CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Rahul Bekal

Project Number
J1201

Project Title
Blood Pressure and Music

Abstract

Objectives/Goals
The objective of this project is to find out whether different tempos of music affect blood pressure of a person. My hypothesis, based on my research, is that blood pressure will go up after listening to fast tempo music and will go down after listening to slow music.

Methods/Materials
Informed consent was obtained from 25 adult volunteers of both gender. Initial systolic and diastolic blood pressure readings of the volunteers were taken with electronic blood pressure monitor kit. The readings were taken again after the volunteers listened to fast music for five minutes with an ipod. Following a 15 minute break, the readings were taken again. The volunteers then listened to slow music for five minutes and then their blood pressure readings were taken.

Results
72% of the volunteers had a drop in systolic blood pressure and 64% had a drop in diastolic blood pressure after listening to fast tempo music. With slow music, 72% had a drop in systolic blood pressure and 44% had a drop in diastolic blood pressure after listening to slow tempo music.

Conclusions/Discussion
My experiment shows that for most people the blood pressure in general goes down after listening to music of any tempo, fast or slow.

Summary Statement
This project is to find out if there is any impact of slow or fast tempo music on the blood pressure of a person.

Help Received
Parents drove me to volunteers' houses and my mother helped with pasting information on the board.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Terran Brown; Gunnar Little

Project Number

J1202

Project Title

Musical Measures: The Effect of Music on Heart Rate, Blood Pressure, and Mood

Abstract

Objectives/Goals

The purpose of this study was to investigate the effect of music on Heart Rate (HR), Blood Pressure(BP) and Mood(M), i.e. level of anxiety. We hypothesized that listening to music would alter a subject's HR, BP, and M. Specifically, when a subject listened to music with a faster tempo, there would be an increase in HR, BP and M; and conversely, when a subject listened to music with a slower tempo, there would be a decrease in HR, BP, and M.

Methods/Materials

Informed consent was obtained from a total of 20 subjects (Ss), 9 test and 11 control Ss. All Ss had their BP and HR measured 3 separate times, and they filled out a Mood Survey 3 times. Ss in the Test Group listened to 2 selections of music: fast rock and slow classical for a 3 minute period. We used an Automatic Blood Pressure Monitor to measure HR and BP, and an anxiety inventory to measure M. HR, BP, and M were measured after each type of music. There was a 5 minute rest period between each BP reading. Both test and control Ss were tested for the same duration of time. Instead of listening to music, control Ss were instructed to sit and relax.

Results

A small majority of the test Ss' systolic BP decreased after listening to either genre of music, but 7 out of 11 control Ss experienced a similar effect. The changes in diastolic BP appear to be evenly distributed for both test and control Ss. The majority of test Ss that listened to either genre of music had an increased HR. 5 out of 9 test Ss had decreased anxiety after listening to music with a slower tempo, and only one had increased anxiety. That one subject is one of two who expressed a dislike of classical music. After listening to faster tempo (rock music), 5 of 9 Ss had increased anxiety.

Conclusions/Discussion

Results for systolic and diastolic BP were inconclusive. There were no changes noted that did not also occur in the control subjects. The majority of test subjects had increased HR after listening to either tempo of music. These results support our hypothesis in regards to fast tempo music and are contrary regarding slow tempo music. Results do not support our hypothesis regarding music preference. The data on change in Mood after listening to various types of music supports our hypothesis regarding tempo, and does not support it for the effect of music preference. Suggestions for further research are discussed.

Summary Statement

This study investigated the effect of listening to music on both physiological and emotional parameters.

Help Received

Mother helped glue display board; Advisor provided feedback on data analysis.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Matthew C. Colbert

Project Number
J1203

Project Title
Right, Left, or "Ampawdextrous"? Brain Laterality in Dogs

Abstract

Objectives/Goals
My objective was to see if dogs were right handed, left handed, or ambidextrous and expressed handedness at the 90% right handed incidence of humans.

Methods/Materials
21 dogs with 18 owners were tested with three distinct, unique tests to determine the dogs' handedness. Informed consent was obtained from all owners. 90 data points for each dog were taken in independent recall, paw-shaking, and walking-on-leash tests. Data was taken on each dog's age, weight, and previous obedience training to see if it correlated with handedness.

Results
Results from the three unique tests were analyzed and interpreted and the Pet Dominant Hand (PDH) was determined. 45% of dogs were left handed. 22% of dogs were right handed. 33% of dogs were ambidextrous ("ampawdextrous"). 100% of dogs under the age of two years were left handed. As dogs increased in age, more dogs tested "ampawdextrous". "Side dependence" (a phenomenon where the dog led with the foot closed to the owner while on leash) was shown by dogs with obedience training. Chi square statistics were utilized to analyze results.

Conclusions/Discussion
There is more variability in handedness in dogs than in humans. The majority of dogs were left handed and therefore, right brained. Right brained individuals have strengths in non-verbal communication and face recognition. Young dogs were 100% left handed. Handedness is both genetic and learned. Obedience training influenced handedness through "side dependency". Chi square analysis showed a positive trend for age and no correlation with weight. Knowing your dog's handedness could help trainers of protection dogs, service dogs, and therapy dogs pick individuals who could succeed at their jobs and could just be fun for the average family.

