CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Viren R. Abhyankar

Project Number
J0701

Project Title
The Brain Beats

Abstract

Objectives/Goals
People all around the world listen to music every day. Some claim it helps them concentrate, while others claim otherwise. However, in the early 1800s, a different kind of "music" was discovered by Prussian physicist Heinrich Wilhelm Dove. This music has been labeled as "binaural beats," and the alternative medicine community claims that it can work wonders on the mind. This experiment is focused on if and how binaural beats can produce an effect on the brain and its functions.

Methods/Materials
The following materials were used in this experiment: "Brainwave (32 Binaural Programs)" app, "Memory Matches" app, ear-specific headphones, and a quiet testing environment. The participant was taken into the quiet testing environment and played the memory game three times. Then, they listened to binaural beats geared towards beta waves for ten minutes. After that, they played the game again three times.

Results
80% of the 25 participants, 80% had an improvement in their median score by an average of 18% per person after listening to the binaural beats. An improvement, in this case, means a lower timing in the memory game. 82% of the teenage group (ages 10-15) improved their median score by an average of 19% per person after listening to the binaural beats.

Conclusions/Discussion
Overall, binaural beats did have an impact on the brain. Their applications are not simply restricted to memory and concentration. These beats can be utilized for treating insomnia and other such chronic ailments. The experiment proved that more tests can certainly be conducted, and this time, these tests can be tailored for certain age groups. They also proved that a tool may be needed to see the actual measurement of the brainwave frequencies. This will show that the binaural beats are a direct cause to an increase in cognitive activity, as opposed to simply being a correlation.

Summary Statement
This project is about how sound frequencies can influence brain functions.

Help Received
My parents helped put together the board

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Jordi Bertran

Project Number
J0702

Project Title
Creating Three-Dimensional Sound Using Mono Audio Recordings

Abstract

Objectives/Goals
Movies have progressed dramatically over the years, but no one has produced inexpensive 3-dimensional sound. I love film and the process of post-production sound. The purpose of this project was to determine if I could create a program in which a user can record a sound using one microphone and alter the perceived location and distance of the sound. Based upon my research on "holophonics" and sound-localization, I believe that could create a program using C#, in which a user can record a sound using one microphone and make the sound three-dimensional by varying the direction and the distance of the apparent sound. I believe that the sounds created to stimulate orientations within 15 meters will be recognized 95% of the time, and I believe the sound orientations simulates as 15-100 meters away, will be recognized 85% of the time. I tested a variety of people to see if the direction I tried to simulate could be correctly identified.

Methods/Materials
After performing preliminary tests to simulate distance and direction of sound on a coordinate plane, I created a program using C# that would allow someone to record a sound using one microphone, and create a three-dimensional sound, whose location could be easily changed. I recorded a total of 20 sounds and incorporated them into the program. I then tested 80 participants to verify the accuracy of the simulated sound location.

Results
According to my results, the program was successful in creating three dimensional sound. I tested 80 original sounds, all taken from the same distance (10 cm.) away from the microphone. I converted them all to three-dimensional sound. Each sound was simulated both between 0-15 meters and 15-100 meters away. 80 people were tested for to see whether they could identify the direction of the sound.

Conclusions/Discussion
The sounds that were simulated as 15 m away or closer in any direction were recognized 99% of the time. For the sound simulated to be between 15 m to 100 m away, the accuracy decreased slightly to 97.4%. Overall the sounds had an accuracy rate of 98.2%, which means the simulation appeared to be successful.

Summary Statement
I created a program in C# using a single microphone that could alter the human perception of the distance and location of a sound.

Help Received
Thanks to my science teacher for her guidance, and my father for helping me record the sounds.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Aidan J. Cerveny

Project Number

J0703

Project Title

Project Innocence: Effects of Photo Lineup Method on Eyewitness Reliability

Abstract

Objectives/Goals

Faulty eyewitness testimonies are the leading cause of false convictions in the United States. There are two primary photo lineup methods used by police: sequential (six photos shown one at a time) and simultaneous (all six photos shown at one time). I wanted to which method would provide better accuracy in identifying the correct suspect. Based on my research, I believed that the sequential lineup would result in more correct answers than the simultaneous lineup. I came to this conclusion because of the different ways the brain recalls information, with absolute memory being found to be more reliable than relative memory.

Methods/Materials

I conducted my testing on 222 students in two different college classes. For each test, the suspect disrupted the class with a fake pizza delivery, staying for a minute or two. Thirty minutes later I came into the class and ran the lineup tests; the simultaneous test in the first class, and the sequential test in the second class. All participants were given consent forms, testing forms and brief instructions to choose the suspect from the lineup. The primary materials were the photo lineups I created in PowerPoint and a computer with a projector to display them to the class.

Results

My results did not support my hypothesis. In my experiment, the simultaneous lineup produced more correct answers than the sequential lineup. The sequential lineup had an accuracy rate of 44% with 64 out of 146 test subjects correctly identifying the suspect. This is 14% less than the simultaneous lineup, which had a total of 58% or 44 out of 76 test subjects who answered correctly.

Conclusions/Discussion

I believe these results may have been due to the fact that the subjects knew the suspect was definitely in the lineup so they used the process of elimination. By being able to directly compare the photos, they may have been able to eliminate some, leaving them only a few choices left. This may also explain the more narrow range of answers chosen in the simultaneous lineup; 92% of those test subjects chose either the correct suspect or the second most commonly picked photo. In the sequential test, the participants were comparing each photo to the one in their mind, but maybe because they only saw the subject briefly and not in a criminal act, the subject#s face did not get stored into short-term memory.

