CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Malak J. Alamad

Project Number
J1301

Project Title
To Breastfeed or Not to Breastfeed

Abstract

Objectives/Goals
I wanted to find out if healthy full term children between the ages of 10 and 12 who were breastfed for the first six months of their life are smarter than healthy full term children between the ages of 10 and 12 who were formula fed for the first six months of their life.

Methods/Materials
1.I will need sixty full term healthy children between the ages of 10 to 12, thirty females and thirty males. For each group, 15 subjects who were exclusively breastfed for the first six months of their life, and fifteen who were exclusively formula fed for the first six months of their life.
My method of sampling was Stratified Random Sampling, where the population was divided into four strata, breastfed male ages 10-12, formula fed male ages 10-12, breastfed female ages 10-12 and formula fed females ages 10-12. Within each stratum any member had the same chance of being included in the sample.
2.Sixty Signed forms from the parent of each child approving to give the test to their child.
3.A standardize intelligence test appropriate for ages 10 to 12.
4.A quite place for each child to take the test at.
5.A chart to convert the results of the test into Intelligence Quotient for each child.

Results
I drafted graphs for the I.Q.s of the breast fed children and of the furmula fed children and compared my results. I found that healthy full term breastfed children are smarter than their formula fed peers by an average of (8) I.Q. points.

Conclusions/Discussion
I hypothesized that breastfed children would be smarter, and my hypothesis was right! Breast milk contains the ideal ratio of fats, amino acids and other nutrients that baby needs for brain and nervous system development. These ingredients provide the ideal basis for the "hard-wiring" component of a person's intelligence. So the correlation between breast feeding and intelligence is that breast feeding allows the child to reach a higher genetic potential of intelligence. Other factors in nature also help a child to reach a higher genetic potential, and that was clear in the high I.Q. scores that were scored by the formula fed children. It is important to note that in breastfed children whose genetic potential for intelligence is at an average, breastfeeding will not allow them to have a higher I.Q., it will only help them reach the maximum potential. That too is clear in the low I.Q. scores that breast fed children scored.

Summary Statement
The effect of breastfeeding on intelligence.

Help Received
Mother helped to double check the I.Q. test corrections .

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Grace P. Ali

Project Number
J1302

Project Title
Effects of Sound on Blood Pressure

Abstract

Objectives/Goals
Noise pollution is displeasing sound created by humans, the environment, or machines that disrupts the balance or activity of human life. The experiment was designed to see if exposure to different decibel levels of different sounds would affect blood pressures and pulses of people tested. The tested hypothesis was if high decibel sound levels are listened to, then a person#s blood pressure and pulse will rise because the sound will cause effects on their circulation.

Methods/Materials
A Decibel meter, CD player/radio, an electronic sphygmomanometer, a tape measure, consent form, classical CD song, a rock CD song, and a chair were used.
An informed consent form was reviewed and signed by each person who participated. To test the hypothesis, a chair was placed sixty centimeters from a CD player/radio. One static radio station and the two CD songs (see materials list) were selected. A decibel meter was used to read the decibel level of each sound used. Safe volumes for hearing were used. To figure out the pulse and blood pressure of each person, an automatic electric sphygmomanometer was used. Blood pressure was taken at baseline and after each exposure to sound.

Results
The results supported the hypothesis. However, those who were tested reported that the static sound was most annoying, but their blood pressures and pulses were not affected by this as much. This may be because the static was steady compared to the way the other sounds varied. Also, males and females were affected differently by different sounds.

Conclusions/Discussion
In conclusion, the hypothesis was not wrong. Certain sound levels do affect a person's blood pressure and pulse. The decibel levels of particular sounds and noise pollution exposures can affect people. Protection from sound is important because it not only protects ears, but it protects people's blood pressures and pulses. Different sound exposures may affect men and women differently. All of these findings can have important application in work and leisure settings.

Summary Statement
The project was about the affects of different sounds on people's blood pressures.

Help Received
My father and my mother helped me with typing. Certification of compliance of research involving human subjects certified by science teacher, Mr. Umezu, and advisor. My father was also my advisor.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Erin N. Beebe

Project Number
J1303

Project Title
A Stretch in Time: The Effect of Aging on Flexibility

Abstract

Objectives/Goals
The objective of my project was to find out how flexibility is affected by age. I also wanted to know how frequency of stretching impacts flexibility in different age groups.

Methods/Materials
I measured five age groups (6-8, 11-14, 18-25, 40-50, and 65+ year-olds) with thirty people in each group. First I had every subject fill out a survey about how often they stretch and exercise. Next I measured their degree of flexibility on four different muscles groups (legs, arms, back, hips) and gave them a score for each one. Then I found the average flexibility score for each muscle group and each age group. I also compared the flexibility of people in the three older age groups who stretched 2 or less times a week with people who stretched 3 or more times a week. I did not do this for the two younger age groups because there was not enough variety in how often they stretched.

Results
On average, the 6-8, 11-14, and 18-25 year-olds did not have significant differences in overall flexibility. The 40-50 year-olds were definitely less flexible than the younger groups, but not by a ton. However, the decrease in flexibility of the 65+group was very significant. According to the surveys, all of the age groups stretched a median of 1-2 times a week except for the 11-14 year-olds who stretched a median of 5 or more times a week. While the 40-50 and 65+ year-olds stretched the same number of times as the 6-8 and 18-25 year-olds, they were much less flexible. When I looked at the effect of stretching frequency on flexibility in the different age groups, stretching really increased flexibility in the 18-25 year-old group, had a smaller effect in the 40-50 year-old group, and did not seem to improve flexibility in the 65+ group.

Conclusions/Discussion
Overall, the results of my project did support my hypothesis that flexibility decreases with age. However, I had expected that flexibility would decrease significantly with each older age group. Instead, there was no significant decrease in flexibility until the 40-50 year-old and 65+ age groups. I also found that flexibility was increased more by stretching in the younger adults than in the older subjects. A follow-up study could explore different ways such as massages, exercise, diet or more intensive stretching to help older people become more flexible.

Summary Statement
My project is about how flexibility is affected by age.