Summary Statement
My project was testing the incidence of handedness in dogs and I picked this project because I am left handed, right brained, and interested in the human-dog relationship and tests that may improve the ease of dog training.

Help Received
My mom and dad helped with Excel graphs and a statistician from my school helped with Chi Square Analysis.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Dylan H. Eremia

Project Number

J1204

Project Title

Hemoglobin Assisted Laser Lipolysis

Abstract

Objectives/Goals

Determine feasibility of a novel concept of non-invasive lipolysis with a 1064nm Nd:YAG laser, a skin penetrating wave-length, far better absorbed by hemoglobin then skin and fat. Investigate if injection of a little blood, will selectively increase fat absorption of 1064nm light delivered to skin surface, raising fat temperature sufficiently to trigger lipolysis, without overheating skin

Methods/Materials

An experimental model of skin and fat was designed using defatted chicken breast skin over a slab of bacon fat sliced 2 mm apart. A 1064nm Nd:YAG laser was used to deliver energy through skin into fat. Laser settings were five 70J/cm2 pulses, 12mm spot, 100ms pulse-width(PW). Preliminary testing determined ideal parameters. A digital infrared thermometer measured surface and 4mm deep temperature changes. The tests were repeated after blood was injected between 2-4mm into the fat. Temperature differentials between surface and 4mm depth, for plain fat, and blood injected fat were studied

Results

Temperature readings after increasing the PW 10ms from 10-200ms each set of 5 measurements, suggested 100ms was the best PW. Shorter PW increased surface temperature more then 4mm deep, thus increasing risk of skin injury. Longer PW underheated both. A series of 30 tests with five 70J/cm2 100ms pulses, raised both surface and 4mm deep fat temperature by about 3.4°C. (mean 3.35°C, range 2.9-3.8°C at the surface and 3.42°C, 2.7-3.8°C 4mm deep). No visible changes in appearance of skin or fat were noted. When the procedure was repeated after injecting a little blood 2-4mm deep into the fat, the mean surface temperature increase was 4.92°C vs 8.99°C 4mm deep (range 4.6-5.3 vs 8.5-9.4°C), a 4°C difference surface to deep. Visible burns were noted in the blood infiltrated fat.

Conclusions/Discussion

The addition of a small amount of blood into fat, significantly increases absorption of 1064nm laser light. In this experimental model using clinically feasible laser parameters, a 4°C temperature difference resulted between surface and 4mm deep hemoglobin laced fat. This temperature differential could likely be increased 3-4°C utilizing simultaneous skin cooling technology available for this laser. Since a temperature difference of 5-10°C is likely ample to achieve selective hemoglobin assisted lipolysis without any injury to overlying skin, this concept appears to have great potential for clinical applications.

Summary Statement

Use of 1064 nm wave-length laser light, well absorbed by hemoglobin, and able to penetrate through skin into the fat, to selectively heat fat tissue injected with a small amount of blood, enough to kill fat cells, without injury to skin.

Help Received

My dad, a physician, helped with books and articles and my online search and made sure I had the knowledge to design the experiment, (how the settings affected how the laser light would pass through skin, reach fat, selectively heat fat etc) He provided laser, thermometer, safety equipment, got the blood,

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Joshua E. Eyre

Project Number
J1205

Project Title
Can You Hear Me Now?

Abstract

Objectives/Goals
The purpose of this project is to determine whether my sister, who has mild hearing loss, can hear better without hearing assistance, with hearing aids alone, with her desktop speaker system alone, or with both hearing devices used together, when in a classroom-like setting.

Methods/Materials
First, the decibel levels in my sister's classroom were tested and found to be between 40-80 dB, consistent with published studies. Then, with background noise set within the lowest decibel range (40-50 dB), I tested my sister#s ability to hear and correctly repeat 50 phonetically balanced words without the use of any hearing devices. I then repeated this procedure and changed the independent variable by having her use hearing aids alone, her desktop speaker system alone, and then using both her hearings aids and desktop speaker system together. This process was repeated 3 times with the background noise set at increasingly higher decibel ranges. The dependent variable was measured by how many words she repeated correctly out of fifty.

Results
The use of the desktop speaker system alone either improved or did not hurt her hearing capability. Any use of hearings aids reduced her hearing capability. With increased levels of background noise, the desktop speaker system dramatically improved her hearing. Surprisingly, I determined that hearing aids did not benefit my sister when there is background noise.

Conclusions/Discussion
I believe that the data was accurate, precise, and could be reproduced easily with the same subject. If this experiment were to be repeated, I would have both a man and a woman speaking each word list to see if the patterns are the same at different frequencies. This could be important since some people have hearing loss only in higher frequencies and some have hearing loss in the lower frequencies. Another change would be to see if changing the volume parameters of the background noise or the volume of the live speaker makes a difference in the overall patterns or just the scores in general.

Summary Statement
Since my sister, who has mild hearing loss, has trouble hearing classroom instruction, this experiment was designed to test which device would allow her to best understand classroom instruction in the presence of background noise.

