Acknowledgments

The editors wish to thank the students, instructors, and administrative staff of the TRIO Upward Bound Math Science Center for their hard work and dedication. Without their commitment to academic excellence, the creation of this journal would not have been possible.

Publisher

TRIO Upward Bound Math Science Center
Wichita State University, 1845 N. Fairmount, Campus Box 156
Wichita, KS 67260-0156

The UBMS Journal of Research Projects was inspired by the Research Journal of the Morehouse College Summer Southwestern Regional Math & Science Upward Bound Program.
Preface

The Upward Bound Math Science Center is federally funded and hosted by Wichita State University (WSU) in Wichita, Kansas. With the support of WSU and the cooperation of schools throughout Kansas, the program is designed to serve seventy-four disadvantaged high school students who have the potential to be the first in their family to attend college and earn a four year degree, preferably in a science or mathematics field.

The curriculum of the "Galaxy Experience" is developed to provide students with the opportunity for academic enrichment in a college setting. While living on campus for six weeks, students attend a variety of classes located on the WSU campus, specifically designed to expand their knowledge and stimulate their interests. Classes simulate actual college courses that address topics that are not usually taught at their high schools. Some of the courses offered in 2014 included: Biology, Chemistry, Environmental Science, Economics, Physics, Anatomy & Physiology, Engineering, Forensic Science, Calculus, Italian, Public Speaking and many more. Moreover, each student’s academic enrichment is supplemented with cultural awareness activities, field trips, academic and career counseling, guest speakers, and tutoring. UBMS students also have access to Wichita State University’s computer, chemistry, physics, and biological sciences labs, Ablah Library, and the Heskett Center for physical fitness activities.

The crowning achievement of the students’ experience each summer is their production and presentation of research projects. The projects are a culmination of what each team has investigated, researched, experimented and/or discovered during the six-week summer session. This journal serves as a record and a celebration of the hard work and commitment put forth by the students of the 2014 summer experience. Each project was presented at the annual UBMS Research Symposium, and the written report is printed in this journal in its original form, therefore allowing the talent and achievement of our students to genuinely shine through.

TRIO UBMS Purpose Statement

“The purpose of the Upward Bound Math Science Center, the “Galaxy Experience,” is to stimulate and advance interest in mathematics, science, and computer technology, challenge students to perform to the best of their ability, provide a unique residential, academic, exploratory, hands-on experience, and encourage high school students to realistically consider the attainment of a post-secondary degree in mathematics or the sciences.”
TRIO UBMS Center Vision Statement:
We are a nationally recognized, intentionally-minded college access program that prepares students for purposeful lives and meaningful careers. We are a leader in empowering students to conscientiously impact the world in which they live.

TRIO UBMS Center Mission Statement:
It is the mission of the TRIO Upward Bound Math Science Center to:

- Educate students with the propensity for study in STEM areas for post-secondary
- Stimulate and sustain interest in STEM careers, and
- Motivate low-income and potential first-generation college students to realistically consider the attainment of a post-secondary degree.

TRIO UBMS Center Guiding Principles:
The following list of Principles (CD-DIP) were developed and adopted by the 2010 participants.

- Conscientious - I make informed decisions, and I accept responsibility for the decisions I make.
- Dedicated - I strive for excellence in all aspects of my life.
- Discerning - I use my imagination, creativity, and my cognitive skills to set and achieve my goals.
- Intentional - I use my given talents and skills to better my life and the lives of others.
- Purposeful - I continually pursue personal success and development.

TRIO UBMS Center Guiding Principles (Staff):
UBMS staff members shall work to uphold and model the following principles:

- Staff will be conscientious with students and service provision, understanding that their work can be life-changing for students when done well.
- Staff will dedicate themselves to the concepts of continuous improvement and constant evolution.
- Staff will strive to be discerning when evaluating student behaviors and academic abilities, believing that every child can learn if we take the time to teach them.
- Staff will plan and implement program services with intention, focused on getting end results and meeting student needs.
- Staff will commit to helping each UBMS student and alumni find their ultimate purpose, including, but not limited, to vocation.
# TABLE OF CONTENTS

**SECTION ONE: UPPERCLESMEN RESEARCH PRESENTATIONS** ................. 9

**The Effect of Temperature on the Speed of Sound** ........................................ 10  
*Shayla Bellamy, Ethan Caylor, Pedro Dominguez, Payton Morgan*  
*Mentor: Phu David Lam, Physics*

**That’s Dope: The Study of Dopamine** .......................................................... 15  
*Shylee Johnson, Skyler Barnes, Tatyana Hopkins*  
*Mentor: Lara Gossage, Anatomy & Physiology*

**Gender Differences Pertaining Optical Illusions** ........................................... 23  
*Naydelin Barrera-Trejo, Areonans Nelson*  
*Mentor: Lara Gossage, Anatomy & Physiology*

**Cooking 101: With Guest Star the Sun** ........................................................ 36  
*Tara Jackson, Steven Robertson, Jr., Christopher Solis*  
*Mentor: Heather Journell, Environmental Science*

**CATIA Part Design & Sketcher: Our Experience** .......................................... 46  
*Angelica Delgado, Solomon Carroll, Alonso Romero*  
*Mentor: Phu David Lam, Physics*

**Vibration Manipulation** .................................................................................. 51  
*Jayden Levine, Gloria Medina, Oases Carrington*  
*Mentor: Phu David Lam, Physics*

**Sports Science 101: Break the Bank** ............................................................ 53  
*Matthew Sen, Ron Lam, Gerald Frayre*  
*Mentor: Phu David Lam, Physics*

**Wind Turbines** ............................................................................................... 57  
*Veronica Nichols, Jonathan Perez, Tiffany Bass*  
*Mentor: Long Zhao, Engineering*

**Sensory Deprivation and Cognition** .............................................................. 61  
*Lilia Marquez, Moe Paw, Douglas Newman, Zane Storlie*  
*Mentor: Phu David Lam, Physics*
SECTION TWO: UNDERCLASSMEN SCIENCE FAIR

67

Are You Thirsty? Rehydration Efficiency .................................................. 68
Edgar Madrid, David Nevarez, Cristian Marquez
Mentor: Heather Journell, Environmental Science

Fluid Effects on the Body ............................................................................ 73
O’Brianna Stewart, Elizabeth (Gabby) Feist, Elyssa Ziad
Mentor: Lara Gossage, Biology

The Effects of the Gaming Lifestyle on the Body ........................................ 76
Devonta Jones, Jesus Manzano-Legarda
Mentor: Lara Gossage, Anatomy & Physiology

Exposing the SPF Hype .............................................................................. 78
Mai Her, Laura Malagan-Palacios, Brenna Storlie
Mentor: Heather Journell, Environment Science

Spicy Foods: Home Remedies to Cool Down ........................................... 86
Whitney Mayberry, Anautica Bodney, Shenice Canady
Mentor: Jan Crownover, Chemistry
Section One:

Upperclassmen Research Presentations
Abstract

Our experiment focuses on whether temperature plays a role in the speed of sound. In order to find whether or not temperature affects the speed at which sound travels, we used four basic materials and measured three variables. These materials include a metal pipe that is six inches in diameter, a metronome, a tape measure, and a metal butter knife. The variables are temperature, distance, and the speed of sound. Our experiment consisted of standing over one hundred feet from Fairmount Towers south tower in order to send a sound to the building and receive the echo. Using the tape measure, we found the distance we were from the building. With the metronome we established a frequency, in beats per minute, at which the echo and the hitting of the pipe coincided. After our ten tests in varying temperatures between 66 and 94, we found that temperature increases the speed of sound.

Introduction

Sound is all around us and plays a large role in how we conduct our everyday lives. Whether the sound comes from the radio or from our teacher during a lecture, sound helps us to communicate and conduct our lives. Sound is energy and travels in waves. Sound waves can be labeled with crests and troughs. A crest is the highest point on a wave, while a trough is the lowest point on the wave. The amplitude is half the distance between a crest and trough and the wavelength is the distance between two crests. Frequency increases as the wavelength decreases. Frequency is defined as the occurrence of an event over time, meaning how often an event occurs (Hillenbrand). Although sound plays such a large role in our lives, it is very susceptible to change. Many things can affect sound, we are going to focus on how temperature affects the speed of sound. An increase in humidity, temperature, or air density could affect the speed of sound, thus affecting our interpretation of the sound. This change could either be helpful or harmful with many applications in fields involving music, the military, and physics equations. Our group began to hypothesize about what happens to the speed of sound as the temperature changes. After analyzing similar experiments, we came up with an idea of how temperature affects sound wave (Perles). We hypothesized that as the temperature increased so would the speed of sound.
Method

Materials
1 - Large building
1 - Metal pipe
1 - Striking instrument, e.g. a butter knife
1 - Partner
1 - Metronome
1 - Measuring tape
1 - Temperature recording device

Design
The goal of the experiment was to show temperature's effect on the speed of sound. Our experiment started with us standing at least one hundred feet away from a building and sending sound waves to the building by striking a metal pipe with a metal instrument and listening for an echo. Once we were far enough from the building to hear an echo, we aligned our strikes to the echo and recorded the frequency of the striking with a metronome. The distance between the striker and the building was multiplied by two and the temperature was also recorded. Then to determine the speed of sound from our measurements, we divided 60 seconds by the frequency to calculate the time it took for the tapping sound to travel to the wall and back. Then to determine the speed of sound, we divided the distance by the time taken for the sound to travel to and from the building.

Procedures
1. Stand far enough away from a building that when the metal pipe is hit, an echo can be heard.
2. Face the building so that one is perpendicular to the building's wall.
3. Hit the pipe and listen for the echo.
4. Strike the pipe at a frequency so that the strikes are placed at the same time that the striker hears the echo.
5. The partner of the striker should step far enough away from the striker that the sound of the metronome will not affect the frequency that the strikes occur.
6. The pace of the metronome should be adjusted to match the frequency of the striker.
7. Record the frequency in beats per minute.
8. Measure the distance from the striker to the building. Multiply this number by two to find the distance the sound must travel. This distance needs to be recorded.
9. Record the temperature.
10. Repeat the experiment at various temperatures so that one can interpret the effect that temperature has on the speed of sound.
Results

<table>
<thead>
<tr>
<th>Temperature (Fahrenheit)</th>
<th>Beats Per Minutes</th>
<th>Speed (Feet per second)</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>205</td>
<td>1113.83</td>
</tr>
<tr>
<td>68</td>
<td>204</td>
<td>1108.4</td>
</tr>
<tr>
<td>77</td>
<td>183</td>
<td>994.29</td>
</tr>
<tr>
<td>83</td>
<td>135</td>
<td>733.5</td>
</tr>
<tr>
<td>86</td>
<td>155</td>
<td>842.16</td>
</tr>
<tr>
<td>87</td>
<td>145</td>
<td>787.83</td>
</tr>
<tr>
<td>88</td>
<td>184</td>
<td>999.73</td>
</tr>
<tr>
<td>90</td>
<td>204</td>
<td>1108.4</td>
</tr>
<tr>
<td>90</td>
<td>206</td>
<td>1119.26</td>
</tr>
<tr>
<td>94</td>
<td>208</td>
<td>1130.26</td>
</tr>
</tbody>
</table>

Temperature relative to Speed

Temperature relative to Speed (without Outliers)
After doing the experiment and collecting the data, the data was graphed on a scatter plot. Using basic statistics the line of best fit was calculated and the correlation was found.

