



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Andrew Bartsch	Project Number J0701
Project Title Playing Fortnite: A Distraction for Pain to the Brain	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this study is to determine if playing the video game Fortnite has the ability to distract your brain from pain.</p> <p>Methods Digital stopwatch, digital probe thermometer, plastic bins of various sizes, plastic bowl, ice cubes, cold water, Xbox console with the video game Fortnite (by Epic Games) installed, Xbox controllers, TV, chairs, and bath towels.</p> <p>Results A baseline was established with the volunteers placing a heel in the cold ice bath without any distractions. Times and temperatures were recorded. During the trials, the volunteers played Fortnite with a heel placed in the ice bath. Fortnite provided a distraction to the brain since volunteers had the ability to tolerate the ice bath longer while they played the video game. By Trial 3, all of the volunteers tolerated the ice bath to the 3 minute (to prevent tissue injury) maximum.</p> <p>Conclusions Repeated trials with the volunteers revealed playing the video game Fortnite had the ability to distract the brain from the pain of a chilly ice bath. Volunteers were able to tolerate the ice bath longer even with colder temperatures while playing Fortnite when compared to their baseline times. Video games like Fortnite could serve as an alternative for pain management in hospitals and clinics. With the opioid epidemic in the United States, playing video games like Fortnite could help decrease the dangerous risks of opioid addiction and overdoses.</p>	
Summary Statement The video game Fortnite can provide a mental distraction and reduce the sensation of pain from a chilly ice bath since players will experience an adrenaline rush.	
Help Received Several of my soccer teammates volunteered to play Fortnite for my experiment and my science teacher explained the "fight or flight" mechanism to me.	



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Paige Collom	Project Number J0702
Project Title Does Right Brain Stimulation Affect Reading Comprehension for Dyslexic Students?	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of my project was to determine if stimulating the right brain improved reading speed and comprehension, for Dyslexic and non-Dyslexic students.</p> <p>Methods The experiments involved having the test subject read a passage aloud to get a baseline. Then, I had them go through a series of right brain stimulation activities.</p> <p>Results The results of my experiment supported my hypothesis that stimulating the right hemisphere would improve reading fluency with both Dyslexic and Non-Dyslexic students.</p> <p>Conclusions When the right hemisphere is stimulated, it opens up neural pathways. When this happens, connections formed by axons improve their ability to make synapses or connections to other locations. In this case, stimulating the right hemisphere, involved with reading, improves the connections or quality of signals being sent from the brain to the eye. In other words, the flow of information is smoother, and faster since there are more synapses taking place. When Dyslexia is included in the process of reading it s even more difficult to process letter combinations and word correlation. So, without the stimulation the Dyslexia will make the person with Dyslexia just function as if not the whole brain is working.</p>	
Summary Statement I timed Dyslexic and non-Dyslexic students before simulating the right brain and after to see if the stimulation improved the reading.	
Help Received My science teacher helped me with my research and my binder, my mom and dad helped me with my display board. And E.V. Cain and Loomis Gateway Academy allowed me to work with the students.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Kylie Copeland; Alexandra Houk	Project Number J0703
Project Title Effects of Auditory Cues on Recall of Visual Materials	
<p style="text-align: center;">Abstract</p> <p>Objectives Our project was inspired by the idea of the bouba/kiki effect, a non-arbitrary mapping between speech sounds and the visual shape of objects. The purpose of this project was to demonstrate that when the subjects rely on the sound to shape correspondence learning method they will be able to recall the shapes more efficiently than when relying on memorizing the order of the shapes.</p> <p>Methods For our control test two videos were shown, a video with ten shapes each with corresponding sounds, and the second a video with just the sounds of the ten shapes in order. The students were asked to memorize the order of the shapes using the sounds and the shapes to convey an image. For the experimental group, the video with the 10 shapes and the sounds was shown, and then a video with only the ten sounds but in a mixed up order. In this test the subjects focused on relying on sound correlation to recall the shapes to prevent memorization.</p> <p>Results We tested approximately 130 students in grades 5, 6, 7, and 8. Our overall results showed that when the subjects relied on sound association they scored higher. The overall control average group score was 77.19%. The overall experimental average group score was 85.07%. The control group's standard deviation was 23.33%, and the experimental groups standard deviation 13.72%. There was no noticeable difference between the averages of the female and male test groups and also no difference in comparing the averages of the ages.</p> <p>Conclusions In conclusion, our results supported our hypothesis. When test subjects relied on using the sound to shape correspondence learning method rather than relying on memorizing the order of the shapes they they would be better able to recall the shapes. Scientists who did the study on the Bouba Kiki effect found that damage to an area of the brain important for language called the angular gyrus resulted in a person not being as able to match shapes to sounds. For the future, we believe our method of learning can be applied to students who have learning disabilities like dyslexia and ADHD to improve learning, speaking, and communication skills. Our methods can also be applied to students and teachers everywhere for learning and teaching techniques. Our discoveries are interesting because it helps us to shed light on the potential evolutionary origins of language.</p>	
Summary Statement The purpose of this project was to demonstrate that relying on a sound to recall a visual image was an effective tool.	