Help Received
My parents drove me around to measure subjects and showed me how to make graphs in Excel.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Page B. Benoit

Project Number
J1304

Project Title
They're Not Sticking! A Study of Gender Responses to Frustration

Abstract

Objectives/Goals
My objective was to determine if there is a difference in the way males and females respond to frustration. Based on my research and observations, I predicted that there would be a difference. I thought males would respond more aggressively and females would respond more subtly, without aggression.

Methods/Materials
Using nails, I made a grid of 16 electromagnets. I attached switches to two so I could switch the polarity. Using a screen to hide the wiring and switches, I asked 15 males and 15 females to copy a pattern by placing paper chips on the electromagnetic nail heads as many times as they could in three minutes. Every 10 seconds, I reversed the polarity on one of the electromagnets so a paper clip would fall, making it impossible to complete the task. Each subject was videotaped and responses were analyzed, using 7 categories.I calculated the frequency of occurrence in each category by gender and performed a chi-square analysis, with the help of a psychology professor, to see if the differences were statistically significant.

Results
My test results showed that boys and girls responded to frustration more alike then they did differently. Although there were some differences in seeking clarification, giving up, persistence, positive responses and subtle postural responses, these differences were small and not statistically significant. This meant that the differences were due to chance and not necessarily due to gender differences. The two categories where they did respond differently were aggression and new methodology. In both categories, boys had a higher percentage of response behaviors. These were statistically significant differences which meant that the differences were due to gender.

Conclusions/Discussion
My hypothesis was supported. Boys responded with more aggressive behavior then girls. Girls did not respond aggressively; they responded in subtle non-aggressive ways. Boys also sought new methods more often then girls. The results of this experiment are important because if people understand how they respond to frustration, they can overcome it more easily. Teachers and parents can help students learn positive new ways to deal with frustration so goals can be achieved and learning can continue.

Summary Statement
This project studied gender responses to frustration in adolescents.

Help Received
An electrician helped problem solve how to reverse the polarity of electromagnets, Dr. Myers at Humboldt State University helped me do a chi-square analysis, mother helped type

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Madeline A. Clark

Project Number
J1306

Project Title
How Do Age and Gender Affect Resting Heart Rate?

Abstract

Objectives/Goals
My objective was to determine if age or gender affects the speed of a human's resting heart rate. I thought age and gender would affect it and I thought younger children would have faster resting heart rates, because they are constantly moving. Also, the blood has less distance to travel, just like females to males. They are generally smaller than males so their blood will have less distance to travel.

Methods/Materials
My subjects consisted of fourteen subjects, seven females and seven males, from each of the four categories that I am tested: first grade, eighth grade, 25-35 years, and 45-55 years. I toke each of the subject's pulses after they sat for five minutes, therefore I collected their resting heart rate. I compared and analyzed my data to see if age and gender affects resting heart rates.

Results
The 1st grade's data ranged from 58-112 beats per minute, the males' average resting heart rate was 92.2 beats per minute, and the females' average was 83.8 beats per minute. The 8th grade's data ranged from 56-104 beats per minute, the males' average resting heart rate was 82.6 beats per minute and the females' average was 72.4 beats per minute. The 25-35 age group's data ranged from 50-78 beats per minute, the males' average resting heart rate was 66.1 beats per minute and the females' average was 65.6 beats per minute. The 45-55 age group's data ranged from 52-68 beats per minute, the males' average resting heart rate was 58.7 beats per minute and the females' average was 62.9 beats per minute.

Conclusions/Discussion
My data seem to indicate that my hypothesis was partially incorrect and partially correct. I hypothesized that females would have a higher resting heart rate than males. According to my data 1st grade males had a higher average resting heart rate by 8.4 beats per minute, 8th grade's data showed that males had higher average resting heart rates than females by 10.2 beats per minute. The 25-35 age group showed males had a higher average resting heart rate, too, but only be half a beat. This may not be a significant difference, given possible error. The 45-55 age group was the only age group that seemed to agree with my hypothesis. It showed that females had 4.2 more beats per minute than males. Overall, according to my data, males generally have a higher average resting heart rate than females, not what I hypothesized. My experiment also showed older people have lower resting heart rates.

Summary Statement
My project is how age and gender affect resting heart rate, to try to answer this I tested four groups: 8th grade, 1st grade, 25-35 years, and 45-55 years, and took their resting heart rates.

Help Received
I received no help while doing this project.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Ari T. Colton

Project Number
J1307

Project Title
Is Your i-Pod as Good as a CD?

Abstract

Objectives/Goals
My project is to determine if people can hear a difference in sound quality between compressed music, and the original uncompressed file. My hypothesis is that professional musicians will rate the Uncompressed WAV file as higher quality than kids and adults; in addition I think that everyone will rate the WAV file as higher quality when compared to the highly compressed 16KBS MP3 file.

Methods/Materials
First I will take a 30 second clip from 4 different songs. Next I will convert 3 of these sections to MP3 files utilizing 3 different levels of compression quality. (320KBS, 128KBS, and 16KBS) As a control I will have one song that is only in WAV format. After this, I will create 4 pairs of recordings with each reformatted song next to its original file. Finally, I will play these pairs of songs to 62 participants, and have these participants rate each clip#s sound quality on a scale of 1 to 4.

Results
Based on my data, 91% of the children, 75% of the adults, and 100% of the professional musicians rate the WAV file as higher sound quality than the 16KBS MP3 file. 14% of the children, 32% of the adults, and 9% of the professional musicians rated the WAV file as higher sound quality than the 320KBS. On the third track 41% of the children, 41% of the adults, and 32% of the professional musicians, rated the WAV file as higher sound quality than the 128KBS song. Finally, 86% of the children, 89% of the adults, and 67% of the professional musicians rated the two identical WAV files differently.

Conclusions/Discussion
From my data I can conclude that my hypothesis is half correct. The professional musicians did not rate the WAV files significantly higher than everyone else, but nearly everyone rates the 16KBS lower than the WAV.

Summary Statement
My Project is to Test if People can hear a difference beetween compressed and uncompressed music files

Help Received
Parents and Teachers proofread everything

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Casey M. Cousineau

Project Number
J1308

Project Title
How Will You React?

Abstract

Objectives/Goals
While it is already known that distractions can affect a person's reaction speed, my project sought to verify that a person's reaction time is decreased while talking on a cell phone, and to quantify the amount of that decrease. By testing subjects' reaction times both on and off the cell phone, I was able to determine the impact cell phones have on a subject's reaction time. My goal is to use the results of my tests to educate people on the dangers of talking on the phone while driving.

