CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Mina L. Abbassi

Project Number
J0701

Project Title
Exploring the Pygmalion Effect: A Study on the Effects of Teacher Expectations on Student Academic Performance

Abstract

Objectives/Goals
My objective was to explore the Pygmalion effect in the setting of education: in other words, whether or not the student performance expectations of school teachers for tests and assignments have a significant positive effect on the academic performance of their students.

Methods/Materials
Two groups of students were administered a short academic test that contained general questions from four of the core school subjects. The differing variable between the two groups was the expectations speech given before the students began to take the test. One group was given a "low-expectations" talk from the teacher, whereas the other was given a "high-expectations" talk from the same teacher. Every student had as much time as they needed to complete the tests. The test scores were then compiled by group and calculated to find the mean, median, mode, and ranges of the data scores.

Results
The students in the "low-expectations" group had an overall average score of 73.3% accuracy on the tests, and the highest score achieved by individual students was 92% accuracy. The median score was 75% accuracy, and the mode score was 83%. The range of the "low-expectations" scores was 59%. The students in the "high-expectations" group, however, had a lower overall average score of 68.25% accuracy on the tests, and a high score of 83% accuracy. Both the median and mode scores were 75% accuracy, and the range was 50%. Both groups' lowest score achieved was 33% accuracy. Thus, the students given the "low-expectations" talk before taking the test scored better on average compared to the students given the "high-expectations" talk.

Conclusions/Discussion
By studying the results of testing students who had received either a positive or negative speech immediately before the test, one can conclude that the Pygmalion effect may not be applicable in the education of school children. In fact, the results were that the test group receiving a "low-expectations" speech performed better than those receiving a "high-expectations" speech. This could have profound implications in the field of education.

Summary Statement
I conducted a study about how the conveyed positive expectations of teachers for their students affect how well those students perform on academic tests.

Help Received
My science teacher at Jacoby Creek School, Mrs. Skiles, gave the speeches to each group as well as provided me with advice and counseling for the project.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Mahmoud J. Alamad

Project Number
J0702

Project Title
Is There a True Link between Breastfeeding and Intelligence?

Abstract

Objectives/Goals
While breast milk has numerous benefits to child and mother, the objective of this project is to prove that increased intelligence is not one of these benefits.

Methods/Materials
40 students ages 12-14, 20 exclusively breastfed for the first 6 months of life, and 20 exclusively formula fed for the six months of life and an age appropriate Intelligence quotient (I.Q.) test. All tested subjects were healthy full term babies born to mothers who had seemingly healthy pregnancies, did not smoke or drink during pregnancy, and had no complications during delivery. The I.Q. test was given to students in the same environment, and results were calculated.

Results
After calculating the average intelligence quotient for tested subjects, it was found that the breastfed students' results averaged 6.15 I.Q. points higher than their formula fed peers. The percentage of students in higher categories of intelligence, based on the Wechler Intelligence Scale for Children, was also higher in breastfed students.

Conclusions/Discussion
While I hypothesized that there was no link between breastfeeding and intelligence, the experiment proved the opposite. Breast milk contains the ideal ratio of fats, amino acids and other nutrients that the baby needs for brain and nervous system development.
Breastfeeding does not automatically guaranty that a child will be smarter. My study shows that the lowest score of an I.Q. of 106 belonged to a breastfed male. Nutrients in breast milk enable the child to reach their maximum genetic potential, but no higher. 30% of the formula fed students tested fell under the category of extremely high I.Q. which indicates that heredity played the biggest role in their intelligence. Had they been breastfed, they would have been even smarter.

Summary Statement
The experiment tested whether there is a link between breastfeeding and intelligence in students ages 12-14.

Help Received
My mother and adult supervisor helped double check the corrected I.Q. tests to make sure the scores where calculated correctly.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

Madeleine C. Arundale

Project Number

J0703

Project Title

Animotion: How Animation Frame Rate Affects Memory Retention

Abstract

Objectives/Goals

The objective of this study is to observe how an animation played at different frame rates affects how test subjects remember what happens within it.