The equation for the line of best fit is Speed of sound = -.208(Temperature) + 1009.51. The correlation results in the correlation coefficient (or “r”) and the $r^2$ value. The closer to one or negative one the correlation coefficient is represents how strong of the relationship is between sound speed and temperature. The correlation $r^2$ value is the percent of the variation in temperature that is related to the variation sound speed. The correlation coefficient for the data was .00124 and the $r^2$ value was .0353. This means that temperature has little to no effect on the speed of sound because their relationship is so small. However, during research we learned that temperature does affect the speed of sound. After reevaluating the data it was determined that five of the point where outliers. Those temperatures were 77, 83, 86, 87, 88. With these five temperature were taken out and the rest were replotted. After being plotted again the line of best fit and correlation was recalculated. The second line of best fit is Speed of sound = .3838 (Temperature) + 1084.71. The new correlation coefficient is .565 and $r^2$ is .3188. The correlation coefficient of .565 is fairly strong. The $r^2$, .3188, shows that the 31.88% variation in Temperature is related to the variation speed of sound. The new line of best fit and correlation support the hypothesis, increase of temperature causes an increase in speed of sound.

Discussion

Our data suggests that there are more variables than just temperature affecting the speed of sound. Other environmental effects such as humidity and the density of the air account for part of the change in temperature. Human error likely played a part in the skewness of the data.

Applications

The results have a wide variety of use in practice. The results could have military applications, specifically focusing on when aircraft are heard overhead and telling where they are in relation to the troops on the ground. Another large field in which this study would be useful would be in music. The sound and resonance of instruments could change drastically from location to location depending on temperature. This study may be especially useful to musicians using wooden instruments, which are also affected physically by temperature and humidity. The acoustic changes that come along with the physical changes may be useful in furthering the understanding musicians have of their instruments’ sound. Another practical application is in general...
physics that deal with sound or acoustics (Hillenbrand). When solving a theoretical or real world problem, the temperature must be taken into account. By using our study to understand the variance in the speed of sound at different temperatures, physicists can more accurately solve equations and problems. This will benefit any field that uses physics and sound, as temperature is not constant worldwide and can still have an effect in temperature controlled environments.

Conclusions and Future Study

We found that the speed of sound increased as the temperature increased. Our project could have been improved if we had the ability to test a more varied set of temperatures, as we were limited to roughly 60 to 90 degrees Fahrenheit. Sadly, we had many outliers which suggest the possibility that our results may not be conclusive. If we were to repeat this experiment, we would perform it in a controlled lab so that we could control more variables such as the wind, the temperature, and the humidity. We would reduce human error by automating the tapping process. The elasticity of the metal pipe could have been improved by using a thinner, more flexible material such as aluminum. Testing in different humidity as opposed to different temperatures would be another useful experiment that could be repeated with the same materials and a similar procedure. Overall the project was useful, but not as conclusive as we would have preferred it to have been.

References


That’s Dope: The Study of Dopamine

By: Shylee Johnson, Skyler Barnes, Tatyana Hopkins
Mentor: Lara Gossage, Anatomy & Physiology

Abstract

The purpose of this experiment was to examine the impact dopamine has on the body. Dopamine solution was intended to be introduced to both Brine Shrimp and Red Cherry Shrimp, while humans were given B6 vitamins which are said to increase the body’s natural dopamine production. Later into the experiment, goldfish were added to observe the results of dopamine solution being added into their water. Our hypothesis was that the increased dopamine levels in both shrimp and humans would cause the groups to display symptoms commonly seen during a manic stage in bipolar disorder. The intentions of this experiment was to support the theory of a neurochemical factor involved in Bipolar Disorder.

When the shrimp were introduced to the dopamine solution they became very hyperactive. The experimental group died after a day of swimming in dopamine solution. The goldfish also displayed hyperactivity after being introduced to the dopamine solution. The humans given the B6 vitamins displayed sporadic changes in mood and behavior also.

Literature Review

Bipolar Disorder is a manic depressive illness that persists of unusual shifts in mood, energy, and the inability to carry out day-to-day tasks. The cause for Bipolar Disorder remains unknown, but there are many factors that are under speculation. Although the National Institutes of Mental Health suggests that Bipolar Disorder is genetic because children who are born from a parent with the disorder are more likely to be diagnosed than a child born by parents without Bipolar Disorder, studies on identical twins give insight on how there are more factors that cause bipolar disorder other genetics. There have been studies where one twin is diagnosed with Bipolar Disorder but the second is not.
There are also anatomical differences between the adult brains of those diagnosed with Bipolar Disorder and those who are not. Most noticeable is the size variation of the Prefrontal Cortex (executive decision making and problem solving center). The Prefrontal Cortex of those diagnosed tends to be smaller and less functioning compared to those undiagnosed. There’s also another theory where some people are simply born with a lack of serotonin. According to BipolarBurble, Serotonin is a mood regulator whereas Norepinephrine has been associated with manic-like symptoms and Dopamine has been linked to hallucinations. Yet, there are still many things to take into consideration when diagnosing someone with Bipolar Disorder. For example, WebMD lists five types of Bipolar Disorder: Bipolar 1, Bipolar 2, Cyclothymic Disorder, Mixed Features, and Rapid Cycling.

Bipolar 1 Disorder is defined by manic or mixed episodes that last for at minimum 7 days, or by manic symptoms that are so severe the person needs to be hospitalized because they can not care for themselves. Bipolar 2 Disorder is a more mild form of mood elevation involving less elevated episodes of hypomania that alternate with severe depression episodes. Cyclothymic Disorder is classified with periods of hypomania with brief periods of depression that are not as extensive or long lasting as seen in full depressive episodes. Mixed Features displays simultaneous symptoms of opposite mood polarities during manic, hypomanic, or depressive episodes. A person will experience high levels of energy and sleeplessness simultaneous with the feeling of hopelessness and suicidal thoughts. Rapid Cycling, a very severe type, occurs when a person has four or more episodes of major depression, mania, hypomania, or mixed states, all within a year.

**Introduction**

There are several factors that are being speculated as the cause of Bipolar Disorder, rather it be something like genetics or something like environmental issues or traumatic experiences. One theory is a chemical imbalance in the brain, the main chemicals being serotonin, norepinephrine, and dopamine.

Dopamine is linked to the manic episodes seen in bipolar disorder, so if dopamine solution is introduced into an organism, it is reasonable to assume it will display manic-like symptoms. Therefore, if Red Cherry Shrimp and Goldfish are given dopamine solution, and humans are given B6 Vitamins, which heighten dopamine levels, it is plausible that they will exhibit manic-like symptoms.
Hypothesis and Variables

If goldfish are given dopamine, then it is assumed that they will exhibit manic behavior. As for the human participants, if they are given Vitamin B6, a vitamin that heightens dopamine levels, then they will also exhibit bipolar-like symptoms of eccentricity. Therefore, the levels of dopamine given to the goldfish and the amount of pills given to the human subjects are the independent variable. The behavior they exhibit is the dependent variable, and the goldfish that was not given dopamine and the human participants’ preliminary surveys are the constants.

Brief Explanation

Because this experiment was conducted to draw conclusions and make comparisons, each experiment that was conducted will have its own materials/methods section and results section. Afterwards, the observations will be synthesized in the discussion and conclusion sections.

Materials and Methods

- 2 Goldfish
- 2 beakers for goldfish
- Powered Dopamine (Goldfish Stimulant)

In order to see the effects of actual dopamine in a subject, goldfish were ordered from the Wichita State University Biology Lab. The goldfish were observed with their normal behaviors/activities before the dopamine and then split up into two groups: the control group, and the experimental group. For six days, one goldfish was observed with 40 ml of powdered dopamine in its tank water, where it was consequently ingesting it. The steps to make the dopamine solution are listed below.

1. Molecular weight of dopamine: 153.178 g/mol
2. 10x dopamine solution = 0.143 mol/L (1L of distilled water = 1 kg)
3. (0.143 moles) (153.178 grams per mole) = 21.9 grams per liter of distilled water
4. Only need 50 mL of concentrated dopamine solution
5. (0.05L) (21.9) = add 1.095g of dopamine powder to 50 mL of distilled water
To make the desired dopamine concentration for the experiment (143 pmol/mg), 40 ml of the dopamine solution was added to the 400 ml of tank water. There was enough dopamine solution for the experiment to be repeated up to 10 times.

The beakers containing the goldfish were sat beside each other so that the goldfish's behavior could be compared at the same time while hand-written notes were being taken.

Results

For the Red Cherry Shrimp, one day of observations were made before they died, but within that day, they displayed several symptoms of a manic bipolar episode. The experimental shrimps hung upside down from the duckweed that was placed in both the control and experimental beakers for oxygenation purposes. However, Red Cherry shrimp don’t usually consume duckweed, so when the experimental group attempted to eat the duckweed, it showed a change in their appetite.

For the duration of the experiment, there were also visibly increased energy levels. The shrimp ran laps around the beaker while the control group stayed relatively stationary. The shrimp’s limbs moved around rapidly and their hearts were visibly beating harder and faster compared to the control group.