Methods/Materials
The 30 participating subjects were all humans between the ages of 8 and 70. Each subject was given two distinctive reaction tests -- the BBC Sheep Dash reaction test and a "Ruler Drop" test. Each subject had to complete each test once while talking on the phone, and once while not on the phone.

Results
In both the BBC Sheep Dash reaction test and the Ruler Drop reaction test, the average speed of a subject's reaction time in seconds, was slower when she was talking on the phone. When the subjects were not talking to someone on the cell phone, the average reaction time was noticeably faster.

Conclusions/Discussion
My hypothesis states that while on the phone, a subject will take longer to react to something than when he or she is not on the phone. I found that while talking on the phone, subjects had worse reaction times than when they were not engaged in conversation, thus supporting my hypothesis. My project establishes that even when one thinks they have mastered the art of "multi-tasking," virtually any task becomes more difficult when the subject is engaged in a phone conversation.

Summary Statement
How much impact does a cell phone conversation have on a subject's reaction time.

Help Received
My project required the help of several "helpers" who engaged my subjects in conversation. In addition, my teacher Ms. Kaufman provided guidance in structuring the report and my research. Then, my Mom gave the written report a final proofread (for typographical errors.)

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Jeremy Fukushima

Project Number
J1309

Project Title
Sugar or Not: Cereal Effects on Blood Glucose

Abstract

Objectives/Goals
To determine if certain cereals or oat meals affect the blood sugars in non-diabetics.

Methods/Materials
Materials:
8 different measured cerals or oatmeals with measured milk or water
9 volunteers (all non-diabetics)
Blood sugar meters, alcohol pads, lancets
Methods:
Each Person tested each cereal at least once or twice
Control - each person obtained 10-12 hour fasting blood sugar
Specified amounts of cereal and milk or water were consumed.
Blood Glucose Measurement performed one hour after the last bite of cereal.
No exercise between the last bite of cereal and the blood glucose measurement.

Results
The best average was a small 4.5 increase in blood glucose for the Cream of Wheat. The worst average blood glucose was a 22.67 increase for Frosted Flakes. There was no cereal that had a consistent low blood glucose or very high blood glucose effect on each volunteer.

Conclusions/Discussion
Non-diabetics should be able to regulate their blood glucose independent of the amount or type of cereal consumed. However, I discovered that there were many changes in blood sugars due to the different types of cereals. The "healthy" cereals did not produce the best sugars. There was not one cereal that produced the best sugars for all the volunteers. Examination of complete nutritional facts such as carbohydrates, fats, protein, and calories for each cereal resulted in possible reasons for higher blood sugars. The sugar content alone was not the only indicator to cause high blood sugars.

Summary Statement
To determine if certain cereals or oat meals affect the blood sugars in non-diabetics.

Help Received
Mother, certified diabetic educator, trained volunteers (mostly pharmacists) to take proper blood sugar tests or performed tests herself for the volunteers.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Sanjna Ghanshani

Project Number
J1310

Project Title
Association between Heart Disease Risk Factors and Elevated CRP Suggests Lifestyle Changes May Well Avoid Statin Drugs

Abstract

Objectives/Goals
A recent report in NEJM revealed that apparently healthy people with normal cholesterol but high levels of C-reactive protein (CRP) in their blood can significantly reduce their risk of heart attack by taking cholesterol-lowering statins. CRP is produced by the liver in response to inflammation and there is overwhelming evidence that atherosclerosis, hardening of the arteries which leads to heart disease, is an inflammatory disease. Though high CRP levels are linked to atherosclerosis, it is unknown whether CRP is merely a sign of cardiovascular disease or if it involved in causing disease. I wanted to determine the prevalence of elevated CRP in the population and investigate its association with known risk factors for heart disease such as high blood pressure, diabetes, obesity, high cholesterol, tobacco/alcohol use, and lack of exercise. Even in seemingly healthy people there is likely to be a correlation between high CRP levels and these risk factors.

Methods/Materials
Blood was drawn by a certified phlebotomist from consenting volunteers. Information about each donor#s physical state (height/weight/waist circumference), medical history (health condition/medications), and lifestyle (exercise/alcohol consumption/cigarette use) was also collected in a questionnaire. Following separation, serum from each sample was run in a commercially available high-sensitivity CRP assay along with 6 standards with known quantities of CRP. Based on a reference curve, the amount of CRP in the serum of each donor was determined and plotted against all of the risk factors for cardiovascular disease.

Results
CRP levels were noted to be elevated in adults with a history of high blood pressure, high cholesterol, diabetes and those who were overweight (high BMI) and had abdominal obesity (large waist circumference). Individuals consuming alcohol at least 1-2 times/week had relatively lower CRP levels. At least in this test population, no correlation between high CRP levels and smoking or physical inactivity was apparent.

Conclusions/Discussion
Though this study represents a small sampling of the general population, there is a trend of higher CRP levels in individuals at higher risk of cardiovascular disease. Thus, it may be more prudent to treat those risk-factors aggressively or modify one#s lifestyle before committing someone to life-long statin therapy which is expensive and has potential for adverse side-effects.

Summary Statement
The observed association between modifiable risk factors for heart disease and elevated C-Reactive Protein (CRP) suggests that a healthy lifestyle could keep CRP levels in check and avoid dependence on prolonged statin therapy.

Help Received
Serum from human donors as well as their medical history was provided by Dr. Menal Borsada at San Judas Medical Clinic, LA. My father purchased the high-sensitivity CRP assay kit from BioCheck, Inc. Use of small equipment and the microplate reader was facilitated by Ms. Ramilla Lewis at Allergan.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Matthew L. Honig

Project Number
J1311

Project Title
The Law Is Hands Free, Is Your Safety a Guarantee?

Abstract

Objectives/Goals
The purpose of my experiment was to determine if talking on a hands free cell phone effected drivers motor skills. I hypothesized it would negatively effect them because it is a distraction. The problem I#m addressing is the increase of drivers using a cell phone while in the car. I believe the solution lies in informing drivers of dangers associated with cell phone use and passing legislature against it.