Help Received We would like to thank our parents for driving us to Staples to get the supplies we needed for our project and our science teacher for guiding us in our project.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Hamza Dajani	Project Number J0704
Project Title Reading, Focus, and the Elderly	
<p style="text-align: center;">Abstract</p> <p>Objectives my goal for his project is to see if rading can help the elderly brain with its declining cognitive ability</p> <p>Methods Prepare the cognition tests, which is called the sage cognition test, a brief cognitive screening test made up of 12 questions to test elderly focus and cognitive ability. The test has questions on how to copy geometrical figures , a question to name two pictures of objects existing in the daily life of humans, few mathematical questions, fill in the blank questions like writing down the names of animals, tracing a line from one point to another and fill in the blanks questions like identifying if the participant is a male or a female and how many years of education the elderly had. The test will be done with a pen and no clocks or calendars are allowed where the test is being performed. Find groups of elders that read and that do not read between the ages of 65-75 years old. The test will be performed on 7 elderly readers and 7 elderly nonreaders. Review the tests for the elderly participants and grade the tests according to the sage scoring scheme which has a maximum score of 21 points . The scheme can help identify the elderly focus and cognitive ability. Any score below 14 points is considered on the low end of the scheme and classifies the focus of that particular elderly person who took the test as having a focus and cognitive ability below average. Compare the results of all the elderly participants. Collect and record data in log books.</p> <p>Results the elderly people that read got an average score of 19.3 but the elderly people that do not read averaged a score of 15.3.</p> <p>Conclusions so, in the end elderly people that read got higer test scores than elderly people that do not read and thus having better cognitive ability than elders that do not read.</p>	
Summary Statement elderly people that read and elderly people that do not read take the sage cognition test o see who has better cognitive ability.	
Help Received rula ashanableh	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Victoria Ehsan; Roeszele Nieves-Ellis	Project Number J0705
Project Title Assessing Responses to Music in Alzheimer's and Dementia Patients	
<p style="text-align: center;">Abstract</p> <p>Objectives Both of our grandparents suffer from dementia. Dementia is a broad category of brain diseases that cause a long-term and often gradual decrease in the ability to think and remember. The memory losses are great enough to affect a person's daily functioning. The goal of this experiment was to document the effects of music on individuals with dementia. For our project, we tested to see if music could evoke memories in test subjects in their eighties with any form of dementia, especially Alzheimer's. We recorded changes in focus, facial expressions and body movements. We played popular music from the test subjects' younger years, and recorded their responses.</p> <p>Methods For our project, we tested more than 50 dementia patients. We tested each subject by asking questions from a questionnaire we developed. We then played a 50s music playlist from Pandora. While each test subject listened to the music, we documented their responses. We carefully observed the test subject before, during, and after the music was played to determine whether there was a significant difference in alertness and activity. Then we asked the test subjects questions again from our questionnaire to see if their answers changed. When the playlist was done, we recorded what we had noticed about each patient. We thanked each patient and moved on to the next test subject and repeated the procedures.</p> <p>Results Before the music played, the test subjects were often silent and unresponsive. They sat slouched with their eyes closed. When asked a question, the reply was either a murmur or there was none. Once the music began, the test subjects became more alert and communicative. Their eyes opened, and they sat up in their seats. They began to sing, move their feet and arms and clap. After the song was over, the patients often talked about their days in school when they were doing their hair, at band practice, or at a dance. They were much more talkative with us as well as with their peers. Their new liveliness inspired others, and soon the room was teeming with conversations and laughter.</p> <p>Conclusions In conclusion, our hypothesis was supported by the results. Based on our findings, it appears music could be used as a valid therapy for inspiring alertness and communication in individuals suffering from dementia.</p>	
Summary Statement The goal of the project was to document the effects of music on individuals with dementia.	
