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Table of Contents

The Effect(s) of Violent Video Games on Behaviour

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I. Abstract

The purpose of this study was to investigate the effect of video games on the behaviour of gamers. Understanding the link between the games people play and how they are influenced by them is vital because if they have a positive impact on gamers such as stress relief, then they can be utilized more effectively for that purpose; and if they have a negative impact on gamers, then, with greater understanding of the link, these negative effects can be avoided. Subjects were assigned one game each to play out of a variety of different games and then, after a week of playing the game, they were tested on how aggressive they were. The results demonstrated that subjects who played more violent and aggressive games were more violent and aggressive during the test. Overall, this means that although games already come with age recommendations, more preventative measures need to be taken in order to make sure that violence and aggression in the vast gamer population does not rise.

II. Introduction

Video games are enjoyed by, and in turn, affect a large portion of the populace. In the USA, 155 million Americans frequently play video games and every 4 out of 5 American homes have devices for playing video games. (Campbell, 2015). As these numbers grow larger, there is a growing concern for the effect these games are having on players, negative or otherwise. For example, a 20-year old man shot and killed 20 kids and 6 adults at Sandy Hook Elementary School. He was found to have owned and played mature, violent games like Grand Theft Auto, Call of Duty and Dead or Alive; however, he also allegedly spent 8-10 hours a night, 3-4 times a month at a movie theatre playing Dance Dance Revolution. (Toppo, 2015). Understanding the links between the games people play and their behavior will not only allow society to avoid incidents like this in the future but will also enhance human understanding of behavior.

The question encompassing this topic is: how do violent video games affect behaviour?

If unisex subjects aged 14-18 play mature video games with recurring violent themes for 2 hours a day, 5 days a week for one week, then they will display negative traits like aggravation afterwards. This is because as the person plays the game, the actions they perform and the dialogue they hear influences the person by setting an example; this is called observation learning. (McLeod, 2014).

III. Method

The experiment was conducted over the course of one week using 10 subjects: 5 males and 5 females. One male and one female were each assigned one game out of 5 total games: Ori and the Blind Forest

(hard difficulty), Call of Duty Black Ops 2 (zombies mode), Overwatch, Grand Theft Auto 5 and DOOM (2016). Each pair of subjects played their assigned game (individually) for 2 hours a day, 5 days a week for one week. On the last day of testing, during the last 30 minutes, subjects were taunted whenever they died in order to stimulate a reaction from them. This reaction was then rated on an aggression scale of 1-5. 1 being passive or no reaction, 3 being verbal aggression and 5 being physical violence. They were also timed on how long it took them to reach each aggression level.

The independent variable in this experiment was the game being played. This was different for every 2 subjects in order to determine the different effects each of the games had on the subjects. The dependent variable was the aggression of the subjects. This was determined through the aggression scale and the time it took each subject to respond at various aggression ratings. In order to keep results consistent, many variables were kept constant: The day the game was played (because some subjects may be more stressed during school days vs weekends), the time of day the game was played (because some subjects may be grumpier later at night as compared to in the evening or vice versa), the amount of time the game was played (because as per the experiment, subjects playing the game for longer periods of time may be effected more than those who played for a shorter period of time), the console on which the game was played (because all games are available for PC), and the environment in which the game was played (because the more immersed the subject is in the game, the more the subject may be affected by it).

IV. Results

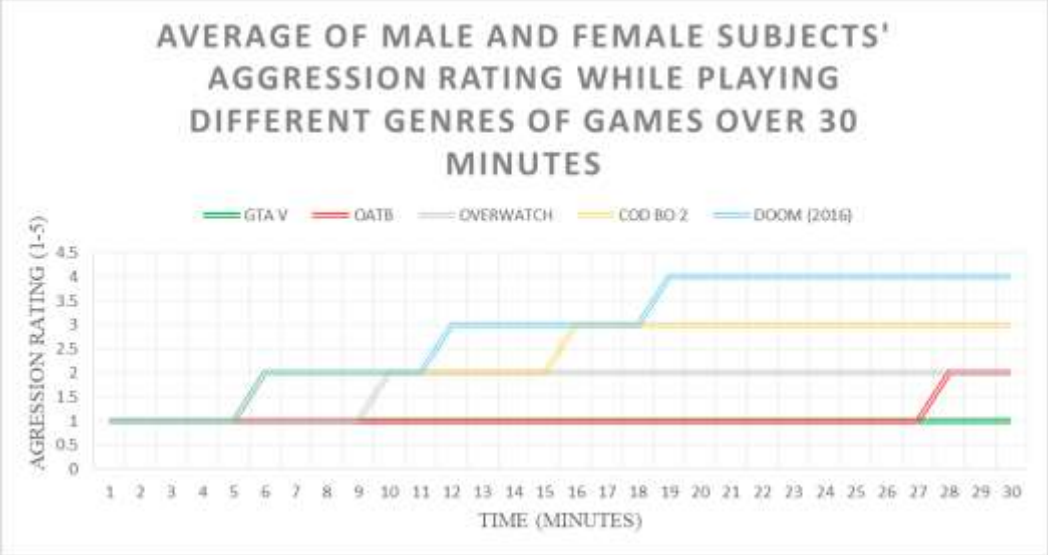

Figure 1: Average of how long it took the subjects to reach each aggression level.

Table 1: Maximum aggression rating of the male and female subjects playing each game along with how long it took the subjects to reach each aggression level.

Game Played	DOOM Male	DOOM Female	COD BO2 Male	COD BO2 Female	Overwatch Female	Overwatch Male	OATB Male	OATB Female	GTA V MALE	GTA V FEMALE
Maximum aggression level	**4**	**4**	**4**	**3**	**2**	**2**	**2**	**2**	**1**	**1**
Time until aggression rating of 2 (min)	**7:20**	**3:56**	**9:51**	**2:24**	**7:09**	**12:12**	**26:24**	**29:03**	N/A	N/A
Time until aggression rating of 3 (min)	**11:46**	**13:08**	**18:37**	**13:49**	N/A	N/A	N/A	N/A	N/A	N/A
Time until aggression rating of 4 (min)	**1 1:18**	**25:43**	**27:55**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time until aggression rating of 5 (min)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

V. Discussion and Conclusion

The hypothesis: If unisex subjects aged 14-18 play mature video games with recurring violent themes for 2 hours a day, 5 days a week for one week, then they will display negative traits like aggravation, was proved to be true. The data

collected *(see table 1)* showed that subjects playing games like Ori and the Blind Forest, a kid's puzzle game only had a maximum aggression rating of 2 and it took them about 28 out of the 30 minutes to reach that point; whereas subjects playing games like DOOM (2016) had an aggression rating of 4 and it only took them 18 minutes to reach that point. The general trend *(see figure 1)* in the data depicts that as subjects play more violent and aggressive games, their responses to real-world stimuli such as taunting will be negatively affected. This is evident by the maximum aggression rating increasing and the

amount of time required to reach that point decreasing as more violent games are played.

The idea that violent video games can affect the actions or behaviour of the gamer is a controversial one. There have been countless experiments that have both proved and disproved this idea with the majority of experiments and studies demonstrating a direct correlation between violent video games and gamer aggression. In this experiment, the conclusion was reached that if a person plays violent games, then he/she will be affected negatively by them. This is evident in *figure 1* in which as the games' violence and aggression increases, the maximum aggression rating of the subject playing the game also increases and the time required to reach that aggression level decreases. However, this trend does not hold true for Grand Theft Auto 5: a game noted for its obscene violence, vulgarity and overall lack of human morals and ethics. So how did the subjects playing this game have a lower aggression rating than those playing Ori and the Blind Forest? One of the possible explanations for this is that the 2 subjects were both coincidentally more easygoing than all the other subjects. Another more plausible explanation for this is that Grand Theft Auto 5 is so profane, vulgar and crude that it acts as a sort of deterrent to the kind of behaviour displayed by the characters in the game. By this logic, it may also be that the game is so profane, vulgar and crude that it is, to the gamer, so artificial and unreal that it is obvious that the world of Grand Theft Auto 5 is fabricated and thus, it doesn't have the same effect on the gamer's subconscious.

Throughout the experiment, many efforts were made in order to keep results consistent, such as the controlled variables during testing. However, there were many problems and sources of error that could have affected the experiment. The main one being that each subject was experiencing different levels of stress and pressure due to tests, assignments, extra-curriculars and other obligations. This easily could have influenced how much each subject lashed out. The easiest way to rectify any possible error due to this, is to recreate the experiment on a larger scale so that the outliers would not affect the general trend of data as much. Overall, the experiment went as expected based on previous research conducted and the hypothesis.

VI. Application

This information can be utilized in other fields of research such as psychology. Enhanced

understanding of how the subconscious is affected by external stimuli and media will allow for more developments in the field.

Understanding the correlation between the video games gamers play and the behaviour and action of the gamers will also allow society to regulate negative media consumption. If the negative effects of violent and aggressive video games can be further proved, it will be the first step in stopping the impact. After all, one must first identify where the problem is before it can be fixed.

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How using proper jumping technique makes vertical jump increase when dunking a basketball

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I. Abstract

The question being investigated is how does using proper technique affect vertical jump when dunking a basketball. The relevance of this question is purely based on the fact that many young basketball players want to be able to dunk and are struggling to find little details that will maximize the vertical jump, like technique. To find a possible answer to this question, five subjects were gathered to a basketball court. Each subject had five attempts to dunk using proper technique, using one leg and both legs, and using improper jumping technique, off one foot and two feet. This will show which jumping technique and how many feet need to be used in terms of increasing the vertical jump. The results of the data collection have shown that the average amount of dunks made using proper form is 4.875 dunks, while the average number of dunks made using improper technique was 3.75 dunks. Using proper technique allowed for the subjects to make 26.1% more dunks than using improper technique. Based on the results, proper technique affects the vertical jump positively as it helps it increase in height. Implementing proper jumping technique can apply to anyone but is mostly used by athletes and coaches who train athletes.

II. Introduction

This project is about how using proper body positioning and technique affects one's vertical jump. The significance of the project is to find out is using proper jumping technique will increase jump height, so athletes and trainers can improve, vertical jump knowledge. Jump height can depend on foot positioning to angle of knees bent (Rodrigo G. Gheller, Juliano Dal Pupo , Jonathan Ache-Dias, Daniele Detanico, Johnny Padul, Saray G. dos Santos, 2015) and even the thought of touching a virtual object and touching a physical object (KEVIN R. FORD, ANH-DUNG NGUYEN, ERIC J. HEGEDUS, and JEFFREY B. TAYLOR., 2017). All these small details will have a large impact on vertical jump height, and using proper technique will have successfully accomplished every small detail.

III. Methods

The first part of the experiment stated; stand 10 to 15 feet away from the basketball hoop. Run towards the basketball hoop as fast as possible and, 2 feet away from the basket jump using preferred jumping

technique and jump as high as possible. When in the air, catch the ball thrown from the alley-ooper and try to dunk the ball. Repeat steps 5 times and, record the number of dunks made and missed.

The second part of the experiment stated; stand 10 to 15 feet away from the basketball hoop. Take long and fast strides towards the basket. When 4 to 5 feet away from the basket, plant strong foot in front of the body as much as possible then, plant weak foot in front of strong foot and, pointed inward to the body to get closer to the basket by around 3 feet. When in the air, catch the ball thrown from the alley-ooper and try to dunk the ball. Repeat steps 5 times and, record the number of dunks made and missed.

The independent variable was the jumping technique used.

The dependent variables were vertical jump height, different ways to measure and test the vertical jump, number of dunks made or missed. The control variables included; the height of the basketball hoop (Has to be 10 feet high). This was controlled because that is the regulation height for a basketball hoop. The size of basketball (Has to be a 29-inch ball). That was a controlled variable because there are different ball sizes. Using a 29-inch ball is the regulation size. The height of test subject (Has to be at least 6 feet tall). This was a controlled variable because it seemed like the most realistic height for a person to dunk. The reach of test subject (Has to be at least 8 feet high). This was a controlled variable since wingspan varies within every person. The way the ball is lobbed to the dunker. The basketball has to be thrown in front of the dunker, in front of the net. The same ground surfaces. Either indoors or outdoors. The distance of test subject from the net. Must be 10 to 15 feet away from the net.

IV. Results

Table 1- Test subjects jumping off both 1 and 2 feet using proper technique

Subjects	Dunks made off 1 foot (using proper technique)	Dunks made off 2 feet (using proper technique)
Subject #1	3	5
Subject #2	4	5
Subject #3	2	1
Subject #4	5	5

Table 2- Test subjects jumping off both 1 and 2 feet using improper technique

Subjects	Dunks made off 1 foot (using improper technique)	Dunks made off 2 feet (using improper technique)
Subject #1	2	3
Subject #2	4	3
Subject #3	1	0
Subject #4	4	4

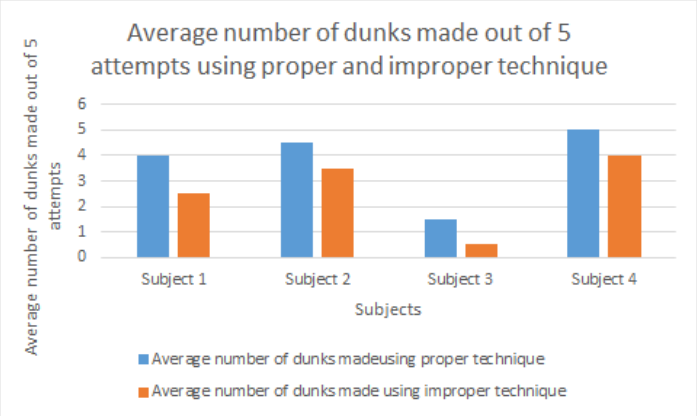

Figure 1- Comparing the average number dunks made using proper and improper technique

V. Discussion\Conclusion

The main purpose of the experiment was to find out if using proper jumping technique affects the height of a vertical jump. The hypothesis provided states, "If you have good body positioning before jumping, then the height of your jump will increase when dunking, because with proper body positioning your horizontal energy when running will then be transferred to vertical energy when jumping". The hypothesis provided was correct. This is so since the average number of dunks made using proper form was 4.875 dunks, while the average number of dunks mad using improper technique was 3.75 dunks. That means that using proper jumping technique has led to the subjects making 1.125 more dunks and roughly 26.1% more dunks. The hypothesis states that using proper form will result to higher vertical jump when dunking. Possible errors that may have occurred during the experiment could have been the number of test subjects. There were only five test subjects and, to have a better and wider range of results, there need to be many more test subjects performing the experiment. The ideal number of subjects could've ranged from 20 to 100. Another error that could've occurred is that the floor from the indoor gym's, could have been dusty and affected the subjects jump quality. Having a clean court assures good traction and a lower risk of slipping, thus leading to a better jump.