Methods/Materials

Tv paint animation software, 3 frames-per-second animation, 24 frames-per-second animation, 2 groups of test subjects, large television screen, custom memory test.

Results

The test results showed a 25% improvement in test scores for the subjects watching the 24 frames-per-second animation. This shows that a higher, smoother framerate animation is easier to retain memory from.

Conclusions/Discussion

The test results of the frame rate and memory test concluded that higher frame rate(24 FPS) animated films are easier to retain information from, compared to lower frame rate (3 FPS) animated films. Because of this information, it can be determined that educational or classroom videos can use a higher frame rate film to increase efficiency in remembering it and learning from it.

Summary Statement

I created an animated film, running at 2 different frame per second speeds, to test how animation frame rate affects memory and memory retention.

Help Received

I created the test, film, and original idea myself. My science teacher assisted me with organizing test groups and the test space.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Jannah Azar

Project Number
J0704

Project Title
Auditory vs. Visual Memory

Abstract

Objectives/Goals
The goal of this experiment is to find which way of processing information, auditory or visual, is the optimal way to remember and recall information.

Methods/Materials
Pre-memory test, auditory story and quiz, visual story and quiz, combined story and quiz

Results
The majority of people did better with visual information than auditory information.

Conclusions/Discussion
Using visual information is more effective than to use auditory information.

Summary Statement
I focused my project on recalling information using auditory and visual memory.

Help Received
After I devised a plan for my project, my science teacher reviewed my topic and methods prior to completing the project.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Adam K. Barron

Project Number
J0705

Project Title
Video Games and Their Effect on Memory

Abstract

Objectives/Goals
If someone played video games for thirty minutes everyday for thirty days, could it improve short-term memory? What category of memory scores would improve or decline if they were tested daily (numbers, letters, photos, images)?

Methods/Materials
Tested and recorded memory skills of subject after subject played video game for 30 minutes daily for 30 days consecutively. Used timer and computer with internet (for game, tests, and scorekeeping).

Results
Over the course of 30 days, my subject's scores improved in all areas (numbers, letters, photos, images). Video games did improve memory.

Conclusions/Discussion
The subject's memory improved in all areas of testing. Number memory improved 20%, letter memory 33%, photo memory 3%, and image memory 29%. The area that showed the most improvement was in the tests of letter memory. My hypothesis was correct. Video games did improve the subject's memory. This proves that video games can help people with poor memory.

Summary Statement
I showed that video game play can improve memory in the categories of photo, image, number, and particularly letter recall.

Help Received
My Dad was my test subject and my Mom taught me how to make a spreadsheet and graph.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

Zoe E. Flanagin

Project Number

J0706

Project Title

The Effects of Multitasking on Test Scores

Abstract

Objectives/Goals

The objective of this study was to determine whether memory is better if people are multitasking or not.

Methods/Materials

Materials: Recording of article on phone, notebook to record results, the game "Subway Surfers" on another phone, 60 test subjects. Procedure: 60 people listened to an article for about one minute, 30 did so while playing the game #Subway Surfers,# and 30 without playing the game. They then answered a series of 5 questions about the details that came up in the article.

Results

The hypothesis that students who did not play the game would get a higher test score was supported. The students who did not play the game got on average 2.8 questions (out of 5) correct. The students playing the game got only about 1.3 questions correct.

Conclusions/Discussion

There was a statistical difference in my data, and so I know that my results are valid. Multitasking is a very relevant thing, especially in a time where almost everybody owns a phone. I think these results show that multitasking can be a very important thing in relation to productivity and attention.

Summary Statement

I showed that people get an average higher memory test score when they are not multitasking.

Help Received

Mrs. Garza, Miriam Metzger, Andrew Flanagin

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Meiwan M. Gottschalk

Project Number
J0707

Project Title
Visual Processing: Males vs. Females

Abstract

Objectives/Goals
The objective of this project was to determine if males or females could process visual information more accurately and at a faster rate. Previous research done on this subject has found that males could visually understand numbers and shapes more easily than females, so it was expected that males would be faster and more accurate.