Help Received Thanks to our parents who drove us to the test sites, and thanks to our science teacher who provided guidance.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Leila Elasaad; Leia Ryan	Project Number J0706
Project Title Attention vs. Retention: Effects of Notetaking on Short and Long Term Memory	
<p style="text-align: center;">Abstract</p> <p>Objectives Many students prefer to take a photograph of the teacher's notes with technological devices rather than hand-write their own notes. We wondered if this might have an impact on student focus and retention of information during the lesson. We designed a test to try to see if we could discover an answer.</p> <p>Methods In our experiment, we tested 120 students in grades 5,6,7 and 8. We divided them into two groups: a control group and an experimental group. We created a lesson about an obscure animal species to eliminate the potential of prior knowledge as an interfering factor. We wrote a quiz to assess recall of the subject matter. Both groups listened to the lesson presented by the teacher. The control group was instructed to take their own notes. The experimental group just listened, and was assured that they could take an iPad photograph of the instructor's notes at the end of the lesson. Once the lesson was finished, both groups were immediately given a memory test on the presented information. One week later, they were given another copy of the same test to attempt to evaluate long term retention.</p> <p>Results According to our results, the collective average of all test subjects' scores in the control group taking notes was 12.75% higher than the experimental group counterpart for the short-term recall test. In the long-term recall test, the collective average of the subjects' scores in the control group taking notes was 8.75% higher than the experimental group. In summary, the subjects who took notes did 12.75% better than those who just listened, waiting to take a photograph at the end of the lesson. On the long-term memory recall test, the note-taking group also performed significantly better than the experimental group. On average, the female subjects scored higher than the male subjects by about 2.00%, which was no significant difference.</p> <p>Conclusions Overall, the notetaking group earned an average score of 84.00% on the short-term test and an average score of 70.75% on the long-term test. The picture-taking group earned an average score of 71.25% on the short-term test and an average of 65.00% on the long-term recall.</p>	
Summary Statement We designed a project to try to determine if taking written notes versus simply taking a photograph of the teacher's notes would impact student focus and retention of information.	
Help Received Our science teacher, Mrs. Hunker, helped distribute quizzes.	



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Adnan Harianawala; Matthew Hoang	Project Number J0707
Project Title Testing Creativity in Different Ages	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this experiment is to discover how age influences right side brain activity.</p> <p>Methods 40 Participants split into 5 age ranges, Two Shapes, Paperclip. Tested to see how many things they could identify out of shapes, and how many uses out of paperclip. Averaged every subject's score.</p> <p>Results Averaged a group score for each of the five age ranges. Repeated trials through 8 people an age range. 31-50 had the greatest score.</p> <p>Conclusions Through multiple tests with several subjects, we concluded that 31-50 is statistically more creative than the others. It is concluded that age can have a factor in creativity, and the middle ages are most likely to have the most.</p>	
Summary Statement Measured by the amount of images identified, we discovered that 31-50 was the most creative age in our research.	
Help Received We created two of the three tests ourselves. Our 6th Grade GATE teacher from Woodsboro Elementary, Mrs. Chung helped create one test.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Angie Hoffmann	Project Number J0708
Project Title Does Age or Gender Affect Change Blindness?	