Help Received
Father helped create graphs; Parents proof read report; Mother helped cut out objects for the presentation board; Mother and Sister participated in experiment as speaker and test subject, respectively.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Steven S. Higginbotham

Project Number
J1206

Project Title
All You Can Find Antlers!

Abstract

Objectives/Goals
The objective of my project is to determine the topography where mule deer bucks winter when shedding their antlers on the East Fork Winter Range in northwest Wyoming. I wanted to determine this by finding antlers on the winter range and keeping a detailed record of my findings.

Methods/Materials
I hiked the East Fork Winter Range to find antlers, collect data related to topography and geographic location, gather and record details about each specific antler. I used a camera to provide pictures of the area I hiked and of some of the antlers I found. Other materials used were a notebook for recording data, maps, binoculars, eye piece, and a variety of resource people which included wildlife specialists (Wyoming Game and Fish Department), hunters, taxidermists, a historian and artist/photographer.

Results
I found 61 antlers during the summer while hiking on the East Fork Winter Range.
I recorded detailed data on each of the 61 antlers in my feld journal which provided me with the information I needed to develop a scientific conclusion.

Conclusions/Discussion
During the season the mule deer shed their antles they prefer areas that are protected from harsh weather conditions of winter in Wyoming, wind and predators that are on the range. These protected areas include ravines, hillsides, slopes and geographic bowls.

Summary Statement
The topography in which mule deer shed their antlers.

Help Received
Father helped type and helped attach items to display board.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Lance S. Lew

Project Number
J1207

Project Title
Swimmer's Heartburn

Abstract

Objectives/Goals

The purpose of the experiment was to answer the following question. How do different swimming strokes (freestyle, backstroke, breaststroke, and butterfly) affect heart rate and why?

Hypothesis:

Butterfly will give you the highest heart rate because it requires a lot of upper body strength, has a fast pace, and requires breath control.

Methods/Materials

Forty-one swimmers were categorized into six groups by age (9-10, 13-14, 15 and up) and gender. Each swimmer measured their resting heart rate. Each swimmer swam the butterfly for 50 yards and immediately measured their heart rate. This procedure was repeated for the backstroke, breaststroke and freestyle.

The materials used include: one stopwatch, one clipboard, one data sheet, two pencils, forty-one swimmers, and a 25 yard pool.

Results

The information obtained from this project illustrates that freestyle (Australian Crawl), in most instances, results in swimmers having the highest heart rate after swimming a 50 yard sprint, particularly with male and older swimmers. This result was not uniform, however, in every age group and gender. Butterfly produced the highest heart rate in younger girls; this may be because of less upper body muscle mass necessary to execute butterfly effectively resulting in higher heart rates.

Conclusions/Discussion

The data obtained from the experiment did not support my hypothesis. The greatest elevation of the heart rate was caused by the freestyle, and was followed by the butterfly, breaststroke, and the backstroke. Freestyle uses the main arm and leg muscles in continuous fast strokes and thus results in the greatest increase in heart rate. Both butterfly and breaststroke utilize major muscle groups. However, they are short axis strokes that utilize body buoyancy; this might explain why they generally resulted in a lesser increase in heart rate than freestyle. Even though the backstroke uses major muscles, the access to oxygen may have resulted in less of an increase in heart rate than freestyle.

Summary Statement

Swimmer's Heartburn examines which of four competitive swimming strokes (butterfly, backstroke, breastroke, and freestyle) produces the greatest heart rate and why.

Help Received

My science and english teachers reviewed my science project. A professional swim coach helped me conduct the experiment and analyze the results.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Josiah L. Luna

Project Number
J1208

Project Title
Age and Eyesight

Abstract

Objectives/Goals
My objective was to test the eye's ability to focus at close range and determine how it relates to a person's age.

Methods/Materials
Created questionnaire for survey.
Interviewed 100 subjects to test Hofstetter's Equation.
Asked each subject to fill out questionnaire.
Asked each subject to take off corrective lenses.
Measured the distance from eyes to focus three times for each subject using a Near Point Accommodation Ruler.
Entered data into spread sheet.
Evaluated results for possible trends.
Used Hofstetter's Equation as the control.
The independent variable is age.
The dependent variable is the distance needed to focus, measured in centimeters.

Materials used were a near point accomodation ruler, subjects for the study, a clipboard, pen, and forms to collect data.

Results
In the end, younger subjects were able to focus on a nearer point than older subjects. The data showed that the degeneration of the human eye followed a parabolic pattern. The mathematical relationship between age and eyesight breaks down after the age of 57.

Conclusions/Discussion
There is a predictable relationship between age and eyesight. Hofstetter's Rule accurately predicted near point accommodation until the age of 57. At that point, vision is unpredictable. So, my hypothesis was both right and wrong. It was correct for people under the age of 57, but incorrect for older subjects.

Summary Statement
My experiment shows the relationship between age and the ability of the human eye to focus at close distance.

Help Received
Father helped format Excel spreadsheet; Mother helped paint board; optomitrist answered some questions I had about getting started.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Spencer E. McVeigh

Project Number
J1209

Project Title
From the Corner of the Eye...