Methods/Materials
One at a time, forty subjects were given a test that had seven questions related to visual processing. Each individual question was timed and when the test was over each was checked for accuracy.

Results
After experimenting on twenty females and twenty males, it was concluded that females were slightly faster and more accurate than males. In three out of seven questions females were faster and two out of seven questions males were faster. In two questions females and males ended with the same result. Overall females were more accurate than males by 0.1 of the questions.

Conclusions/Discussion
The results did not support my hypothesis. Females were both faster and more accurate than males. This project can help people understand their visual perceptual strengths and weaknesses, which can help determine the right job for a person and help those with learning disabilities learn more effectively.

Summary Statement
This project investigates whether males or females can visually process information more accurately and at a faster rate.

Help Received
This project was proof-read and edited by teachers.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Laura Kate Holliday

Project Number
J0708

Project Title
Can Young Children Mistake Medicine for Candy?

Abstract

Objectives/Goals
The purpose of my science fair project is to determine if young children can mistake common medicines sold over the counter for candy that is similar in appearance.

Methods/Materials
5 types of medication and 5 types of candy similar in appearance affixed to index cards and 32 kindergarten students. Each subject was shown ten different index cards and was asked if the item affixed to the card was medicine or candy. The results were recorded and the age and gender of each subject was noted.

Results
Young children mistake medicine for candy 52% of the time. The results also showed that age made a greater difference in the results than gender because 6 year olds were able to correctly determine candy from medicine 10% more accurately than 5 year olds.

Conclusions/Discussion
If medications are left where young children can get them, they are likely to ingest them because many medications look like candy. Many medications are manufactured in the same shape, size, color and overall appearance of commonly sold candy. There are approximately 2 million accidental poisonings a year. Manufacturers of medications should be required to make the medicine look different than candy.

Summary Statement
I found that young children often cannot determine the difference between medicine and candy.

Help Received
None. I designed the experiment, determined which medicine and candy to use, and conducted the testing.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Catherine J. Ikeda

Project Number
J0709

Project Title
2D or Not to See

Abstract

Objectives/Goals
The objective of this experiment is to discover if video games affect depth perception in humans. This experiment compared subjects' depth perception after playing with three-dimensional Lego building blocks versus playing a video game, Minecraft, which has a three-dimensional visual depiction on a two-dimensional screen.

Methods/Materials
I had my subjects align two points in the apparatus that I built using the Howard-Dolman model. First, prior to playing with the Legos or the Minecraft video game, I had my subjects take a baseline test on my apparatus. Then I tested my subjects after they played with Legos, and again after they played with the video game. I asked my subjects to alternate between starting with Legos or the Minecraft video game. I compared the results between each of the three times I tested the subjects. Each subject took a total of three tests on my apparatus: baseline test; Lego test; and, Minecraft test.

Results
Thirty-three (33) subjects in total were tested. Using the Howard-Dolman model, depth perception was measured by the distance between two points. The greater the distance between the two points indicated a negative effect on depth perception. The baseline test result on average was 0.201 cm. After playing with the Legos, the average was 0.159 cm, and after playing with the Minecraft video game, the average was 0.392 cm.

I also thought that the subjects would get better each time that they took the depth perception test. The data show that the subjects did slightly worse. The average distance for the first test, the baseline test, was 0.201 cm, the second time the subjects took the test the average was 0.239 cm, and the third time the average was 0.250 cm.

Conclusions/Discussion
I found that video games negatively affect depth perception. Additionally, my results showed that after playing video games, the depth perception in my female subjects was affected less than the depth perception in my male subjects. I would like to further research gender differences in depth perception. This experiment raises safety concerns. For example, since depth perception is negatively affected by video games, driving may be impaired.

Summary Statement
I found that video games negatively affect depth perception in humans.