VI. Application

This experiment has shown that using proper jumping technique and proper body positioning, improves your vertical jump when dunking a basketball. This information can be used by athletes who want to improve vertical jump height. Athletes can watch videos and tutorials online on different jumping techniques and can choose the one that fits the best. \This information can also be used by coaches and trainers who can teach athletes proper techniques, show live demonstrations and point out errors. This will massively improve the athlete's

athletic performance, thus making sports more interesting.

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Vertical Jump Biomechanics Altered With Virtual Overhead Goal

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Benefit of Video Games on Hand-Eye Coordination

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I. ABSTRACT

The video game industry is rapidly increasing in popularity and sales worldwide and gamers around the world are scolded for using their leisure time to play these games. The purpose of this study was to determine whether gamers are really benefiting from playing action video games, despite the backlash received globally. Four subjects with little to no previous gaming experience were chosen to do a common hand-eye coordination test that involved throwing and catching a tennis ball for one minute. Once the test was completed, the results have been recorded. The subjects then played the chosen action video games every day for a maximum of half an hour for five days straight. On the last day of testing, the subjects did the hand-eye coordination test once more and the results were recorded, concluding the experiment. Throughout the five days, the subjects skills began to improve slowly and it could be seen through the amount of eliminations each subject was getting per day, signifying that they were getting better at the game. The results of this experiment show that gaming does improve hand-eye coordination and that games are not a complete waste of leisure time.

II. INTRODUCTION

The purpose of this project is to determine if hand-eye coordination is affected in any way while playing action video games. Many parents nowadays say that video games are a waste of time and that they amount to nothing. However, that is not true. Research shows that people who regularly play action video games such as Call of Duty or Assassin's Creed are better able to improve hand-eye coordination (Integrated Listening Systems, 2017). This is vital information because something so heavily looked down upon such as gaming is proven to develop and train such an important skill required doing even the simplest things, it should be respected. Many people who play action-based video games are proven to develop better hand-eye coordination than not playing video games at all. This is because the left frontal eye fields help process stimuli (Kate Kershner, 2014) and trains people's eyes and hands to respond better to the environment around them. Since it is proven to help, simple tasks such as catching a ball can be mastered. The hypothesis is if playing action-based video games have an effect on the brain, then their hand-eye coordination will improve since getting better at a game is based on if reflexes speed up.

III. METHODS

For the tennis ball toss, the tennis ball is picked up by the subject using the right hand while directly facing the experimenter. The experimenter and the subject stands 10 meters away while still facing one another. The subject

tosses the ball towards the experimenter. The ball was caught and later thrown back with left hand. The subject then prepares to catch the ball with the right hand. This is continued for roughly one minute. The amount of successful catches is recorded in the table titled 'Tennis Ball Toss'. This procedure is done for the first and last day of the experiment. For the wall toss, the tennis ball is picked up by the subject using the right hand once again while directly facing the wall. 10 long strides are taken backwards by the subject while still facing the wall. The subject begins to toss the ball towards the wall. The ball was caught and later thrown back with left hand. The subject then prepares to catch the ball with the right hand. This is continued for roughly one minute. If the ball is dropped then the subject picked the ball up and continued on with the test. The amount of successful catches is recorded in the table titled 'Wall Toss'. This procedure is done for the first and last day of the experiment. For the gaming section, the subjects opened the laptop and opened the "Blizzard App" application. They pressed the blue 'Play' button which is located at the bottom left corner of the open application. The 'Play' button at the top left pressed and 'Practice VS AI' is clicked shortly after. The 'Easy' mode is later selected. The subjects listened to the experimenter to learn the controls of the game. The subjects played for 15 minutes minimum or 30 minutes maximum and closed the application when finished. The amount of eliminations is recorded by the end of each day in the 'Eliminations' table and the process is repeated for the remainder of the five days.

The independent variable in this experiment is time playing action video game; it is played by the subject since the variation does not depend on the other variables and it remains constant throughout the experiment. The dependent variable is hand-eye coordination since throughout the experiment the subjects hand-eye coordination increased gradually. The control variables vary; based on the type of video game, the genre must stay constant in order to see results in fluctuating hand-eye coordination. The amount of time spent playing must be a set time in order for the subject to have steady results that don't fluctuate so it does not throw off the results. The subjects must have little to no experience in that genre of games or video games in general so it doesn't affect the increase of hand-eye coordination by too much or too little.

IV. RESULTS

Tennis Ball Toss (Table 1)

SUBJECTS	**# OF SUCCESSFUL CATCHES (DAY 1)**	**# OF SUCCESSFUL CATCHES (DAY 5)**
Subject 1	21	27
Subject 2	20	28
Subject 3	18	23

Subject 4	16	29

Table 1: Recorded number of successful catches on Day 1 and Day 5.

Wall Toss (Table 2)

SUBJECTS	**# OF SUCCESSFUL CATCHES (DAY 1)**	**# OF SUCCESSFUL CATCHES (DAY 5)**
Subject 1	36	38
Subject 2	28	36
Subject 3	22	26
Subject 4	26	33

Table 2: Recorded number of successful tosses on Day 1 and Day 5.

Eliminations (Table 3)

SUBJECT	**DAY 1 ELIMS.**	**DAY 2 ELIMS.**	**DAY 3 ELIMS.**	**DAY 4 ELIMS.**	**DAY 5 ELIMS.**
Subject 1	4	2	4	5	6
Subject 2	2	2	7	7	9
Subject 3	5	6	6	5	8
Subject 4	3	4	4	6	7

Table 3: Recorded number of eliminations throughout five days.

(Figure 1)

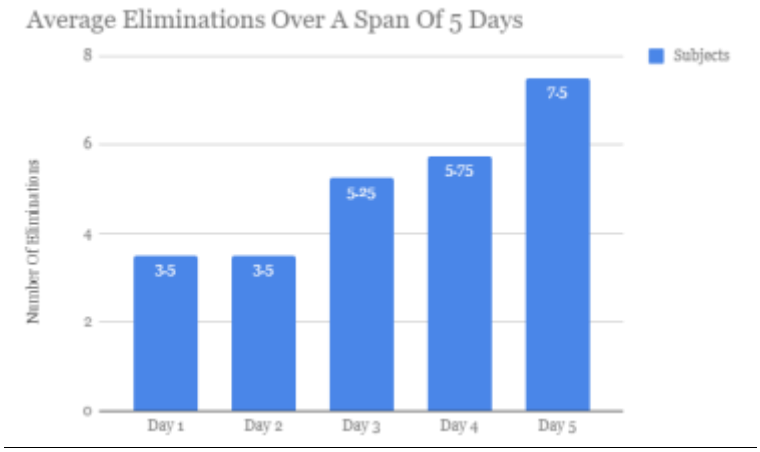

Figure 1: Average of all the recorded eliminations over a span of five days.

(Figure 2)

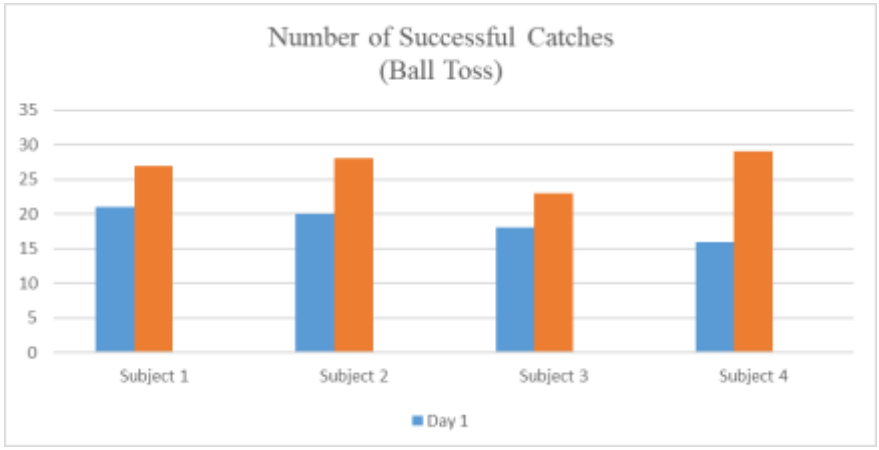

Figure 2: Number of successful catches on the first and last day of testing.

(Figure 3)

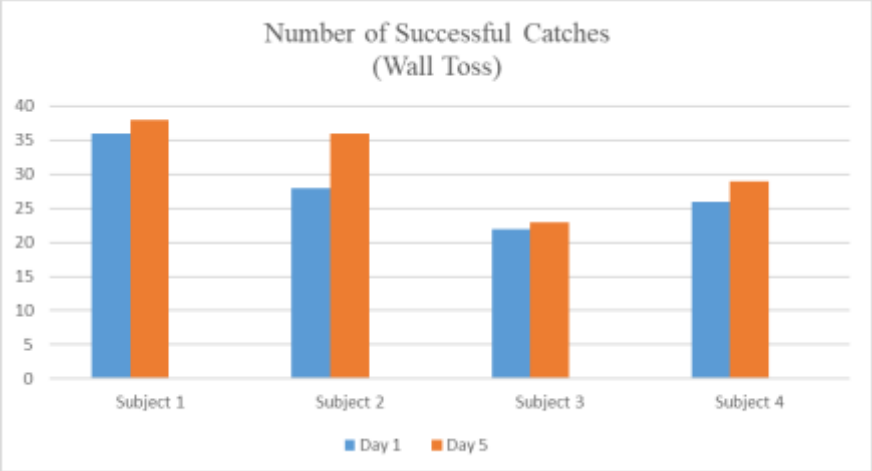

Figure 3: Number of successful catches on the first and last day of testing.

V. DISCUSSION & CONCLUSION

The hypothesis was correct. Action video games do affect hand-eye coordination in a good way; action video games in fact improve hand-eye coordination. This can be seen through the results that can be seen between the four subjects that volunteered to play the action video game. The subjects either had very minimal experience with action video games or had none at all; those who did have even the littlest amount of experience were generally better at the game and the hand-eye coordination tests. Generally, the subjects hand-eye coordination improved by a great deal, which can be seen through the increase of the test results. This is both demonstrated by the actual test as well as the game (faster reflexes). The average for the ball catch and toss increased by 5-8 more successful catches at the end of the five days of gaming. The eliminations also increased as well, the subjects began getting good at the game and having a more thorough understanding.

The scientific background has a great correlation with the experiment. The experiment performed in the background information had the same result as this experiment. Over a long period of time, both experiments played action video games to train their hand-eye coordination. Specifically, in the background research the reason why games generally help better hand-eye coordination is because it helps produce stimuli and that is what both the experiments were testing.

VI. APPLICATION

The information learned in throughout this experiment could be very useful if used properly. By learning that action video games, something that is largely shunned can drastically benefit hand-eye coordination within a short period of time can be taken in any direction. It could be used to argue many scientific related cases

which involve video games being put down in a negative way since what was learned in this experiment is proven, it could also be utilized in schools or improving in sports. Looking into the bigger picture, this kind of information can be applied in medical-related fields, since hand-eye coordination is a skill required to do even the meekest things, playing action video games can be used to strengthen and improve some individual's reflexes and reaction time.

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Looking at Two Languages, French and English, How Does Reading One Affect the Other

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I. Abstract

The question investigated was how reading in English or in French would affect one's ability in vocabulary of the other language. The importance of this experiment was that it would aid students in studying languages and improve the general population's understanding of how their brains function. The experiment was conducted on 6 students with the same level of French and English education, and they were asked to answer a variety of vocabulary questions in one language, read a short story in the other language, and then answer the same vocabulary questions in the first language again. The results found that the reading of the short story made no significant changes in the subjects' knowledge of vocabulary in either language. The average of answers correct by the subjects only increased by a fraction, demonstrating how little they were affected, but most subjects did change some of their answers from an incorrect one to another incorrect one. In conclusion, the results implied that reading such a little amount in a second language will not affect one's vocabulary in their first language;

there must be a significant amount of reading done for the second language to actually be implemented into one's brain.

II. Introduction

Languages are often thought to be entirely separate, but they could affect the comprehension and development of each other positively. Learning a second language enriches one's brain development and memory, along with several other benefits (Merritt, 2013), which means it could also improve one's skills in one's native language. Using context and root words to find the meaning of a word is a great way to learn, and this can be done with any language (Hansen, 2016). However, this would especially be important with languages that share similar roots, such as French and English, or Arabic and Hebrew. So, how does reading in English and in French affect one's vocabulary in both languages?