Summary Statement

I was testing to see whether the simultaneous or sequential photo lineup method would produce a higher eyewitness testimony accuracy rate.

Help Received

Dad acted as suspect; Mom helped with board layout; Dr.Rebekah Wanic at UCSD let me use her classroom and students as subjects.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Tara L. Cole

Project Number
J0704

Project Title
Can You Pass an Eighth Grade Science Quiz?

Abstract

Objectives/Goals
To find out if adults with different levels of education could pass an 8th grade science quiz with a score of 70% or better.

Methods/Materials
I used a basic 8th grade science quiz I found online

Results
Adults with higher levels of education generally did better on the quiz

Conclusions/Discussion
Not one person was able to score 100% on the quiz. It was very difficult to find adults that were willing to take the quiz. I found out that even adults are nervous to take a pop quiz. Many were actually embarrassed that they did not pass.

Summary Statement
Did higher level of education make a difference in passing an 8th grade science quiz

Help Received
Grandmother helped me with the placement of materials on the board

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Ilan E. Cosman

Project Number
J0705

Project Title
See the Force: Can Vision Help Tactile Memory?

Abstract

Objectives/Goals
The objective is to see how accurately people can remember and reproduce a specific force level when they push on a deformable object where they can see the indentation, or on a hard object that has no indentation.

Methods/Materials
Informed consent was obtained from 36 subjects. Each subject (randomly assigned to moderate or heavy force) grips a hand exercise device that requires a particular force. The subject then tries to remember and reproduce that force five times on a hard object (table) and five times on a deformable object (squeeze ball). The order is randomized. A fingertip pressure sensor records the force exerted by the index finger. The average force for each push is calculated, and the variance of the five values for each object is used as a measure of repeatability. A one-tailed paired t-test was used to compare the squeeze ball data and table data, and an unpaired t-test was used to compare the moderate and heavy force data.

Results
I found that forces are repeated more reliably for the deformable object ($p < 0.01$). The comparison of moderate vs. heavy force provided some evidence that people are more consistent when trying to repeat a moderate force than when they try to repeat a heavy force ($p=.051$ for squeeze ball).

Conclusions/Discussion
When a person pushes on a hard object such as a table, there is the tactile sensation of pressure on the fingertip. When pushing on a deformable object such as squeeze ball, there is additionally a visual sensation (seeing the indentation) and a proprioceptive sensation (feeling the finger moving into the ball). People are more accurate in a statistically significant way at repeating force levels on deformable objects, perhaps due to this additional feedback. This may be useful for designing user interfaces and remote controls, or for providing guidance to physical therapy patients and surgical trainees.

Summary Statement
People can more accurately repeat forces when pushing on deformable objects than on hard objects.

Help Received
Brother taught me statistical tests and how to use sensors; Mom helped design posterboard

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Emily K. Cummings

Project Number
J0706

Project Title
The Placebo Effect

Abstract

Objectives/Goals
My project investigated whether changing the color of the same drink affected which drink people rated as the sweetest; I wanted to learn whether I could use people's own minds to trick them into thinking the drinks were different.

Methods/Materials
I used clear Gatorade and food dye, and I divided the Gatorade into four sections. I dyed each of three sections a different color, then gave those three drinks to my test subjects, asking them to rate which one was the sweetest. For the fourth section, my control, I gave each of them three cups of the same Gatorade that had not been dyed, and asked them to rate which one was the sweetest.

Results
Out of the colors, blue, green, and red, I discovered that red is most commonly rated as the sweetest. I believe that red was rated as the sweetest because it is associated with sweet fruits such as watermelons, raspberries, strawberries, and cherries.

Conclusions/Discussion
My hypothesis was correct. Based off of my standard deviation, my tests were very accurate. There is much debate over whether the placebo effect is real or not, and my tests indicate that it is. Given that the placebo effect is primarily used in medicine, my research is very helpful because it provides evidence that the placebo effect works.

Summary Statement
My project tests whether the placebo effect can make people think that drinks that are the same taste differently.

Help Received
Friend helped with experiment itself, science teacher advised on much of the writing.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Andrea Darnbrough; Andres Garcia

Project Number

J0707

Project Title

Memory Recall: Finding the Best Way to Memorize Terms

Abstract

Objectives/Goals

The objective is to determine if memorizing words in black text, in yellow text with a black outline, or as a naturally colored picture is more effective. We believe colored pictures will be the easiest to memorize and the black text will be the hardest to memorize.

Methods/Materials

Ten words were selected, and three sets of index cards were made with these words in black text, yellow text outlined in black, and a naturally colored picture of the word. For each card type, we tested a group that consisted of two boys and two girls between the ages of ten and twelve that had an average of 93% or higher in their overall school grades. Each group was given 30 seconds to recall words or pictures from the ten index cards shown to them in the same sequence for three seconds each. We determined the average percentage of cards memorized for each card group and compared them.

Results

Our data shows that the picture group had the highest percentage of memorized cards, with an average of 60.0% of cards correct. Following were the black text group, with an average of 55.0% of cards memorized, and the yellow text group, with the lowest percentage of 52.5% of cards memorized.

Conclusions/Discussion

Our conclusion is that students recall memory at a higher level with naturally colored pictures over reading text.