Help Received
I built the testing apparatus at home with the help of my parents, and tested my subjects by myself. Mrs. Linda Miller and Mrs Lynne Dowdy proofread my written work.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Warisha F. Jilani

Project Number
J0710

Project Title
Lifestyle vs. Memory

Abstract

Objectives/Goals
The objective of this experiment is to test whether an active or non-active lifestyle can affect the memory of a person. This experiment specifically targets elderly persons between the ages of 70-75. My operational definition of an active lifestyle constitutes of a person who performs a physical activity (walk/jog, golf, tennis, etc.) at least three times a week.

Methods/Materials
I used 20 subjects, 10 with an active lifestyle and 10 with a nonactive lifestyle. To do the experiment, first I asked the participant a series of question to see if they had an active or nonactive lifestyle. I laid down a memory game in front of the participant. Then I started the timer. The participant would flip ver two cards at a time. If the pictures on the back of the cards match, then they could put them aside. If they do not match, they would put them back and continue the game.

Results
My results showed that the seniors with an active lifestyle took an average of 4.19 minutes to complete the test. The seniors with an inactive lifestyle took an average of 5.18 minutes to complete the test. The comparison between the inactive and active lifestyle results showed that there was a difference of about 1 minute to complete the test between the active and inactive lifestyles.
My promising results were that its never too late, even the seniors who did not exercise in the past, and started exercising after they got old showed a better memory than the seniors that did nothing at all.

Conclusions/Discussion
After I tested all of the participants I conclude that my hypothesis is correct. The seniors with an active lifestyle have better than seniors with an inactive lifestyle. The seniors with an active lifestyle had better memory so it took them less time to complete the memory game whereas the seniors with an inactive lifestyle took them longer to complete the memory game because their memory is not as good. The seniors with an active lifestyle took an average of 4.19 minutes and the seniors with an inactive lifestyle took an average of 5.19 minutes. The comparison between the active and the inactive lifestyles showed that there was a difference of about one minute between them.

Summary Statement
I showed that seniors with an active lifestyle have better memory than seniors with an inactive lifestyle

Help Received
Ms.Sarah and Mr.Mohammed

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

Colin Johnson; Calvin Lee

Project Number

J0711

Project Title

Strategic Stroop

Abstract

Objectives/Goals

Determine at what age group brain interference is least and most prominent when concentrating in a given task (e.g., saying color vs reading word).

Methods/Materials

Make the Stroop Test in Google Slides by making 20 slides showing color words in different font colors, one word per slide. In addition, make a Google Form that has 3 questions: what age group are you in, what is your gender, and your score (to be filled out by tester). Ask ~20 subjects (~10 per gender) from each of the age groups 5-9, 10-19, 20-29, 30-39, 40+, to take the test. During testing, pay attention to which slides the subject got a wrong answer, and calculate percent correct out of 20 questions. Enter the score in percent into that subject's Google Form and submit the form.

Results

A total of 108 subjects were tested, 47 females and 61 males. All of the age groups had 17-28 subjects. All age groups, except 5-9, obtained an average score in the Stroop Test between 89 and 96%. While the age group 20-29 scored an average of 96%, making it the highest scoring age group, the age group 5-9 scored an average of 60%, with high variability (10% being the lowest score and 100% being the highest). The age groups 10-19 through 40+ had very similar scores and 6-8% variability as an average. The data shows that these average scores are not dependent on gender. The Score Distribution per Age Group plot showed an interesting pattern. While 68 subjects scored 90-100 percent, 29 subjects got a score between 75 and 85 percent, and only 11 subjects got a score < or = 70%, mainly subjects in the 5-9 age group.

Conclusions/Discussion

Based on our experiment, our hypothesis was proven incorrect. We believed that the 10-19 age group would have done better in the Stroop Test because they have not been exposed to the reflexive action of reading as much as the older age groups and they are more competitive than the younger age group. We found out that although the score for the older age groups (10-40+) were similar (89-96%), the 20-29 age group did better (96%) than the 10-19 age group (90%). After further research, we found out that the brain reaches its full maturity by age 25. The results of each age group were similar between male and female subjects, leading us to believe that the scores were not dependent on the subject's gender.