If one reads an excerpt in French and in English, then they will understand a larger quantity of vocabulary from both languages, because the roots of these two languages derive from Latin and will allow one to better understand the word when it can be connected to another language one understands (Oxenham, 2015).

III. Methods

The experiment was conducted on six Vincent Massey S.S. students who have taken or are currently taking the grade 10 courses for French and English. The subjects were given either Booklet #1, which had five English vocabulary questions with a French story, or Booklet #2, which had five French vocabulary questions with an English story. The subjects were timed while they answered the vocabulary questions given, then read the story before answering the same vocabulary questions again. They were not permitted to go back and read the story after they had started answering the second set of questions. The time it took the subject to complete the booklet, how many questions they answered correctly before reading the story, how many questions they answered correctly after reading it, and the number of their answers they changed before and after the reading were recorded.

The independent variables were if they were reading or not, whether it was in English or in French. The dependent variables were the time the subjects took to complete the booklet, how many questions they got correct, and how many of their answers they changed from before and after the reading. The controls were the questions and story they received, the environment they wrote the test in, the prior education of the subject in French and English, and the instructions they were given. If the questions, story, and instructions each subject was given were different, then the results could not be used in relation to each other; if the environment they did the test in was loud and distracting instead of calm, then they may not have been able to focus on their task as much; and if they had varying levels of French and English, the testing of their increase in knowledge would not be accurate.

IV. Results

The results did not show any significant improvement in the scores of the subjects in either situation.

Booklet #1				
Subject Number	Time (in minutes) to Complete Booklet	# of Questions Correct Before Reading	# of Questions Correct After Reading	# of Answers Changed from Before and After
1	6:18	2	2	0
2	3:05	2	2	1
3	4:08	2	3	3

Table 1. This table shows the time the subject took to complete the first booklet, how many questions they answered correctly before the reading, how many questions they answered correctly after the reading, and how many of their answers they had changed from before reading and after reading.

Booklet #2				
Subject Number				
Name of Subject	Time (in minutes) to Complete Booklet	# of Questions Correct Before Reading	# of Questions Correct After Reading	# of Answers Changed from Before and After
1	3:21	1	1	2
2	1:57	1	1	0
3	6:15	1	2	1

Table 2. This table shows the time the subject took to complete the second booklet, how many questions they answered correctly before the reading, how many questions they answered correctly after the reading, and how many of their answers they had changed from before reading and after reading.

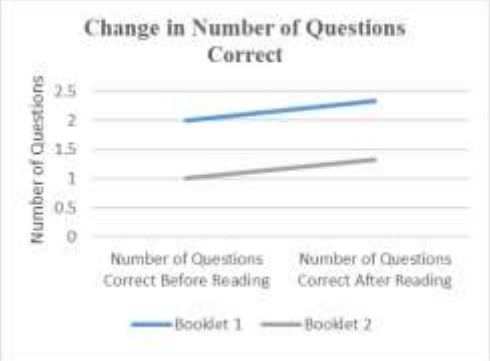

Figure 1. This figure demonstrates the average number of questions the subjects got correct, comparing before and after they read the story for both booklets.

V. Discussion and Conclusion

The hypothesis was partially correct. It has been found that reading in either English or French barely affects one's vocabulary in the opposite language. In both cases (reading in English then defining vocabulary in French, and vice versa), only one subject got 1 more question correct after reading the excerpt versus before reading the story. Two of the three subjects changed at least one of their answers after reading the excerpt, which proves that the reading affected their thought process concerning the definitions of the vocabulary, but there wasn't enough of a change for them to locate the right answer.

Learning a second language augments brain development and memory (Merritt, 2013), but

reading a 250-word story once doesn't necessarily mean that one is learning that language, which proves that reading won't always improve one's vocabulary in a different language with similar roots. Both English and French derive from Latin, (Oxenham, 2015), which means that some words may have the same roots. However, both languages have had other factors, such as different roots like German, influencing them over the past thousand years, which have caused words such as "saumure" (French) and "brine" (English) to share no similarities.

VI. Application

The information found through this experiment could be used in various fields of study, such as when learning scientific terms. It is understood that learning another language would augment one's vocabulary in a different language slightly if they share the same roots, so if one attempts to learn Latin, then they will be more capable of understanding the numerous Latin terms there are. The general public, in knowing this information, will now have a better understanding of how one's brain works and how they can improve their own studying and/or learning. The information established by this study brings light to how a human brain works. Despite not fully knowing any language, one's brain can and will find patterns from other languages and import it to one's knowledge of varying other languages.

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Higher Expectations equals Higher Academic Results but a Low Self-Worth

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I. Abstract

The goals and expectations that parents lay upon a child from a young age have both negative and positive impacts their future academic performance. With the constant pressure in school, parents have been stricter and setting unattainable goals for children, which have resulted in many facing a problematic future. Six students from three different grade levels were put through two standardized testing trials, with the subject's parent present during the second trial. The trials lasted 10 minutes each, and two sets of surveys was passed out afterwards, one for students and parent subjects. After the data had been collected, results from both tests and surveys showed that parents with higher expectation had children with a higher academic performance rate along with a lower self-image than those with parents with lower expectations. The relationship between a parent and child were an intriguing finding from the surveys which displayed that close family bonds came from majority of the parents with lower expectations than compared to those on the other spectrum. From this, parents should be wary of the goals laid upon children, as well the amount of pressure on the kid currently. Furthermore, both parents and children should start strengthening their relationship to further increase the chance of happiness.

II. Introduction

The purpose of this project is to see how high parental expectations affect the academics of students. The relevance of this topic important since everyone can relate to this topic and further strengthens the knowledge of a difficult topic. The emotional aspect of both parents and children will be better understood by the majority, with a high chance of helping change the ways of many parenting styles. The unattainable expectations or even lack of goals set by parents, have all reside to negative effects on children according to Carly Seifert (2017). Children with high expectations weighing their shoulders often develop some sort of self-esteem issue with one self. These self-issues often have long lasting effects which can carry through into the adult life of the child. Along with teaching parents, this teaches students how to properly manage expectations and stress, which increases the likely hood of a happier wellbeing in the future according to Jan-Emmanuel De Neve and Tali Sharot (2012). Overall, all children and parents will have a greater knowledge on such a narrow topic.

In a generation where education is heavily credited for success, the amount of stress and mental hard ache a student goes through is

astounding. On top of that, the support of parents play a big role in how students can achieve. Over the past years, the percentage rate of students who graduated with a university degree a has doubled, with a 18% rate in 1998 and a whole 27% in 2007. As the education system grows with the use of new technology, newer generations will have access to better resources which will inevitably lead to parents creating unrealistic goals. This now leads to the question; How do parental expectations affect the academic performance of students? From extensive research, the hypothesis to this question would be; If parental expectations were tested on children, over a range of ages, then parental expectations would affect the academic performance of the child because having either high or low expectations would negativity impact a child's academic performance.

III. Methods

Six students of the same grade were provided with a pencil, eraser, and calculator, and were handed later a folder with a number the front and version one of their grade level test. The student wrote the test in the given time of 10 minutes but during the trial, observation of students was noted to prevent cheating as well as preparations for the second trial were readied. After the 10 minutes, the students were asked to place the completed test in their designated number folder and to afterward bring in their parent into the testing area. Goal sheets were passed out to the parents and version two of same grade level to the student subjects. Parents were asked to write a down a few goals for the student subject and to be asked a few questions (Figure 1), in an interview process, off to the side of the testing area during the 10 minutes.


Parent Interview Questions

1. How do you think your child did on the test?
2. Do you know how your child is doing in school currently?
3. Does your child participate in any extra-curricular?
4. How often does your child hang out with their friends outside of school?
5. Describe the after-school schedule of your child.
6. What kind of post-secondary would you like your child to go to?
7. What does your Child's success mean to you?
8. Do you want your child to be successful? Why?

Figure 1: This is the list of interview questions that were asked during the parent interviews.

Once all test, goals sheets and interviews have concluded, ask the respective students to once again place their completed test and parent's goal sheet into the same previous designated folder. Afterwards, two versions of a survey were handed out, one version for the parents and the other for the students, which were placed into the student's designated folder after completion. The process was repeated in the same manner for each grade level.

As for variables during the experiment, having the parents present the second test trial was the independent variable, and for the dependent variables, the test scores and how each student felt during the second test trial. As for the controlled variables, there were three significant variables which were the amount of time students got to write their test, parents keeping silence during testing, and the location of the testing area. The 10-minute time limit that was kept during test

trails, ensured that each student got the same amount of time as everyone else. During the second test trial, parents of the respective student were present and so silence was constantly reminded to the parents to prevent any nature of cheating. Finally, the testing took over a course of 3 days but every time, the testing location had remained constant so each grade level had the same surroundings and distractions as the other grade levels. Keeping these three specific variables controlled, ensured that all three grade levels, each had a fair testing session.

IV. Results

Figure 2: These are all the completed 4th grade tests and goal sheets of the parents

Figure 3: These are all the completed 8th grade tests and goal sheets of the parents

Figure 4: These are all the completed 10th grade tests and the goal sheets of the parent

Grade	Average of Test Version 1	Average of Test Version 2
4	9.8	8.6
8	8.6	9.6
10	10.2	11.5

Table 1: This table displays the averages for version 1 and 2 of the test for each grade. The average of the grade 4 students dropped 1.2 during the version 2 test. The average of the grade 8 students increased by 1.0 during the version 2 test. The average of the grade 10 students 1.3 increased by during the version 2 test.

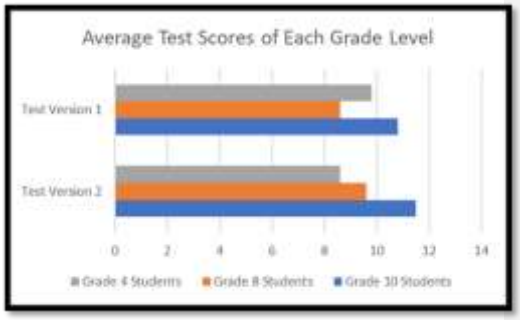

Figure 5: These are overall averages of each grade level during the first and second tests.

V. Discussion & Conclusion

The hypothesis was partially correct due to the data collected proving half of the hypothesis and disproving the other half. The initial hypothesis was "If parental expectations were tested on children, over a range of ages, then parental expectations would affect the academic performance of the child because having high or low expectations would negativity impact a child academic performance." From the data, the average test scores of the subjects in grade 4 dropped by 1.2 marks during the second test trial, which supported the hypothesis a bit. However, as an unexpected result, the average test scores for the subjects in grade 8 and 10 improved, going up by 1.0 for the grade 8's and 1.3 marks for the grade 10's. Moving on, to answer the question "How do parental expectations affect a student's academic performance?", one must look at and account for the parent and student surveys, written after the second trial. From that data and the test averages, our answer is that "High parental expectations help boost a child's academic performance but also may potentially leave negative effects one's mental state." To further explain, the test results for the grade 8 and 10 subjects increased during the 2nd test trial, but looking at the survey written right afterwards, the subjects all stated to have felt pressured to well in school and are afraid of disappointing their parents. As for the parents, majority stated that having high parental expectations is ok in terms of the belief of higher expectation equals a higher, better success rate in the future.

Although the results were unexpected, the research behind the topic supports the outcome very much. As stated a few sections back, parental expectations help shape a child's character, in which also gives a rough ideal of the child's success path. Parents with high expectations often result with a child that can meet those expectations, but the psychological state is affected in the process, depending on the parenting style of the guardian, as well as how achievable and realistic the goal is. Children that are often raised in families that supply tons of encouragement and praise, allow freedom in opinion and self-expression often have a more positive outlook on one's future and self-image and maintain a strong bond with their parent. However, contrary to that, children that are raised in households with constant stress filled environments, packed schedules, and are shamed upon for failures, are more likely to develop a self-image where of constant self-degrading and a need to please others besides ones' self. As for goals and expectations, the more unrealistic the goals are, the more likely the child's psychological state will suffer accordingly.

Some major error that altered the results would have been the location of the testing area and the student subjects not having learnt some of the material on the tests. The test was run at Copeland's Martial Art & Fitness Centre, in the backroom with a cased opening, leading to the training area. The tests were run at the same time as classes were going on which may have caused severe distractions for the test writers. Along with distractions, one to two subjects for each grade had stated that they

haven't learned some of the material that had been present on the test so that may have hindered their test scores and the overall result of the experiment. Initially, if everything had gone as planned without any errors at all, the experiment may have produced much better results, being able to see much more of a significant change in test scores and the overall averages.

VI. Application

The use of this data can be as a guide for new soon to be parents, allowing them some insight on the parent life but as well as how one should parent their children. This allows people of the public to be more knowledgeable about young children and the dangers of unrealistic goals. This could also be useful for phycologists or any sort of counseling for children or even parents. Having this information on hand can help with counseling the children much easier and also allow parents to have a better idea of how a young child can experience such emotions. One might even use this data to help with further the study of growth and development of a child.

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How accurately does IQ measure logical intelligence?

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Abstract I

Today, IQ was used constantly in daily conversations or assessment of a child's potential. It was highly debated and questioned on its reliability and importance. IQ was created not to measure the entirety of one's intelligence, but logical intelligence. Despite that, an IQ could still hold large importance; logical intelligence could predict ability in math, innovation, and decision making which are all vital to succeed in society. Of course, that all depends on IQ tests being accurate. That was what is being measured, the accuracy of IQ tests in measuring logical intelligence. Fifteen subjects were taken and after being split in three sections, they took four tests in an isolated space, two measuring IQ, one measuring memory, verbal, and reasoning skills, and one seeing how they saw themselves. The results showed that IQ tests didn't measure consistently between each test but after putting all fifteen subjects together, showed a similar trend on graphs, subjects who scored higher also had higher reasoning skills, showing IQ did measure logical intelligence with a certain degree of accuracy. This data could be used in schools or in the general population, to see their IQ as a rough indicator of their logical intelligence, and predictor of success in certain subjects.