Abstract

Objectives/Goals
To determine which colors a human's dominant and non-dominant eye distinguish the soonest through peripheral vision.

Methods/Materials
4 cm by 21.4 cm sheet of red paper
4 cm by 21.5 cm sheet of light red paper
4 cm by 21.5 cm sheet of blue paper
4 cm by 21.5 cm sheet of light blue paper
4 cm by 21.5 cm sheet of black paper
4 cm by 21.5 cm sheet of white paper
60 cm by 90 cm black foam board

Results
For red, 15 subjects chose it the soonest using their dominant eye, and 14 subjects chose it the soonest using their non-dominant eye. For pink, 7 subjects chose it the soonest on their dominant eye, and 11 subjects chose it the soonest on their non-dominant eye. For blue, 31 subjects chose it the soonest on their dominant eye, and 25 subjects chose it the soonest on their non-dominant eye. For light blue, 13 subjects chose it the soonest on their dominant eye, and 16 subjects chose it the soonest on their non-dominant eye. For black, 14 subjects chose it the soonest on their dominant eye, and 13 subjects chose it the soonest on their non-dominant eye. For white, 26 subjects chose it the soonest on their dominant eye, and 27 subjects chose it the soonest on their non-dominant eye.

Conclusions/Discussion
The hypothesis of this experiment was that a human's dominant eye will see a brighter color the soonest and a human's non-dominant eye will see a darker color the soonest while using peripheral vision. The purpose of this was to determine which colors the dominant and non-dominant eye distinguishes the best with peripheral vision.
The color that was overall seen the most with the dominant eye was blue, a total of 31 subjects. The color that was overall seen the least with the dominant eye was pink, a total of only 7 subjects. The color that was overall seen the most with the non-dominant eye was white, a total of 27 subjects. The color that was overall seen the least with the non-dominant eye was also pink, a total of only 11 subjects.
The hypothesis was proven to be incorrect. A human's dominant eye did not distinguish a brighter color the soonest; it saw blue the soonest, which is a darker color. A human's non-dominant eye did not

Summary Statement
This project is about which colors a human's dominant and non-dominant eye distinguish the soonest through peripheral vision.

Help Received
Teacher informed of GSDSEF guidelines.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Justin L. Myhre

Project Number
J1210

Project Title
Fox's Response to Territorial Markings

Abstract

Objectives/Goals
My objective was to determine the concentration of ammonium hydroxide masking necessary to purge the pheromones and scent-qualities of coyote urine (which has naturally occurring ammonia) to the extent where a fox is unable to detect the pheromones.

Methods/Materials
Six cans of coyote urine were needed to complete 4 tests at each of 3 locations in a fox territory. For each test, coyote urine was sprayed for 30 seconds, and then masked with 3 milliliters of 1 of 4 ammonium hydroxide solutions (0%, 2%, 3%, or 4%). A game camera was placed facing the brush that had the coyote urine and ammonium hydroxide deposited on it. The camera records anything visiting the site for two nights, which is the length of time urine can be detected by a fox. I then determined the effectiveness of the ammonium hydroxide masking by whether a fox responded territorially to the urine.

Results
Consistent with all 3 locations, the fox responded to the control, which has 0% ammonium hydroxide masking (0.05% of the total contents of urine). The tests with 2% ammonium hydroxide masking, which is 0.166% of the total contents of urine, showed that a fox ceased to respond at 2 out of the 3 locations. This gives you a 33% chance of attracting a fox with 2% ammonium hydroxide masking. The remaining tests with levels of 3% (which is 0.22% of the total contents of urine) and 4% ammonium hydroxide masking (which is 0.28% of the total contents of urine) failed to attract any fox. Therefore you have a 0% chance of attracting a fox with 3% or 4% ammonium hydroxide masking.

Conclusions/Discussion
I can conclude that fox have an instinctive response to coyote urine (which has 0.05% ammonia), and that if sprayed in their territory they are almost certain to react to it in a territorial fashion. I can also conclude that ammonium hydroxide masking, even in concentrations as low as 2%, can mask the pheromones and scent-qualities in urine. I can also conclude that fox cease to respond to 3% ammonium hydroxide masking, which equals 0.22% of the contents of urine. Because ammonia in urine increases over time, I calculated the growth rate of ammonia in urine to be 7.3% per hour. Therefore, I can also conclude the best chance to attract a fox with urine is within the first 31 hours. This is the time it takes urine to reach 0.166% ammonia, which equals 2% ammonium hydroxide masking.

Summary Statement
My project deals with urine as a form of communication for fox and ammonia's masking effect on it.

Help Received
Father helped dilute ammonia and with board; Nina Kidd and Julie Bundy approved animal care plan

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
K. Colton Pinson

Project Number
J1211

Project Title
What's In Your Genes? White Hair? Red Eyes? Big Hips? Thunder Thighs?

Abstract

Objectives/Goals
The objective of this project is to find out when breeding rabbits which parent has stronger traits that are passed down to the offsrping, the sire or the dam?