<p style="text-align: center;">Abstract</p> <p>Objectives The purpose of my experiment was to figure out if age or gender affect change blindness. Change blindness is when you don't notice that something changed in your surroundings. I predicted that older men would experience more change blindness. Older people don't detect changes as well because they aren't as good at searching for visual information. Men are more likely to have a narrow focus, while women have a broader perspective.</p> <p>Methods I tested my prediction by showing 122 people a video I made where five things changed halfway through it. Then, I gave them a questionnaire with 5 questions about what the people talked about, 5 questions about things that did not change appearance, and 5 questions about things that did change appearance. I showed them the video and had them answer the same questions again to see if they still experienced change blindness even when they knew what to look for. I tested six age groups: elementary school, middle school, high school, young adults, middle aged adults, and seniors. I averaged the results by gender and age group.</p> <p>Results For the first viewing, females detected 1.6 changes on average and males detected 1.2 changes on average. I performed a t test which indicated that the difference was not statistically significant (p-value = 0.179). For the age groups, the young adults noticed the most changes (2.0) on average, followed by the middle-aged adults (1.7), then high school (1.4), middle school and senior adults (1.2) and elementary school noticed the least changes on average (0.6). I performed an ANOVA test which indicated the differences were not statistically significant (p-value = 0.079). I decided to do an additional t test which compared changes detected by children and adults. The t test showed the results were statistically significant (p-value = 0.038). By looking at the data from the second viewing, I concluded that even when people knew what to look for, they still experienced change blindness because the results from the change questions were worse than the no change questions.</p> <p>Conclusions My results don't agree with my hypothesis. According to the t test, I cannot say that women have less change blindness than men. I can't say that young adults have the least change blindness but I can say that adults have less change blindness than children. My project can help society by increasing awareness of change blindness. People usually think that they process everything they see, but in reality, they don't. If individuals are over confident about their ability to see things, it can lead to accidents.</p>	
Summary Statement I concluded that adults experience less change blindness than children and that gender does not significantly affect change blindness.	
Help Received My father and brother helped me film and edit my video. My mother drove me to the participant's house or work. My mother helped me understand statistical analysis.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Nina Hollars	Project Number J0709
Project Title Mind over Motion: The Motion-After Effect	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this project was to determine if a person's age affected the amount of time they experienced the Motion-After Effect. The hypothesis is that the oldest age group would experience the Motion-After Effect for longer periods of time than the other age groups.</p> <p>Methods A total of 22 volunteers, which consisted of a variety of ages, were tested and placed into three age groups; Youth, Middle Age, and Older Adults. To establish testing, the subjects were to stare at the center of a moving spiral for 30 seconds. The picture then changed to a stationary checkerboard. Immediately after the moving spiral switched pictures to the stationary object, a timer would start, and the subjects would state when they no longer noticed the checkerboard moving.</p> <p>Results In the Youth Age group, (6 subjects) 50% had an experience time of under five seconds, 50% had an experience time of over five seconds, and 0% showed signs of no effect. For the Middle Age group, (8 subjects) 62.5% had an experience time of under five seconds, 37.5% had an experience time of over five seconds, and 33% showed signs of no effect. As for the Older Age group, (8 subjects) 25% had an experience time of under five seconds, 75% had an experience time of over five seconds, and 14% showed signs of no effect.</p> <p>Conclusions The Motion-After Effect is one of the strongest, most effective illusions that has puzzled scientists since it was first discovered by Jan Purkyne in 1820. The results of this study indicate that the Older Age group experienced longer times of over five seconds than that of the other two age groups. This data supports my hypothesis. There are many external factors that might influence these results. As the So What factor, the scientific study of the Motion-After Effect may be able to detect vision deficiencies that are unable to be detected through normal tests. This analysis may also help scientists to determine other factors influencing the conditions of motion sickness and/or vertigo.</p>	
Summary Statement I tested a variety of age groups to determine if age affects someone's experience of the Motion-After Effect and what factors can influence the results.	