Introduction II

IQ is used constantly in daily conversations or assessment of a child's potential. IQ is highly debated and questioned on its reliability and importance. It claims to measure logical intelligence but there isn't any evidence or studies backing up this claim. This is what this project is about. Testing if IQ tests are accurate is important because IQ can cause many changes in life. They determine if a student will enter special education (Kristeen, 2012), or if an employer wants them. IQ results also can cause low self-esteem (Christie, 2010) (Viatcheslav, 2014), resulting in higher suicide rates. Knowing if IQ tests are accurate can let people know if they should take it seriously. So how accurately do IQ tests measure ones logical intelligence? If official IQ tests are given to adults and students of various academic levels, then they will show relatively accurate results of logical intelligence, through two IQ tests, academic marks, and tests specifically targeting logical reasoning/thinking. This is because IQ tests are specifically targeting the ability to retain information and using it effectively, also processing information like phrases or synonyms quickly (Joel, 2014). As research on IQ continues the ability to measure spatial processing, short term memory, and

auditory learning are also becoming possible (Joel, 2014). IQ tests also have been shown to be able to predict how someone's career/life may generally look like (Joel, 2014). It's also been observed that

IQ tests can measure creative potential in someone (Scott, 2011). So, IQ tests do accurately measure a large majority of potential and learning ability. Kristeen, C. (2012, July 03).

Methods III

Subjects needed to go online to two websites, one called Cambridge brain sciences, and to the link http://adaptiv-iq-teszt.mensa.hu/test.php?tid=1, they would complete both tests in an isolated space before being given a paper test which they would finish as well in forty minutes, ensured no possible distractions were around them, or any opportunity to communicate with others. The independent variable was the test subjects, the dependent variable was the IQ scores, because that was what was being tested, and the controlled variables were the test booklet and online tests, the environment where the test took place

Results IV

After having tested and analyzed the results, IQ tests were successful in measuring logical intelligence in subjects. Shown in Table 1, 2, and 3, columns labelled Mensa and Stanford, were the scores of the subjects in three levels. There was not a consistent difference in IQ scores, but in Tables 4 and 5 they shared similar structures and ranges between each group, which suggested that IQ tests did measure subjects logical intelligence consistently in each individual test, subjects who scored higher also had a higher reasoning score, in the column labelled reasoning, further confirming an IQ tests capability in measuring logical intelligence.

Names	C-Score	Memory	Reasoning	Verbal	Mensa	Stanford
Sub 1	11.47	10.94	18.64	6.87	108	114
Sub 2	6.27	11.51	7.5	7.24	110	108
Sub 4	9.86	10.67	13.13	8.61	105	110
Sub 5	17.49	14.47	15.61	15.86	125+	120
Sub 6	18.38	16.64	18.44	12.43	124	110

Table 1: Test results for group one, enriched

Names	C-Score	Memory	Reasoning	Verbal	Mensa	Stanford
Sub 1a	**7.79**	**9.42**	**9.68**	**9.5**	**99**	**106**
Sub 2a	**8.79**	**6.58**	**10.35**	**14.03**	**105**	**97**
Sub 3a	**8.77**	**6.22**	**10.01**	**14.93**	**82**	**106**
Sub 4a	**4.5**	**9.13**	**3.21**	**11.64**	**71**	**80**
Sub 5a	**6.99**	**6.45**	**11.55**	**9.55**	**90**	**84**

Names	C-Score	Memory	Reasoning	Verbal	Mensa	Stanford
Sub 1d	**9.22**	**12.46**	**11.04**	**7.83**	**105**	**118**
Sub 2d	**3.3**	**5.58**	**8.34**	**7.1**	**92**	**96**
Sub 3d	**8.05**	**6.35**	**11.84**	**11.3**	**121**	**120**
Sub 4d	**4.81**	**6.06**	**9.49**	**8.09**	**98**	**90**
Sub 5d	**10.64**	**6.7**	**13.13**	**14.51**	125+	102

Table 2: Test results for group two, adults

Table 3: Test results for group three, adults

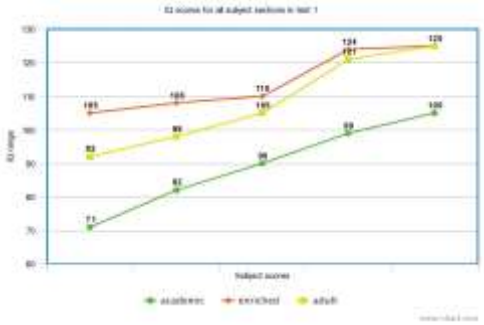

Table 4: Test scores for first test overall

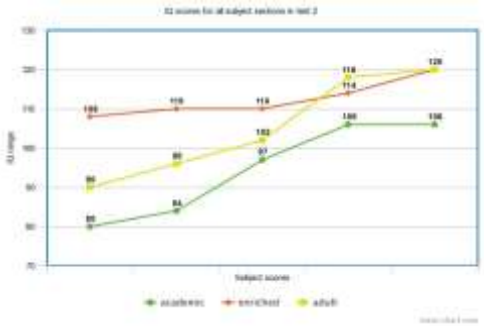

Table 5: Test scores for second test overall

Conclusion V

The hypothesis originally said IQ can accurately measure logical and creative intelligence. After testing the results show that the hypothesis is incorrect. The original question was asking how accurate can IQ tests measure intelligences. The answer is only roughly. This is because in the results, while the range between each patient's results was far too erratic for any consistency in scores, there was clearly a difference between each level of subjects. For example, the lowest score in the Academic class was 71, and the highest was 106. While in the enriched class the lowest score was 106 and the highest was over 125. Displaying a difference between the enriched and academic group at least in effort, with the enriched group scoring higher possibly due to wanting a higher score. This shows that the IQ tests did measure some form of intelligence consistently. In the adult class it also showed how age seriously affects the IQ of subjects. Two subjects who were over the age of fifty both scored relatively low, the lowest being 92, and the highest 102. In contrast, one subject in their late twenties scored in the high twenties through the tests. The age range in the adults group varied so much in order to observe the effects of age on IQ when all the adults had the same level of education. Most subjects who scored higher had a strong reasoning ability with a weak verbal ability, while the opposite was true for subjects with lower scores. The level of creativity throughout the subjects was inconsistent, with no real relations to their IQ. The levels of logic in the tests were greatly influence simply by how quickly subjects could react. Creating a bias towards younger subjects, this further proves that IQ does measure a certain type of intelligence roughly throughout age, although only vaguely. IQ tests didn't measure logical and creative intelligence accurately since through observations of subjects taking the test it was evident that the IQ scores were lower for those subjects who reacted/understood slowly. So, the IQ test was unable to accurately measure one's logical intelligence accurately because they could only measure how fast they could think. The creativity portion of the test only seemed to loosely correlate with their IQ scores with too many outliers, making

it seem like IQ scores didn't really measure people's ability to think out of the box, and imagination. So, it seems that IQ tests don't accurately measure creativity either despite research saying it does, since to respond to questions it requires creative thinking. IQ tests seem to be based heavily on measuring fast reactions and thinking, with pattern recognition and logic being the focus that's tested. Research that suggest IQ can estimate success in life seems to be more accurate, since subjects who scored higher in tests excel or excelled more in academics and were content with their life so far. IQ tests look to just measure the brains processing speed, since the subjects who scored the highest were all young and had quick reasoning skills.

Application VI

This data could be used in a variety of ways. It can help the general public with understanding what IQ scores mean, and what it's measuring. Other scientists or studies may use the data or results to measure IQs and use it in their tests or research. This can also be involved in fields of psychology, biology, and other human related subjects. Overall more people in variety of situations can confidently use IQ tests; trust its results and how to interpret scores.

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The Effect Competition has on Grade 10 Enriched Math Students' Academics

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I. Abstract

With competition being prominent in the majority of students' lives, this experiment was conducted to see if it made a positive or negative impact on grade 10 enriched math students' academic performance. This was done by administering tests to eight subjects currently in an enriched math class in both competitive and non-competitive environments. When in the competitive environment, subjects were paired to race each other; when in the non-competitive environment, subjects were separated to complete tests alone. It was shown that subjects worked less effectively in a competitive environment. When the results are compared from the non-competitive environment to the competitive one, the average time took to complete the test increased by over two minutes and the average test score decreased by 8%. These results prove that competition negatively affected subjects and their mindsets during competitive events.

II. Introduction

Some believe that competition is a great way to compare and distinguish yourself from others (Christina, 2017). Others think that competition is harmful because it makes students put their extracurricular interests on hold in order to focus on academic courses (Tucker, n.d.). Knowing whether competition affects students' academics benevolently or malevolently is important because students can change their forms of learning/studying and teachers can alter their forms of teaching to be more efficient and effective. Everyone can also learn to change their mindset during competitive events in order to reach their full potential.

How does the incorporation of competition affect the mentality of a student and the speed and accuracy of a student's academics?

With the incorporation of competition being a prominent aspect of many students' lives, it is important to know whether it is giving a positive or negative affect. Some believe that if students are in a competition to complete a math test as quickly and accurately as possible, then they will work faster to outperform their peers at the cost of accuracy. Other believe that if students are racing one another, their work will be done more efficiently because emotions towards academics are related to a student's motivation (Pekrun, Goetz, Titz, Perry, 2010). If the at-ease students are put in a relaxed environment to do the similar questions, their work may be done slower, but it will be done more accurately due to the absence of stress that comes with competition. Since stress takes over a student's ability to focus (Carlson, 2016), a

competition-free environment will provide the ultimate atmosphere for the best quality work.

III. Methods

The experiment was conducted on eight grade 10 enriched math students. Each subject was given a 10-question math test in both a competitive and a non-competitive environment. Both of these tests contained similar questions. For the competitive environment, the subjects were paired up to race one another in a quiet, clean classroom. Subjects were notified that their times and scores would be tracked, and that their goal was to complete the test more quickly and accurately than their partner. Times and scores were recorded as subjects finished writing the test. After the first test, subjects were immediately separated to be evaluated individually. A new 10-question math test was administered to each subject in the same environment, and they were also notified that time and score would be accounted for. Times and scores were recorded as subjects finished.

The independent variable was the incorporation of competition during the first test. The dependent variables were the number of correct answers the subjects were able to give and the amount of time it took for them to complete each test. There are many factors that can contribute to a subject working slower or making more mistakes. In order for this experiment to work, the only difference between the environments would be whether there was competition. The constant variables were the quiet, clean room; that the test for the competitive environment and the test for the non-competitive environment stayed the same; that each subject was in a grade-10 enriched math class so that each person had a similar skill level; and that the subjects were not given calculators or any tools to assist them. If there were changes it could affect the subjects' performance. This could include noisy distractions or a change in lighting or temperature.

IV. Results

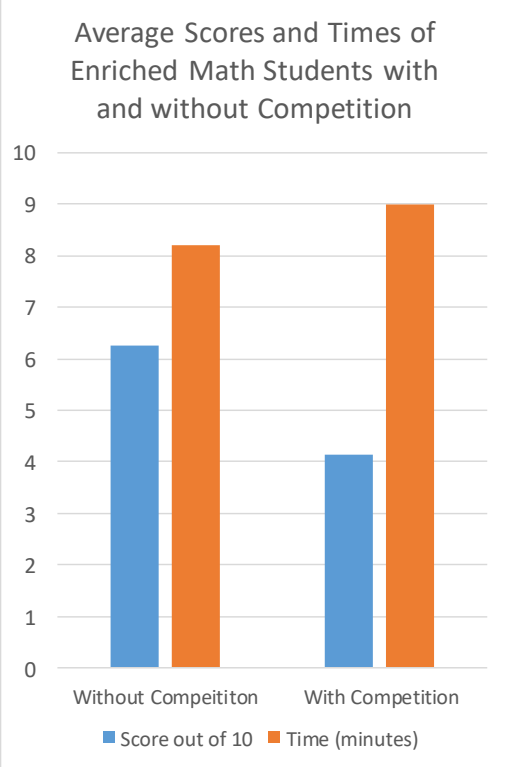

Figure 1: Bar graph shows comparison between the average time (in minutes) and score (out of 10) in a competitive and non-competitive environment.

show that they work more accurately and efficiently in a competition-free environment.

When students are placed in a competitive environment, the amount of stress they feel increases. This stress could have caused the students to work less accurately because they felt a sense of urgency and made small mistakes. Stress also impairs a student's ability to focus which caused them to take a longer amount of time to complete the test with competition. Without competition, there is less stress and pressure put on each student, and this can allow them to accurately and quickly complete the tests.

Table 1: Table shows score (out of 10) and time (in minutes) for each subject in both a competitive and non-competitive environment.