Methods/Materials
To test my project idea I bought a realistic steering wheel and driving pedals that I could connect to my Play Station Two, and that were compatible with the driving simulation game, Gran Turismo Three. The first thing I had my test subjects do was sign the consent form, then I would allow them a thirty second warm up to become familiar with the game. The first part of the test, the subject drove around a course for a minute with no distractions, then I would record how well they did in these categories, speed(50-65 mph), if they were able to stay on the road and avoid collisions. I would then have them play at a similair track, but while equipped with a hands free cell phone and talking to one of my assistants who had a scripted conversation. I then recorded the second set of data and compared the results.

Results
When I concluded my research I found that the middle age group 17-29 had done the best. They averaged 16 times off the road, 11 collisions and 14 times outside the speed limit while on the phone. Next was the younger age group, 12-16 year olds. They averaged 20 times off the road, 13 accidents and 15 times outside the speed limit. Last was the eldest age group consisting of people of thirty years of age and above. They averaged 27 times off the road, 18 collisions and 27 times outside the speed limit. I believe my test was an accurate depiction of how driving while talking on a hands free cell phone impairs drivers from performing as well as they can while on the road.

Conclusions/Discussion
These test results prove my hypothesis. The data I gathered supports my hypothesis because I was unable to find any studies done on this subject. But with the aid of these results I have reliable proof.I believe that my data is very reliable because I followed a strict scripted procedure and I had a large test group of 102 subjects. In all of my data I saw similar results in every test save for two. Both of those tests were major outliers in my data.

Summary Statement
My test was focused on finding out if talking on a hands free cell phone impares drivers abilities and if so how much.

Help Received
I was able to comolete this project completely independently.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Bethany J. Johnson

Project Number
J1312

Project Title
Just Keep Swimming: A Study of Asthma and Swimming

Abstract

Objectives/Goals
This project was designed to answer the question whether swimming competitively is helpful in reducing the effects of asthma in children aged 11 to 13. Some research suggests that the controlled breathing, cardiovascular fitness, and moist environment involved in swimming may improve lung function, even in asthmatics. Other research, though, is showing that chlorine exposure may be causing asthma or worsening its effects. I wanted to find out which was true.

Methods/Materials
A water displacement method was used to measure the lung capacity of the subjects. This included a one-gallon milk jug, marked at 250ml levels, flexible irrigation tubing, an elbow coupler and a straight coupler, a large plastic basin of water, and a bathroom scale and measuring tape to find the body surface area of each subject. The students were asked to take in a deep breath and blow the air completely out of their lungs into the tube which was placed inside the jug, submerged in water. The volume of water that was forced out was recorded and the process repeated two more times. The results were compared to predicted lung volumes for the person, based on body surface area.

Results
The results showed that swimming does appear to improve the lung capacity of the swimmers, even when asthma is present. 58% of swimmers performed above their predicted capacities, but only 7% of non-swimmers did. 87% of asthmatic swimmers performed above the prediction, and only 33% of asthmatic non-swimmmers did.

Conclusions/Discussion
The sport of competitive swimming appears to have a beneficial effect on the lung function of middle school students, even if they have asthma.

Summary Statement
This is a study comparing the lung capacity of swimmers, both with and without asthma, with non-swimmers, with and without asthma.

Help Received
Mother helped with typing and obtaining some parent permission slips. Father helped cut the tubing, explained the math formula and assisted with set up of Excel.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Jennifer Lam

Project Number
J1313

Project Title
6th, 7th, 8th Grade FVC Living with Smokers/Non Smokers: How Much Air Can You Force Out of Your Lungs?

Abstract

Objectives/Goals
My objective was to determine whether living with a smoker or non-smoker affects your forced vital capacity.

Methods/Materials
1. Gather all necessary materials needed for the experiment.
2. Select students to get tested.
3. Make sure that the students understand, fill out, and return the survey.
4. The selected students will get tested with the Spirometer.
5. Record name, age, gender, height, and weight of each student.
6. Turn on the spirometer. Insert the subject's details; age, height, weight, and gender. Insert a mouthpiece to the head house of spirometer and make sure it is tightly fitted. Apply nose clip on subject. Have the subject lean forward and insert the mouthpiece to their mouth and have them hold the spirometer with one hand. Press FVC symbol to start the test.

Results
From my experiment, I found that for 6th grade, they had the least amount of students living with smokers so they had the highest forced vital capacity. For 7th grade, they had the mid-range of students living with smokers, but they had the lowest forced vital capacity. Finally, for 8th grade, they had the highest amount of students living with smokers, but they had a mid-range forced vital capacity between the other two grades.

Conclusions/Discussion
By doing this experiment, I found that my hypothesis was partially right. I learned also that many other factors that can easily change my results and the results can change from a day to day basis. It also helped me learn about social/behavioral science because most students with an exception of a few lived with smokers and interact with them that it can be harmful to their health.

Summary Statement
My experiment was to test the students from each grade level to compare whether living or not living with a smoker affects your forced vital capacity.

Help Received
For my science fair project this year, my science teachers helped me decide which course to take in my project and helped me revise my work.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Phillip C. Lucero

Project Number
J1314

Project Title
The Rhythm of Life

Abstract

Objectives/Goals
My project was to identify how someone's extra curricular activities correlate to their senses of rhythm.

Methods/Materials
I exposed 10 diffeent test subjects to 4 different tests. My project will require me to test many people to determine their Sense of beat. I will test people who do many different types of activities. I will try to determine any correlation between the activities and their sense of beat. I will test their sense of beat by having them go through a series of tests. Some of which include: How precisely they can detemine the length of one second, what their score is on an easy rock band drum piece. (This will test how well they will be able to keep a repeating pattern with hand-eye-correlation.) Also, I will test their ability to listen to, and then minic easy rhythms. Once they complete the test, I will total up all their scores, Based upon those scores, I will give them a number rating (1-10) which is representative of their sense of beat. I will put all the scores/numbers in a graph and interoperate the correlations between their activity and their sense of beat.

Results
Those of my test subjects who were involved in some type of music and /or soccer had the highest scores and those who were involved with basketball had the lowest scores.

Conclusions/Discussion
My conclusion is that because the soccer players had many long practices and in most cases, busy schedules that they kept to, their sense of rhythm increased. This leads me to beleive that backetball does not require the level of rhythmic technicality that soccer does.