Summary Statement

Our project was to determine the most effective way for students to memorize terms.

Help Received

Our mothers helped us with scheduling appointments for the test takers, using Excel for our data analysis, editing our work, and purchasing materials for the study and the poster. Family members also helped us select the words for our project (see composition book).

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Summer M. Ellis

Project Number

J0708

Project Title

Perception

Abstract

Objectives/Goals

The purpose of this experiment is to determine how humans perceive information while external distractions take place. This study can be applied to daily life in many ways. Living in the 21st century, humans are frequently texting and listening to music. The hypothesis is, if a subject is distracted by music or texting while reading, then they will recall less information than without distractions.

Methods/Materials

To conduct this experiment we presented to the subject three narratives. Three conditions were tested: texting, background music and without distractions. We tested subjects on their recollection of the content of the narratives.

Results

We found that recollection of subjects while texting was significantly inferior to the two other groups. We performed an Analysis of Variance test to compare all three groups. Our results were significant to the .0001 level. On the other hand, subjects tested with background music and without distractions tested similarly. The average score of background music was 8.84 and without distractions was 9.12. We performed a student t-test to determine whether there was a significant difference between background music and no distraction. We found no significant difference between them.

Conclusions/Discussion

Overall, our experiment shows that it is difficult to perceive information while texting, while listening to music does not negatively or positively affect narrative recall. These results will impact our daily lives and stimulate further experimentation on effects of distractions and multitasking.

Summary Statement

Subjects distracted by music or texting while reading, impacted differently in recall.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Alexis Fastlicht

Project Number

J0709

Project Title

Is Technology Advancing Our Education?

Abstract

Objectives/Goals

For my science fair, my objective was to find out if typing notes is better than to write them down by hand. I choose this because I think it is important to know what way is more effective and better to retain information when taking notes. Everyday technology grows in our society and it is vital for us to know if it is doing us any good.

Methods/Materials

In order to figure out if note taking on the computer is effective or not, there are several experiments that must be made. In experiments like these, the correct order to accomplish an established conclusion is to get rid of all the variables and other possible ways to differ. I did this by testing 50 students from my school in grades 6 through 9. All of these students watched a Ted Talk, for about 4 minutes. Meanwhile, half of the students took notes by hand on paper, and the remaining half used their computers to take notes. Right after the video, I asked all the students factual and conceptual questions on a survey. During these questions, I payed close attention to the students answers and recorded all of their answers. Later, I calculated which notes were more effective.

Results

The total point of questions that the participants answers was 84, the group that worked by hand received a total of 52 points while computer users got 32. This means, the students who took longhand notes got a total of 62 percent as a group. In the other hand, the students who took their information and took notes on a computer received a total of 38 percent. This makes the group who took notes by hand get a total of 24% better than the others. The mean of the students who got correct answers by hand is 8.6, and the students who took notes on their computer had a total of 5.3. The median for longhand is 7 while for computer it is 6. The range for longhand is 5 and for computer users is 6. Also, the computer users had no mode of correct answers but the computer students had a mode of 6.

Conclusions/Discussion

My results proved my hypothesis right with support from evidence from the people I tested. Now, the information I collected expanded my knowledge on this subject. I have learned that taking notes is about the person you are and the way you learn. But other than that, it is also about how you take in the information that is given to you and what you do with it.

Summary Statement

My objective in this project was to determine if when studying, taking notes using a computer is truly more effective than taking notes by hand.

Help Received

Used a video from Ted Talks; tested in a school classroom under the supervision of Mrs. Mangel; participants used their own equiptments; Mrs Rines assisted me through the work.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Erin G. Gonzales

Project Number
J0710

Project Title
Let's Test Your Balance

Abstract

Objectives/Goals
The objective is to figure out what factors will affect a dancer's balance in positive or negative ways. My hypothesis was the dancers would balance the longest in a silent room with marley flooring, while looking into a mirror.

Methods/Materials
This project requires eight different dancers with similar amounts of training, five different locations to test the balance of the dancers and one stopwatch to time how long the dancers balanced. To test this experiment, the dancers will balance in five different locations while they are being timed with a stopwatch. The data will then be reviewed and compared to determine which factors affected the dancers in the most positive and negative ways.

Results
In this project, the dancers balanced the longest, on average, in the quiet environment standing on marley floors, while looking into a mirror. The dancers balanced the least amount of time, on average, when they were looking into a spinning image, listening to music, while standing on marley floors. My hypothesis was proven correct.

Conclusions/Discussion
This project could inform studios about the proper and most effective locations for their dancers to extend their balance time.

Summary Statement
To identify external factors that impact a dancer's ability to balance for extended periods of time.

Help Received
Studio dancers volunteered time to be tested for the project.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
A. Gabriella Gutierrez

Project Number
J0711

Project Title
Snooze It or Lose It!

Abstract

Objectives/Goals
My goal was to determine if the amount of sleep you receive will affect your cognitive abilities.