Scores and Times of Subjects in Competitive and Non-Competitive Environments

Subject	Score in Competitive Environment (out of 10)	Time took to Complete in Competitive Environment (minutes)	Score in Non-Competitive Environment (out of 10)	Time took to Complete in Non-Competitive Environment (minutes)
1	7	3:47	9	3:00
2	7	10:14	10	5:14
3	8	4:52	10	3:50
4	8	6:24	9	4:48
5	10	8:38	10	4:11
6	7	8:50	7	6:38
7	9	3:43	8	2:57
8	10	3:43	9	2:34

V. Discussion and Conclusion

The hypothesis was partially correct because the subjects' performance was more accurate without competition as predicted, but faster as well. The majority of the subjects received higher scores when working without competition; the average score with competition was 82.5% and the average score without was 90%. All eight subjects completed their tests without competition much faster than with competition. The average time was 6:27 minutes with competition and 4:15 minutes without competition. When comparing the overall times and scores, grade 10 enriched math students

To make the results more accurate in the future, it would be beneficial to have all the subjects complete the tests at the same time of day. Some pairs wrote the tests in the late afternoon when they

were more mentally exhausted, and some wrote them at noon when they have just eaten and felt more relaxed and energized. This test should also be expanded to the entire grade population rather than just those in a grade 10 enriched math class. Those in enriched math are likely more competitive people because they have taken part in math contests and regularly work in competitive atmospheres; therefore, the rest of the student population in general might react differently to the element of competition.

VI. Application

With many aspects of a student's life being involved with competition in some way, it is beneficial to know whether competition is affecting them benevolently or malevolently. This experiment shows that the majority of grade 10 enriched math students working in a competitive environment work both slower and less accurately. This means that people should change their mindset during competitive events in order to perform at their fullest potential. These results can also alter the format students use to study and teachers use to teach, and well as to find new ways in order to make the learning experience as effective as possible.

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The Impact of Mindset and Perception on Problem Solving in Youth ages 15-19

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Abstract (I)

The question asked in this study was, how does the perception of the difficulty of a problem, impact a person's ability to solve the problem? Answering this question yielded important results in how mindset impacts problem-solving, which could be used to improve problem-solving approaches and increase success in problem solving. Subjects were given a pre-examination survey, three medium difficulty math questions one by one and a post-examination survey to understand how factors such as mindset and confidence affected their perception. Subjects were told the question was either easy, medium or difficult before they solved it to induce a specific perception. It was found that 90% of subjects answered the easy question and only 50% answered the difficult question. Students who had a fixed mindset were deeply impacted by perception, to the extent that they were unable to solve the "difficult" question. Subjects also stated that perception impacted their problem-solving approach. The results implied that success in solving problems was controlled by the subject's mindset which was the main control of perception.

Introduction (II)

Perception is how humans interpret stimuli such as events, people or things and is impacted by a variety of things like the interpreter's physical appearance, interests, mindset, expectations and peer group (Saylor Academy, 2012). Perception often dictates how a person is going to react to a problem or a certain situation. A key factor that controls how much perception impacts a person is mindset.

There are two main types of mindsets, fixed and growth. People with fixed mindsets believe that their intelligence, character and creative ability are static givens which cannot be changed and define their capability for success. They avoid failure at all costs to maintain a feeling of smartness. People with growth mindsets believe the exact opposite. They see challenges as well as failure as a chance to grow and improve their existing abilities (Popova, 2015). Most people have characteristics of both but are categorized by the mindset they have most often (Dweck, 2016).

Since people solve problems every day it is very important to understand how perception impacts the

process, so people can eliminate barriers and be more successful. This can be understood by answering the following question. How does the perception of the difficulty of a problem, impact a person's ability to solve the problem? If students with a fixed mindset are told a problem is too difficult to solve and is above their grade level, the student will be unable to solve it because they lack persistence when they are struggling or facing challenges (Friesen, 2018).

Methods (III)

Three medium difficulty math questions from the Cayley math contest run by the University of Waterloo's Computing, Engineering and Mathematics Contest (CEMC) were selected. Specifically question A was part B number 19, 2013. Question B was part B number 17, 2013. Question C was part B number 18, 2015. Subjects were split into group A and group B participants. Each subject sat in a quiet room and received a pre-examination survey (Figure 1) prior to doing the questions.


Pre-Examination Survey

Figure 1: Picture of Pre-Examination Survey before to subject filled it out.

Upon completion of the survey, subjects received the first question to solve and were told it was "very easy and below [their] grade level". Upon the completion of the first question, subjects received the second question being told it was "medium difficulty and is at [their] grade level". After completing the second questions students received the third question being told it was "very difficult and above [their] grade level". Subjects in group A received the questions in order A, B, C and group B subjects received them in the order C, B, A. Observations upon the time taken to answer the question, verbal comments and behavior of the subject were made for each question. After finishing all three questions, subjects completed the post examination survey (Figure 2).


Post Examination Survey

1. On a scale of one to ten how difficult did you find the first question?
2. On a scale of one to ten how difficult did you find the second question?
3. On a scale of one to ten how difficult did you find the third question?
4. Did you find it more difficult to answer questions you were told were more difficult compared to the ones you were told were easy?

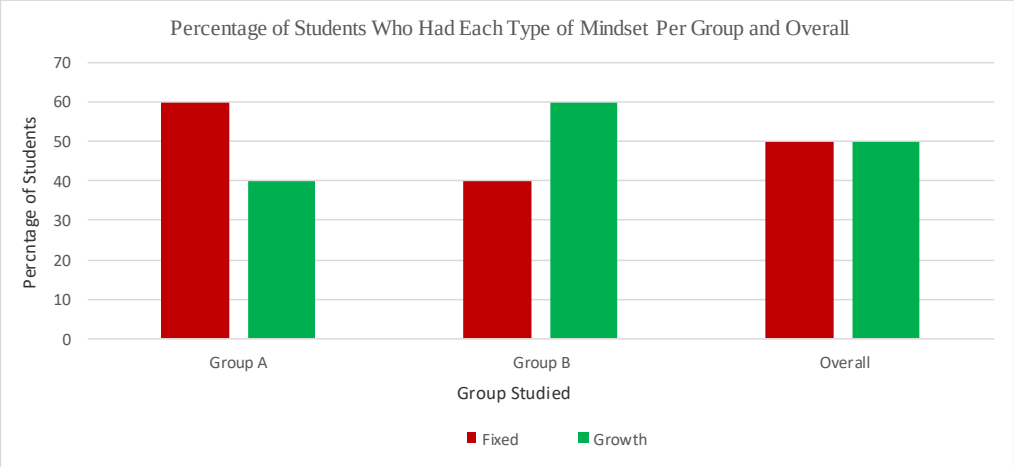
Figure 2: Picture of Post Examination Survey before to subject filled it out.

The independent variable controlled in this experiment was the degree of difficulty (D.O.D) the subject was told prior to doing the question. The

dependent variables were how quickly the subjects solved the problem and how difficult they found the problem. The controlled variables for this experiment were: age, skill level, grade in math, subjects liking towards math, parents level of education, type of question (probability, geometry, algebra etc.), D.O.D of each question, problem-solving environment, and amount of time given. Some of the variables selected as controls such as age, skill level in math, grade, liking towards math and parents' education level were for sub categorization of subjects in order for the data to be analyzed correctly and to understand any pre-existing bias the subjects may have had. The rest were selected because they could impact experiment consistency. If subjects of the same grade level received different questions, the experiment would no longer credible or consistent because each subject was evaluated differently. The degree of difficulty of each question was controlled so the only thing impacting the subject's ability to solve the problem was what they were told about it.

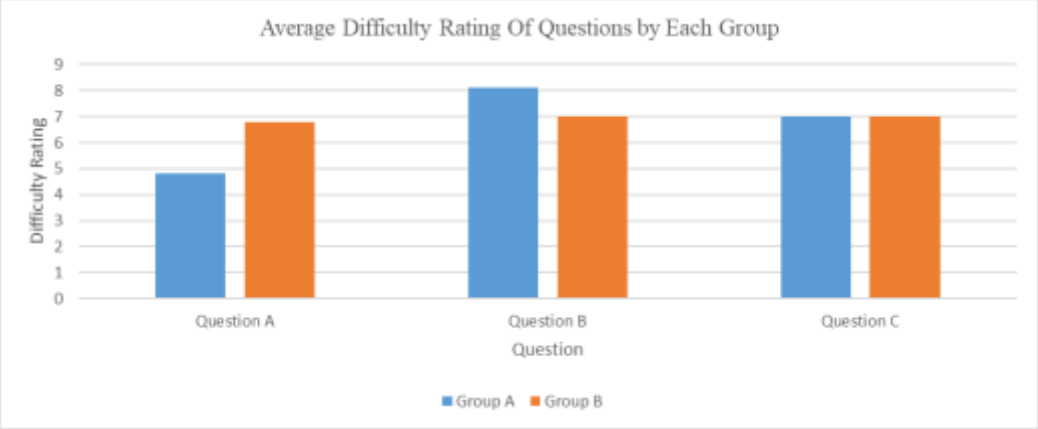
Results (IV)

Graph 1: The percentage of subjects with growth mindsets and fixed mindsets per group and in the study as a whole.

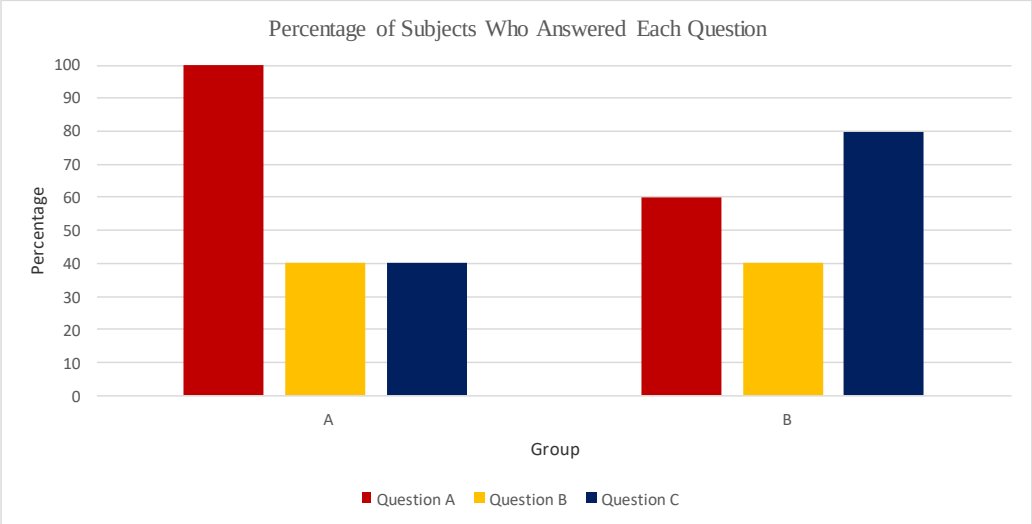


Graph 2: The average difficulty rating per question in each group. Note that questions are referred to by name

not order given.

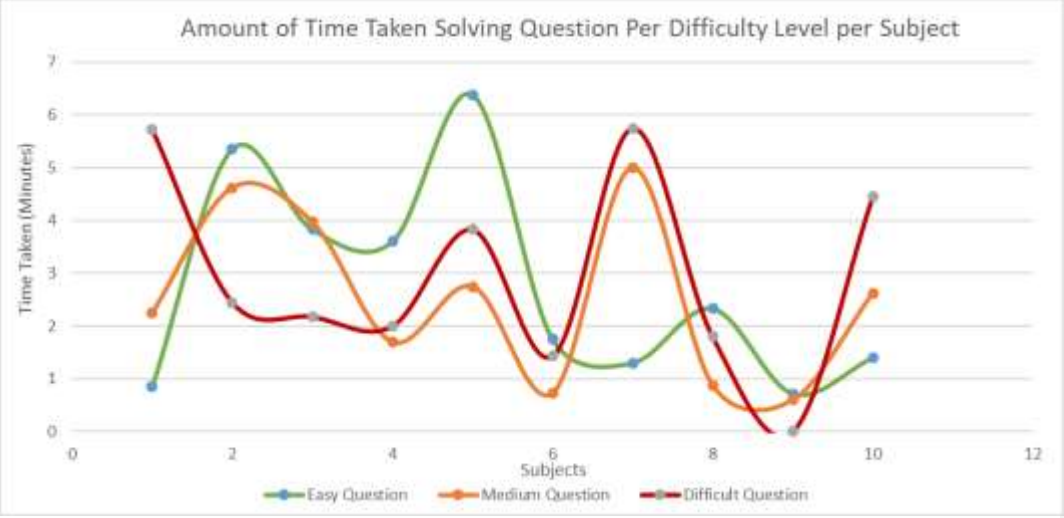


Graph 3: The percentage of students in each group who answered each question. Remember Group B received questions in the order C, B, A.



Subjects with a growth mindset spent more time per question as the difficulty increased, whereas subjects with fixed mindsets spent less time per question as the difficulty increased (Graph 4).

Graph 4: The amount of time that each subject took to answer the question they were told was “easy”, “medium” and “difficult”.



Discussion and Conclusion (V)

The hypothesis – if students with a fixed mindset are told a problem is too difficult to solve and is above their grade level, students will be unable to solve it because they lack persistence when they are struggling or facing challenges – was correct. 100% of the students with mostly fixed mindsets did not solve the question they were told was difficult. Perception of the problem’s difficulty impacts people’s solving abilities by dictating the approach towards solving the problem and time spent solving it. 90% of the students tried harder on the easy question because they thought it was easy. In group A 100% of the subjects solved question A whereas in group B only 60% of students did. This was due to the fact that group A was told question A was easy whereas group B was told question A was difficult. 30% of subjects stated they made a silly mistake because they underestimated the question while 40% over complicated it or got frustrated because the question was supposed to be “easy”. For the “hardest” question, 100% of the people who believed they were poor problem solvers were unable to solve the question. They spent very little time on it and gave up easily. Students who had fixed mindsets also spent less time on each question as the degree of difficulty increased. This is because their mindset suggests they were unwilling to try struggling because they were scared of failure. They would rather choose to “give up” quickly and “not try” than admit failure. This establishes a very important connection between self-evaluation, mindset and perception.