Summary Statement
How a person's extra activity correlate to their sense of rhythm

Help Received
none/ first time completing a science project with out help from my parents.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Stephanie S. Manson-Hing

Project Number
J1315

Project Title
Now You See It, Now You Don't!

Abstract

Objectives/Goals
The objective of my science project is to explore how the perception of objects, using peripheral vision, is affected by the objects' color.

Methods/Materials
I tested ten people from two different age groups: 30-60 year old adults and 13-15 year old adolescents. Using a vision protractor I designed and created myself for the project (made out of foam core), I tested which out of the colors blue, red, yellow, and green was percepted easiest and at the earliest degree on the protractor. Each person must focus on a pin in their direct line of central vision (90 degree mark on the vision protractor) thus forcing them to use their peripheral vision to detect the different, nickel sized, colored objects. I tested both eyes/sides of peripheral vision in my experiment.

Results
After gathering together my data, I concluded that the object colored yellow, for both age groups, was detected earliest and was easiest to see. For the 13-15 year old age group, the average perception was 9.5 degrees and the average for the 30-60 year olds was 11 degrees. I also figured out that green was the most difficult color of object to recognize. The younger age group recognized the objects earlier in general (with all four colors) by about 2-4 degrees on both sides.

Conclusions/Discussion
My hypothesis: If I test peripheral vision using the colors blue, red, yellow, and green, then the brightest color, yellow will be detected earliest and easiest out of the four colors, was proven correct by my experiment#s data. Yellow is the closest out of the four colors I tested with to the color chartreuse, the easiest color for the human eye to see. I discussed these kinds of facts with my optometrist before forming a hypothesis and experimental procedures. Since peripheral vision is used a great deal when a person is driving, yellow street signs would be a good idea if something important should be displayed. In my city I have noticed most directions and signs on the highway bridges and overpasses are green, which might seem illogical because of my data, but there is no way to link the variables I tested with peripheral vision to that of central vision.

Summary Statement
My project is about how the perception of objects, using peripheral vision, is affected by the objects' color and which color is percepted easiest and earliest in a humans span of vision out of blue, red, yellow, and green.

Help Received
Father helped cut faom core; Optometrist Dr. Wendy Santizo answered a few basic questions in a short interview.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Andrew R. Mitchell

Project Number
J1316

Project Title
Now You See It, Now You Don't! Does Age Affect the Size of a Person's Blind Spot?

Abstract

Objectives/Goals
My objective was to determine if age affects the size of a person's blind spot. I predicted that as age increased, the size of a person's blind spot would increase.

Methods/Materials
Fifteen male test subjects, five from each age group (5-15 years old, 25-40 years old, and over 50 years old), were given blind spot tests to determine the size of their blind spots on paper. This was done by having each test subject stand across from a piece of paper, close his right eye, and focus his left eye on a dot on the right hand side of the paper. As I slid a pencil from left to right across the paper, the test subject told me when the tip of the pencil disappeared and reappeared. I marked these points and then measured the distance between them. The size of the test subject's blind spot on paper, and the distance between the test subject's eyes and the paper, were entered into a computer spreadsheet. A calculation was then performed to determine the diameter of the test subject's actual blind spot on his retina. An average blind spot size for each age group was then calculated.

Results
The results of my testing showed that the 25-40 age group actually had the largest average blind spot of 1.201mm, while the oldest age group, 50 and over, had the smallest average blind spot of 0.999mm. The 5-15 age group had an average blind spot of 1.092 mm.

Conclusions/Discussion
I predicted that the size of a person's blind spot would increase with age. However, my experiment did not prove my hypothesis to be true. The oldest age group actually had the smallest average blind spot size.

Summary Statement
My project is about whether age affects the size of a person's blind spot.

Help Received
My mother helped me proof read my final report and helped me arrange my display board.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Meredith V. Monke

Project Number
J1317

Project Title
Free Weights Does Bicep Size Indicate Endurance?

Abstract

Objectives/Goals
My objective was to learn if bicep size affected an adolescent girl's endurance by using a free weight. I believed that the larger the bicep size, the more repetitions would be performed.

Methods/Materials
A five-pound free weight, measuring tape, information sheet, and release forms were the materials I used in my project. Twenty-five female adolescents between the ages of 9 and 14 were tested. Their bicep size was measured using a measuring tape, and then I counted how many times each participant could lift the five-pound free weight.

Results
Participants with a bicep size from 19 to 25 centimeters all did between 15 and 60 repetitions. When participants had smaller arms, they didn#t do very many repetitions, but after their biceps got bigger, the number of repetitions performed became unpredictable. The number of repetitions performed became more variable after bicep sizes exceeded 26 centimeters.

Conclusions/Discussion
In adolescent girls, bicep sizes ranging in 19 to 25 centimeters may indicate endurance.

Summary Statement
My project was to determine if bicep size indicated a person's endurance.

Help Received
Teacher helped with writing; parents helped with testing; people who were tested; principal provided materials

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Healey Montague-Alamin; Talbott Paulsen

Project Number

J1318

Project Title

Wii vs. Real Life

Abstract

Objectives/Goals

Although many people have bought into the marketing that Wii can "make people fit" and "help people lose weight", using heart rate as a measure of exercise level, we tested the following:
1. Do Wii sports video games raise your heart rate to an exercise target heart rate?
2. Do they raise your heart rate as high as doing the activities for real?
3. If not, can you get your heart rate closer to playing the sports for real if you play the Wii Sports video games more vigorously?

Methods/Materials

We took the pulse of students while 1) resting, 2) playing Wii tennis and baseball at an average level by using a "flicking" motion to play, 3) playing Wii tennis and baseball vigorously, and 4) playing tennis and baseball for real. Student pulses were recorded and compared to each other and to target heart rates for kids their ages.

Results

The average student's heart rate did not go up as much when playing Wii Sports as it did when playing the real sport. However, you can raise your heart rate more if you play Wii Sports more vigorously. Wii Sports did not raise heart rates to an "exercise" level in most cases, either when played at an average level or played vigorously. Most students reached exercise heart rates when playing the sports for real though.

Conclusions/Discussion

If you're going to play Wii, you should play it vigorously to raise your heart rate more, but it's still best to play it for real outside. We also learned that Wii has a very strong marketing department.

Summary Statement

We examined what happens to your heart rate when you play Wii sports regularly, vigorously or when you play the sport for real.