Methods/Materials
I bred 26 litters of Netherland Dwarf rabbits to compare the litters against the sire and dam for variety/color, body type, and head shape. I bred two litters of New Zealand Whites which excluded the color gene and allowed me to only compare the litters against the sire and dam for depth and width of loin.

Results
In the Netherland Dwarf litters the dam passed down the variety/color genes, where the sire showed to pass on more of the body type and head shape to the offspring. In the New Zealand litters my first experiement showed to be equal as the sire and dam were equally matched in size, depth and loin, giving me five of seven kits of eqaul in size. The second litter the sire passed down more traits to four of the seven kits than the dam.

Conclusions/Discussion
My conclusion is that the sire and dam did have equal amount of traits passed down to the offspring. I believe that there are many factors that figure into the experiments such as the size of the litters. Netherland Dwarfs have very small litters, New Zealands have larger litters. I also believe that traits are not always passed down generation to generation because of the recessive gene. I saw this in one litter during my experiments, where particular features skipped a generation. I think this is where the heritability issue comes into play and how certain genes are inherited in one sibling but not another, and from one litter to another.

Summary Statement
Genetics and heritability in rabbits.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Maya Lee Pollack

Project Number
J1212

Project Title
Which Is Faster, "Rocker Start" or "Track Start"? Comparing Two Approaches to Softball Base Stealing

Abstract

Objectives/Goals
My objective was to see if the "rocker start" was faster than the "track start" for stealing bases in softball. Because the "rocker start" allows you to gain momentum before you actually leave the base, my hopothesis is that the "rocker start" will be the faster stance. The "rocker start" enables you to break inertia before you leave the base, so you will gain greater velocity in a shorter amount of time.

Methods/Materials
Materials: 7 softball players, an electronic timing system, 2 bases, and a tape measure.

Method:
1. Identify 7 softball players, ages 12 - 14. 2. Set up timing equipment at CSUMB softball field at 60 feet. 3. Line up girls at first base. 4. Two base running styles will be used when running from first to second, the "track start" and the "rocker start." 5. Three trials of each condition will be conducted in a randomized manner with ~ 3 minutes of rest between trials. 6. Set up timing equipment at 15 feet. 7. Line up girls at first base. 8. Two base running styles will be used when running the 15ft., the "track start" and the "rocker start." 9. Three trials of each condition will be conducted in a randomized manner with ~ 3 minutes of rest between trials. 10. Download data from timing system to computer. 11. Calculate the means and differences for each athlete, using the two starts at the two different distances. 12. Compare the means to determine if there is a significant difference.

Results
The tests showed that my hypothesis was correct. The "rocker start" was faster than the "track start," at both 60ft and 15ft. The difference between the means was about the same at both 60ft (.0914/sec) and 15ft (.0729/sec). This shows that the difference is really a result of the explosive start.

Conclusions/Discussion
The results are even more interesting because the players were not trained in the "rocker start." During the testing, the players commented that the rocker start felt uncomfortable and that they didn#t like it. The players felt more comfortable with the track start because it was familiar to them. During the testing, I noticed that the players did not rock back as much as they could have. So, they did not get as much momentum as possible. Even with the players not rocking back as much as they could have, the rocker start was still significantly faster. With more practice on the "rocker start," players could gain as much as .25/sec over the "track start."

Summary Statement
To see whether the "rocker start" in softball was truly more "explosive" and allowed for a faster start when stealing a base in softball.

Help Received
My mentor was Dr. Kent Adams, Professor of Kinesiology at California State University Monterey Bay. He helped me set up and operate the electronic timing system. The idea was inspired by the women's softball coach at CSUMB, Coach Andrea Kenney.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Mark P. Raphael

Project Number
J1213

Project Title
The Leading Causes of Lung Cancer in Non-Smokers

Abstract

Objectives/Goals
The purpose of my science fair project was to find the leading cause(s) of lung cancer in non-smokers.

Methods/Materials
Using the website, Surveymokey.com, I created a survey and posted a link to the survey on several different lung cancer sites, such as Lungcanceralliance.org, and anonymously surveyed 50 non-smokers and 78 smokers, smokers being my control. My survey asked about different factors which could have caused the survey-takers lung cancer.

Results
The data from this experiment showed that secondhand smoke was the cause of 56% of non-smokers lung cancer, with 36% of smokers with lung cancer having a family history of lung cancer and a mutation on the EGFR gene coming in second, and air pollution causing cancer in 20% of non-smokers with lung cancer.

Conclusions/Discussion
My conclusion is that secondhand smoke is the leading cause of lung cancer, with a family history of lung cancer and a mutation on the EGFR gene coming in second, and air pollution is the third leading cause. I also think that a mutation on the EGFR gene may be genetically passed down because of the same percentage of people who responded positive to both factors of a mutation on the EGFR gene and a family history with lung cancer. The results of my experiment suggest that people should try to avoid secondhand smoke and get tested for a mutation on the EGFR gene if they have a family history with lung cancer.

Summary Statement
I created and sent out a survey to smokers and non-smokers with lung cancer to determine the leading cause of lung cancer in non-smokers and the results showed that secondhand smoke was the leading cause.