Materials and Methods

- Vitamin B6 Supplements (Human Stimulant)

After the goldfish experiment, volunteers were asked to receive Vitamin B6. The names of the volunteers were randomized by gender and two males and two females were picked. Once they were selected, their initial/normal feelings and behaviors were surveyed, and then they were given their first dosage of the vitamin the following day. For six days they received 300 mg (three capsules) of Vitamin B6 at approximately 9:15am. Over the course of the experiment they were surveyed three times, the first being a preliminary survey for future comparisons, the second survey for their behaviors during the experiment, and the last as a reflective survey seeing how the participants felt during the duration of the experiment. However, before the surveys and vitamins were given, the participants agreed to the experiment and its details by signing a consent form.
Results

Survey Results: Preliminary

Survey Results: Interim
In order to numericalize the qualitative data, each answer to the questions on the survey were given a number on a scale of negative 3 to positive 3 by each researcher. Negative 3 being the worst and positive 3 being the best for the respective categories. The numbers were then averaged and put in graph form. Therefore, as bipolar disorder affects each of its victims differently, the results above support the hypothesis. For example, subject 1 for the “feel” question is in the negatives, around a -2.5, for the preliminary survey. As their trial goes on, they move into the positives in the interim survey at a 2, and stays there for the duration of their trial, which is evident in the post survey results. This means that after their partaking of the vitamins, they became happier or more energized.

Each participant exhibited a change in some area, rather it be a change in their appetite or a change in their emotional state. This is to be expected because the heightened levels of dopamine that come with Bipolar Disorder affect each victim uniquely.
Discussion

The results seem to support the chemical imbalance theory that is prominent in the research of Bipolar Disorder. However, the results are best looked at holistically. Because this was a sort of experimental case study, the subjects have to be looked at in a comprehensive manner, where everything is taken into account. And still, these findings could lead to better understanding or even better treatment of bipolar disorder patients. Of course, further studying is recommended for reliability. Giving mice dopamine and observing their behaviors afterwards would be beneficial because so much is already known about mice and their behaviors. Even having more red cherry shrimp or goldfish and watching a multitude of them would be beneficial. As for human experiments, having a longer time span for the Vitamin B6 observations would probably produce even better results, since the vitamin would have longer to make a stronger effect.

Still, this experiment was not without its faults. The original test subjects were brine shrimp, but because of possible weather fluctuations within the building, the Brine shrimp did not hatch. The next subjects were Red Cherry Shrimp, and a day of observations were done with them before they died, supposedly because of heart attacks, since their hearts were beating rather fiercely because of the adrenaline pumping through their veins. The final issue was the time limit, since the supplies arrived late, the desired amount of time for the intake of the B6 vitamins had to be shortened.

However, many people may think that these results are coincidences, rather it be because of the aforementioned issues or because of their belief in another theory. Yet, each person exhibited a change in some way. There is no way to give someone Bipolar Disorder, so doing this and still observing a change in each person is extraordinary. Even then, Bipolar Disorder affects each of its victims differently, therefore, it can only be expected that there is no uniformity among the subjects.

Conclusion

Bipolar Disorder affects millions of people worldwide. This experiment was conducted in order to support the theory that a chemical imbalance in the brain is the primary cause of Bipolar Disorder. Through this experiment, evidence was found that dopamine and chemicals like it may indeed be a primary factor, and because of this research, new and improved treatment options could impact the lives of millions in the future. If this study’s results and future study’s results are taken into account, Bipolar Disorder could become less of a burden in millions of people’s lives.
Literature Cited


Gender Differences Pertaining Optical Illusions

By: Naydelin Barrera-Trejo, Areonans Nelson
Mentor: Lara Gossage, Anatomy & Physiology

Abstract

People think and see differently all the time. Optical illusions are one way to categorize how all humans surmise and view the world around them. Optical illusions are observed contrastingly between the general population let alone between the genders, however, there are only a limited number of images that can be distinguished in an optical illusion; because of this optical illusions can be categorized into three sections: which image was seen first, how frequently was an image seen, and which order were they seen in. All categories were tested against a sample size of twenty people, ten males and ten females. The results divulged to be inconclusive with the same amount of images being regarded by both female and male. This, however, is not a setback; within these groups, males had a much higher ratio of noticing the original image first than females (the original image being the image that the painting/picture was intended to be in its entirety).

Introduction

“Art is not what you see, but what you make others see” (Schneiders). That was a quote from Edgar Degas, a French artist famous for his paintings, sculptures, and prints. Optical illusions are fascinating artwork, but they leave us with a big concern; did we see what we were supposed to see? Or did we see what others wanted us to see?

Background

Our brains are always processing information to make sense of the world. Having the ability to have such skill is a crucial part of human evolution. Since we have such an ability we are able to make sense of several different entities that computers cannot (Lotto). How we see is one of the primary concerns of neuroscientists and optical illusions aid us greatly with this. One such way is that we are able to use optical illusions to test for schizophrenia. Schizophrenic people cannot see optical illusions. This has been a breakthrough due to the fact that someone with an illness is able to do something better than a healthy person.
Even though we are able to use such images to test for illness it does not necessarily mean that we do all the time. Innumerable amounts of people participate in them on the streets for fun and a multitude of the people that participate in them do not even recognize that they are optical illusions. This can be for several different reasons. Optical illusions have many definitions, despite that, for us to understand what they are we must be conversant with the definition of them in plain terms. An optical illusion is a complex image that your brain identifies a main figure in and relegates the rest of the image to the background until the focal point is switched, which holds an opposite effect ("What Optical Illusions"). Along with that definition comes many other descriptive subsets of the types of different optical illusions that can be created.

There are eight different types of optical illusions. These eight types are binocular vision, monocular vision, interposition, atmospheric perspective, texture gradients, object size, parallax movement, and linear perspective ("What Optical Illusions"). The images within this experiment were all monocular vision, one of the most common optical illusions that are seen. It has been noticed throughout the years, when concerning monocular vision optical illusions, women are able to see two different images when compared to men majority of the time. Men, however, are occasionally stuck on one image and cannot see the other or need assistance to see the other. This is all due to the mindsets of our different genders and is what was set out to test.

**Hypothesis**

If ten different optical illusions are shown to ten males and ten females then females will be more susceptible to the illusions.

**Purpose**

The purpose of this experiment is to see whether gender is a factor on how we see these particular images. The results will prove if the hypothesis is right or wrong, as well as see if this kind of experiment can be used to determine if gender is a factor in the perspectives of human beings.
Variables

- Independent Variable: Gender
- Dependent Variable: Peoples’ perceptions
- Control Variables: Optical illusions, Survey

Procedures

1) Create a survey that has a consent form for the first page. The second page should be an instruction page and explain what the participants are going to see and how they will describe it. The rest of the pages have one optical illusion per page and have the answers:
   - I’ve seen this image before
   - I see one image
   - I see two images
   - I see three images
   - I see four images
   - I see five images
   - What do you see?

2) Gather ten females and ten males at random to take the survey. To find people at random give the test to every fifth person you see until you have ten females and ten males.

3) Read the descriptions the participants have given and decide which image they saw first. If the participant only sees one image then make a conclusion to which image they saw.

4) From the results see if females are more susceptible to optical illusions than males.
Results

Image 1

![Bar chart for Image 1 showing the amount of people in different locations (Balcony, Floor, Both) for boys and girls.]

Image 2

![Bar chart for Image 2 showing the amount of people in different images (Original Image, Tree Face, Face, Two, All) for boys and girls.]

Image 3

![Bar chart for Image 3 showing the amount of people in different images (Ice-Skaters, Stars, Both) for boys and girls.]

Page 26
Image 4

Image 5

Image 6
Results

Image 7

Image 8

Image 9
Images

Image 1
Conclusion

After careful analysis the result proved to be inconclusive. There is no difference between female and male recognition of optical illusions. There is, however, a difference between the order that each gender perceives several different images. The males have a 4:1 ratio of seeing the original image first off whereas the females have a 3:2 ratio. This may have become a factor in determining the results. As such, something to further research would be the ratio of which each gender recognizes a particular image.
Works Cited


Background Information

Using solar energy to power human utensils have been around since time immemorial, with ancient civilizations such as Egypt, Greece and Rome using them to cook their food in the form of solar ovens. Fast forward 5,000 years and you see problems that could be solved by using these ovens still exist. Organizations such as Solarcookers.org are attempt to do their part by creating more affordable ways to get solar ovens to those who don’t have any means of cooking their food or having a power source and are in sunny areas, but there knowledge is not known besides certain groups of individuals.

Introduction

Take a second to imagine the utilities that you come across all the time within your everyday life. Imagine all the energy that flows around you’re able to use and the clothes you’re able to use to cover yourself. Think of the necessities that you come across, like the cooked food you’re able to eat and the clean water you’re able to drink. Now, imagine your life without these things. Think of your life without being able to easily access these things that are found so trivial but are necessary for human survival. Think about not being able to easily access clean water wherever you go, not having food you’re able to retrieve. Now open your eyes and look around. On the planet Earth each one of its inhabitants aren’t able to enjoy even the most basic necessities of life, including being able to live a life where they are easily able to retrieve and drink clean, uninfected water. Unfortunately as we are so frequently reminded, this is the case in so many people’s lives, as over 2 million children each year die due to a lack of clean water. What if, there was a way to purify water with something each human, regardless of where they are, has contact with. What if water and other foods could be purified and cooked with the power of the sun? This research paper seeks to determine an efficient and cost effective method of developing an object that utilizes the power of the sun to cook food and boil water. The paper will include information upon 2 types of ovens, the tandoori and minimum solar box cooker their uses and affordability and how well they work.
Why were the ovens used the ones that were chosen? This refers to what is called functionality and essentially means that ovens were chosen that were easy to create and sounded like that would be affordable and efficient. The solar cooker was chosen because it was low-cost and previous experiments regarding it yielded positive results. The tandoori oven was chosen because it was also cheap and easy to assemble. It was made with fire as the primary power source, so it was decided that the fire would be switched out with solar power to see how that would affect the temperature reached by the oven.

Our hypothesis was that "The solar cooker should be able to reach a temperature in which it will be able to boil water (100°C)." Another hypothesis we developed was that “The solar box cooker would reach a higher internal temperature than either oven." These hypotheses were developed to seek both to determine the maximum temperature the ovens we created could reach and to find out which was the better oven to use for cooking food.

Variables

- Independent: The type of solar cookers used (Box Oven, Tandoori)
- Dependent Variable: Temperature and how the food cooks
- Control: The materials used (don’t have control over)

Hypothesis

The solar cooker should be able to reach a temperature in which it will be able to boil water (100°C).

The box oven will be the better oven to use.

Research Question

Can an affordable and efficient way of cooking food using only the sun be created and used?
The “Minimum” Solar Box Cooker

Materials
Two cardboard boxes. The outer box should be larger than the small box all around, but it doesn't matter how much bigger, as long as there is 1.5 cm (a half inch) or more of an airspace between the two boxes. The distance between the two boxes does not have to be equal all the way around. Also, keep in mind that it is very easy to adjust the size of a cardboard box by cutting and gluing it.

- One sheet of cardboard to make the lid. This piece must be approximately 4 to 8 cm (2 to 3 inches) larger all the way around than the top of the finished cooker (the outer box).