Summary Statement

Our experiment tested in which age group brain interference was least prominent; results showed that the 20-29 age group had the least brain interference.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Anya E. Jones

Project Number
J0712

Project Title
How We Perceive Sound

Abstract

Objectives/Goals
The objective of this experiment was to examine the effect on an individual#s ability to identify an instrument when they were played samples with all three parts of a note: the attack (beginning), sustain (middle), and decay (end) vs. just the sustain.

Methods/Materials
Twenty-six participants were played 16 samples of four instruments (clarinet, saxophone, flute and trumpet) with and without the attack and decay. After hearing each note twice, participants wrote the corresponding sample number next to the instrument they thought it was on a test answer sheet. Participants were diverse in age and knowledge of music. Pre-recorded samples were played using an iPhone.

Results
The results of the experiment showed the attack, sustain, and decay test scores only had a 14.3% increase from the sustain-only test scores. But the average number of correctly guessed instruments was exactly the same for both test groups: 3.65.

Conclusions/Discussion
Although my hypothesis was proven--yes, the attack and decay of a musical note does improve a person#s ability to identify an instrument--the effect was much smaller than I expected. It showed important limitations in how I conducted the tests. For example, the inconsistent use of earbuds and using a grid that let people guess. I also realized context and visuals affect people#s perceptions of sounds. It showed there are many other variables that contribute to people#s ability to identify instruments.

Summary Statement
My test of 26 participants showed that the attack and decay of a musical note has a smaller effect on a person#s ability to correctly identify the instrument than I hypothesized.

Help Received
My dad, Christopher Jones, helped me come up with the initial idea of what to test and find the pre-recorded samples.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

Paige R. Kieding

Project Number

J0713

Project Title

Typoglycemia: Fact or Fiction?

Abstract

Objectives/Goals

The objective of my science experiment was to raise awareness and increase understanding of a very common learning disorder called dyslexia by simulating what reading with dyslexia is like.

Methods/Materials

Printed an original and a scrambled version of the same paragraph. Had each of twenty test subjects read both paragraphs aloud and used a stopwatch to time how long it took them to read each paragraph. Recorded results. Found the average of all test subjects' times on the scrambled paragraph and the average of all the test subjects' times on the original paragraph. Determined the percentage increase or decrease of time the test subjects took on average between the two paragraphs. Analyzed and shared my results.

Results

The results of this experiment proved that it took test subjects longer to read the scrambled paragraph than the normal paragraph (about 35% longer). The normal paragraph (control) took an average of 41.81 seconds for test subjects to read and the scrambled paragraph (manipulated variable) took an average of 64.13 seconds for test subjects to read.

Conclusions/Discussion

My experiment proved that it takes roughly 35% longer to read a scrambled paragraph than a normal paragraph. It also allowed my test subjects to experience what people with dyslexia have to endure on a daily basis. Additionally, it enabled me to spread awareness for this extremely common learning disorder. My results showed that dyslexia is a difficult learning disorder to live with and people should not assume that people with dyslexia are unintelligent or just being lazy.

Summary Statement

I simulated what reading with dyslexia is like and proved that a scrambled paragraph takes much longer to read than a normal, unscrambled paragraph.

Help Received

I came up with the idea of my project and created my experimental procedure by myself. I contacted Ms. Amanda Kautzman, a graduate student in the Psychological and Brain Sciences Department of UC Santa Barbara over email, who reviewed my project and provided helpful tips for my overall outline.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Annabelle R. Mersman

Project Number
J0714

Project Title
Inattentional Blindness: More Than Just a Magic Trick

Abstract

Objectives/Goals
Is there a connection between how much inatterntional blindness you experience and your personality? I will categorize subjects into Type A personality and Type B personality groups then test how focused and aware of their surroundings they are through a short video. I hypothesize that the type B personality types will show that they experience more inattentional blindness than the type A personality types and get lower scores on the Inattentional Blindness test than the Type A personalities.