Help Received I received help from the many volunteers willing to assist me with my tests. I also received guidance from Stephania L. Hayes who helped me with understanding my statistical data.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Arissa Huda; Michelle Jin	Project Number J0710
Project Title The Effect of Fear on Spatial Perception	
<p style="text-align: center;">Abstract</p> <p>Objectives The purpose of our project was to determine whether fear affects spatial perception. Specifically, we tested how greatly a person's fear may affect his/her estimate of a cockroach's size under 2 different settings.</p> <p>Methods A 2-inch Madagascar hissing cockroach, a 2.3 inch small cube clear acrylic box, pulse oximeter (these are the main materials). In our project, we tested participants with katsaridaphobia under 2 settings: one showing the 2-inch cockroach first, and the other showing a clear box first. The 2.3-inch neutral box was used as a comparative object to the cockroach, as they were approximately the same size. To measure participants' values of fear, we utilized a pulse oximeter (bpm) to monitor their heart rate. During set-up, we placed 2 tri-fold folders onto a table; behind the first folder was the cockroach, and behind the second was the box. The 20 participants, who were 12-14 years old, were split arbitrarily into two different settings, one displaying the cockroach first and the other showing the box first. Giving participants 30 seconds behind each folder, we recorded their highest heart rate (bpm) per folder. Setting 1 participants gave a guess of the cockroach's size before being shown a neutral box, whereas Setting 2 participants were given the neutral box before having to provide a size perception of the cockroach. Field data was used to elicit legitimate human reactions to the cockroach, and the same male Madagascar hissing cockroach was utilized for each participant.</p> <p>Results After collecting our data, we realized that those in Setting 1 had much more inaccurate size depictions of the cockroach than participants in Setting 2. In fact, 90% of Setting 1 participants guessed the cockroach size to be inaccurate, whereas only 30% of Setting 2 participants perceived the size to be inaccurate.</p> <p>Conclusions Despite still having an increased heart rate due to fear, the neutral box acted as a proper comparative for Setting 2 participants, resulting in a more exact perception of the cockroach's size. There is no way to rid a person of his/her fear completely, but through this study, we can inform one about the distortion of size in their phobia, helping them understand its irrationality and why their fear lingers for so long. Through discovering this factor of distorted perception, we and scientists can better comprehend the factors that contribute to our persistent fears, finding a viable solution.</p>	
Summary Statement The purpose of our project was to determine whether fear affects spatial perception. Specifically, we tested how greatly katsaridaphobia may affect his/her estimate of a cockroach's size under 2 different settings.	
Help Received We received help from Tina Kim, our mentor. She owns cockroaches and that elicited the idea to use cockroaches on our experiment regarding fear/spatial perception, but we designed and conducted the experiment ourselves.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Swaraa Joshi; Inaaya Omer	Project Number J0711
Project Title The Effects of Stress on Memory and Performance	
<p style="text-align: center;">Abstract</p> <p>Objectives The goal of our project was to determine how short term stress affects memory and performance in Middle and High School students, based on their heart rate.</p> <p>Methods 2 Pulse monitors, game Perfection with the purpose to test performance, memory tests created on a laptop, computer generated stopwatches. Split participants into two different groups (control and stress group), and asked them to answer questions or complete tasks accordingly. We conducted this experiment on both High School and Middle School students.</p> <p>Results The effects of short term stress on Middle School and High School students' memory and performance are significantly lower under stressful conditions, with an exception of High School memory, with the results proving that stress helped these students under stressful conditions.</p> <p>Conclusions To conclude, short - term stress does have a negative effect on memory and performance. Although, we do have some exceptions. Depending on that individual, stress may be beneficial or not helpful. Based on our experiments, the results depend on how calm an individual remains under stressful conditions.</p>	
Summary Statement We designed 2 experiments to test the effects of short term stress on memory and performance.	
Help Received We ran some ideas by our parents and our science teacher, and the students that participated in our experiment both middle school and high school made it possible to successfully conduct our study.	



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Rozita Kareem	Project Number J0712
Project Title Can Chewing Gum Help with Concentration?	
Abstract Objectives The objective of this project was to test if gum can help people focus and if so, does the flavor have an effect. Methods Computer, printer, and paper Four multiplication tests, each consisting of 25 double digit problems Memory test Pencils for test-taking Chewing gum Timer Test subjects Paper and pencil for recording and analyzing data Results The final result indicated that chewing gum helps with attention and focus and that the mint flavored gum had an increased effect on concentration the most followed by the citrus and then the sweet flavored gum. Conclusions In conclusion, my hypothesis was correct: chewing gum, specifically mint flavor, significantly increases concentration and in turn, improves test performance. The mint flavor helps to activate the sensory regions of the brain and therefore increases attentiveness. It was not surprising that none of the subjects had completed the math tests in their entirety as they were given a limited time in order to mimic high-pressure testing conditions.	