Methods/Materials
1. Record age, education level, stimulants; sleep/awake times Mon-Sun
2. Identify participant as non-sleep deprived (7.5 or more hrs of sleep) or sleep deprived (less than 7.5 hrs of sleep) so I can tell them apart
3. Measure the timed test by using a 1/100 second resolution accuracy stopwatch
4. When testing the participants repeat the same lighting, materials, noise level, and administer the test around the same time of the day
5. Repeat steps 1-5 doing three trials
6. Perform memory test
7. Perform judgment test
8. Perform coordination test

Results
Non-Sleep Deprived:
Memory Test: Score/min/sec 32, 35, 44, 53, 1:15, 1:18
Judgment Test: Levels 7, 3, 3,3,2,2
Coordination Test: Laps 24, 20, 19,19,14,13
Sleep Deprived:
Memory Test: Score/Min/Sec 32, 55, 58, 2:00, 2:00, 2:00
Judgment Test: Levels 5, 5, 3,3,2,1
Coordination Test: Laps 19, 16, 15,15,13,12

Conclusions/Discussion
My hypothesis stated that non-sleep deprived people would achieve higher results on memory, judgment, and motor skills cognitive abilities tests. The results of my experiment proved that my hypothesis was correct. When I began deciding how I was going to test my hypothesis, I wanted to test subjects who professed to be dealing with sleep deprivation on a regular basis, who said they slept less than 7.5 hours per night and often waking up between 1-3 times a night, against non-sleep deprived subjects, which I based on sleeping 7.5 hours or more per night on a regular basis. An interesting future study would be to test non-sleep deprived and sleep deprived teenagers, elderly and in general more test subjects.

Summary Statement
My project was about sleep and the effect it has on your cognitive abilities of memory, judgment and coordination skills.

Help Received
I used my school's science lab and benches to perform my experiment on my subjects, and my mom drove me to the store to purchase my science fair board and supplies.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Zoraiz A. Hashmi

Project Number
J0712

Project Title
The Battle of Wits

Abstract

Objectives/Goals
My project was to find out which gender has better short term memory. My hypothesis was if males and females take the same memory tests, then the females will achieve higher scores.

Methods/Materials
. To determine this I prepared four tests based on short term memory (STM). Two of them were physical and two were online memory tests. First test was Item Recall (one trial), twenty items were displayed for a couple of minutes and subjects had to write it in given time. The second test was Simon Flash (three trials), where colors flashed in a certain order, the subject had to repeat it with the same pattern. The two online tests were Number Sequence (two trials) and Letter recall (six trials), where number or letters appeared in a certain order, and participants had to memorize and write it in the same order. Those tests needed internet access. I tested thirty subjects fifteen of each gender. All subjects took every test; the totals of trials of the tests were 360.

Results
The results show that in all four memory tests, the average of the females# scores was higher than of the males# scores.

Conclusions/Discussion
The derived conclusion supported my hypothesis; females have a better STM than males which indicates that memory plays an important role in brain function. Females have been shown to have consistently stronger short-term or working memory. Women are thought to be able to hold more items of verbal information in short-term storage at once. This advantage in short-term memory is thought to be linked to women#s superior ability to attend to more than one task at once, or #multitask#

Summary Statement
My project was about short-term memory differences in males and females

Help Received
Mom helped organizing the project; Dad helped in printing papers.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Shafieen Ibrahim; Keval Shah

Project Number

J0713

Project Title

Effects of Technology-Assisted vs. Hand-Written Note Taking Methods on Academic Results on Science and History Tests

Abstract

Objectives/Goals

As technology advances as the years pass by, schools have gradually implemented increasing use of technology in the curriculum. Administrators believe the incorporation of technology in the curriculum will enhance and enrich the students# learning and education. However, we want to investigate whether technology has a beneficial effect on teens# academic performances.

Methods/Materials

We used these materials: science and history lecture videos/information, paper, pencils, exam papers, laptops. First, we presented the science lecture and had students take notes either by hand or laptop. They were given 20 minutes to study, and another 20 minutes to take the test. This was repeated for the history lecture.

Results

For the science and history assessments, we found that the students who hand-wrote their notes achieved better results on the assessments than the students who used a computer. The average science results for handwritten grades was an 87%. However the average for the computerized science grades was 61.3%. For history, the average results of computerized notetakers was 69% while the handwritten notetakers# results averaged out to 82%.

Conclusions/Discussion

According to our results, we concluded that students who hand-wrote their notes received better test grades than those who typed them. With our discovery, we can possibly help students improve their test taking skills. Some sources of experimental error: rowdy classroom behavior, inadequate number of test subjects, and some of the information in the lectures was too long and presented too quickly.

Summary Statement

Our project is testing to see whether or not students studying from handwritten notes will do better than those who are studying from their computerized notes on science and history tests.

Help Received

None

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Alexa Q. Infelise

Project Number
J0714

Project Title
Investigating Influences on the Recognition of Mandarin Tones

Abstract

Objectives/Goals
Recently, I have been researching whether music or foreign language proficiency impacts the ability to distinguish the four primary Mandarin tones. As a Chinese adoptee, I wanted to further explore the effect of exposure to Chinese at infancy on the ability to distinguish Mandarin tones. I believe that the brain may store in its long-term memory this exposure to Mandarin and this project investigates that hypothesis by comparing the abilities of Chinese adoptees and non-adoptees of non-Chinese descent and non-Chinese households. I also believed exposure to musical training would enhance the ability to distinguish Mandarin tones.

Methods/Materials
I created an online survey using SurveyGizmo. I gathered and analyzed 140 responses. The survey requested demographic information such as age, grade, gender, and data on music and foreign language proficiency. It included an audio tutorial on the four tones of Mandarin and an identification assessment of 10 randomly played tones. The survey was distributed through social media such as Facebook to the Chinese adoption community. I also tested students at my school in order to compare Chinese adoptees to non-adoptees.