- One small roll of aluminum foil.

- One can of flat-black spray paint (look for the words "non-toxic when dry") or one small jar of black tempera paint. Some people have reported making their own paint out of soot mixed with wheat paste.

- At least 250 g (8 ounces) of white glue or wheat paste.

- One Reynolds Oven Cooking Bag®. These are available in almost all supermarkets in the U.S. and they can be mail-ordered from Solar Cookers International. They are rated for 204 °C (400 °F) so they are perfect for solar cooking. They are not UV-resistant; thus they will become more brittle and opaque over time and may need to be replaced periodically. A sheet of glass can also be used, but this is more expensive and fragile, and doesn't offer that much better cooking except on windy days.

Instructions for the Base
1. Fold the top flaps closed on the outer box and set the inner box on top and trace a line around it onto the top of the outer box

2. Remove the inner box and cut along this line to form a hole in the top of the outer box.

3. Decide how deep you want your oven to be. It should be about 2.5 cm (1 inch) deeper than your largest pot and about 2.5 cm (1 inch) shorter than the outer box so that there will be a space between the bottoms of the boxes once the cooker is assembled.
4. Using a knife, slit the corners of the inner box down to that height.

5. Fold each side down forming extended flaps. Folding is smoother if you first draw a firm line from the end of one cut to the other where the folds are to go.

6. Glue aluminum foil to the inside of both boxes and also to the inside of the remaining top flaps of the outer box. Don't bother being neat on the outer box, since it will never be seen, nor will it experience any wear. The inner box will be visible even after assembly, so if it matters to you, you might want to take more time here.

7. Glue the top flaps closed on the outer box.

8. Place some wads of crumpled newspaper into the outer box so that when you set the inner box down inside the hole in the outer box, the flaps on the inner box just touch the top of the outer box.

9. Glue these flaps onto the top of the outer box.

10. Trim the excess flap length to be even with the perimeter of the outer box.

11. Finally, to make the drip pan, cut a piece of cardboard, the same size as the bottom of the interior of the oven

12. Apply foil to one side. Paint this foiled side black

13. Allow it to dry.

14. Put this in the oven so that it rests on the bottom of the inner box (black side up)

15. Place your pots on it when cooking. The base is now finished.

**Instructions for Removable Top**

1. Take the large sheet of cardboard

2. Lay it on top of the base.

3. Trace its outline

4. Cut and fold down the edges to form a lip of about 7.5 cm (3 in).

5. Fold the corner flaps around and glue to the side lid flaps.
6. Orient the corrugations so that they go from left to right as you face the oven so that later the prop may be inserted into the corrugations.

7. Don't glue this lid to the box; you'll need to remove it to move pots in and out of the oven.

**To Make the Reflector Flap**
1. Draw a line on the lid, forming a rectangle the same size as the oven opening.

2. Cut around three sides and fold the resulting flap up forming the reflector.

3. Foil this flap on the inside

**To Make a Prop**
1. Bend a 30 cm (12 in) piece of hanger wire. This can then be inserted into the corrugations.

2. Turn the lid upside-down and glue the oven bag (or other glazing material) in place. We have had great success using the turkey size oven bag (47.5 cm x 58.5 cm, 19 in x 23 1/2 in) applied as is, i.e., without opening it up. This makes a double layer of plastic. The two layers tend to separate from each other to form an airspace as the oven cooks. When using this method, it is important to also glue the bag closed on its open end. This stops water vapor from entering the bag and condensing. Alternately you can cut any size oven bag open to form a flat sheet large enough to cover the oven opening.

**The Tandoori Oven**

**Materials**
- Two clay pots
- Aluminum foil
- Aluminum wire

**Instructions**
1. Use the wire to make a small grill face and place it into one of the pots.

1. Cover the grill face in aluminum foil.

1. Cover the pot with the grill with the other pot.
Control Oven

Materials
- A piece of cardboard
- A small weight (rock or brick)

Instructions
1. Place the cardboard down.
2. Put the weight on the cardboard to keep it from flying.
3. Leave it in the sun.

Results

Data for Cooking
1. Preheat the oven for 15 min (started at 87.8°F)
2. Place food to cool
3. Clock temperature in an hour. (Box :103°[Fig 1] tandoori: 103.28°[Fig 2] control: 96.62°[Fig 3])

Data for Cooking: Day 2
1. Preheat the oven for 15 min. Started at 89.1 for all.
2. Constant : 99.8 °F [Fig 4]
3. Tandoori: 105.5 °F [Fig 5]
4. Box: 120.6 °F [Fig 6]

Graphs

The following graphs show where the temperature of the boxes began and the highest point it reached in a 3 hour time period.

*Examinations were once every hour for the testing period.

*Temperature was measured in Fahrenheit.
Figure 3

Solar Oven Results
Day 1: Control Oven

Figure 4

Solar Oven Results
Day 2: Control Oven
Figure 5

Solar Oven Results
Day 2: Tandoori Oven

Temperature (°F)

Examinations

Figure 6

Solar Oven Results
Day 2: Box Oven

Temperature (°F)

Examinations
Discussion

In conclusion, our hypotheses “The solar cooker should be able to reach a temperature in which it will be able to boil water (100°C)” was not proven correct, while our second hypothesis, “The solar box cooker would reach a higher internal temperature than either oven.” was proven to be correct. Our Solar Box Cooker reached a maximum temperature of 50°C (120°F), while our Tandoori oven reached a maximum temperature of 40.8°C (105.5°F). Although the first hypothesis was proven to be incorrect in this recreation of the box oven, almost all other experiments had proven to yield greater results, having the internal temperatures of other solar box cookers reach an upwards of 148°C (300°F).

There were a variety of limitations within the research experiment, such as the condition of the ovens we used. Each day the experiment was in session our ovens were hand carried throughout the day, which led to them being noticeably damaged more and more each day. Another limitation to our experiment was the construction of our boxes. When planning the experiment, access to the materials that would have proven the results of our experiment and our hypothesis was not with us, so it had to be completed with the next best thing. Though these limitations did prevent us from being able to support the findings of other research in this field, the greatest limitation had was that by the weather. The weather changed dramatically each day, from being the sunny and hot one day, to just being hot and cloudy, to being cloudy and cold. Though this severely impacted the results of our experiment, it also showed our oven’s performances in different types of weather, which is great in choosing the correct solar oven for those who need it.
CATIA Part Design & Sketcher: Our Experience
Expanding Our Knowledge of the Basics of Modeling and Engineering Design Process

By: Angelica Delgado, Solomon Carroll, Alonso Romero
Mentor: Phu David Lam, Physics

Abstract

This summer our research group enrolled in CATIA at Wichita Area Technical College. All of us have some interest in pursuing studies and careers in an engineering field. We were informed that CATIA is a good class to take if you were interested in engineering. We all had a general idea of what CATIA was but none of knew exactly what we were getting into. We got a little more in depth understanding through the first week of class learning how to use the program and going through the book exercises on Part Design and Sketcher. By the second week we were given a quiz over basic terms you should know and an isometric view of a product we had to model. Around this time we began to understand the impact and importance of CATIA in the world. It wasn’t until we actually were given more freedom to create our own products that we were truly able to grasp the significance of the knowledge we had gained. Three times a week we attended a two hour lecture where without fail our teacher Chuck would fervently preach to us saying “guys, if you know CATIA you can rule the world.” Those words have become more believable as we have progressed in our studies and research.

What is CATIA

CATIA is an acronym that stands for Computer Aided Three-Dimensional Interactive Application. Basically CATIA allows you to create three-dimensional parts from sketches that you make. CATIA has a very wide range of applications. Think of something, anything you see in your daily lives: a bike, a car, a hamburger all of these things can be modeled and printed out using CATIA. (the hamburger might not taste very good.)
Applications in Industry

CATIA is widely used in engineering industries such as aerospace, automotive and shipbuilding.

Aerospace
The Boeing Company used CATIA V3 to develop its 777 airliner, and is currently using CATIA V6 for the 787 series aircraft. (First-rate Mold Solution Co., Ltd. Team|March 6th, 2010)

Automotive
BMW, Porsche, Daimler Chrysler, Audi, Volkswagen, Bentley Motors Limited, Volvo, Fiat, Benteler AG, PSA Peugeot Citroën, Renault, Toyota, Ford, Scania, Hyundai, Škoda Auto, Tesla Motors, Proton, Tata motors and Mahindra & Mahindra Limited are all among the automotive companies that use CATIA to varying degrees. (First-rate Mold Solution Co., Ltd. Team|March 6th, 2010)

Shipbuilding
GD Electric Boat used CATIA to design the latest fast attack submarine class for the United States Navy, the Virginia class. Northrop Grumman Newport News also used CATIA to design the Gerald R. Ford class of supercarriers for the US Navy. (First-rate Mold Solution Co., Ltd. Team|March 6th, 2010)

What We Have Learned

Through weeks of lectures, problems, and exercises we have effectively learned how to use the Part Design and Sketcher section of CATIA in order to create a part efficiently. the first thing we learned was how to sketch a profile and the various tools needed for different shapes. Next we learned how to constrain those profiles we sketched using the constraint tool. In order to make your object as efficiently as possible you have to constrain it to a certain place in space and to a certain size. After we learned how to sketch and constrain profiles we were able to make them three dimensional parts using the pad tool. Once we got the basics of making things three dimensional we began to learn how to make those three dimensional parts look exactly how we wanted them to using dress up features such as edge fillet (used to round out a corner), Chamfer (used to slice of a corner leaving the face underneath), or even hole (used to make holes). Once we demonstrated that we were able to utilize these tools with a high level of proficiency our teachers allowed us to come up with an idea for our own parts to design sketch and make three dimensional and be printed off.
Our Applications

These are some of the parts we modeled to be printed in the 3-D printer:
Conclusion

Through our research we sought to strengthen our understanding of how CATIA is used in the world to improve people's quality of living, how CATIA works, and how we can use it to rule the world. We accomplished the first two by attending classes Monday through Friday 16 hours a week for seven weeks and applying ourselves the best we could while we were there. As for our third goal, we found that we may need to take a couple more advanced courses to achieve world domination.
Vibration Manipulation

By: Jayden Levine, Gloria Medina, Oases Carrington
Mentor: Phu David Lam, Physics

Everything is made of tiny particles called atoms. These atoms huddle together to make every last object of matter in existence; Solid, Liquid, or Gas. It is widely thought that these atoms are static in a sturdy structure that composes a molecule of some type of matter. But the surprising truth is, atoms are constantly moving back and forth at a rapid pace. This phenomenon is called Atomic Vibration. The intensity of the vibrations are measured by frequency which controls the shape or structure of an object. The frequency of an object in a natural state is its resonance frequency. When an object is hit with a frequency matching its resonance frequency, its atomic vibration flutters and the object distorts. This distortion is called Mechanical resonance and is the focus of our project.