As per the background research, people with growth mindsets or “grit” were more likely to succeed in life because they view challenges and failure as a chance to improve or grow. Similarly, in this experiment, the students who agreed with all three statements in question 9 in the pre-examination survey were successful because they had growth mindsets. They were less affected by what they

were told about the question because they believed in their abilities and saw the challenging question as an opportunity to grow. They were the 40% and 60% who solved the tough questions in group A and B respectively. The students with a lower self-esteem and fixed mindset were more deeply affected by what they were told. They perceived the question as harder than it was because they had little confidence in their abilities and little will to persevere and grow. Hence, a second conclusion can be made. Students with a growth mindset are less affected by the effects of perception in problem solving.

During the course of this experiment there were many opportunities for error. One of the errors that may have occurred is subjects not being told the difficulty level explicitly enough. If the difficulty level was not stressed to a subject it could have reduced the impact of perception for them and altered the results. Another error was timing the subjects correctly. Not every subject was timed accurately. Another factor that impacted the results was a small group of subjects. Having a small group of only 10 subjects split into 2 groups of five made it difficult to analyze the different factors affecting perception because it split the subjects up into too many small groups. This experiments results would be more accurate if more subjects were tested.

Application (VI)

The conclusions from this experiment have many applications in the real world. For starters, schools can begin to encourage and foster growth mindsets in order to cultivate students who are strong problem solvers and will have higher chances of success. Workplaces can also encourage growth mindsets in their employees to help employees achieve success which will ultimately improve company growth. Regular people can also use these results to help them be successful in their endeavors. A few ways to foster a growth mindset: embrace challenges, believe that one has failed only when one gives up, embrace mistakes and embrace the word “yet” (Gerstein). Another way people can apply these results is to reduce the impact of their perception when solving problems. People can reduce the impact of perception by pretending the problem is super easy and convincing themselves they can solve it.

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Effects of Team Success on a High School Basketball Student Athlete's Academics

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I. Abstract

The purpose of this experiment is to investigate the relation between a high school student athlete's basketball team success and academic success. This topic is important because it proves how playing team sports in high school is beneficial to a student's grades. The experiment was conducted by comparing how a student athlete on a basketball team scored on a quiz/test after playing and winning a competitive basketball game to a quiz/test that was taken after losing a game. The results of the study indicated that student athletes tend to do better on a test after they have played a winning game of basketball, and they usually score lower on a test after losing a game. The average score on a test after the game resulted in a win among all subjects was 88.30%, and the average score on a test after the game resulted in a loss among all subjects was 70.67%. This is likely because the motivation student athletes gain from being successful in their sport will translate over to the classroom, allowing them to do better on their schoolwork.

II. Introduction

Answering this question is important because by understanding the correlation between athletic success and academic success, people like parents will see the benefits of playing team sports and allow their kids to play sports. Student athletes must compromise their time for both sports and studies. Many coaches will pressure their athletes to succeed academically, but their lack of success on the court may lead to less motivation to succeed off the court. A study conducted by Danielle Tower from UConn shows that most student athletes are motivated to not only perform well in their sports but also in school (Tower 2008). Another study showed that a student's academic motivation is usually fueled by their desire to outperform their peers and competition (Butterworth 2013). Therefore, to find the motivation to succeed academically, athletes must also flourish in their athletics.

This study can be applied to different groups of people, but it targets student athletes specifically. This leads to following question: how does the success of a student athlete's team affect his/her performance in school? A student athlete whose team is more successful will likely have a higher morale and be more motivated than a student athlete whose team is not doing so well. If a student athletes' team success is related to their academic success, then their success on the court will translate over to the classroom because athletic participation will have positive contributions to academic success (Comeaux 2011). Student athletes that are committed to their sports tend to carry that

commitment into the classroom. The amount of time in which a student athlete commits to their sport will directly affect their academic success (Comeaux 2011).

III. Methods

For each basketball athlete, their season scoring average (points per game) was observed and three games were selected in the athlete's season in which the athlete's team had won the game. The athlete's performance in each game chosen was determined to be above average, average, or below average. An above average performance in a game is scoring above the season average by five points or more, and a below average performance in a game is scoring below the season average by five points or more. The grade of the most recent quiz/test regardless of the subject/course after the game played was observed and recorded. Do this for all games. This procedure was repeated for three more games in the athlete's season in which the athlete's team had lost the game. The data was recorded in a table and analyzed.

The independent variable in this experiment is the athlete's team performance. This is because the purpose of this experiment is to find out how the success of an athlete's team will affect the athlete's grades and performance in school. The dependent variable in this experiment is the athlete's academic performance. The athlete's academic performance will be dependent on their athletic performance, and that is what will be observed. One of the controlled variables of this experiment is minutes the athlete has played in a finished season. This is because an athlete's performance in a game directly impacts the outcome, affecting their morale and learning ability, thus making injured players ineligible as a subject. Another controlled variable is the age of the athlete. These learning effects will be more significant in high school students compared to college/Division I athletes. High school athletes do not have the external support from coaches and mentors that college athletes have, and college athletes have a more mature and developed mindset. The time between the game played and when the test was taken is a controlled variable because these effects will fade over time. The time between the game played and test taken should not be over 7 days.

IV. Results

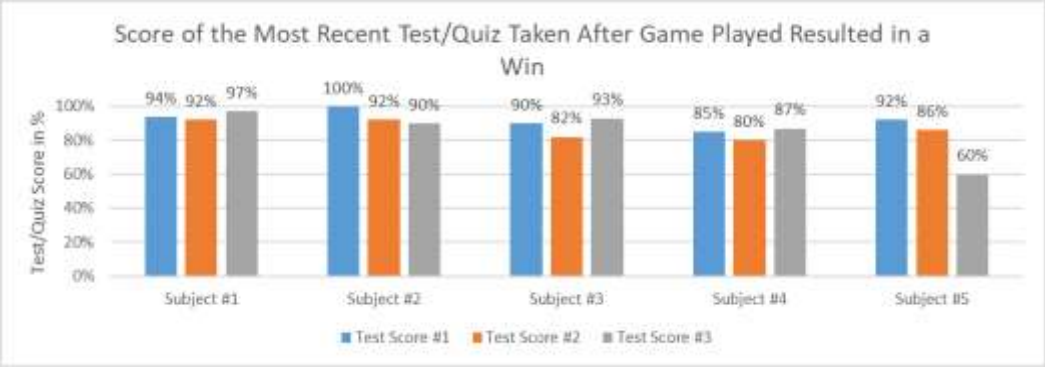

Figure 1: Comparing the test scores among all subjects after the game played resulted in a win

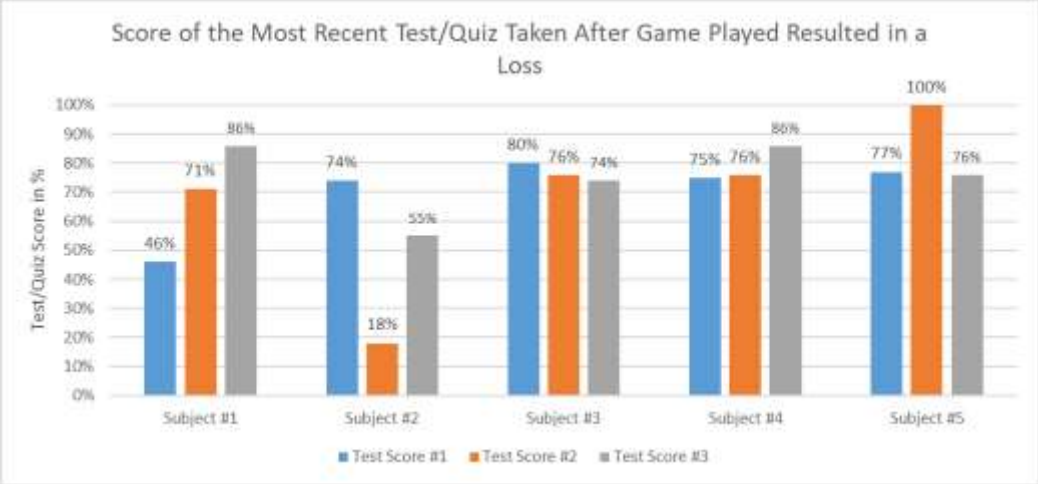

Figure 2: Comparing test scores among all subjects after the game played resulted in a loss

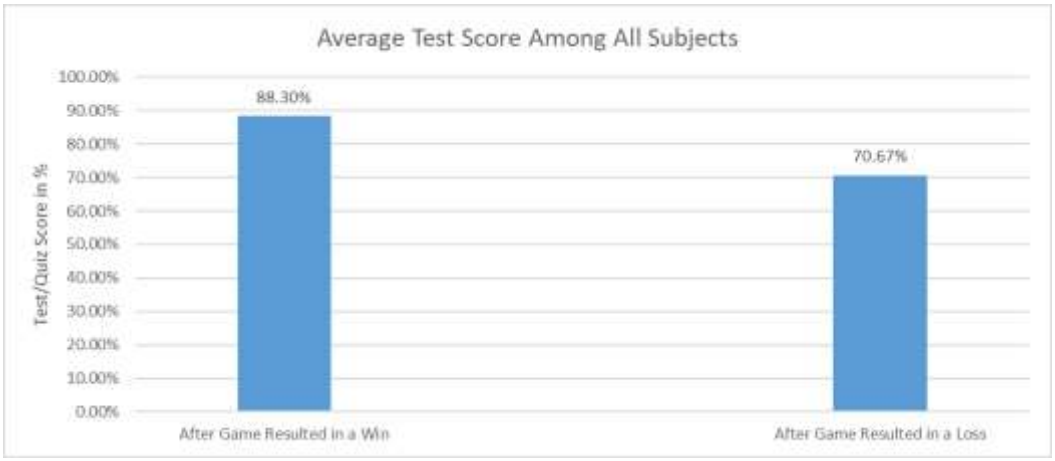

Figure 3: The average test score among all subjects

The results of this study show that the subjects who recently played and won a game of competitive game of basketball will score higher on a test (Figure 1). These subjects tend to score lower on a test after recently playing and losing a competitive basketball game (Figure 2). The average score among all subjects after the game resulted in a win was 88.30%, and the average score after game resulted in a loss was 70.67% (Figure 3).

V. Discussion & Conclusion

The hypothesis was correct as it stated that a student athlete's team success will have a positive effect on the student's grades. When student athletes are successful in their athletics, they tend to score higher on tests/quizzes, as shown in the data. The average score of the most recent test/quiz after a game resulted in a win is 88.30%, and the average score after a game resulted in a loss is 70.67%. The result was most evident in Subject 1 and Subject 2. Each time when Subject 1's team won, he scored higher than 90% on his most recent tests after the games. However, when Subject 1's team lost, he scored an average of 67.6% on his most recent tests after the games, which is a big decline. This pattern can also be observed in Subject 2. The initial purpose of the experiment was to observe how a basketball team's success would affect an athlete's academic performance. It can be concluded using the evidence from the data that a successful basketball team will affect the athletes positively as they will be more motivated to do well not only in their sport but also in school. Some possible errors could have been the amount of time that the subject has studied for the test. While a student's morale and motivation level will affect the outcome of a test as proven with the experiment, a student that has spent time studying for a test will still likely achieve a higher score. Another possible source of error may have been the subject's individual performance. An athlete that underperforms in a basketball game may lead to the athlete feeling discouraged and losing motivation to practice. However, this could have a different effect on another athlete. Underperforming in a basketball game can be used as motivation to practice and improve for student athletes, and the motivation will likely have a positive effect on how the student is doing in class.

VI. Application

The information collected from this experiment can be used in different fields of psychology, especially sports science and adolescent psychology. By understanding how a student athlete's academics can be affected by team success allows for more people to acknowledge that playing team sports will contribute more to a person's life other than keeping the body active and healthy. This data allows parents from different cultures to have a new perspective on how high school sports can benefit their child. Sports has been the one most common ways of bringing people together, so understanding the physical and mental effects of playing a team sport like basketball is crucial for our mission to unify people around the world.

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The Effects of Infrasound on Human Subjects at Frequencies of 5, 10, and 20 Hertz

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I. Abstract

The experiment tested the effects that infrasonic frequencies of 5, 10, and 20 hertz had on subjects by asking the subjects after exposure to rate, on a scale of 1-10 with 1 being very low and 10 being very high, feelings of anxiety, unease, and annoyance induced by exposure to the frequencies. This was done by exposing subjects to clips of infrasound created using a sine wave in the audio editing software Audacity and played using a powered, self-amplified subwoofer, and then asking them for the aforementioned ratings after the clips had been concluded. The results revealed that while infrasound does appear capable of causing feelings of anxiety, unease, and/or annoyance, no clear correlation between the tone of the clip and the intensity of the feeling produced was found. This implies that more testing of a greater sample size and across a greater pool of frequencies would be required to establish a correlation, if such a correlation were to exist.

II. Introduction

- Infrasound, occasionally referred to as Low Frequency Sound (LFS) or Low Frequency Noise (LFN), is a type of sound just below the audible range that is often produced by both natural and artificial environments. Infrasound can often be produced by explosions, supersonic travel, as well as by some animals; more prominently, there has been growing concern in recent times of windfarms as a major generator of infrasound (Jørgen Jakobsen, 2005). This concern is centered on the fact that infrasound could have a major detrimental effect on the psychological well being and happiness of residents in the surrounding area (Loren Knopper-Christopher Ollson, 2011). There also exists several accounts of infrasound at very specific frequencies causing visual and auditory hallucinations over extended exposure periods. Despite this, there is a notable lack of scientific research into the effects of infrasound on humans relative to most other fields.
- Can infrasound actually cause the psychologically detrimental effects that it is rumored to be able to, and how does the frequency of the sounds effect this?
- If people are exposed infrasound, then they will be more annoyed and less at ease than normal, because infrasound can have negative psychological effects on people (Michael Persinger, 2013). Some tones will

also be better at inducing some feelings than others.