Results
The results of my project indicated that adoption from China does enhance the ability to distinguish Mandarin tones. Adoptees scored 10% higher on average on the tone identification test than non-adoptees. The difference was even greater among female respondents with female Chinese adoptees scoring more than 29% higher on average than female non-adoptees. I also found that musical training and especially musical proficiency was highly correlated with the ability to distinguish tones.

Conclusions/Discussion
Based on my results, I suggest that Chinese adoptees learn Mandarin because they will be able to learn tones more easily, as their ability to identify tones is greater than non-adoptees. Another useful application would be for Chinese language teachers to encourage their students to participate in musical training.

Summary Statement
My project explored whether exposure to Chinese in infancy or music proficiency might impact the ability to distinguish the four primary Mandarin Chinese tones.

Help Received
Professor Tony Tan provided research and advice

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Tyler D. Johnson

Project Number
J0715

Project Title
Food Coloring Mind Games?

Abstract

Objectives/Goals
My objective was to see if the color of a drink would affect the way a person will think something tastes.

Methods/Materials
I used three pitchers of water with an equal amount of colorless, strawberry watermelon flavored juice powder in them. I put red food coloring in one, blue coloring in another and left the third one clear. I had ten different people taste the juice from each of the pitchers first with a blindfold on and then with the blindfold off in clear plastic cups so they could see the color. As they tasted each cup I wrote down what flavor they thought it was.

Results
All but one of the the people in the taste test thought that the same drink with a different color was a different flavor when they tasted them without the blindfold and they could see the color of the juice. Half of the people tested thought that the blue colored juice was a blue raspberry type of flavor when the blindfold was off. Only one person out of the ten said that all six cups of juice were the same flavor both blindfolded and unblindfolded. Twenty-four out of the thirty comparisons showed that the taste testers thought the same juice was a different flavor once the blindfold was taken off and they could see the juice.

Conclusions/Discussion
My conclusion is that the presence of food coloring does affect the way most people think something will taste. The brain seems to override the taste buds. However, at the end of the tests I feel like I had too many variables. If I did this experiment again I would only use the clear juice and one colored juice instead of two.

Summary Statement
My project is about how simply changing the color of a juice will make people think it is a different flavor when tasted.

Help Received
Mom bought all of the materials I needed, helped me with things I didn't understand and drove me to the taste testers houses. My teacher gave me the project board.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Kanika Khemka

Project Number
J0716

Project Title
The Impact of Warped Words on the Stroop Effect

Abstract

Objectives/Goals
The objective is to find out if 'warping' the words impact the Stroop Effect.

Methods/Materials
To test how warped words would impact the Stroop Effect, I designed 6 tests. To collect accurate test times, I sought my brother's help to write a program that recorded the time of each test. Using an IPad I then tested 90 people aged 7 to 88. I collected demographic data from test takers to analyze if different demographics impacted the results. To analyze the results, I took "color square patches" test as the "control", and normalized all test results as percent of this time for each test taker. Then I averaged results for each demographic segment in Google Docs.

Results
Average time taken for the six tests in least time to most time order were color names written in 1. same ink color, 2. black ink, 3. warped fonts in same ink color, 4. colored square patches with no name, 5. warped font in different ink color, and 6. normal font in different ink colors (the original Stroop Effect test case).

Demographic analysis indicated that younger kids had least Stroop Effect. As you grow older, the Stroop Effect was more prominent. The Stroop Effect was gender neutral as also concluded in the original research by Stroop. Education level had similar impact as age. Primary school showed least Stroop Effect, while High School+ folks showed higher effect, and the postgraduates were actually the slowest. Due to lack in ethnic diversity in my data sample, differences due to ethnicity could not be studied.

Conclusions/Discussion
Contrary to my hypothesis, warping the words actually reduced the impact of the Stroop Effect in all demographic segments except in children. The Stroop Effect happens due to the confusion created in the brain by contradicting results from two of its primary cognitive functions - reading and color recognition. If reading function concludes a different color name than the actual ink color, it slows the brain's response in saying the ink color. However, with warped words, the reading function was slowed, reducing confusion in the brain, resulting in faster decision.

The results also concluded that both Stroop effect and impact of warped words was more for older and higher educated folks then children. Which means that as brain matures more, the confusion of cognitive functions takes longer to resolve. Such tests can be used to identify brain disorders.

Summary Statement
In this project I studied how our brain reacts to the confusion between its different cognitive functions by testing if the warped words impact the Strrop effect.

Help Received
My brother who is a UCLA computer Science under graduate student helped write the Java Script program that I used for collecting accurate test time readings. My parents and teacher helped by reviewing and providing their feedback to improve.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Jacob Y. Kim-Sherman

Project Number
J0717

Project Title
Effects of Inaudible Sounds on Memory Performance

Abstract

Objectives/Goals
My objective was to learn if memory performance is affected by inaudible sounds with different frequencies. One study found that high frequency sounds audible to non-human animals are stressful, and potentially harmful to those animals, and stress is known to harm working memory. Thus, I reasoned that high pitch sounds would harm memory performance. Other studies found that audible low pitch sounds caused participants to relax, and that relaxation improved memory performance. Finally, a study showing that inaudible sounds prompted brain responses suggests that what happened with audible sounds may hold up with inaudible sounds. Therefore, I hypothesized that if an inaudibly low sound is played while people are taking a memory test, then their performance will be better than people taking the test with no sound, which in turn will be better than the score of people taking the test with a high sound in the background.