Our experiment is the simulation of Mechanical Resonance. We used sine waves to create the frequency inflicted on the object which in our experiment was water. Our goal was to find a frequency that would affect the water in the greatest way (create the greatest distortion). The experiment was fairly easy to conduct and the materials were easy to obtain. Also, there was a lot of information existing related to the experiment which made research a breeze. This is why we chose to do this experiment. All of that and the fact that the results are amusing. We expected to see an effect with the lower frequency sine waves.

The materials needed for the experiment are duct tape, a subwoofer, a garden hose, a rubber hose, a tone generator, a wall outlet near a water spigot, an elevated surface, a camera with adjustable fps and video capability, and a lot of light. Everything other than the fps of the camera and frequency of the sine wave was kept constant. Note: The fps of the camera does not affect the results of the experiment, it is simply to capture any effect that may occur because the effect cannot be seen with the naked eye. On camera, if it worked, the water should appear distorted or irregular in shape.
When conducting the experiment, it is best to have 3 people at least. Make sure it is a sunny day outside and you have access to a lit up place with an outlet, elevated surface, and a water spigot close by. First, place the subwoofer on the elevated surface. Second, attach the rubber hose to the garden hose and duct tape the rubber hose to the subwoofer so that the rubber hose is facing downward and touching the speaker part of the sub. Third, Plug in the Sub and hook the hose up to the spigot. Turn the water and the subwoofer on. After it’s on, connect the tone generator and prepare the camera. Then record the water running at 24fps, 30fps, 60fps, and 120fps. Repeat the previous step with frequencies matching each fps value (24hz, 30hz, etc.) on each fps. Record all of the observations.

Our results showed that the lower frequencies had greater effects on the water and 120 hz had no visible effect. Our hypothesis was supported by our data. The smaller the hz the greater distortion the water had.

**Works Cited**


Sports Science 101: Break the Bank

By: Ron Lam, Matthew Sen, Gerald Frayre
Mentor: Phu David Lam, Physics

Abstract

The purpose of our experiment was to show how important it is to use the backboard as a helping tool to help bring your team or yourself to a whole new level. We formed our hypothesis that using the bank shot in different positions can help increase your shooting percentage. We used a 2-D model to demonstrate the angle of shot. This experiment included the work of geometry. In order to find the right angles we had to use the protractor to figure the correct correlations. The angle a player shoots in a game can determine whether he/she should make a swoosh or a bank shot. The controls of our experiment were a golf ball for the 2-D model, the tube that will give the ball a ramp to go down from, and a goal so that we can tell whether it was successfully made. The independent variable in our experiment is the angle of shot. We calculated the shots from a 30, 60, and 90 degree angle making 10 trials per angle. Our dependent variable is the chances of scoring from each angle. Later throughout the paper will be more in depth, we will be highlighting the chances and how should a player approach bank shot.

Introduction

In a basketball game, there is a 24 second shot clock in the NBA. However, the team that has a ball can either choose to score or they will have to cooperate and pass to a teammate. The results might change when you shoot when there is little time left. A player would just throw the ball in the air, but you can actually make the shot if you have the right mindset- the mindset of a scientist. If the body is set at the right position, a bank shot will be the perfect path to chose rather than throwing it at the small goal. Using the backboard can gain a player 20% more successful shot than making a swoosh (Gammon, 2011). We formed a hypothesis that a specific positions on the court will better chance the score using the backboard. We used a smaller setup instead of using the real basketball because it would be more difficult to perform and calculate the measurement. Since we used a smaller model we can measure the impact point of when the ball hits the backboard which in the smaller model is the flat wall. The true nature of this project is that we can help any basketball player improve their game by using the fundamentals of the bank shot.
Methods

Materials
For preparations of our experiment, we needed any type of ball that at least has a 4.5cm diameter we happen to use a golf ball, dry erase board, protractor, ruler, and a cardboard tube. We used a cardboard tube that was at least 50 cm long so that the ball has the accuracy to make it to the destination. All trials done was to find the average of the impact point, with enough data we can find the most likely spot that the ball will always go in. This was done so that players have a generally good idea where to aim. We also had a 4 cm player at beginning of the cardboard tube. The 4 cm player is represented by a toilet paper tube.

Finally, we used a protractor to determine the angles of where we were going to let the golf ball go. We drew on the dry erase board the angles 30, 60, and 90 degree angles.

Procedures
The first step of our experiment is to gather all materials and cut the cardboard tube in half so that the ball has a smooth surface to go down from without getting stuck inside the tube. Next, for our preparations, we had to make a diameter of a about 5 cm because the ball is at least 4.5 cm. After making the circle on the dry erase board, make a line on the 12 o’clock spot on the circle for the rim, measure about 16 cm to the left of the line made so that you can measure the impact point of the ball. After everything is set up, place the board against the ball so the board and the flat wall makes a 90 degree angle. Have a piece of paper having the same measurements of the 16 cm long and place it on the ball so that both lines pair up together. All 3 angles should have 10 trials. After gathering all the data, find the average of each angle then in that common spot it will be the most successful area.
Results

We first found out our angles on the dry erase board from the protractor. The most common spot for the 30 degree angle was 3-4 cm to the left of the rim. The 60 degree angle had a common spot of 1-3 cm from the rim, with enough force and arc in a real game there is a guarantee or a highly like percentage of going in. The 90 degree angle is more reliable than trying to goal for the swoosh (Malinowski, 2011). The 90 degree bank shot is high probability of making it if a player shoots straight for the backboard rather than going for the swoosh. We came to our conclusions that our hypothesis stands corrected because of our data. Bank shots have a greater chance of turning successful if you master the shot, rather than having to throw the ball up in the air and guessing where the shot will land. Having a bigger target will be easier than having to aim in a 18 in diameter where a player could be aiming at a 72 in backboard.

Discussion

With all the data we inquired, we realize that making the bank shot will have a better probability of making it instead of making a swoosh. Bank shots are key points in a game. They are basic fundamentals to learn, they might be basic and not flashy, but they will give you the points and it will lead your team into victory. Bank shots can be used in many different situations from floaters and runners. It is not directly good to shoot directly to the basket that is why researchers have proved using the backboard in highly recommended.

Conclusion

The purpose of our experiment was to help players, coaches, or people who are interested in the game basketball. In our hypothesis, we stated that making a bank shot is better than scoring directly to the goal, our hypothesis was stated truly. Although there was very limited time in our experiment and other factors, our group successfully did our project and hope that players will take bank shots into their game.
References


Wind Turbines

By: Veronica Nichols, Tiffany Bass, Jonathan Perez
Mentor: Long Zhao, Engineering

Introduction

The experiment was to measure how the wind blades’ materials and type of wind blades were affected by wind. The blades that were created was the two types of blades which was a straight edged and curved edge blade. Three types of materials were used cardstock, cardboard, and plastic. The hypothesis of the experiment was the straight edged plastic blade would go fastest as a result of the sturdiness of the blade and the straight and clean cut of the blade. The experiment did not work as expected due to the flatness of the blades, the experiment was changed and the question became which material and type of blade would go further if thrown. The hypothesis became that the plastic straight edge would have better results over the other materials. The same materials and blade types were used in the original experiment.

Wind turbines help create electricity using wind energy. The project was selected to help others around the world. The question was how the type of blade and type of material used would affect the velocity of the wind turbine. The reason the project is something that can be used everywhere is due to the fact that since wind energy can be harnessed anywhere with the right tools it can be used to help countries in poverty develop their countries. With those blades we could measure which type of blade others could use to create working turbines with. The blade was made to cut through the air and be able to twist in a circular motion to create energy in order to help other countries with their particular situations that require electrical power.

The hypothesis was presumed to be that the plastic straight edge wind blade would go the fastest due to the cleaner cut edge. Since the actual experiment did not work as it should have, in the process of this failure the group still wanted to impact others in such a manner that the whole experiment was not a failure the blades could still be used. The blades could be used to measure how well the blades could travel while still cutting through the air to gain the most stability.
Wind energy has been utilized by people since the earliest recorded history. It powered boats down the Nile River and helped Persians with their daily lives. It helped pump water and grind grain in 500 B.C and help do many other things due to improvement of wind energy utilization. Peria is where windmill were originated from. The world's oldest windmills are located in Afghanistan. In the late 1890's steel blades were invented to make the windmills more efficient. Now roughly today 2.5 million homes are using wind energy. Which is 5% of the renewable energy we use today in the United States. As a group we wanted to find a way to make our own homemade wind turbine. Therefore we came up with a way to make our own wind turbine.

Procedure

1. Collect 6 sheets of cardstock paper, 2 cardboard boxes 8.5x11, and 6 sheets of plastic 11x14 for the blades, 4 pieces of pinewood 2x4's (1 being 3 ft and 3 being 2 ft), 8 screws, 1 nail, a drill, a fan, hair tie, an electrical source, a pencil and a sharpie.

2. Build the base: Take 2 pieces of the pinewood 2x4's (2ft) and put them parallel to each other. Then taken another 2x4 (2ft) and put across the two parallel pieces like as a crossbeam. Drill 2 starter holes on each side of the cross beam. Then drill 2 wood screws on each side in the starter holes. Then take the last 2x4 (3ft) and stand it up on top of the cross beam and drill 3 screws on each side of it. Then drill a hole on the top of the front face of the 2x4 (3ft), big enough to fit a pencil snugged inside of it.

3. Design the blades: Draw a templet of 2 types of blades (curved and straight). Then draw each templet on each of the materials (3 on each). Then take the plastic to be cut. Take the scissors and cut out the cardboard and cardstock blades out.

4. Take the extra cardboard box and draw an out line of a unused toilet paper roll and use that as a templet for the base and support for the blades. Take the templet and draw 12 circles. Then take the scissors and cut out the circles.

5. Repeat step 4 with each material and shape.

6. Take the hot glue gun and plug it into the wall to warm up. Once it is warmed up glue the 3 of the blades onto 1 of the supporters then take another supporter and glue it on the other side of the blades.
7. We attached a set of the blades on the pencil and tied a hair tie at the end of the pencil.