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III. Methods

- Using a sine wave imported into an appropriate audio editing software, create three clips of infrasonic frequencies at 5, 10, and 20 hertz lasting 30 seconds in length each. Export these files and save them on a device with an audio output channel that is capable of being connected to an external speaker. Connect this device to a speaker which has a powered, self-amplified subwoofer capable of producing infrasonic frequencies. Expose the subject to the 5 hertz file using the aforementioned device and speaker, playing the clip at a constant volume and for the entirety of it's duration. After the clips conclusion, ask the subject to rate on scales of 1-10 (with 1 being low and 10 being high) the severity of feelings of anxiety, annoyance, and unease induced by the clip, as well as asking them to note any other unusual feelings. Repeat for every audio clip and every subject.
- The independent variable of this experiment was the tone of the clips used. The dependent variables were the ratings of annoyance, anxiety, and unease given by the subject. The control variables were the volume at which the clips themselves were played, and the setup used to play it. These variables were chosen to be controlled because there is sufficient research to establish that the severity of the effects of infrasound correlates directly with the loudness of the sound played, and because different speakers could produce different variations in the sounds respectively.

IV. Results

Person	Clip tone (Hz)	Annoyance Rating	Unease Rating	Anxiety Rating
1	5	2	2	2
1	10	3	3	3
1	20	2.5	2.5	2
2	5	3	2	2
2	10	4	3	2.5
2	20	1.5	1	1
3	5	1	2	1
3	10	3.5	3	3
3	20	3	2	3
4	5	2	3	2
4	10	3	1.5	3
4	20	6	3.5	1.5
5	5	2.5	3	2.5
5	10	4	2	4
5	20	3	4	3
6	5	2	2	2

6	10	3.5	2.5	3.5
6	20	2.5	2.5	2.5
7	5	1.5	1	2
7	10	2	2	3
7	20	1	1.5	1
8	5	3	2	2.5
8	10	3.5	3	3
8	20	3	4.5	1

Table 1 – Ratings of annoyance, unease, and anxiety, by person and clip tone

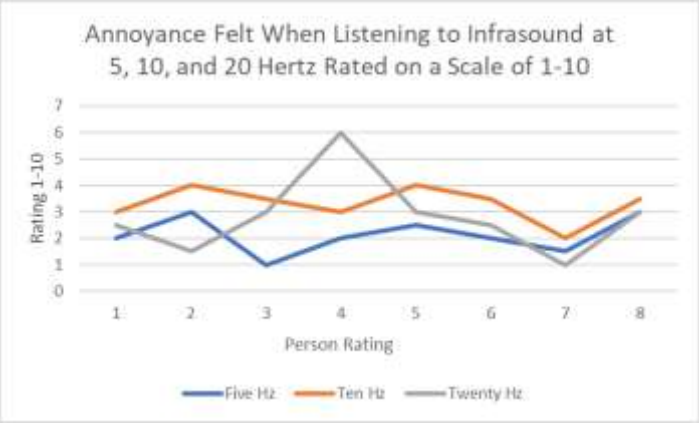

Figure 1 – Annoyance graphed by ratings, frequency, and person

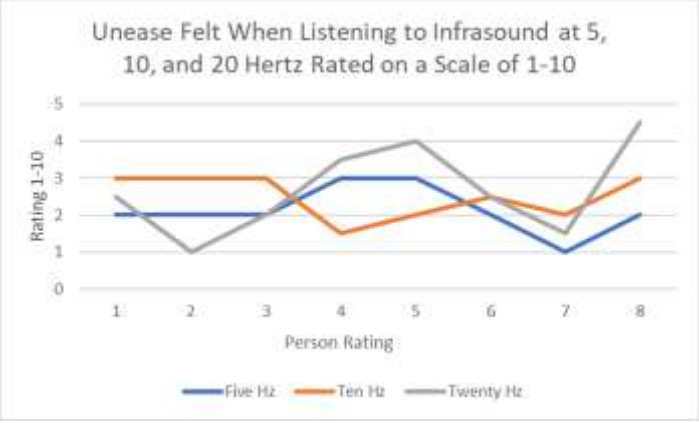

Figure 2 – Unease graphed by ratings, frequency, and person

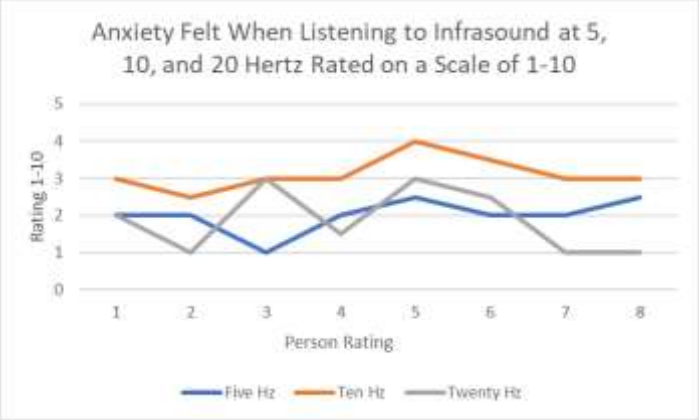

Figure 3 – Anxiety graphed by ratings, frequency, and person

V. Discussion & Conclusions

The hypothesis was partially correct, in that the subjects when exposed to infrasound reported experiencing sensations of annoyance and being ill at ease during and post exposure; however, for the majority of the data no clear correlation between tone and intensity of feelings was found, with the exception that the 10 hertz frequency appears to be more effective at inducing feelings of unease than the other frequencies as it had the highest overall ratings. This shows that while infrasound can have detrimental effects, these effects are far from consistent and vary from person to person. Further testing is required to establish what correlation, if any, exists between the frequency of a sound and the effects that it causes.

Originally the experiment was meant to test the negative effects that different infrasonic frequencies have on people. The results show no clear correlation between frequency and intensity in most cases except for the unease ratings, in which the 10 hertz tone rated overall higher; there is however no guarantee that this was not in it of itself a fluke given the relatively small sample size and glaring lack of correlation otherwise. These results are neither surprising nor inconsistent with others results because they did show that infrasound was capable of causing negative effects.

One potential source of error is that subjects could have been suffering from the nocebo effect, or otherwise exaggerating results out of a feeling of obligation to not simply rate everything at a 1. This may have created erroneously high ratings among subjects. This is, however, anything but certain, and there is simply no telling how severe it skewered the results. Future experiments will both have to account for this and draw from a larger sample size to reduce the impact of flukes in the data.

VI. Application

- This information could be applied to acoustics and psychology, due to the fact

that it could be used to make predictions in both.

- Uses could be found city zoning, as it would demonstrate that major sources of infrasound (such as windfarms or heavy industrial machinery) need to be placed away from residential areas in order to minimize the impact.
- These results fit the big picture well by demonstrating that infrasonic frequencies can indeed cause negative effects on humans, and by hinting at the possible relation between tone and severity.

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Ideal Time of Day to Run Based on Emotions, Fatigue and Stress Levels

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I. Abstract

The purpose of this experiment was to determine the ideal time for humans to exercise, more specifically run, based off the emotions, fatigue, and stress felt afterwards. The results of this experiment would be beneficial to a wide demographic of people, especially those who struggle with finding an optimal time to exercise. The experiment was conducted by having four subjects run at three different times of the day (morning, afternoon, evening) for a total of 30 minutes. The results of the experiment concluded that running in the morning was the most effective time to run in terms of stress and fatigue.

II. Introduction

Answering this question is important because it would allow athletes to minimize wasted time in choosing an effective practice time. There are varying outlooks and research on the most effective time of day (Christine Luff, 2017), most of which try to find the time of day in which your workouts will be most successful in terms of physical gain.

This experiment holds a lot of weight as it can determine what works best for runners not only physically, but mentally as well. This leads to the following question. How does the time of day at which a person runs affect their fatigue levels, stress levels, and emotions?

It is believed that if one runs in the morning, then they will be able to face the day energized, destressed and with a positive mindset because running in the morning strengthens your mental capacity, improves your productivity (Raine Aggari, 2017) and lowers your blood pressure (Andrea Cespedes, 2018).

III. Methods

Four subjects ran a total of three runs, each at a specified time of day. The runs were to be completed in the morning (in the time frame of 7:00 – 11:00), afternoon (in the time frame of 12:00 – 16:00), and in the evening (in the time frame of 17:00 – 21:00). The run was 30 minutes long, and was recorded using a stopwatch. The route or location of the run was at the subjects' discretion to ensure that all subjects were as comfortable with their surroundings as possible. Immediately after the run was completed, the subjects completed a survey (Figure 1) to rate their stress and fatigue level on a scale of 1-10 and accurately describe the emotions felt after the run. The age category is controlled because this experiment is geared towards the high

school demographic, so the age range of the subjects must be controlled to ensure fair results. The length of the run must be controlled because all the subjects need the same length of time to determine the effects of running at the time of day. If this wasn't controlled the experiment would become ineffective due to the presence of more than one independent variable. The type of shoe must be controlled as well because running in anything other than running/training shoes would most likely prevent the runner from completing the run. Anything other than running shoes also might not be able to withstand the terrain or length of run and could render the experiment incomplete. The weather this experiment takes place in must also be controlled because running in rain for 30 minutes may not be realistic and give inaccurate results. This is because running in rain is generally harder, and affects moods and emotional states in a negative way as compared to other weather. The length of time between the end of the run and the writing of the survey is controlled and set to 10 minutes. This is controlled because it allows the subject to gather the materials necessary to complete the survey and think more clearly about the questions rather than rushing to finish the survey and giving false and inaccurate answers.

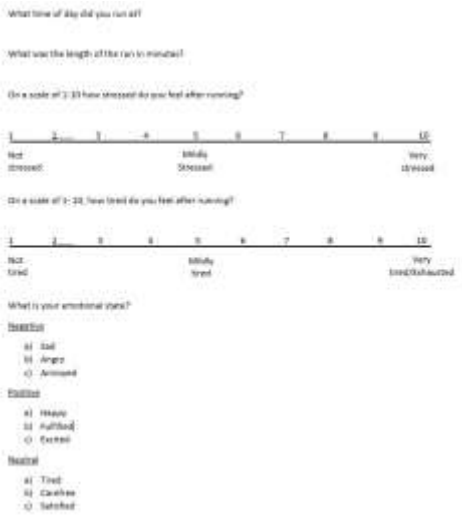

Figure 1: Sample survey sheet

IV. Results

The data gathered from this experiment showed that the subjects were overall less stressed, energized and optimistic after running in the morning. The average stress level after the morning run was 2/10 (Figure 2), which was lower than both the average afternoon and evening run stress levels. On average, the fatigue level was 4/10 (Figure 3) after the morning run which was lower than both the afternoon and evening. The general mood after running in the morning was positive (Figure 4), which was happier than the afternoon and evening runs.

Figure 2: Stress Levels (out of 10) after running graph

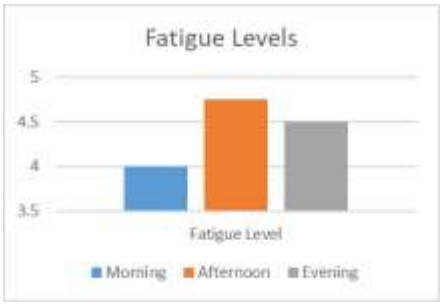

Figure 3: Average Fatigue Levels (out of 10) after running graph

Table 1: Average Emotional State After Running

	Morning	**Afternoon**	**Evening**
Emotion	Positive	Neutral	Neutral

V. Discussion and Conclusion

The hypothesis made at the beginning of this experiment was proven to be correct based upon the collected data. Overall, the subjects' emotional states after running in the morning was positive, which proved that running in the morning allows the runner to start the day happier. Morning runs are also proven to strengthen mental capacity and improve overall productivity. Both of these factors could have contributed to the subjects feeling happier and more energized. The average stress level was two out of ten, which was lower than the afternoon and evening runs. The reason the subjects felt less stressed after running in the morning compared to the afternoon or evening was due to the lowered blood pressure early in the day. High blood pressure has a strong correlation to higher stress levels, which is related to various physical and mental illnesses. All of this can be prevented by running in the morning. Running in the morning has a multitude of benefits, all of which contribute to a healthier physical and mental state. Possible errors in the data collected could have been due to external factors such as nutrition, sleep cycle or athletic ability. If the subject had a large, healthy, beneficial meal before running in the morning, it may have given the subject an increased feeling of energy and have been the source of their low fatigue level, positive mood, or both. However, this could also have the reverse affect, as having too much food prior to testing could affect the subject's run negatively, causing the subject to feel discomfort and give inaccurate answers on the survey that are not related to the actual run. If the subject had received less or more sleep, the run may have been easier or harder, affecting the survey answers. If the subject had previous experience with running or was fairly new to running, the subject's fatigue levels may have been different.

VI. Application

The results and information collected and concluded from this experiment could prove to be extremely useful in many different areas, both professional and casual. Whether it be an Olympic athlete, or someone just trying to get into running for the sake of physical fitness, having this data would allow the reader to decide what time to run using scientific proof. This experiment could also be used as inspiration for other young and aspiring scientists to start scientifically researching and experimenting.