Methods/Materials
Thirty-two participants aged eight to sixteen were tested separately with inaudible sounds played on a speaker. Individuals who reported hearing the sounds during a manipulation check were excluded from the data set. All participants received all three conditions: inaudibly high sound (20,000 Hz), inaudibly low sound (30 Hz), and no sound. Participants took a Simon Memory Test (color memory test) nine times, three times under each condition. The condition orders were counterbalanced.

Results
Although not statistically significant, the results show a general trend that high and low frequency sounds have a positive impact on memory performance, both the level (based on accuracy) and the score (based on speed). The inaudibly high sound correlates with higher scores than the low sound, which were better than no sound at all.

Conclusions/Discussion
My results did not support the hypothesis. Instead, my results showed a positive trend of both high and low inaudible sounds on memory performance. It is possible that these results occurred because an inaudibly high sound put gentle pressure on the participants, which made them focus more. This could just have been a coincidence as well. I am currently running a second study that is focused on reducing the problems of the first study. I am going to use a more sensitive memory test, the N-Back test. I am also going to administer the sounds through headphones instead of a speaker, as they will reduce unwanted random background noise.

Summary Statement
This project is about how stimuli that cannot be perceived (inaudible sounds) could still affect our minds (memory performance).

Help Received
Ms. Kim Miller taught research methods in class and gave invaluable feedback; Dr. Michael Miller helped me decide on memory test for Study 2; Goleta Valley Junior High library will lend headsets for Study 2; Dr. Rebecca Schaefer met with me to discuss sounds; Bruce Murdock will test headphones for Study 2.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Matas G. Kulikauskas

Project Number
J0718

Project Title
A Puzzling Parallax Perspective

Abstract

Objectives/Goals
To understand how distance affects parallax shift--specifically how far an object appears to leave your field of view as it is moved closer. The observer stands at a distance from a cardboard tube and looks parallel to the left or right of it. Here, a camera was used to simulate the eyes of the observer. This experiment explains parallax shift and its importance in vision, astronomy, and mathematics.

Methods/Materials
A cardboard tube was positioned at different half-meter distances in front of a 220-cm grid. Photographs were taken parallel half a meter to the left and right of the center of the grid. Photoshop was then applied to analyze the pictures and determine exactly how far the tube appeared to move to the left or right of the center. To make it easier to determine the exact center of the tube, a strip of tape was placed vertically down the cardboard.

Results
The cardboard tube did not move out of the camera's field of vision by a consistent unit every half meter the tube came closer. Instead, it increased in a way that looked almost exponential. The parallax shift did not increase in the way anticipated.

Conclusions/Discussion
This strange shift could be due to the curvature of the camera lens. A different perspective would occur when looking at the object through a flat surface. This is similar to the human eye, which is also curved. In theory, if this experiment were done on a larger scale with a telescope, there would be different results because the curve of the telescope's lens would be differently shaped. A mathematical version using trigonometry would have different results if that curve factor was not applied. In future experiments, it might be best to see if the curve of the telescope lens really causes different results from those of this experiment.

Summary Statement
My project is designed to understand parallax shift in relation to distance.

Help Received
My dad, Jonas Kulikauskas, helped me find the right conditions for the experiment. My mom, Nola Butler, helped to edit my work. My science teacher, Ms. Horridge, gave me advice on assembling my binder.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Annika S. Mauro

Project Number
J0719

Project Title
How Taste Affects the Brain

Abstract

Objectives/Goals
My project was to determine how the brain reacts to different tastes, as measured by an EEG (electroencephalogram).

Methods/Materials
Using an Emotiv EPOC EEG Neuroheadset, I measured the "excitement" and "frustration" levels over time as ten people aged 12-14 tasted sweet, salty, spicy and sour solutions.

Results
After the sour solution was tasted the EEG registered a 15% average increase of "excitement" and "frustration". After the sweet solution was tasted the EEG registered a 33% average increase of "excitement" and a 30% average increase of "frustration". After the salty solution was tasted the EEG registered a 15% average increase of "excitement" and a 10% average increase of "frustration". After the spicy solution was tasted the EEG registered a 50% average increase of "frustration" and "excitement".

Conclusions/Discussion
After tasting the spicy solution the EEG measured the greatest increase of both "frustration" and "excitement". This is because spicy foods activate nerve fibers on the tongue which send messages to the amygdala as well as other parts of the brain releasing endorphins and other hormones. This pain and mixture of hormones creates a large increase of "excitement" and "frustration" as measured by an EEG.

Summary Statement
The focus of my project is how "excitement" and "frustration" levels in the brain react to tasting sweet, spicy, salty, and sour solutions, as measured by an EEG.

Help Received
Grandfather helped purchase the Emotiv EPOC EEG Neuroheadset.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Sheyenne E. Mitchell

Project Number
J0720

Project Title
Are There Superhumans Among Us?

Abstract

Objectives/Goals
The objective of this project is to identify whether synesthesia is rare or is synesthesia more prevalent than we think? I believe that synesthesia is rare. My research states that one out of every twenty people have synesthesia. Therefore, 1.55 people out of the 31 people I test should have synesthesia. I believe it will be difficult to find synesthetes.