Methods/Materials
Materials: Computers and 7th and 8th grade subjects
Procedures/Methods: Create the tests (Inattentional Blindness and Type A Type B Personality tests) and administer them to the students. Score the 2 tests and merge the data from both tests. Create graphs to represent data.

Results
I found that Type B personalities received slightly higher scores on the Inattentional Blindness test than Type A personalities. Type B scored an average of 7.53 and Type A scored an average of 7.36.

Conclusions/Discussion
My project helped humanity because this subject has not really been tested and explored, but it is very important because in today world, there are a lot of distractions. There is so much going on around us, and there is high volume of information in this world. We need to work on becoming more aware of our surroundings and learn how to become more focused, especially on the road. I wanted to find out who is better at paying attention and knowing who is more at risk of high inattentional blindness.

Summary Statement
In this project, I will find the link between inattentional blindness and personality types.

Help Received
I received help from my teacher, Mrs. Rodrigues\z, for formatting guidelines, project ideas, and research. I also received help from my mother, Jennifer Mersman, who helped with improving my project and helping me merge data for hours on end.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Sabahat A. Nabiha

Project Number
J0715

Project Title
Alzheimer's Relieves: Cognitive Training Put to the Test. Seeking the Best Method of Cognitive Training

Abstract

Objectives/Goals
As cognitive training has been used as a primary treatment of several disabilities as well as memory diminishing diseases, my main objective of this project was to prove that different techniques of cognitive training have the same impact on Alzheimer's Patients.

Methods/Materials
I contacted a senior center that allowed me to conduct my experiment on the residents who were all aged 64 and up. I interviewed several seniors to end up with my 10 Alzheimer's patients who were all in the early to moderate stages of Alzheimer's Disease. For test 1, I created a replica of a method of cognitive training which I called "hands-on training". I manually did the training for each of my subjects and then giving them a short quiz. I got my results by the accuracy of the quiz. I also downloaded a cognitive training app called BrainCoach, and I also gave another memory related quiz. Likewise, I got my results by the accuracy of the quiz. I did a total of 2 trails. Each trail had a 3-day gap between them.

Results
When I compared the graphs, I saw that there was not a major difference between the scores. So I did standard deviation to find that the standard deviation of scores was low, meaning that most of my scores were very close to the average. My variance point was 1.26, and the difference in the average 0.3, meaning that there wasn#t a significant difference between the scores.

Conclusions/Discussion
In conclusion, my results support my hypothesis which basically states that there is no correlation between the methods of cognitive training versus the positive effect of the training. As Alzheimer's Disease has been on the rise, many families have their loved ones do cognitive training as primary treatment. And thousands of those families believe that the most expensive method of cognitive training is the best. Through the help of science, I proved that not only the most expensive method of training is the best, but also that there is no correlation between the method of cognitive training versus the positive effect of the training.

Summary Statement
I tested the effects of two different methods of cognitive training on patients who suffer from Alzheimer's Disease.

Help Received
Kellie Smith from UCLA Semel Institute, my mentor through my project. The Meridian of Culver Village, for allowing me to do my experimentation. My parents for helping me complete my volunteer hours. My math and science teacher as well as my advisor for helping me at almost every step of my

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

Angelica Osorio; Clarissa Ramirez

Project Number

J0716

Project Title

Memory Strength: Musicians vs. Non-musicians

Abstract

Objectives/Goals

Our objective questions if students with experience as a musician possess stronger memory capabilities than those students who are not musicians. Our goal was to test a group of student musicians and a group of those students who are not musicians (ages 13-14), with memory tests, presumably finding if either group had a difference in memory strength.