8. Plugged the fan into an outlet and turned it on high and pointed it at the wind turbine.

**Procedure Part Two**

1. We use the blades from the last experiment

2. Went outside of Fairmount Towers

3. Laid a long strip of tape on the ground and another strip to stand at while throwing the blades

4. Have one person throw the blades (at the same force for accurate data)

5. Throw each blade and blades shape three time each.

6. Take the tape measure and measure the distance after each throw

7. Record the data

**Discussion**

When conducting our experiment several things did not go according to plan. We had a base set up and the blades attached. The blades couldn’t catch air with fan. We found out that since our blades were not at an angle that they wouldn’t be able to catch the air. We also had blades that were bent slightly in the process of making them. We also ran out of super glue and had to switch to hot glue. All of these things could have affected our results.

As I said before our experiment didn’t at all but we didn’t give up there. While conducting our initial experiment if also figured out that our blades could be thrown like frisbees and fly. So when we couldn’t get any data for the wind turbine we decided to throw the blades like frisbees and collect that data. That experiment is almost the same. We were looking to see which type of blade and which materials would fly the farthest. When doing this we had the same person throw all of the blades to eliminate another variable. We also used a wide indoor space so that the wind outside would not affect anything. The wide space was so the when we did throw it it didn’t hit any walls or other objects. When it did hit walls we through it again and took that trial. We didn’t have a perfect or successful experiment but we did learn from our mistakes.
You always have to do research before doing anything. That was one of the things that we could have done a lot better. When you research we didn’t really look up the mechanics of a wind turbine or what really went into creating one. That was a big mistake on our part. We also waited too long to actually conduct our experiment. When we conducted our experiment and we got no results we did some more research and found out that one of the reasons it wasn’t catching any air was because the blades were attached flat and not at an angle. To make the wind we used a regular box fan you can buy at Walmart and for some of the materials we used it wasn’t powerful enough to make it spin.

Conclusion

In conclusion the first experiment did not work as expected to. The group was unable to affect many lives in the countries that faced poverty. Although the experiments weren’t a complete bust, the blades made were still able to be measured for distance. The distance became a substitute for the original reason the blades were made. The type of material and the angle of the blade could still be used to help others. The plastic straight edged blade went the furthest most consecutively, the group’s hypothesis was correct. With the plastic straight edge blade the whole world could benefit from these findings, especially if the original experiment worked.

References

http://energy.gov/eere/wind/history-wind-energy


http://www.scientificamerican.com/article/bring-science-home-wind-speed/
Sensory Deprivation and Cognition

By: Lilia Marquez, Douglas Newman, Moe Paw, Zane Storlie
Mentor: Phu David Lam

Abstract

This experimental study was conducted in an effort to measure the effects of sensory deprivation (in this case, a deprivation of the auditory and visual senses) on cognition. Sensory deprivation is known to have both helpful and harmful effects on cognition to a certain degree. The purpose of this experiment was to see which side of the spectrum, harmful or hurtful, 30 minutes of sensory deprivation would fall on. The participants, both control and sensory deprived groups, had their cognition (words per minute) tested before they were experimented on. Once they were experimented on, their cognition was tested to observe a difference in words per minute. There was a slight increase in words per minute in the participants that were under sensory deprivation. These results indicate that in short intervals, auditory and visual sensory deprivation has a slight beneficial effect on cognition.

Introduction

Sensory Deprivation (SD) is a forced psychological state in which one cannot feel, smell, see, hear, or taste. SD has many different implications, both positive and negative, from spa treatment and meditation to solitary confinement and punishment. SD has been known to be relaxing, but excessive SD has been known to drive people insane. This experiment sought out to determine the effects of SD on cognition over a small time-frame of 30 minutes, using test methods from a similar experiment to compare with the results of that experiment and possibly gain insight into how SD has different effects depending on the amount of time spent in SD. The experiment was not complete SD, for the participants only had their sight and hearing deprived.
Methods

Four Sensory Deprivation (SD) participants (two boys and two girls) and two Social Isolation (SI) participants (one boy and one girl) were given tests prior to and after the deprivation/isolation period. The participants were tested on their ability to create a story in under 2 minutes from a verbally-presented scene. The scenes used were borrowed from a similar experiment already conducted. The participants were given different tests before and after the deprivation/isolation period. After the SD participants were given the pre-experiment test they were confined to a small study room in a library. These rooms had a window and a sheet had to be used as a blind to decrease the amount of light entering the room so as to increase the likelihood of complete sight deprivation. The participants were instructed to sit in a chair in the darkest corner of the room facing the wall with a hoodie over their eyes and earmuffs/headphones covering their ears, and they were to remain this way for 30 minutes. The participants were also instructed to refrain from making noise and moving as much as they could, for to do so would have certainly reduced the effects of sensory deprivation. After the 30 minute period was up, the participants were tested, and were then dismissed. The SI participants had a slightly different experience in that they were confined to a dormitory restroom with no senses deprived of them. The results of the tests were measured in the length of the story in words and average words per minute, which was calculated by taking the number of words of the story and dividing that value by two (the time the participants had to tell the story).

Results

The participants showed no significant increase or decrease in cognition after being sensory deprived. The results for the pre-test can be found in Figure 1. The words per minute were calculated by recording the participants as they gave their verbal response. Once their verbal response was recorded, the audio was reviewed to as accurately as possible type up the words the participants said. This same procedure was done with the post-test data which can be found in Figure 2. There was a slight increase in words per minute for the sensory deprivation group after the test which suggests a slight increase in cognitive abilities. Although their words per minute increased, it cannot be clearly stated that 30 minutes of auditory and visual sensory deprivation do indeed provide a significant amount of cognitive increase in order to make a true difference in overall performance.
With such little data, that conclusion can not be inferred. The differences in words per minute can be found in Figure 3. A comparison of all of the three stated data can also be found in Figure 4. Since the experiment was a sort of replication of a previous study done before, a reference table has been provided in order to compare the data of that experiment to that of this experimental study. That reference table can also be found in Figure 5.

Figure 1
This data is a table of the words-per-minute for both the sensory deprivation group and the control group pre-tests.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Total Words</th>
<th>Average Words Per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Isolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>391</td>
<td>190.5</td>
</tr>
<tr>
<td>Y</td>
<td>217</td>
<td>108.5</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>304</td>
<td>152</td>
</tr>
<tr>
<td>Sensory Deprivation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>178</td>
<td>89</td>
</tr>
<tr>
<td>B</td>
<td>193</td>
<td>96.5</td>
</tr>
<tr>
<td>C</td>
<td>103</td>
<td>51.5</td>
</tr>
<tr>
<td>D</td>
<td>183</td>
<td>91.5</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>164.25</td>
<td>82.125</td>
</tr>
</tbody>
</table>

Figure 2
This data is a table of the words-per-minute for both the sensory deprivation group and the control and the control group post-tests.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Total Words</th>
<th>Average Words Per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Isolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>345</td>
<td>173</td>
</tr>
<tr>
<td>Y</td>
<td>189</td>
<td>94.5</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>267.5</td>
<td>133.75</td>
</tr>
<tr>
<td>Sensory Deprivation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>175</td>
<td>87.5</td>
</tr>
<tr>
<td>B</td>
<td>201</td>
<td>100.5</td>
</tr>
<tr>
<td>C</td>
<td>144</td>
<td>72</td>
</tr>
<tr>
<td>D</td>
<td>184</td>
<td>92</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>175</td>
<td>88</td>
</tr>
</tbody>
</table>
Figure 3
This data is a table of the words-per-minute for the sensory deprivation group and the control group and the difference in mean.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Total Words</th>
<th>Average Words Per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Isolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>-45</td>
<td>-22.5</td>
</tr>
<tr>
<td>Y</td>
<td>-28</td>
<td>-14</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>-36.5</td>
<td>-18.25</td>
</tr>
<tr>
<td>Sensory Deprivation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>-3</td>
<td>-1.5</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>41</td>
<td>20.5</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>11.75</td>
<td>5.875</td>
</tr>
</tbody>
</table>

Figure 4
This data is a bar graph of the words-per-minute for both the sensory deprivation group and the control group and their mean differences.
Figure 5
This data is the data that coincides with a previous experiment title ‘The Effects of Sensory Deprivation and Social Isolation on the Performance of an Unstructured Cognitive Task’ by Suedfeld, Peter, Robert J. Grissom, and Jack Vernon (suedfeld, et al., 1964)

| TABLE 1 |
|-----------------|---|---|---|
|                  | C  | SD | S1 |
| Story length     | 1521 | 1881 | 526 |
| Final            | 1442 | 1299 | 818 |
| Diff.            | -79  | -522 | 292 |
| p                | 0.41 | 6.30 | 2.43 |
|                  |     |     |     |
| Speech rate      | 164.5 | 240.5 | 161.0 |
| (words per min.) | 150.0 | 177.8 | 142.3 |
| Diff.            | -14.5 | -62.7 | -18.7 |
| p                | 1.82 | 5.23 | 1.36 |
|                  |     |     |     |
| * One-tailed.    |     |     |     |

Discussion

Anomalies and events that were out of the administrators control added to the slight inaccuracy of the overall experiment. One of the first flaws of the experiment can be found in the actual sensory deprivation environment that the participants were in. The participants were on the third floor of the Ablah library on the Wichita State Campus, in quiet rooms 314 and 341. The problem with the quiet rooms was that both rooms had large windows in them that caused light from the 3rd floor to somewhat flood in. Due to this problem, alternate measures were needed in order for the experiment to become somewhat of a success. This problem was solved by taping up bed sheets over the window so as to make the room darker than it was before. Since the first two experiments were performed late into the night before closing time in the library, there were loud intercoms that interrupted the participants’ auditory sensory deprivation. This intercom interrupted the participants fifteen minutes into their auditory and visual sensory deprivation states. This interruption only occurred for participants A and B (you can refer to these participants’ data by looking and figures 1-3.) Another anomaly in the experiment was that participant C fell asleep during the deprivation state which could have caused them to produce inaccurate results of a true auditory and visual sensory deprivation.
References

Section Two:

Underclassmen Science Fair
Are You Thirsty? Rehydration Efficiency

By: Edgar Madrid, David Nevarez, Cristian Marquez
Mentor: Heather Journell, Environmental Science

Introduction

Do you have a favorite drink for your work out? Is it Water, Coconut Water, Cold Water, or Gatorade? We all have different preferences when it comes to what drink to choose when working out, but do you know which drink is best for you? We decided to conduct an experiment in order to test which drink would benefit us more. So our hypothesis was that coconut water was going to benefit us the most in our experiment. Our dependent variable would depend on what liquid we will drink. Our independent variable will depend in our outcomes of our measurements; body temperature, heart pulse, body weight, and feelings.