Methods/Materials
First, I presented my project at synesthete.org to attain permission for myself and human test subjects to use the synesthete battery.
After acceptance, my test subjects will "Register to start the battery" at synesthete.org, they logged in with their email and password, test subjects filled out researchers information and questionnaire. I then printed, studied, and logged results.

Results
Overall Testing:
54.8% of the people I tested are Synesthetes.
57.1% of the women I tested are Synesthetes.
50% of the men I tested are Synesthetes.
Among the people I tested taste to color synesthesia was the most common at 38.7%

Conclusions/Discussion
It's a bird ; it's a plane, it's SUPERHUMAN'S! Not the Clark Kent that we remember. They can't fly or move tall buildings, but these superhuman's (synesthetes) can smell what they hear, hear music in color, taste shapes, see letters in color, etc. Sometimes in reverse order and sometimes having it all. "Mother Nature Network" quotes synesthetes as being Superhuman's. Studies show one out of twenty people have synesthesia. My study shows that 54.8% of the people I tested are Superhuman's. These results prove my hypothesis incorrect. Seventeen out of the thirty one people I tested had some form of synesthesia. It turned out to be that synesthesia is more prevalent than it is thought to be.

Summary Statement
This project explores the phenomenon of synesthesia and also identifies whether it is rare or more prevalent than we think.

Help Received
Mom helped with board and helped find test subjects and Granny helped provide supplies for my project.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Aurora K. Murphy

Project Number
J0721

Project Title
The Effect of Color on Facial Recognition

Abstract

Objectives/Goals
If the photo was in standard color, then the volunteer would be able to distinguish the persons ethnic background easier, because the facial features would be easier to recognize which could decide an ethnicity.

Methods/Materials
I made a Qualtrics survey account. Then I had a picture of a male and a female of the same ethnicity together in 3 different color pigments. (standard color, black and white, sepia) After I made the survey I launched it and let it run for 2 weeks. Last I shut down the survey and calculated all the data.

My material most used was a computer.

Results
The data was separated into three graphs; Age Groups, Ethnicities, and Genders. Age Groups, 26-35 and 36-49 year olds, had the highest averages for color at and average percent of 62.9 and 59.4. The Ethnicities, Filipino and Caucasian, had the highest average percent of color at 66.6 and 56.3. Last, females had the highest average percent of color at 55.8. All was determined by how many people correctly answered the questions.

Conclusions/Discussion
In conclusion to the project, my hypothesis was supported by my data, because volunteers could distinguish between ethnicities easier when the picture was in a standard color pigment. The survey was tested in three different groups; Age Groups, Ethnicities, and Genders. In all test color was proven to be the easiest for volunteers.

Summary Statement
The effect of Color on Facial Recognition

Help Received
Science Teachers Jack Chen and Vanessa Hooker

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Jonah M.J. Nascimento

Project Number
J0722

Project Title
Note Taking vs. Memory

Abstract

Objectives/Goals
My objective was to learn if people retain more information by taking notes. I believe that the group that does not take notes will perform better than the group that did take notes because they were paying more attention to the video instead of writing down notes.

Methods/Materials
I gathered 30 subjects, 15 male and 15 female, ranging from ages 13 to 14. I showed them a three minute video. Half of the subjects took notes (Group B), while the other half (Group A) did not. Group A consisted of 8 males and 7 females, and Group B consisted of 7 males and 8 females. After the subjects watched the video, I collected the notes from Group B and tested the subjects, using a ten question test that I created.

Results
The group that did not take notes (Group A) averaged a slightly higher score, 58 percent, while the group that did take notes (Group B) scored lower, with 54 percent, on the test.

Conclusions/Discussion
Although these results did support my hypothesis that Group A, subjects who did not take notes, would do better than Group B, subjects who took notes, I assessed that the small difference in the results and the small subject size did not clearly indicate that one method was better than the other. To research further on this project, I would test a larger subject size and create a test with more questions.

Summary Statement
My project is about the effectiveness of note taking on retaining information.

Help Received
Teacher provided the tri-fold board and colored paper for backing.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Maeve A. Richards

Project Number

J0723

Project Title

Does Time Actually Fly When You're Having Fun?

Abstract

Objectives/Goals

The objective of my experiment was to determine which two minute task, sitting in silence, listening to music, and playing 'Temple Run', 6th graders thought went by the quickest.

Methods/Materials

I took individual 6th graders out into the hallway of my school, I had them sit silently for two minutes and recorded how much time they thought had passed. Then I played random music from my phone for two minutes and recorded how much time they thought passed. Lastly, I allowed them to play the game 'Temple Run' on my phone for two minutes and recorded how much time they thought passed.

Results

The average time guessed for silence was 3 minutes 1 second. The average time guessed for music was 3 minutes 16 seconds. The average time guessed for Temple Run was 2 minutes 42 seconds.

Conclusions/Discussion

In conclusion, the students thought the time spent listening to music went by the slowest, which disproves my original hypothesis. Although, the students did think the time spent playing 'Temple Run' went by the quickest, supporting my hypothesis. If I were to do this experiment again, I would increase the time of each individual task and change the environment to make it less distracting.

Summary Statement

My project tested 6th graders perception of time by giving them three different two minute tasks and asking them to tell me how much time they think passed in each task.

Help Received

My father explained parts of the science fair process that I didn't understand.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Julia P. Stuart; Owen P. Stuart

Project Number

J0724

Project Title

Wait a Minute! Time Perception in Children Can Change?