Help Received

Talbott's mom helped take photos and reminded us how to graph in excel. Healey's mom taught us how to take a pulse, and explained standard deviation.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Bianca Moser; Alexandria Sadlier

Project Number

J1319

Project Title

Reflexes through the Ages: Which Age Group Has the Quickest Reflexes?

Abstract

Objectives/Goals

We wanted to determine if 2nd Graders, 7th Graders or adults had the quickest reflexes.

Methods/Materials

We built a reflex testing device by creating a sturdy frame, then attached a clothes pin to the top bar from which we dropped a ruler. We released the ruler from the same height every time and the subject had to catch it. We took a measurement at the point where it was caught. We had three groups with 16 subjects each: 2nd Graders (ages 7-8), 7th Graders (ages 12-13) and adults (ages 25-70). We repeated the experiment 7 times with each subject, discarded the highest and lowest reading and calculated the average for each subject and then for each age group. We noticed a difference between males and females and calculated the averages in the same way.

Results

The adults were the fastest, but only a little bit faster than the 7th Graders. The 2nd Graders were a lot slower than the two older groups. We found that males were faster in every age group.

Conclusions/Discussion

Our hypothesis was not supported by our results, because we expected 7th Graders to be faster than adults. Reflexes seem to develop quickly through childhood (there was a big improvement from 2nd Grade to 7th Grade) and seem to keep on developing into adulthood, before it starts to decline.

Summary Statement

We tested people in three different age groups to determine how fast their reflexes were.

Help Received

Father helped with design and construction of reflex tester and creation of graphs. Mother helped to correct typing and helped with printing and layout.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Christopher A. Powers

Project Number
J1320

Project Title
Effects of Conversation on Driving

Abstract

Objectives/Goals
The purpose of my project is to find out if talking on a hands-free cell phone while driving or talking to a passenger while driving is more distracting to your driving.

Methods/Materials
I simulated my experiment by having the participants play a driving video game called Mario Kart Wii while being asked questions.The participants were either asked no questions (the control), or asked questions from a person sitting next to them, or over a cell phone.The trials were each repeated three times. I used the same race each time so as not to affect the data.I made several question sets that were a mix of riddles, math problems, spelling questions, etc. I used different question sets for each race so the participants would have to think for each trial.I also gathered many participants of different ages to see if different groups of people reacted differently. I allowed people who had never played the game before more practices than skilled players. I also mixed up the order in which the control, seated, and cell trials were done.

Results
I found that talking on a cell phone was more distracting than talking to a passenger seated next to you. The difference between the average cell and seated times is 3.9 seconds. Both the seated and cell phone trials were slower than the control (no conversation). The cell was 8.4 seconds longer and the seated was 4.5 seconds longer. I also noticed that the subject you are talking about can make a difference in how much you are being distracted.

Conclusions/Discussion
My hypothesis was correct. Talking on a cell phone was more distracting than talking to a passenger seated next to you. The difference between the average cell and seated times is 3.9 seconds. Both the seated and cell phone trials were slower than the control. The cell was 8.4 seconds longer and the seated was 4.5 seconds longer. I also noticed that the subject you are talking about can make a difference in how much you are being distracted. I learned that a cell phone and a seated conversation are not the only factors that can affect your driving. It also depends on what you#re being asked about. If you are asked what you will eat for dinner it will not distract you very much. But if someone asks you what 6000 minus 56 is, you will have a little more trouble.

So, if you are driving and your cell phone rings or your child has a question you might want to think about not answering them.

Summary Statement
My project deals with comparing the effects of distractions while driving caused by talking on a hands free cell phone and talking to a passenger in the car.

Help Received
Mother helped tape things to board; Father instructed me on how to make excel graphs for board

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Michael G. Russell

Project Number
J1321

Project Title
Are Fingerprint Patterns Similar in Twins?

Abstract

Objectives/Goals
This researcher's goal is to discover if the fingerprint patterns of twins are similar or different. If it is determined that there is a similarity in the fingerprint patterns of twins, is the similarity greater than that of non-twin siblings?

Methods/Materials
Materials: black ink pad, white unlined note cards, hand-held magnifying glass

Procedures: (1) Obtain the fingerprints of 15 sets of twins and 15 sets of non-twin siblings; (2) Analyze the fingerprints with a hand-held magnifying glass

Results
This researcher's hypothesis stated that 85-90% of the twins tested would have at least a 60% similarity rate (that is, three out of five prints), compared to only 65-70% of the non-twin siblings tested. The results of this experiment show that only 80% of the twins tested have at least a 60% similarity rate, compared to 73% of the non-twin siblings tested. However, when separated into two groups, identical twins have a 100% similarity rate and fraternal twins have a 73% similarity rate.

Conclusions/Discussion
The identical twins had an average of 4 similar prints, the fraternal twins had an average of 3.36 similar prints, the identical and fraternal twins combined had an aveage of 3.53 similar prints, and the non-twin siblings had an average of 3.2 similar prints. There is great similarity in the fingerprint patterns of all family members due to shared DNA, but the greatest similarity is with identical twins because they come from one egg and share all of their DNA.

Summary Statement
Twins have a greater similarity in their fingerprint patterns than non-twin siblings, but only when identical twins and fraternal twins are combined together.

Help Received
My mom helped with the editing and typing of my project.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Justin R. Scott

Project Number
J1322

Project Title
Down with Diabetes

Abstract

Objectives/Goals
I am testing if Body Mass Index (BMI) in non-obese adolescents is related to the rise in blood glucose levels two hours after a high carbohydrate intake. I hypothesize that the adolescents with higher BMIs will have a higher rise in blood glucose levels.

Methods/Materials
After obtaining informed consent, I interviewed 19 adolescent test subjects regarding family history of diabetes and number of sports played. I obtained height and weight data for calculation of their BMI. They had a fasting fingerstick blood glucose level checked and were given 75 gm of glucose in the form of grape juice. Two hours later, another glucose level was obtained and the difference between the fasting and 2 hr. glucose was recorded.