Help Received
Dr. Gregg Newman of Sansum Clinic in Santa Barbara, CA and Dr. Jack West of the Swedish Cancer Institute in Seattle, WA answered a few questions about my topic and survey

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Celeste M. Stoker

Project Number
J1214

Project Title
Tort vs. Otter in the Holland Lop Rabbit: Breed for Color, Body Type, or Both?

Abstract

Objectives/Goals
To breed a Holland Lop rabbit with black or blue otter color pattern that has proper, show quality body type. Also, I want to expand the color varaitions in show qaulity Holland Lop rabbits.

Methods/Materials
- two generations of Holland Lop show rabbits
- 2 rabbit hutches
- Rabbit food and waterers
- camera
- nesting box

Breed the rabbits Henry and Haiku, and find the different color probability percentages using a punnett square. Take the best show quality offspring from the litter with the desired color pattern (otter) and show it at local ARBA rabbit shows against torts and other show Holland Lop rabbits. After it has won enough to validate that it has good lines, body type and color genes, use it as a herd doe or buck.

Results
I found that one rabbit in the litter from Henry and Haiku had the proper body type as well as the black otter pattern, with the recesive blue gene. When I showed her, she competed well and beat other colored rabbits as well as torts. Now I will breed her to get a blue otter. In this case I have to find a blue otter buck or a black otter buck with the recessive blue gene to breed to my rabbit to get a blue otter.

Conclusions/Discussion
I predicted that one rabbit from the litter would have proper body type as well as the desired color and patterns. That prediction was correct, but I thought this rabbit would have a slightly differnt body type than what was produced. I thought the rabbit would have features more like its parents, but it turns out, her body type is more similar to her grandfathers'. Her body is short and compact, meeting the ARBA "Standard of Perfection" for the Holland Lop Rabbit. Now I will breed her to produce a third generation that will have both the desired body type and color pattern that requies two ressive, dilute blue genes and the otter patten gene.

Summary Statement
This project is about breeding show quality Holland Lop rabbits with color patterns that require two recessive color genes, and an otter pattern gene.

Help Received
Mother helped take photographs of rabbits

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Hanna Taormina; Shaye Widger

Project Number
J1215

Project Title
After Exercising a Horse, Does Grooming It or Putting It Back into Its Stall Make Its Recovery Heart Rate Faster?

Abstract

Objectives/Goals
Our objective was to determine whether grooming or putting a horse back into its stall lowers its heart rate faster. We thought putting the horse back into its stall alone after exercising it would lower its heart rate faster, because when horses are around people, they feed off of the energy of the humans which raises their heart rate. Therefore, the horse's heart rate would most likely be slower if the horse was not around people.

Methods/Materials
First we took and recorded the horses resting heart rate. Then we lunged the horse for 8 minutes at a constant speed (walking, trotting, and cantering). After that we took and recorded the horses exercise heart rate. Subsequent to that we groomed the horse in the grooming stall and took and recorded the horse's heart rate every minute until it returned to it resting heart rate. The next day we repeated the process, but just put the horse in its stall instead of grooming it. We then repeated this process with 9 other horses.

Results
Our graph shows the differences between the recovery heart rates for when the horses were groomed and when they were put back into their stalls. In every case, the horse which was put into its stall alone had a faster recovery heart rate.

Conclusions/Discussion
Our data seems to indicate that our hypothesis is correct. The horses heart rates were lowered faster if they were alone in their stall. Our experiment seems to show that when the horses were groomed, the recovery heart rate took a longer period of time than it did when putting them back into their stalls. We believe we got these results because when horses are with people they feed off of their energies, making their heart rates higher or more difficult to return to normal. We controlled our variables well. For instance, we used the same stop watches, the same stethoscope, the same horses, the same stalls, the same amount of exercise time, and the same exercises (walk, trot, and canter) There were some variables that we hadn't expected. For example, it was colder the first day we did our experiment than the second day. Also, the second time the horses were eating, so that may have affected our results as well. These variables may have raised or lowered the horses' heart rates.

Summary Statement
We are trying to deterine whether after exercising a horse, does grooming it or putting it back into its stall make its recovery heart rate faster.

Help Received
Ruth Widger, Mother, lunged the horses because it would be quite dangerous for someone who is untrained and we did all of our work under the supervision of Mr. Bud Smith the Science teacher at All Saints Day School.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Claudia Torres

Project Number
J1216

Project Title
Have You Seen My Master?

Abstract

Objectives/Goals
I want to know if a dog's attention towards its owner is affected if the dog can't see its owner's face.

Methods/Materials
Materials
50 dogs with owners
1 person each dog is unfamiliar with
2 large paper bags
2 stopwatches
Procedure
1.Obtain materials.
2.Take one dog, its owner, and the person the dog has never seen into an area with minimum distractions.
3.For one minute, have the dog#s owner and the other participant walk back and forth, in opposite directions, without speaking or making any noise, in front of the dog.
4.Using a stopwatch, time how long the dog follows or shows interest in its owner.
5.Have the dog#s owner and the other participant put the paper bags over their heads, so their faces aren#t visible.
6.For one minute, have the dog#s owner and the other participant walk back and forth, in opposite directions, without speaking or making any noise, in front of the dog.
7.Using a stopwatch, time how long the dog follows or shows interest in its owner.