Methods/Materials

We tested twelve student musicians with two to three years of experience and twelve non-musicians willing to participate in three memory tests. Testing visual memory, we showed each participant a short story that they read for 35 seconds. They then answered corresponding questions solely off the memory of what they read. Testing auditory memory, we read a random sequence of three letters and three numbers aloud two times. Afterward, we blocked working memory, asking participants to recite the alphabet. Finally, we asked the participants to attempt to recall the characters they'd heard. Our last test measured the number of random words a participant could keep in their short-term memory. The online test was given, and we then recorded the given score. We recorded all responses for all three tests, then ended up giving each participant an overall score. The overall score was a combination of each of the three test scores. Every correct answer in every test was the equivalent of one point.

Results

Taking all of the participant's total scores, we found the average score of each group (musician and non-musician). We also found which participants individually had the highest overall score, visual score, short-term memory score, and perfect auditory scores, and compared those between the groups. Our hypothesis was correct, student musicians had stronger memory compared to the non-musicians. The musician's average score was 78.25 and the nonmusicians' average score was 51.5. Also, there were four musicians who got a perfect score on the auditory test. As for the nonmusicians, only three got a perfect auditory score. Also, the highest overall score for a non-musician was 98 in comparison to a 135 from a musician. This shows musicians outperformed the non-musicians in multiple ways.

Conclusions/Discussion

From our results, we conclude that learning how to play an instrument improves your power in the arts as well as enhancing neurological functions including but not limited to memory.

Summary Statement

Using visual, auditory, and short-term memory tests, our project proves that student musicians have stronger memory capabilities than non-musician students

Help Received

None. We gathered, created and performed all the memory tests on each of our subjects, as well as organizing the data.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Andrew Qin

Project Number
J0717

Project Title
Determinants of a Font's Readability

Abstract

Objectives/Goals
This project is concerned with an experimental study of how certain characteristics of fonts affect their ability to be read, specifically thickness and the inclusion of brackets.

Methods/Materials
I printed out two pages of text with each page a different font. To test this, I assigned groups to read both pages Arial, first page Arial second page Georgia, etc. until all combinations with Arial and another font of Georgia, San Francisco, and Times New Roman have been read. I timed each page separately and analyzed the data through the ratio of the times of the pages, so the speed of their reading didn#t affect the results.

Results
I analyzed times using both pages having the group reading both Arial pages as a control, and found that the average in each category was: Arial-Arial = 1.113, Arial-Georgia = 1.124, Arial-San Francisco = 1.257, Arial-Times New Roman = 1.05 for Arial being the first page, and in the same order for Arial being the second page: 0.844, 0.868, 0.976, 0.83.

Conclusions/Discussion
These results show that San Francisco, the thick font without brackets, was the easiest to read. Arial, a medium thickness un-bracketed font, and Georgia, a thin bracketed font, were about equal. Times New Roman, a thin bracketed font, was the slowest.

Summary Statement
I showed that fonts that are thicker and have bracketed letters are easier to read than those who do not have these characteristics.

Help Received
I received help in getting literature resources from Professor Kimin Eom in the Psychology Department from UCSB.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Xulian Romano

Project Number
J0718

Project Title
Is a Picture Worth 1000 Words? Written vs. Pictorial Input

Abstract

Objectives/Goals
This project aims to test if pictorial or written input is more effective when learning a foreign language, which in the case of this experiment, was Mandarin.

Methods/Materials
In order to test this hypothesis, nine basic words in Mandarin were selected and two groups of students were trained either by being shown their English translation in written form, or being shown an image depicting their meaning. Mandarin words were presented simultaneously in spoken and written form (pinyin). The students were then tested twice, first using the method corresponding to their training to choose the meaning of the Mandarin words, and then using the other method. The tests and training were executed by showing the children a set of Quizlet flashcards and then, in a multiple choice format, testing the children on what they were trained with also by using Quizlet flashcards.