Results
The adolescents with a BMI of 21.0 to 24.9 had an average rise in glucose levels of 19.5 mg/dL after the two hour period. Those with a BMI of 19.0 to 20.9 had a rise of 8.0 mg/dl, BMI group of 17.0 to 18.9 had a rise of 12.6 mg/dL, and BMI group of 15.9 to 16.9 had a rise of 9.5 mg/dL. Thus, those with the highest BMI had a rise in glucose level 6.9 to 11 mg/dL greater than the other groups. However, there were some adolescents in the 15.9 to 17.0 BMI group with some large increases in glucose levels. To investigate this disparity, the subjects were grouped by the number of sports each played. The adolescents who played no sports had an average difference in glucose levels of 21.67 mg/dL, those who played one sport averaged 11.3 mg/dL, two sports averaged 5.0 mg/dL, and 3 or more sports had no average change in glucose levels.

Conclusions/Discussion
The data from my experiment shows that my hypothesis was correct. The test subjects with the highest BMIs did have the highest rise in glucose levels during the glucose tolerance test. Conclusively, those with a BMI over 21 had an average increase in glucose levels of over 19 mg/dL. I also gathered information about the adolescents# family history and physical activity. Unexpectedly, I found there was a strong association between the rise in glucose levels and the number of sports in which they participated. Taken with the BMI data, it can be seen that the adolescents who played the most sports had the healthiest BMI levels and best glucose responses. Therefore, measures to promote a healthy body weight and activity level could have a favorable impact in preventing type II diabetes in adolescents.

Summary Statement
My project showed that BMI in non-obese adolescents is a determinant of glucose response after a high carbohydrate intake.

Help Received
My mother, Denise A. Scott, M.D., supervised and provided the glucose testing supplies; my father helped me with my data graphs on the computer; 19 of my friends and relatives were test subjects for my experiment.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Karren E. Stille

Project Number
J1323

Project Title
Is There a Correlation Between Relative Pitch and Gender?

Abstract

Objectives/Goals
The purpose of this experiment is to determine if there is a direct correlation between relative pitch and gender.

Methods/Materials
1. Gather the necessary materials.
2. Record notes F, A, and C along with "Mary Had a Little Lamb" on a recording machine.
3. Ask a teacher#s permission to use classroom students for experiment.
4. Explain the experiment procedure to the students participating.
5. Find a quiet place to perform experiment.
6. Record gender and age of student participating.
7. Have each student try to hit the notes played, noting details in logbook.
8. Have student sing "Mary Had a Little Lamb" noting whether or not pitch was achieved.

Results
Approximately 76% of the girls achieved relative pitch in the experiment, while only 40% of the boys were able to achieve relative pitch.

Conclusions/Discussion
The hypothesis was correct. More girls were able to achieve relative pitch as compared to the boys. A possible reason is that the boys were in a younger grade level so voice maturity has not yet been reached. Some students hummed rather than sung the song. Further study results are pending as additional experiments are being conducted.

Summary Statement
This experiment is to determine if there is a direct correlation between relative pitch and gender.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Kiran Suryadevara

Project Number
J1324

Project Title
Hmm... What is That? Smell vs. Taste

Abstract

Objectives/Goals
I conducted my experiment to determine which of the two senses, taste or smell, takes less time to recognize a particular food.

Methods/Materials
Students ranging from twelve to fourteen years of age were tested by having them smell, taste (with a plugged nose), and taste with smell, various purees of fruits and vegetables, namely apple, strawberry, orange, carrot, lettuce, and corn. With the use of a stopwatch, they were timed to see how long it would take them to identify each of the purees, and also to see how accurate they were in identifying them.

Results
Students were generally able to identify the purees faster by taste than by smell, but for one exception. Carrot was identified by smell in 4.6 seconds, which was 0.4 seconds faster than the average time it took to be identified by taste. When using both senses together, students also generally were able to identify purees faster than when they used one sense at a time. This was true for all purees but lettuce, which took a longer time to be identified by taste than it did by smell.

Conclusions/Discussion
Based on the results I have gotten from my testing so far, my hypothesis that identifying a food by smell would take less time than by taste is neither proven nor disproven. This may be due to a few factors that affected my experimental procedure. To accurately prove or disprove my hypothesis, I would also test a larger sample of students which I am now currently doing with an improved procedure.

To take this experiment to a next step, one can investigate how vision plays a role in "tricking" the brain when identifying various foodstuffs with the combined senses of taste and smell. This may be able to provide insight into the psychological connection between sight, taste, and smell.

In conclusion, I hope my idea and expanded ideas of the same nature can guide scientists to learn more about the senses and how they might affect people with impairment of senses like taste and smell. With a more specific understanding of the mechanisms that may be causing altered taste and smell, like in cancer patients receiving chemotherapy treatments, one might be able to help improve their taste and smell, therefore their appetite and nutritional state.

Summary Statement
Students ranging from twelve to fourteen years of age were tested to see which of the two senses, smell or taste, is faster in identifying a particular food.

Help Received
My science teacher, Ms. Skiles, guided me throughout the duration of the project and let me use her classroom as a testing site. My parents helped me in making the purees. My friends, Christiana Taylor and Kira Weiss, helped me to set up and clean up after every test.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Joshua A. Sweat

Project Number
J1325

Project Title
Pumping Diabetes

Abstract

Objectives/Goals
The objective of my experiment was to determine which Fast Acting Insulin, Novolog or Humalog, affect's a Type 1 Juvenile Diabetic's blood sugar the best.

Methods/Materials
To conduct my experiment I had to gather all of my materials and keep both Insulin's at room temperature between 40 and 85 Degrees Fahrenheit. For four days and three nights, I had to eat a specific kind of food that I picked out to have at the same time and day as the next week. I had to log and keep track of what I ate, at what time, how many Carbohydrates I consumed, how much insulin I injected into my body through interstitial fluids by using my Medtronic Minimed Paradigm Insulin Pump, and I had to track the amount of exercise that I performed. On my four day, and three night trial the first week I was injecting Novolog Insulin. I then followed all of the same steps mentioned above and injected the second week using Humalog Insulin. To determine my results I went through my hand written logs and counted the amount of times I had Hyperglycemic or Hypoglycemic episodes with each brand of Insulin.

Results
After injecting the first week using Novolog Brand Synthetic Insulin and the second week on the four day three night trial I injected using Humalog Brand Synthetic Insulin. The results of my experiment did not support my hypothesis that Novolog Insulin would work better. Much to my surprise, Humalog Insulin reduced the amount of Hyperglycemic or Hypoglycemic episodes the best. In my experiment I showed that Humalog Insulin is a much better brand of Insulin for a Type 1 Juvenile Diabetic to help prevent Hyperglycemic or Hypoglycemic episodes.