Results
According to my data, dogs who could see the faces of their owners were attentive towards the owners for an average of 24.86 seconds out of one minute. When the dogs' owners' faces were invisible to them, the dogs only paid attention for an average of 22.56 seconds out of one minute.

Conclusions/Discussion
My hypothesis was incorrect. I found that dogs paid less attention to their owners when their owners' faces were covered. Puppies, really old dogs, and smaller-sized dogs didn't show much interest in their owners. The bigger dogs between ages 2 and 7 seemed to pay the most attention to their owners. They were also the most active dogs. I also noticed that when the people's faces were covered with bags, the dogs looked from one person to the other more frequently. This project is a small advance in the study of dog cognition. It also shows the importance of dog owners always staying in sight of their dogs. Dog owners and scientists who study dog cognition are benefitted by the results I gathered in this project.

Summary Statement
I wanted to know if a dog's attention towards its owner is affected if the dog can't see its owner's face.

Help Received
My mom drove me to the dog owners' houses. Mrs. Rodriguez answered all my questions.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Molly M. Tucker

Project Number
J1217

Project Title
Fiddles and Phalanges: Will Playing the Violin Make Your Fingers Grow?

Abstract

Objectives/Goals
The effect of physical impact on bone development has previously been studied in physical activities such as running and other high impact sports. Playing the violin, due to the pressure exerted by the left hand fingers on the fingerboard, can also be considered a "high impact sport." The purpose of this project was to find out if playing the violin had an impact on the left hand finger growth, and if starting at an early age and continuing through puberty increased the effect.

Methods/Materials
To test my hypothesis, a caliper was used to measure the left and right hand fingers of violinists and those who did not play violin (control group). The data was organized into four groups, which represented the independent variables: that the subject played violin, when the subject started, and if they had undergone puberty. Overall, the subjects who played violin had longer left hand fingers than those who did not play violin.

Results
The group of the subjects who had started early did not have longer left hand fingers than those who had started later, but the group of subjects that had undergone puberty showed the most effect on the left hand finger growth.

Conclusions/Discussion
This experiment demonstrated that playing the violin has an impact on finger bone growth, though the starting age did not matter as much as if the subject had or had not undergone puberty. For those who are starting violin, it is important that they start before puberty, if their finger length is to be affected the most.

Summary Statement
The finger bones of the left hand will grow more in length as a result of playing the violin.

Help Received
Father helped glue board; Orchestra conductor allowed time to be taken from rehearsal for subjects to be recruited; Mother reviewed report; Parents provided information on the scientific method.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Nick B. Watkins

Project Number
J1218

Project Title
I Can See Clearly Now

Abstract

Objectives/Goals
The objective of this experiment is to determine if adolescent (13-14 year old) girls blink more than adolescent (13-14 year old) boys.

Methods/Materials
Sixty Marshall Middle School students were tested to determine how many times each student blinked in one minute. Before the main segment of the interviews subjects were asked about their age, their height, and the height of their (same-sex) parent. The subjects were then asked to tell a story based on two pictures that they were shown. The story was limited to one minute, as measured by a Robic Twin Chronograph and Count Down Timer. During the story, the tester counted the number of times the subject blinked using a Champion Sports Tally Counter. After the story, subjects were asked whether they were wearing contacts or had any eye issues. The results (the number of times the subjects blinked) were written on a customized Microsoft Excel Sheet. After the data was collected, it was transferred onto a computer and averages were calculated. Then the difference between these two averages was determined.

Results
The results showed that 13-14 year old girls blink 30.6% more times per minute than do boys of the same age.

Conclusions/Discussion
This experiment established four main conclusions. First, adolescent girls do in fact blink more than adolescent boys. Second, the development of blinking does parallel physical development, which confirms the hypothesis of this experiment. Third, there is a small but interesting association between the difference in height between the subject and their (same sex) parent and the subject#s blink rate. Fourth, the use of contacts had a slight effect on spontaneous blink rate (the difference between the boys and girls who wore contacts was 31.2%, compared to 30.6% for the remaining subjects.)

Summary Statement
This experiment has found that adolescent girls blink more than adolescent boys because of their heightened development.

Help Received
Professor Nicholas Christenfeld (UCSD) confirmed the standard deviation for the data and calculated the standard error; Doctor Alan J. Zametkin (NIH) wrote an important paper on the topic and helped with the bibliographic search; Eric Watkins helped with the revision of many drafts; and Teresa Elston gave

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Alexa J. Wheelan

Project Number
J1219

Project Title
Off Balance: Year II

Abstract

Objectives/Goals
The purpose of this project is to evaluate how severely music affects a human#s ability to perform spatial tasks that require coordination accuracy and quick reaction time.

Methods/Materials
Participants were instructed to perform a series of physical tasks through a series of different tests while listening to synthesized music. Test results were recorded and participants were instructed to perform the same series of tasks without the music. Test results were again recorded. Tests were repeated several times with the participants.