Summary Statement The objective of this project was to test if gum can help people focus and if so, does the flavor have an effect	
Help Received I am using this opportunity to express my gratitude to everyone who supported me throughout this project: Ms. Najwan Nasereddin:I would like to thanks my mentrer for her advice and support and encouragement to not give up. My parents:I would like my parents for buying all the gum and supporting me. The	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Simratpreet Kaur	Project Number J0713
Project Title Head Rush	
<p style="text-align: center;">Abstract</p> <p>Objectives I wanted to learn if doing a headstand improves your memory and my hypothesis was, If doing headstands improves our memory, then people who do headstands will do better on a memory test than the people who don t do headstands.</p> <p>Methods To conduct this experiment, I had 20 human test subjects ages 10-16, a pre/post test that I created with 25 similar questions, each worth 2 points, 6 pictures to go along with 3 questions on each test, a yoga mat, a pillow, and a timer. Each human test subject had 2 minutes after the question was read to them. After 2 minutes passed, they continued until the last three questions, which included pictures. A picture was shown to them for one minute and then the picture was taken away, another minute to revisit the image in their head. When the minute passed, a question was asked to them like, what was the boy doing or how many plants were there? Each question was worth 2 points, 1 if they got half or more correct and 0 if it was incorrect. When they did the headstand, they had a yoga mat and a pillow to avoid possible head or neck injury. The headstand was done for 30 seconds and they rested for 2 minutes to relax. The same procedures from the pretest were performed at the post-test.</p> <p>Results The average number of memory retrieval problem done correctly before doing a headstand was 26 and after a headstand was 38. This shows that doing a headstand improves your memory. The mean total for after doing a headstand increased significantly over before doing a headstand (twosample t-test; $p < 0.0001$).</p> <p>Conclusions Based on the results, my hypothesis was accepted because my hypothesis was if doing headstands improves our memory, then people who do headstands will do better on a memory test than the people who don t do headstands. This means that doing a headstand improves your memory since doing a headstand makes your blood circulate and increases the oxygen flow to your head. A headstand should be done for at least 30 seconds before studying so the information will stay in your head.</p>	
Summary Statement My project was to see if doing headstands improve your memory by testing 20 human test subjects to do a headstand for 30 seconds and I found that doing a headstand increased significantly over before doing a headstand (twosample t-test; $p < 0$	
Help Received Through this experiment, I'd like to thank my mother for getting the supplies I needed for this project and my sister who helped edit & set up my science board. A big thank you to the people who participated in my project. Last, but not least, I would like to thank my science teacher who helped me the most, Ms.	



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Lydia Richards	Project Number J0714
Project Title Total Recall: Testing Memory during Expected and Unexpected Events	
<p style="text-align: center;">Abstract</p> <p>Objectives This experiment will test a person's ability to recall specific details during both expected and unexpected events.</p> <p>Methods Test subjects, two actors, script and props for actors, questionnaire. Actors performed script on two different days. Test subjects recorded details of unexpected and expected events, both immediately after the event and 40 minutes later.</p> <p>Results The data showed that when test subjects anticipated an upcoming event, they remembered more details of the event. During unexpected events, test subjects recalled either very few significant details, incorrect details, or no details at all.</p> <p>Conclusions It is concluded that when an unexpected event occurs, people have difficulty remembering specific details of the event immediately after, and 40 minutes later.</p>	
Summary Statement People have difficulty remembering specific details about an unexpected event.	