Research and Experimentation

We hypothesized that coconut water would effect us in a better and healthier way to our bodies. We researched that coconut water had natural sugars, fats, and electrolytes. This would help us run in a non tired way since it is all natural. Gatorade had sugars that were made in laps that would only give us non natural sugar that wouldn’t help us as much as the Coconut Water.

Before starting our experiment, we measured our body weight, body temperature, heart pulse, and the way we felt after it. We then drank our 4 ounces. We then started to run for fifteen minutes. Next, we took five minutes of break, while measuring ourselves and drinking our designated drink. We then ran our final half of our thirty minutes. Finally we measured ourselves again to see our final results.
We tried to maintain a steady pace during the run by running at about one lap per minute. We took the average of each of our laps and we did very well, having an average of about thirty for almost all of them, for each drink, since we ran for thirty minutes. Even so, we were able to run a little more on with the cold water, which shows that we felt much better during the experiment. On the other had, with the coconut water we ran way less than the average of thirty that the others had. This is because of the ill feeling that caused two of our participant to no longer be able to continue and not succeed in completing the second 15 minutes of the run.

We also recorded our feelings after our experiment. For Gatorade we all felt tired and full to our stomachs. For cold water we all felt very we and had the endurance to continue running if we wanted to. Room temperature water had similar results as the cold water, but we felt much cooler and fresher with the cooler water. Coconut water had a different result from the rest of the drinks. Two of our participants felt ill during the experiment. This led to them stopping and not able to finish the experiment. One of us actually threw up. For the other two, they felt full, a little dizzy and tired.
Heart Rate and Temperature Change had similar results. They both increased less with Cold Water, unlike the other drinks. This proved that our bodies didn’t need to work as hard, allowing us to feel less tired and have more endurance. If our bodies needed to do more work, our temperature would increase. Gatorade and Coconut water had energy that made us get a faster Heart Rate that made us increase temperature. With Room Temperature water, our bodies just received liquids with out cooling us down and making our inside body feel refreshed as the Cold Water.

<table>
<thead>
<tr>
<th>Feelings</th>
<th>Gatorade</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Stomach Ache, Lots of sweat</td>
</tr>
<tr>
<td>P2</td>
<td>Tiredness</td>
</tr>
<tr>
<td>P3</td>
<td>Heart burns, felt like throwing up</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cold Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
</tr>
<tr>
<td>P2</td>
</tr>
<tr>
<td>P3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R-T Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
</tr>
<tr>
<td>P2</td>
</tr>
<tr>
<td>P3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coconut Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
</tr>
<tr>
<td>P2</td>
</tr>
<tr>
<td>P3</td>
</tr>
</tbody>
</table>
This graph shows that we lost more weight with coconut water, but this isn’t necessarily a good thing. As I mentioned before, one of our participants threw up which made him lose more weight. The Cold water didn’t make us reach as much weight, this show that we didn’t have to work as hard. Coconut and Gatorade made us tired faster which caused us to work harder and lose more weight.

**Conclusion**

In conclusion, it was revealed to us, out of all the four fluids we tested, cold water was the most beneficial in helping us stay more hydrated and feeling better. It gave us a higher endurance to do more laps. Our bodies kept a steady temperature and heart rate, so it made us feel more refreshed.
Fluid Effects on the Body

By: Elyssa Ziad, O’Brianna Stewart, Elizabeth Feist
Mentor: Lara Gossage, Biology

Introduction and Background

We hear about celebrities making mistakes that can lead to scandals, but sometimes they can do crazy things to end their life. In the 2000’s also known as ”A Golden Age For Dehydration” many celebrities have complained about them being dehydrated. All of these celebrities could have prevented this if they had the proper fluids in their body. Many people look up to celebrities as an influence and they are not putting such a good influence on people if they don’t express the importance of proper fluids in the body.

We decided that this experiment would help people who do not know what would happen if they drink certain fluids and how those fluids would lead to damage in the kidneys. This experiment would help people to make wise decisions on what type of fluids they put into their body. Many people are at risk for kidney damage and they do not realize it. This could help people be more concerned towards having kidney damage.

Normally, an eight-ounce can of an energy drink will contain roughly around 70 to 80 milligrams of caffeine. Approximately 200 milligrams per day does not have a very bad effect, but almost about 600 milligrams or more per day could increase your risk of kidney damage. If you only drink, let’s say 2 cans of energy drink in one day you’re not going to have a bad effect on your kidneys, but if you drink from 9 to 10, then your risk of having kidney damage is higher up the charts.

Soda has a whole lot of caffeine in it. And caffeine is typically a drug for you because it’s addicting and bad for your kidneys. The caffeine acts as a diuretic which means that the person gets dehydrated so the kidney has to work extra hard. Alcohol can prevent your kidneys from trying to filter blood throughout your body. That is not a good thing for your body because if your body can’t filter blood then your body could possibly shut down.
Your kidneys control the amount of water in your body, filtering your blood and excreting waste products in your urine, leaving nutrients in the bloodstream. In order for your kidneys to fulfill their main function of excreting waste products they require a minimum amount of water alcohol. Another side affect of alcohol is that it depletes your body of all your water soluble vitamins such as your B complex & vitamin C. Your kidneys play a key role in controlling blood pressure. The reason we are doing this experiment is so we can prove why we need to stay healthy and why drinking energy drinks, soda, and other things with a lot of sugar will lead to kidney damage and possibly death.

We are doing this to show you how drinking energy drinks can lead to a higher risk of kidney failure. First, it’s not healthy for you, it has a lot of sugar and caffeine in it. The high concentration may be associated with kidney damage. The reason we are using the chicken because it is raw and it has lots of blood. We are hoping to prove that the fluids we have chosen will lead to negative effects to the kidney.

Hypothesis

Our hypothesis is that if you drink one of these fluids then alcohol will lead to you having a higher risk for kidney damage.

Experiment

Materials
1. aluminum trays (16)
2. raw chicken legs (16)
3. rubbing alcohol
4. mountain dew
5. monster energy drink
6. gatorade yellow and blue
7. water distilled and tap
8. aluminum foil

Procedure
1. Get the aluminum trays.
2. Put a piece of chicken legs on each tray have two trays for each liquid.
3. Pour one liquid for each of the two trays with the chicken.
4. Cover chicken with foil.
5. Put chicken in the fridge for 6 days.
6. Observe the chicken everyday take pictures and record data and put data on rubric.
<table>
<thead>
<tr>
<th>Color</th>
<th>No Change</th>
<th>Specks</th>
<th>Large dots 1/4</th>
<th>1/2</th>
<th>3/4</th>
<th>Whole chicken color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>No Change</td>
<td>Inch +/-</td>
<td>15 CM</td>
<td>2 cm</td>
<td>25 cm</td>
<td>3 cm +/-</td>
</tr>
<tr>
<td>Texture</td>
<td>Regular</td>
<td>Slimy</td>
<td>Squishy</td>
<td>Rubber</td>
<td>Fragile</td>
<td>Hard</td>
</tr>
<tr>
<td>Smell</td>
<td>No smell</td>
<td>Slight raw chicken smell</td>
<td>Both 1 and 3</td>
<td>Smell like fluid</td>
<td>Moldy</td>
<td>Rotten old pungent</td>
</tr>
</tbody>
</table>
The Effects of the Gaming Lifestyle on the Body

By: Devonta Jones, Jesus Manzano-Legarda
Mentor: Lara Gossage, Anatomy & Physiology

Introduction

As I look through the cross hairs of my scope I can see the enemies waltzing around the open river bank in front of my position, at the top of the building where I creped in. One enemy player stopped; it looked like he was trying to reload, while taking cover behind a burnt out pick-up truck. The poor soul was under fire by friendlies on the ground, but I would not let them take my kill. My crosshairs zeroed in on his helmet covered head and pressed "LS" to hold my breath and zoom in... *zooms in* *holds breath* *pulls trigger* the in-game announcer voices spoke louder than the enemy's gunfire and said "care package inbound" the unlucky player was my fifth kill.

Research Background

This experiment is testing the effects of different types of video games on the human body. In particular four genres of video games on a Xbox 360. My group tested Horror, First Person Shooters (FPS), Adventure, and Sports games. To be exact, the four games we planned to test where Call of Duty (COD), F.E.A.R, Minecraft, and FIFA.

The purpose of this experiment is simple. We’re gamers and we would love to know how and what type of video games affect our health so would also caring mothers and fathers of subscribed gamers. As parents, they are worried about their children’s health and knowing that video games affect our physical and physiological health. We are mainly focusing on what type of video games affect us more than the other such as scary games such as “Slender, the arrival” can get the heart pumping faster than playing an adventure game such as “minecraft” which will tend to be slower paced at time for the same duration of time. We believe that certain types of video games will affect the body the body to increased heart rate, blood pressure, and body temperature for a short term.

Hypothesis

Our group predicted playing certain types of video games will have an affect on the body which will lead to increased heart rate and blood pressure.
Research Findings

There have been many studies of the effects of video games on the human body since its advent in the 1970’s. Most have concluded that video gaming has more negative effects than positive effects on the human brain and body. However, there are some who have found positive effects to video gaming. For example, many studies have found video games can cause weight gain due to the lifestyle it promotes; a study by the University of Geneva showed violent video games can affect a person’s emotional behavior for the worst, even with only one week of gaming. A positive study by the University of Rochester in 2012 found that people who played action-based video games made decisions 25% faster without losing any decision accuracy. Most studies, however, agree that there are far too many costs that outweigh the benefits. For example, many studies have found video games can cause weight gain due to the lifestyle it promotes. Not only can the physical body end up unhealthy, but also it has been found that video games can affect a person’s emotional and social health as well. A study by the University of Geneva showed violent video games can affect a person’s emotional behavior for the worst, even with only one week of gaming.

Results

The data we have shows us that all the games have some type of effect to your health, but two of them stood out. The first person shooter games (FPS for short) and the scary game. had risen the participants heart rate significantly and also their blood pressure. We concluded that scary and FPS affects the gamers health significantly change their heart rate and blood pressure. This shows us that there is a change in your health short term when you play FPS and scary video games. The players also showed a change in their survey questions, in the “if” questions it showed a change in results as in most had gone into a more violent or heroic choice. So we had concluded that after playing an hour of video games your heart rate and blood pressure increases there for proving our hypothesis correct “just as I thought” – Jesus Manzano it also showed that it had changed their mental state influencing a different approach to a situation.
Exposing the SPF Hype

By: Mai A. Her, Laura Malagan-Palacios, Brenna Storlie
Mentor: Heather Journell, Environmental Science

Introduction

Why do sunscreens have many different kinds of SPF numbers? Is there really any difference between all these SPFs? The purpose of our experiment is to find out the hype behind all the commercials sunscreens. If we take about ten people and test SPF 15, SPF 30 and SPF 70 sunscreens and spray them on the participates, then we will find that SPF 70 works the same as SPF 30.