Results
In the Finger/Nose and the Heel/Knee Tests, most subjects were able to hit their target 67% of the time when they were not listening to music. When the subjects were listening to music, they were only able to hit their target 33% of the time. In the Ruler Test, 13 cm was the average for subjects when not listening to music. When not listening to music, subjects averaged 17 cm. In the Nystagmus Test, almost none of the subjects showed nystagmus for even 10 seconds. When music was added to the test, subjects showed nystagmus for 10 seconds or longer.

Conclusions/Discussion
Through these results, the hypothesis was proven correct as it appears music does have a negative effect on the vestibular system and in turn, can negatively affect a human#s ability to perform spatial tasks. This could be due to an overload of information trying to be transferred through the eighth cranial nerve as it tries to reach the cerebellum or temporal lobe.

Summary Statement
This project is to see how synthesized music affects human vestibular system.

Help Received
none

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Nicholas C. Wilbur

Project Number
J1220

Project Title
Which Carbohydrate Metabolizes the Quickest in a Type 1 Diabetic?

Abstract

Objectives/Goals
I investigated how rapidly carbohydrates are metabolized in a Type 1 Diabetic. I chose this topic because my brother & I both have Type 1 Diabetes and suffer from low blood sugars daily. With this project I can see which carbohydrates raises my blood sugar the quickest and how long it takes for the increase to occur. This will help me understand how long it takes my body to recover from a low blood sugar and be able to return to normal activities.

Methods/Materials
I tested 3 different carbs to determine which would metabolize into blood glucose the fastest. For each of the liquids, I used the following procedure:
1. Test blood sugar. If blood sugar is 150 or below, proceed with experiment.
2. Drink 15 grams of carbohydrate (Gatorade, Chocolate Milk, or Orange Juice)
3. Retest blood sugar after 10, 20, 30 and 40 minutes.
4. Graph the change in blood glucose levels vs. time to determine which liquid raises blood glucose levels the fastest.

I also used water as a control group to ensure that my basal insulin rate was set correctly and my blood sugar remained constant during the test periods.

Results
The tests with water confirmed that my basal rate was correct and my blood sugar remained constant. The tests with each of the carbohydrate liquids showed that there was a time lag between when I drank the liquid and when it metabolized into blood glucose. Of the three liquids I tested, Orange Juice caused my blood sugar to rise the quickest.

Conclusions/Discussion
In my tests, Orange Juice caused my blood glucose to rise the quickest. This was a surprise and contradicted my hypothesis that Gatorade would be the quickest. During my research, I investigated the Glycemic Index. This indicated that Gatorade should be metabolized the quickest. I'm not sure why my results failed to match the predictions in the Glycemic Index, except to say that there is always a lot of variability in how carbohydrates are metabolized in a Type 1 Diabetic. That's one of the reasons it is so hard to maintain good blood sugar control! The most surprising result was how long it took to metabolize the carbs. Observing this has made me understand that I have to test my blood sugar at least 20 minutes before I try and do any critical activities, like taking tests or playing sports, so that if I am low, I can drink some carbs and get my blood sugar back to normal before the event starts.

Summary Statement
This project analyses how rapidly various carbohydrates are metabolized by a Type 1 diabetic.

Help Received
My Endocrinologist helped me design the testing protocol & my parents helped me put together my board.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Vahe S. Yacoubian

Project Number
J1221

Project Title
Having Fun Burning Calories

Abstract

Objectives/Goals
The purpose of this experiment is to determine which of my typical daily physical activities burns the most calories. The three activities I chose are playing tennis, playing Wii Dance video game and walking my dog around our hilly neighborhood. My hypothesis was that playing tennis would burn the most calories.

Methods/Materials
Each activity was done for 30 minutes as measured by a stopwatch and each activity was repeated ten times over ten days. I wore a pedometer during each activity to measure the number of steps taken. This data was averaged for the ten trials of each activity, and the number of steps taken was used to calculate the calories I burned during the course of each activity using this formula: Calories burned for each activity = # of steps x 2 feet/1 step x 1 mile/5,280 feet x 0.5 calories/miles per lbs x 102 lbs (my weight)

Results
The data revealed that the average calories burned for tennis, Wii Dance and walking the dog were 48 calories, 42 calories and 62 calories, respectively. Surprisingly, and contrary to the hypothesis, walking the dog for 30 minutes in my neighborhood burns more calories than playing tennis or playing Wii dance.

Conclusions/Discussion
To put these results in the context of my daily life, I compared the calories contained in the snacks I buy in school, like Funyuns and apples, to the calories I burned in the three activities tested. Amazingly, according to my results, I would have to play 4.5 hours of tennis to burn off one bag of Funyuns (390 calories). An apple (50 calories) however, would take about a half hour of tennis to burn off. There are many other interesting comparisons I have made with other foods I eat. I hope to make healthier food choices as a result of this eye-opening project. As our nation struggles with a childhood obesity epidemic, hopefully this and similar projects can have a positive impact.

Summary Statement
My project is about appreciating how many calories my daily physical activities burn and using this information to make healthy snack choices.

Help Received
My dad helped with some of the calculations; my mom helped me with the poster board.