Help Received I designed the experiment, questionnaire, script, and graphs myself. Two friends served as actors. My father helped me process the data collected.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Mehar Thaper; Jamie Jane Weston	Project Number J0715
Project Title Effects of Transient Emotions on Short Term Memory	
<p style="text-align: center;">Abstract</p> <p>Objectives School environments are noticed to be stressful. We recalled times we became distracted by the stress given by teachers rather than paying attention to the lesson. We began to wonder if transient emotions, such as stress, might impact memory.</p> <p>Methods 15 common words were selected to test 125 students in grades 5 through 8. We gave the test subjects 30 seconds to memorize the words. We also found and created two short videos that we believed elicited either positive emotions or stress. After the students examined the common words for 30 seconds, the words list was taken away and the students were shown a video. Both videos were equal in length. The control group viewed the positive video while the experimental group viewed the stressful video. When the video was done playing, the participants were given a response form to list the words they recalled. The response forms were collected and recorded and the results were analyzed and compared.</p> <p>Results We tested experimental and control groups for grades five, six, seven, and eight. The fifth grade experimental (stress exposure) group recalled 33.2% fewer words than the control group (positive video). The sixth grade experimental group averaged 47.8% fewer words retained than the control group. For seventh grade, the experimental group recalled 28.7% fewer words on average. In eighth grade, the experimental group on average retained 30% fewer words than the control group. On average, the percent decrease from the control group to the experimental group was 35.6%. For our two-way t-test to determine whether the differences between the control and experimental group were significant, the P values were 0.004 for fifth grade, 0.00001 for sixth grade, 0.0035 for the seventh grade groups, and 0.003 for the eighth grade groups. The t-test results for gender differences found no significant results.</p> <p>Conclusions Our hypothesis stated that stress would impact the test subjects ability to recall information. The results strongly supported our hypothesis. In the first t-test, all the values were far less than 0.05, and confirmed that the experimental group recalled significantly fewer words than the control group. The results suggest that there is a statistically significant correlation between transient emotion and memory. We recommend further studies be performed to learn more about the impacts of emotion on memory.</p>	
Summary Statement Our project tests whether positive reinforcement and positive transient emotions (such as compliments) before a test is effective compared to negative transient emotions such as stress and anxiety.	
Help Received Our science teacher helped us understand the process of executing a test and eliminating confounding variables.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Keddy Thomsen	Project Number J0716
Project Title Identifying Color Blindness in the Primary Grades	
<p style="text-align: center;">Abstract</p> <p>Objectives For my science fair project, I tested students in grades K-5 to identify if they had any indication of colorblindness. In my experiment, I individually tested 40 students with a standard Ishihara plate color blindness test. 6 students out of 40 showed signs of some type of colorblindness. I chose to do this project because in my 7th & 8th grade art class our teacher noticed some kids were struggling with our color wheel project, so she tested them for colorblindness, and it turned out they were positive with different types. I was curious if there were more students at my school and why this wasn't caught in the primary grades.</p> <p>Methods Materials: Chromebook Ishihara Plate test Method: I created a PowerPoint test that I showed to students individually and kept a log of their answers.</p> <p>Results In grades K-5 my data shows that 6 of the 40 students I tested show some type of colorblindness. It was equal 3 boys and 3 girls. My data shows that in Kindergarten, 1 in 8 students were identified. In 1st grade-2 in 8 students, in 2nd grade- 1 in 8 students and in 3rd grade - 2 in 8 students were identified. None were identified in 4th or 5th grade.</p> <p>Conclusions In conclusion, I was able to identify students with colorblindness in the primary grades. My data came out the way it did because our school population is a micro representation of the general population. This information made me more aware of the challenges that kids face who are color blind. I would like to see a Ishihara Plate test poster in doctor's offices next to the standard vision test.</p>	
Summary Statement I tested students for colorblindness in the primary grades.	
Help Received None. I created the PowerPoint presentation and performed the student testing.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Hattie Ugoretz	Project Number J0717
Project Title The Music of Memory: How Singing Affects the Ability to Learn	
<p style="text-align: center;">Abstract</p> <p>Objectives This study examined if music would help junior high students memorize. It compared how singing information as opposed to speaking it affected how well the information could be learned. I hypothesized that the singing participants would remember more of a passage than those who learned by speaking.</p> <p>Methods Each participant was asked to memorize a passage from Shakespeare's Hamlet. Every other participant was taught the information in one of two ways: Speaking or Singing. Speaking participants read along with a spoken recording and singing participants sang along with a version of the passage from the musical Hair. After learning the passage participants were tested to determine how much of the passage they were able to recite correctly.</p> <p>Results On average, singing learners remembered nearly twice as many words (17.5) than speaking learners (9.7). The results from boys and girls were compared as well, to see if there was any gender difference. Boys who learned by speaking remembered 8.8 words on average compared to 10.6 words for girls. Boys who learned by singing remembered 20.7 words on average compared to 14.3 words for girls. While there was a strongly significant difference between singing and speaking learners overall, the differences between boys and girls were only slightly significant for singing participants and not significant for speakers.</p> <p>Conclusions The study's results support the hypothesis that singing information will help you learn it. Students who learned by singing remembered 1.8 times as many words on average than students who learned by speaking. These results are consistent with previous research.</p>	
Summary Statement This study examined if singing information as opposed to speaking it affected how well the information could be learned.	