Results
At first glance, the data collected in this experiment show that the pictorial trainees performed only slightly better, but after closer examination other aspects of the data were revealed. One of these was that both groups of students generally performed better on their first test. The decrease in performance from the first to second tests with the written trainees was twice that of the pictorial trainees, which suggests the pictorial training may help retention in the longer term.

Conclusions/Discussion
The results of this experiment point towards the proposed hypothesis being partially correct, and suggest several directions for further exploration.

Summary Statement
In this project it was shown that the method of training (written vs. pictorial) does affect children's ability to learn and retain words in a new language.

Help Received
David Romano and Kings Mountain Elementary School students and teachers.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

Bradley L. Shannon

Project Number

J0719

Project Title

Dart Frenzy

Abstract

Objectives/Goals

The objective of this experiment is to determine if a video game simulation improves how a person plays darts in real life.

Methods/Materials

Wii , Wii remote, Dart Rage video game for simulation, Darts, Dart Board, Tape Measure, and IPhone. Human test subjects practiced with real or simulated darts and improvement was measured based on beginning and ending set of throws. Data was measured on distance from bullseye.

Results

Test subjects who practiced with real darts improved more than the Dart Rage test group from distances of 6 and 8 feet. The test subjects practicing with Dart Rage improved more from the distance of 10 feet. On average the test group practicing with real darts got closer to the bullseye by .63 of an inch from 6 feet, .78 of an inch from 8 feet, and .86 of an inch from 10 feet. On average, the test group practicing with Dart Rage got closer by .3 of an inch from 6 feet, .4 of an inch from 8 feet, and .98 of an inch from 10 feet. Overall the group practicing with real darts improved the most.

Conclusions/Discussion

Both test groups did show improvement and this supports my hypothesis. Also, the group practicing with real darts improved more than the group practicing with Dart Rage, which doesn't support my hypothesis. Additionally, my predictions were much greater than the actual results. For the test subjects practicing with real darts they only improved 0.28% from 6 feet, 8.54% from 8 feet, and 0.51% from 10 feet, which does not support my hypothesis of a 20% improvement. For the group practicing on Dart Rage they actually did worse by -2.39% from 6 feet, -11.23% from 8 feet, and -48.43% from 10 feet, which does not support my hypothesis of a 40% improvement. Because the females improved more than males in both test groups, my hypothesis wasn't supported. This experiment showed when developing a simulation, male and female skill level and interest should be considered. Also, that a simulation should very closely resemble the actual event or action for it to be an effective tool for learning.

Summary Statement

Practicing with simulation for darts did not show the improvement expected, but a more realistic simulation tool would have had a greater effect on the results.

Help Received

None. I performed and executed this experiment by myself.

CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Julia P. Stuart

Project Number
J0720

Project Title
Does Light Intensity Affect People's Perception of Fechner Colors?

Abstract

Objectives/Goals
The goal of my project is to determine if light intensity affects people's perception of Fechner colors. I hypothesized that Fechner colors would change in different luminosities, and that they would change in a distinct pattern.

Methods/Materials
I used a drill to spin Benham's disk at a constant rate that was fast enough for people to see Fechner colors, and a light meter to measure the amount of light in the area. I had the subjects fill out a questionnaire about their vision, take the Ishihara color blind test, and then look at the spinning Benham's disk. They would pick the color they saw from a color matching guide. Then, I had them repeat this in separate locations that had different light intensities.

Results
We tested different subjects in three different locations with multiple varying light intensities. The same light intensity with the same subject had the same results but the same subject in different light intensities perceived different colors. Perception differed between subjects. The data loosely follows the light spectrum.

Conclusions/Discussion
My first hypothesis was correct in that the Fechner colors changed in different luminosities, and my second
may be correct because the subjects seemed to follow the visible light spectrum. As the light brightened, the colors' wavelengths fluctuated. This may have something to do with the color receptors in the retina.

Summary Statement
I found that people's perception of Fechner colors varies depending on the light intensity of the environment.

Help Received
I tested the subjects, collected data, and created diagrams by myself. Andrea Preble, my mother, offered some advice on experimental design.