Conclusions/Discussion
Novolog Insulin was the first synthetic insulin known to treat Diabetes Mellitus. Although Novolog Insulin is the older insulin many diabetics still use it today. In fact, there is a 7 to 4 ratio that doctors prescribe Novolog Insulin to their patients more than they do Humalog Insulin. This science project has been so amazing for me because I am a Type 1 Diabetic and I have learned so many things I never knew about Type 1 Diabetes, including all the possible complications I may face in my life, as many diabetics experience, if I do not stay on top of my medical care, but I have also learned that with good control I can live an almost normal life free of complications. This project has made me realize how much more enjoyable life can be living with Type 1 Juvenile Diabetes.

Summary Statement
My California State Science Fair project is about the affect's of Synthetic Insulin on a Type 1 Juvenile Diabetic.

Help Received
My mom wrote the final copy of my handwritten logs; Don Scott and Betty Martin helped me proofread and spell check my reports several times; California Children Services covered the cost of Glucometers, Insulins, etc.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Julia M. Thackrey

Project Number
J1326

Project Title
How Dogs Affect Blood Pressure

Abstract

Objectives/Goals
My objective was to study how being in a room with a dog affected the blood pressure of people over the age of forty, the age group at highest risk for hypertension. I hypothesized that exposure to a dog will decrease blood pressure.

Methods/Materials
The test subject was asked to sit in a chair and complete the experiment questionnaire. After a period of three minutes, the test subject's blood pressure was recorded. This established the subject's baseline blood pressure. Next, the subject was moved into the experiment room where a ten pound Bichon Frise was roaming freely. The subject was given instructions and observed. After three minutes, the subject's blood pressure was recorded. This measurement was considered the experimental blood pressure. The experiment was repeated for three different test groups in order to increase the reliability of results. Sixty two test subjects over the age of forty were tested in all.

Results
83.9% of the participants experienced a decrease in blood pressure during the experiment. 65% of the test subjects decreased their systolic blood pressure in amounts known to reduce stroke and death. Evaluating the result data using the experiment questionnaire enhanced the informative quality of the research by addressing variables affecting experiment results. For example, using the questionnaire data, it was determined that 92.6% of the participants aged 60-79 experienced a decrease in blood pressure compared to 73.7% of those aged 40-59. Results were also analyzed and compared for dog owners and non-dog owners, males and females, dog lovers and non-dog lovers, and those with a medical history of high blood pressure.

Conclusions/Discussion
The results of this research support my hypothesis, indicating that dogs can indeed lower blood pressure for many individuals. While it is true that influencing variables affect the degree of benefit, the overwhelming results of this research experiment demonstrate the possibility of improved health for many Americans. In application, using a canine companion as a non-medicinal way of lowering blood pressure has the potential of revolutionizing healthcare in convalescent homes, personal residences, and other elder care facilities.

Summary Statement
I designed this project to examine whether exposure to a dog can improve one's heart health by reducing risk for heart attack and stroke.

Help Received
St. Brigid Church allowed me to use office space to conduct my experiment.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Kana Yamamoto

Project Number
J1327

Project Title
How Does the Eardrum Affect Our Hearing?

Abstract

Objectives/Goals
To see how holes in the eardrum affect our hearing.

Methods/Materials
I built a model of the ear and made holes in the "eardrum". The vibrations of each sound were picked up by the mic element. The mic element was connected to the computer and the vibrations were recorded on to the computer. I tested 8 different frequencies and the holes were made bigger each time.

Results
There was no specific relationship between the hole's size in the eardrum and the amplitude. But it seemed that specific frequencies were better heard with varying hole sizes.

Conclusions/Discussion
There was actually suppose to be a constant result of hearing loss of some degree becuase one of the side effects of perforated eardrums, which is a disorder of having a hole in the eardrum, is hearing loss. Since i used a mic, there is a possibility that the sound itself was picked up instead of just the vibrations which made the results inaccurate.

Summary Statement
To see how holes in the eardrum affect the amplitude and frequency of audible sound.

Help Received
Father helped make model and use computer softwares

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Annie N. Zell

Project Number
J1328

Project Title
Dilation Sensation

Abstract

Objectives/Goals
The objective of this experiment was to find out if it is possible to determine how exercised an individual is by measuring how dilated their pupils are.

Methods/Materials
My experiment involved taking pictures of my participant#s eyes using a digital camera. Each time I took a photo, I measured the light going into the eye using a device called a light meter. I then downloaded the pictures on a computer, zoomed in, and measured the pupil and the iris to make a dilation ratio. First, I took pictures of my participants when they were calm at different light levels. This would be used to compare my exercise data. Next I took photos of my teammates# eyes after each quarter during a basketball game. I also had my participants do running on an elliptical machine for 21 minutes and stopped them to take photos of their eye every 7 minutes. I not only took pictures of human participants, but I also used a dog participant. The way I had my dog exercise was by throwing the ball for her 60 times, pausing every 20 throws throughout the run to take a photo.

Results
The human and dog calm pupil dilation baselines were very similar which means their pupils have about the same reaction to light. My basketball teammates# pupil average dilated 45.4% above the calm baseline before the game and close to the end it reached 56.7%. The elliptical machine exercise resulted in an increase of 46.6% above the calm baseline after 21 minutes. My dog#s pupils were dilated 19.6% above the baseline even before her exercise started and near the end of her exercise they were 60% above the baseline.

Conclusions/Discussion
After all my experimenting was done I compared my exercise data to my calm baseline to figure out how much exercise effects the dilation of the pupils. What I found in my data is that the dilation of the pupil increases as exercise increases, but I was not able to prove my hypothesis that it was possible to tell how hard an individual has exercised by measuring the size of their pupils. I conclude that the different levels of excitement and anticipation during and before exercise affect the size of pupils as well. I think this science fair project could go much further than it already has and its method could be used to identify over-exercised or stressed individuals that are at risk of asthma attacks, heart failure, or aggression.

Summary Statement
This project explores how different amounts of exercise affects the dilation of eye pupils.

Help Received
parents helped me collect the data, plot the data, edit my project backboard; borrowed a light meter; interviewed two ophthalmologists and a high school biology teacher