Help Received My science teacher provided support throughout the project. Mr. Tommy Kan of UCSB's Music Cognition Laboratory reviewed my methods and provided suggestions on ways to improve them.	



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Ananya Vinay	Project Number J0718
Project Title Disruption of Circadian Rhythm: A Big Price to Pay if We Disregard Nature's Zeitgeber	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective is to see whether there is any correlation between sleep and working memory. The hypothesis is as follows: people who are getting less than the recommended 8 hours of sleep or has other sleep-disrupting risk factors like night shifts or travel across time zones would perform poorly or get low test scores on a test of working memory or short term memory.</p> <p>Methods The study was a cross-sectional survey. My subjects were students from my school and class and also some long distance friends, night shift workers (Physicians, Nurses, Other Hospital workers, Call Center Workers), adults employed in non shift work, and subjects with recent transatlantic travel. There were a total of 201 participants. The anonymous online survey included informed consent and collect anonymous data including age, gender, sleep habits, employment etc. All subjects also did a working memory test that involved remembering pictures or figures on the previous screen. This test was chosen as it did not involve any mathematical calculations and also was freely available online without any licensing or cost involved. (http://opencoglab.org/memtest1/) .</p> <p>Results Subjects who worked night shifts had a significantly lower working memory score than those who did not do night shifts (.37.23 versus 42.53, p value =0.0011). Over all, the subjects who slept <4 hours had a significantly lower score than the subjects who slept more than 7 hours.(33.56 vs 44.39, P value=0.001). In subjects 15 years or younger, the score was significantly lower (p-value= 0.015) for students sleeping less than 7 hours versus students having more sleep.(40.79 and 45.4 respectively). This shows that younger kids were especially vulnerable to sleep deficits. Among the 29 subjects, who had recent transatlantic flights, those who slept more than 7 hours did much better on the working memory test (49.33 versus 36.66, p value=0.001). This pertains to my objective because it proves my hypothesis.</p> <p>Conclusions Subjects less than 15 years old had significantly lower scores on the working memory test even at a sleep duration of less than 7 hours. Overall, sleep less than or equal to 4 hours, night shift work, and transatlantic travel, correlated with poor short-term memory. This should be considered in picking course load and extracurriculars in school. These results could be interpreted to suggest that young adults are particularly vulnerable to sleep loss and circadian disruption even at sleep less than 7 hours. It is important to determine whether chronic sleep deficit has long term effects on memory and anxiety or depression.</p>	
Summary Statement My project proved that there is a direct correlation between sleep deficit and working memory. This is especially true in students younger than 15 years.	
Help Received My science teacher :Kay Barrie and my friends ,teachers and neighbors who took the survey	



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Owen Weddington	Project Number J0719
Project Title The Ikea Effect: How Does Participation Influence Perceived Value?	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this study was to show that people put added value on something they construct themselves.</p> <p>Methods 3 test groups (10 people per group), instructions based on group, lego car set (20 pieces), questionnaire</p> <p>Results People were put into three different groups: Prebuilt - People valued the prebuilt lego car. Instruction - People followed instructions to build lego car then put a value on it. Free Hand - People were told to build lego car without instructions then put a value on it. The instruction group valued the lego car the highest on average.</p> <p>Conclusions My results showed that when people built cars with instructions rather than free-handing or inspecting a prebuilt car they valued the car more.</p>	
Summary Statement I showed that when someone participates in building a lego car with instructions they put a higher value on it.	
Help Received I took inspiration from a Harvard study and came up with the idea of using lego cars to test people.	