Abstract

Objectives/Goals

The objective was to see how time perception is learned in children. We hypothesized that time estimation would become more accurate with age and could be learned with feedback.

Methods/Materials

We tested 40 children ranging in age from 4 to 18. They were all tested in a controlled environment, a large cardboard box with lights inside. Each subject was asked to estimate one minute three times. One group was told their actual times between estimates (feedback), and the other group was not (no feedback). Seven subjects returned for testing on a second day.

Results

The four and five year olds did not understand the concept of a minute. Most subjects eight and under did not have the attention required for time estimation. Time estimation was similar in subjects 9 to 18 years old. In subjects nine and over, time estimation improved with feedback. Unexpectedly, subjects gave longer time estimates on their second and third attempts.

Conclusions/Discussion

Older children had more accurate estimations of one minute, and feedback improved time estimation. It is likely that older subjects had more accurate time estimates because they had more focus. Subjects probably gave longer time estimates in in their second and third tries because they knew what to expect and were more relaxed.

Summary Statement

Time perception in children changes with age and can be improved with feedback.

Help Received

Our mother, Andrea Preble, helped us design the experiment and build the time machine (a controlled testing environment). Our father, Joshua Stuart, taught us how to make tables and graphs.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Anjali U. Thakrar

Project Number
J0725

Project Title
CheckMate: The Effect of Playing Chess on Spatial Cognition

Abstract

Objectives/Goals
The objective of this experiment was to determine if spatial cognition is affected by playing chess, gender, and grade level.

Methods/Materials
In my experiment, I used an online, 16-question spatial reasoning test. I tested a total of 138 students -- 41 sixth grade students, 49 seventh grade students, and 48 eighth grade students. Within each grade level, the students were divided into two groups: the control group, composed of students who did not play chess, and the test group, consisting of students who self-reported that they were active chess players. Each student took the untimed test individually in a quiet setting.

Results
I found that the eighth grade chess group performed 15.35% better than the eighth grade non-chess group, that the seventh grade chess group 17.5% better than the seventh grade non-chess group, and that the sixth grade chess group performed 1% better than the sixth grade non-chess group.
Looking solely at the student#s grade levels, I found that the eighth grade chess group had the highest average score on the spatial reasoning exam. This group scored 5.3% higher than seventh grade chess group, and the seventh grade chess group scored 9.2% higher than the sixth grade chess group. Similarly, the eighth grade non-chess group performed 8.15% better than seventh grade non-chess group, but only 0.85% better than sixth grade non-chess group. Surprisingly, the non-chess group of sixth grade students performed better on the assessment than the non-chess group of seventh graders.
Furthermore, the male students performed better than the female students. The chess playing female students scored 8.4% lower on the exam than their male counterparts, and the non-chess playing females scored 6.6% less than the control group males.

Conclusions/Discussion
My test results demonstrated that students who play chess have measurably greater spatial ability than those who do not play chess. I also found that as the students# grade levels increased, their scores did as well. Lastly, I discovered that the average male test subject performed better than the average female test subject. The data from this project can be directly translated into school curriculum; schools can add chess electives to their course selections at the elementary school and junior high levels, improving student#s spatial abilities, their abilities to comprehend new and abstract concepts, and solve problems.

Summary Statement
This experiment studies the effect of gender, grade, and chess-playing ability on spatial cognition.

Help Received
Dr. David Sherman provided guidance throughout the project.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Julia E. Walls

Project Number
J0726

Project Title
3D Perspectives: Applying Parallax to Create 3D Video

Abstract

Objectives/Goals
The objective of this project is to see which distance between two cameras edits together to make the most preferred 3D video.

Methods/Materials
Thirty-six subjects were shown three 3D videos created with two identical flip cameras and iMovie editing software. Viewers' preferences were collected through an online survey.

Results
Five of the subjects chose Video A, made with camera lenses set a 63mm apart. Twelve people preferred Video B made with lens distance of 54.25mm. Nineteen of the subjects preferred Video C made with 58.25mm distance.

Conclusions/Discussion
Video C was the most preferred by subjects. This result challenged my hypothesis that Video A, based on a researched average, would be the most preferred. This outcome may be because Video C was made with the middle range distance between cameras. However, the presence of unintended variables may have influenced the outcome.

Summary Statement
In this project, three 3D videos were made using the parallax affect by setting two cameras at different distances to test for the best 3D video.

Help Received
My little sister Alison inspired the ideas and was my partner in the whole process; my mom helped type, revise, and keep up with deadlines; my dad helped with setting up the cameras; Roberto Garcia helped me prepare for the RIMS fair; Dr. David Hall helped with research and background; and Tony Palmisano

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Lindsay D. Yang

Project Number
J0727

Project Title
Can You Learn by Playing Video Games?

Abstract

Objectives/Goals
The goal of my project is to see if people could learn by playing a video game.

Methods/Materials
I created a video game using RPG Maker 2003. In this game, I had information about how overfishing is a problem. Before playing the game, I had eleven people take a quiz about overfishing and I recorded that information using google forms. Then I had them play the game. After playing the game, I had them take the same test to determine if they had learned from the game.

Results
Before playing the game, the average score was 1 correct out of 8 questions, or 12%. After playing the game, the average score was 6 correct out of 8 questions, or 75%.

Conclusions/Discussion
From the results, my conclusion is that people can learn while playing a video game.

Summary Statement
My project is about how people can learn from playing a video game.

Help Received
Father helped glue and cut items on the board.