this experiment, I wanted to find out if mice prefer familiar surroundings, or if, between smell and sight, they prefer to rely on one sense more than the other. To test the familiarity preference, I first trained 8 mice to learn a route in a maze for 2 weeks, after which I allowed them the freedom to use whatever route they want to reach the bait (seeds and cheese) for a duration of another 2 weeks. To test their preference of senses, I placed the mice between a piece of foam board, rubbed with cheese and seeds to leave their scent, and a clear, plastic ziplock bag containing seeds and cheese so they can be seen but not smelled, and observed which one the mice went to first. Results Mice showed no preference for a familiar surrounding, but did show a preference for the sense of smell. Conclusions/Discussion If it were possible, I wish I could have been able to feed the mice regularly instead of leaving the inside the tank with them. By doing this, I could have had a greater control of how much the bait might be desired by the mice by having a better grasp of when they might be hungry. The biggest flaw that I perceive in my experiment is the fact that I could not tell how much does the bait attract the mice, thus not knowing that when they wander whether it is because they can't find their way or if it was because they simply are not interested in the bait.	
Summary Statement To see if mice have a familiarity preference and/or a sense preference (between the sense of sight and the sense of smell).	
Help Received N/A	