According to Ibraimov, the dark skin pigmentation of the first people in Africa occurred not only for UV lights but also provide supplementary energy for the importance of maintaining a constant body temperature by heating blood circulating in skin. However, Franz Greiter created the first sunscreen. He was a chemist and got the idea of sunscreen from the sunburn he got during a trip to the mountains. We had found a research conducted by All Science Fair Projects; they believe that with a higher SPF, the larger amount of UV lights it was able to block. However, their data shows that SPF 30 and SPF 50 work the same. We based our hypothesis of SPF 30 being the same as all the SPF above it. Additional information to this is that zinc oxide provided by squash seeds naturally are active ingredients that blocks ultraviolet A and B.

Experiment

For this experiment, we will use Coppertone (SPF 15) sun spray, Banana Boat (SPF 30) sun spray, and Neutrogena (SPF 75) sun spray and a Sharpie. In order to make this experiment work, we think that by finding a 90ºF or higher sunny day to do the experiment; clean skin with soap and water; dry the skins; mark the skins with a sharpie where sunscreens will be applied; apply two sprays of each sunscreen on marked areas; expose the skins for an hour; and wait for two days then collect data and take pictures will make this a accurate and profitable research for both us and the benefits of average citizens.
Results

The following figure serves as the legend for our data charts:
Data collected after one hour of sun exposure:
Data collected after two days of sun exposure:
Discussion

During the act of doing this experiment, we ran into many difficulties. For example, when we found a good day for the experiment, we were not able to get the supplies for the experiment. Also, we want all the factors into this experiment to be at most similar as possible, but we understand that yesterday, today and tomorrow could never be the same. We did the experiment on June 30 2015 with a 97ºF.
Conclusion

All in all, we were unable to obtain favorable results due to lack of trials. We do see a big difference between the control variables and all the SPF sunscreen sprays, although they have similar results and there weren’t many significant big differences. However, we still believe that as long as there is Zinc Oxide in the sunscreen, one will be protected. If we were to do this or a similar experiment again; we would like to have a SPF 4 or lower sunscreen and a SPF 100+ sunscreen; a longer amount of time to experiment with multiple trials; and we would like to have more accurate measurement tools.

Work Cited


Spicy Foods: Home Remedies to Cool Down

By: Anautica Bodney, Shenice Canady, Whitney Mayberry
Mentor: Jan Crownover, Chemistry

Introduction

Have you ever intentionally eaten something spicy; knowing you were probably going to regret it despite knowing that nothing eaten or drank was going to give you the relief needed? Most of us enjoy a little spice here and there, yet on the other hand the burn is often too much to handle. Spicy foods are offered in many places and we tend to go beyond what we know we can handle. So that turns into a hot problem, your mouth is on fire due to some really good Mexican food you just had and you rush for some water, drinking away. If people knew what would give them relief due to eating something spicy we think more of us would be opened to trying new foods, which could help better you as a person instead of eating the same old thing over and over every time you’re eating.

Rationale for Experiment

This experiment is relevant to life today because, when you eat spicy foods you might regret it because you really don’t know what to drink or eat when the spicy taste hits your tongue. Our group will be experimenting on what remedies will give the best relief, and how long it will take for the test subjects to find the most effective relief after eating the habanero peppers. Research proves that people mainly will drink water after they eat something spicy, yet it does not help. Some people or cultures can build a tolerance, however; many experience gastrointestinal problems, resulting into heartburn, indigestion, and aggravate potential ulcers. We will differentiate types of remedies to get rid of the effects of the pepper. It might take a while for the burning sensation to cool down. This is relevant for knowing what to consume next time to cool down their taste buds after eating a spicy food.

The purpose for this experiment is to help those who consume spicy food to not suffer because normally the first thing someone picks up is water. Most people don’t realize that it does a poor job of cooling your mouth off due to water and oil not mixing well. Most peppers carry oil inside their seeds and by drinking water, this only spreads the oils around your mouth increasing the intensity. So by doing this experiment, we want to help you better understand what is going to cool your mouth off and how fast you should get your relief.
Research and Experiment

On July 16, 2012, Expresso Recipes conducted a type of experiment on live television about what foods or drinks would cure the spicy burning sensation in their mouths. First the test subject ate a chili pepper, and then she waited a minute for it to start burning her mouth. Next the woman who did not eat the pepper gave her a cucumber, but it did not help her. Next she gave her white yogurt, the taste started to go down to her stomach, but it still did not help. She gave her some parsley leaves, but it barely helped her. She gave her condensed milk, and let her take two teaspoons of it because she said the sweet taste started to take her mind off of the hot taste; but her throat was still burning. They notified that whoever was watching live or on the web that dairy was known to soothe the burning of the mouth. But after the test subject got through testing the things that she gave to her to see if it would relieve the burning tastes, she was given a cup of tea. Hot on Hot? That does not sound right. But after she drank the hot tea, she said it relieved her tastes buds from the spicy tastes that the chili pepper had given her.

The MythBusters informed their readers that about 8,000 years ago South and Central Americans started to put hot chilies into their food. Which was the same the same time that they tried to start finding ways to soothe the spicy tastes that they have when they eat the spicy foods. For the past years, milk has been the best remedy for spicy tastes. Apparently chilies have a substance called capsaicin that cause the taste buds to sting. When it is stinging the taste buds, the neural sensors send the message to your brain; “your mouth is burning!”. But milk contains casein, a compound that binds with the spicy taste capsaicin and washes it away. Even though water may ease the pain, oil and water don’t mix. It will actually spread the taste of the capsaicin oil and make it burn more.

We set up the experiment the way we did because over the course of three days beginning at three and later in the evening. We will test five people and one remedy each session. It is thought that it would be better to do it that way because it will be too hard to get someone to taste a habanero pepper five times in one day. When the test subjects will have to spit out the pepper after 30 seconds of chewing to minimize the chances of them getting sick. Comparisons will be made between reaction times, time it took for the remedy to bring relief and amount of remedy needed. Subjects are tested separately to try and decrease the influence of others’ reactions.
The scoville scale is a scale that is used to measure the spiciness of a pepper or hot sauce. The scale is named after the creator, American pharmacist Wilbur Scoville. A weakness of the Scoville Organoleptic Test is its imprecision due to human subjectivity, depending on the taster’s palate and their number of mouth heat receptors. The heat level is based on this dilution, rated in multiples of 100 SHU which is a measurement of Scoville Heat Unit in pungency.

If we tested a few people to see which home remedy would give a better and quicker relief after eating about a teaspoon of habanero pepper, then milk would give them a much faster and enjoyable relief then water, bread, toothpaste, Lipton tea, and sugar water.

Variables for this project consist of our independent which are the type of remedy will be using; milk; water; sugar water; tea; bread; toothpaste and the pepper. The amount of relief given by a remedy and how long it took will be our dependent variables. Everyone will be receiving the same amount of diced up peppers so a teaspoon, same pepper, the timer used will also be the same. That’s our control to make sure there is a balance that we are not changing up everything, and have something the same throughout the testing.

Voluntary participants will be given a survey to respond to in preparation for participation in this experiment.

**Materials**

- One loaf of white bread
- One Pitcher
- White sugar, small (one pound bag)
- One pack of vinyl gloves
- Colgate (white not gel) toothpaste one tube
- 30 pack of popsicle sticks
- One gallon of vitamin D white milk
- Stop watch
- Half a pound of habanero peppers (Dillions)
- Bottled water (24 pack)
- Disposable cups (one 24 pack)
- Lipton Green Tea
Procedure
1. Shenice and I will put on gloves and get out the knife to cut the habanero peppers into 8 equal pieces.

2. Have our testers come in one at a time and eat the pepper, or if they cannot swallow it they can also spit it out into a trash can.

3. Start stop watch

4. On day one we will test two out of the six remedies.

5. Our testers will have as much as that one remedies to give him/herself relief.

6. We will record the day, remedy, amount of remedy and amount of time it took for ones to get relief.

Questions that were asked of test subjects immediately:
1. Rate a 1 to 10, how spicy the pepper was?

2. Compare which gave you the best relief in your opinion?

3. We will keep asking if the hotness is gone about every min and if not then ill once again ask them to rate the spicy.
Results

Can You Handle A Little Spice In Your Life?

Can You Handle A Little SPICE IN YOUR LIFE?
Discussion

We had some unexpected factors that we had to overcome. It was determined that most of our responses to gauging rate of relief on a scale of one to ten would be subjective, due to a test subject not being able to fully answer questions on an even scale. Their personal experiences with spicy foods and the remedies they've already tried, it could have put them into a mind set about the type of remedy used. We had to rely on what was reported and reflecting on their individual tolerance levels. Instead we should have measured out all of the liquid remedies, rather than just using the bottle they came in or using a solo cup of which we didn't have an accurate measurement.

A modification next time would be to use more than one type of pepper and only one type of remedy which would be milk due to our data supporting the greatest relief. Another modification would be to use one gender and/or test subjects with approximately same tolerance levels which would have to be predetermined.

Conclusion

The results we collected supported our hypothesis, which was by testing different remedies that milk would give more immediate relief then the other chosen remedies. The results show that some of our remedies that were said to give some type of relief gave nothing to our test subjects. Due to constraints of time had, remedies were to be tested each day over the course of six days. Instead one remedy was tested in the afternoon and then another one in the evening after dinner to allow time for cleansing palates and recovery.
THANKS

SPECIAL THANKS TO:

WSU Biology Department
WSU Chemistry Department
WSU Engineering Department
WSU Physics Department

The TRIO UBMS Center is funded by the US Department of Education for the 2014-2015 year in the amount of $310,800 and operates a College Access Completion Grant from the Kansas Board of Regents in the amount of $95,000.57.

Notice of Nondiscrimination: Wichita State University does not discriminate on the basis of race, religion, color, national origin, gender, age, marital status, sexual orientation, status as a Vietnam-era veteran, or disability. Any person having inquiries concerning this may contact the Office of Equal Opportunity, Wichita State University, 1845 Fairmount, St, Wichita, KS 67260-0145 (316) 978-6791
TRIO Upward Bound Math Science Center
1845 Fairmount, Box 156
Wichita, KS 67260-0156
(316) 978-3316
(800) 531-4984

Building Habits for a Lifetime
...one block at a time!