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The Effects of Practice on an Individual Practicing a Specific Skill Set

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I. Abstract

The purpose of this study was to find out what kinds of display and backlighting was best for overall comfort and have the smallest impact on the user's eyes. The procedure consisted of 3 computer monitors to be viewed independently by 7 different subjects over the course of 3 days, to determine which screen would have the smallest possible impact on the user's eyes. After the data was collected, averages were taken, and any differences in the user's vision were also recorded. The results of the procedure showed that the backlighting is a major factor in the strain felt after the viewing period. LED backlighting had the best results, as the strain was the least due to it's capability to completely turn off when given very dark colours, and the worst combination was the VGA display and backlighting. The conclusion over all of this study, is that the backlighting of the display is the largest overall factor in determining if the user will encounter problems with the display.

II. Introduction:

The purpose of this study is to determine if the different kind of screens that user's use, has any correlation to the amount of strain received from the viewing session. Knowledge of this information would allow for users of all kinds of screens to avoid exposing themselves to screens that can impact them negatively. if a specific type of laptop, or screen is used for a prolonged period of time, it could increase the chance of eyesight diminishment. 50%-90% of people who work in front of screens all day, on a day-to-day basis, are affected with at least some kind of syndrome. This is also particularly interesting because the range varies by 40%, "meaning there are companies that use better screens than others in the workplace." (Chan, 2011)

This 40% differentiation, could pose many questions, ranging from amount of usage per day, to the overall number of years that that specific screen has been used by that specific person. So, what is the correlation between the type of screen a person uses for a prolonged period, and the strain it can produce on that person's eyes?

If a LED backlight screen, in combination with a high quality (higher pixel density) LCD, or LED screen is used, the impact of the screen will be minimal on the user's eyes, and the risk of some sort of eye syndrome will be decreased. This is because most LED backlighting is paired to IPS displays, which provide a greater amount of allowable pixel density and overall better representation of everything. (Taylor, 2017) The

pairing of the LED backlighting with the clear, and consistent coloured display with high pixel density will allow for a easier use of the display over a long period of time. The combination of the higher pixel density and fluid, natural colours, will also allow for less re-adjustment of the eyes to the display, also developing a smaller, almost non-existent amount of strain. (Tape, 2014)

III. Methods

The methods for this experiment are very easy to replicate/duplicate, and can be repeated as many times as there is a need to do so, to get a more sufficient amount of information and gather practical information on the differences between any amount of screens.

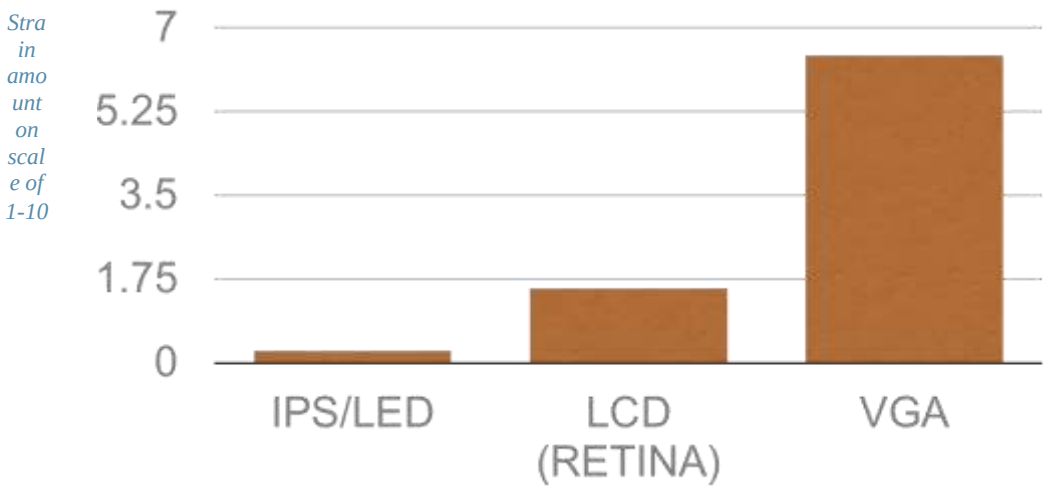
Set up the first screen in a well lit from above environment, to keep results consistent, the same amount of lighting should be used for all different screens tested. Set the brightness of the monitor to full, and have the subject face the screen directly, with their eyes being directly across the centre of the screen. Have the user view any video with a consistent amount of dark and light colours (longer than 1 hour), such as an Avengers movie. Have the subject watch the entire video/movie, and then write out any changes they felt in their eyes, and write a review, then have them give a rating out of 10, where one is zero, to no strain, and ten is a very large amount of strain. Continue with the next display the next day, and remember to ask the subject to have the same amount of rest to their eyes, as they did for the first test. Keep doing the test every day with a different display, and the same number of subjects from the previous day, until satisfied with the amount of screens tested and number of people tested on. Also make sure to have the same/similar sized display for each testing, and distance the subject views the display at. Then average out the data from the rating of one to ten, and see what the data has to say about the display.

The variable of the procedure include the following. Independent variable is the screen type, dependant variable is the amount of strain on the eye. The controlled variables should be the video being played, so that the colours, and lighting should be similar in some way. Brightness of the screen is also controlled, which would result in the same amount of projected light into the eyes, so that the display is the only thing tested. Angle, and distance viewed, also needs to be controlled so that the results will be more accurate. Size of screen, amount of sleep, and visual aids, are also controlled so that there is a similarity in pixel size, rest to the eyes, and visual environment for the eyes as well.

IV. Results;

At the end of the data collection and experiments, all three displays had been tested thoroughly, and by enough people for a good amount of solid data. Over the course of the three days, it was evident from the results that the backlighting was a large factor in the actual amount

Amount of Strain Felt After 1 Hour of Viewing on 3 Different Kinds of Displays



of strain that was produced. The IPS and LED combination had the lowest reported strain amount, and LCD with LED combination was right behind with also a very small amount of reported strain and overall good ratings. The VGA had the worst reported strain, and was not preferred to even glance at by any of the subjects. Between the IPS and Retina LCD displays, subjects said that the Retina display had a better, more fluid look, but the colour consistency was not on par with the fluidness. Moving onto the IPS, the subjects loved that the fluidness was transferred over as much as possible, and that the colour consistency and brightness was fixed with the display and coatings. The data for the IPS display had a overall rating of 0.25/10, for amount of strain felt, the LCD was close behind, with a rating of 1.55, and VGA far off, with a rating of 6.43.

V. Discussion and Conclusion:

The hypothesis was correct, the LED backlit IPS display was the best overall screen, with the least strain, and over the 1 - hour period of testing, some subjects did not feel any strain whatsoever. Subjects 1, 4, and 7 did not feel any strain (rating:0/10), and all 7 of the subjects from the test did not have anything bad to say about the display/backlight combination. Even though the LED Retina display was more fluid, the LED had better lighting and colours to produce less strain.

The science behind the results also match. The LED backlighting has the ability to completely turn off pixels, resulting in a full black display. This helps with strain because the subject's eyes would not have to see any light for very dark colours. Less light seen also means less strain, because if there is no light being shown, eyes cannot strain or have any impact at all. The main difference between the IPS and LCD Retina displays was colour consistency and brightness consistency, which was also recognized by the subjects, and taken into account for their rating. Also a problem that could have occurred during the procedure is not having a sleep chart for the user for the testing period, this could have affected the results for amount of strain felt the ratings could get better for all of the displays and possibly change what some users think about the screens.

VI. Application:

This study can be applied to many other situations. It can be used in computer based working environments, to ensure that workers will not develop any kind of work related syndrome. Companies that employ many workers that work on computers all day, can use this procedure, to not only find the strain levels of different displays, but they can also use it to see how much money it will cost them, and average out the data to meet an equilibrium of price and strain levels. It can also be used by individuals looking for a new display of any kind, like a TV.

This information can be applied to studies on people's eyesight after a certain age, they can take into account what kinds of screens the person was using, and use it to determine the affect it had over a long period of time.

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Which of the five senses contribute the most when we are eating?

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I. Abstract:

The question asked was which of the five senses contribute the most when we are eating? this is important because knowing how each sense contributes could guide us when eating because they each have special properties that can help us. Subjects were given food items which they were not aware of and they had to guess what was being fed to them without using the help of their five senses. Based on the observations, subjects found it difficult to guess the correct food item they were given whilst being blindfolded and not using the nose, ears, and hands to aid them. Without smelling only 38% of the guesses from all subject was correct, without hearing 40% of the guesses from all subject was correct and the highest of 52% correct guesses were made without feeling. In conclusion, the five senses do indeed guide us when we are eating however, the sense that contributes the most other than taste is smell as subjects found it harder to guess the food item without sniffing the smell through their nose.

II. Introduction:

A) Purpose: How do the five senses contribute to the recognition of similar food?

B) The five senses work involuntarily together allowing one to enjoy tasteful treats, however, imagine if one was blindfolded, or if the nose was pinched shut and the food was placed in the mouth with touching it. Would one still be able to recognize the food without the support of the five senses? According to research, in the brain "taste" is actually a combination of a food's taste, smell, and touch into one sensation.(Your Sense of Taste. (2016, November 03). Retrieved March 01, 2018, this is important because knowing how each sense contributes could guide us when eating because they each have special properties that can help us. Most of the experience is shown through the scent rather than the taste. (How does the way food looks or its smell influence taste? (n.d.). Retrieved March 01,2018

C) Hypothesis: If the five senses weren't used then it would be harder to identify the taste of the food, because every time food is bitten into, receptors in the mouth that are known as taste buds pick up the taste of the food that's being consumed.(Your Sense of Taste. (2016, November 03). Retrieved March 01, 2018) By using the eyes we can help trigger taste buds; if something isn't pleasing to the eye there would no longer be a desire to consume it. The eyes have been programmed to see particular foods in a certain way. The nose also contains millions of receptors for odor molecules, which allows one to smell food by sniffing through the nostrils or even through the air that

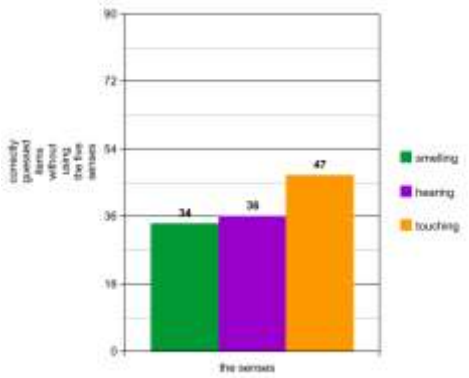
accumulates in one's nose as food is being chewed. (How does the way food looks or its smell influence taste? (n.d.). Retrieved March 01, 2018). These receptors connect with chemicals in one's food and transmit the information about the chemicals to the brain, leading to a healthy gratitude for the tasteful treats. One way or another, the five senses contribute to the recognition of similar foods.

III. Methods:

The secret items were placed into individual plates then covered. Subjects were provided with blindfolds that were worn for the entire experiment. Subjects then plugged their noses and were given the 1st secret item. They had 10 seconds to guess and then moved on to do the same for each secret item. Nose clips were removed. Next, subjects were given headphones and a loud song was played to cancel out the sound made by food items. They were given 10 seconds and did the same for the other secret items. Headphones were removed. Lastly, subjects were provided with gloves to wear and food was placed in their mouths. They were given 10 seconds to guess and did the same for the other secret items. Blindfolds and gloves were removed and set up was cleaned up

C) Independent variable: the five senses? Dependent variable: recognition of the food, age? Controlled variable: Same type of the food, time given, amount of the food. These variables were chosen because with providing all subjects the same amount of food and time, it makes fair and it is more accurate when observing the results. If subjects had different amount of food and time then it would not be possible to accurately test the relative relationship of the dependent and independent variables.

IV. Results:



a graph showing the amount of correctly guessed items made by subjects without the aid of their senses.

V. Discussion & Conclusion:

A. The hypothesis was correct. It is harder to identify the taste of the food without the help of the five senses. The purpose was to see how the five senses work with our taste buds when one is eating. Based on the observations, subjects found it difficult to guess the correct food item they were given whilst being blindfolded and not using the nose, ears, and hands to aid them. Without smelling only 38% of the guesses from all subject was correct, without hearing 40% of the guesses from all

subject was correct and the highest of 52% correct guesses were made without feeling.

B. According to data subjects found it harder to guess what they were fed without using their hearing. Without hearing the crunch, crackle, and crisp sound of what they were eating had an impact on the perception of food's taste, this was proven when they mostly guessed items like carrots, celery and chips incorrectly. However, when consuming foods like oranges, baby tomatoes, and candy they didn't have a hard time figuring out what the food item was. Subjects were having a harder time guessing the food items without being able to feel and smell because the nose contains millions of receptors for odor molecules, which can allow one to smell food by sniffing the air that accumulates in the nose as food is being chewed. Without feeling the different types of textures and shapes, smooth or rough, rounded or symmetrical, makes it difficult to guess familiar foods without touching it and recognizing the familiar textures and shapes of.

C. Some sources of error could have occurred when I used too many food items at once causing the subjects to have all sorts of flavors in their mouth. This could have made it more difficult for their taste buds to distinguish. If I did not have this issue maybe the subject would have found it easier to guess the food item without having different flavors in their mouths.

VI. Application:

How would this information be applied to other fields of study? This would apply to culinary school because by knowing how the senses and taste relate to one another, it can guide them to make the perfect dish. A dish that has a strong and divine scent, satisfying sounds and beautiful to the eye.

How would the general public or scientific community use this information? I would make them use it for day to day meal prepping, knowing how the senses could affect the way they perceive food should guide them to know what to do and what not to do.

How do your results fit into the "big picture"?

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Lack of Sleep Resulting in Lack of Productivity/energy

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As students, we're always put in a position to choose between sleep and work. For my Sci-Can I wanted to find out if we gave up our sleep, would it affect the energy we have to do our said work? I conducted an experiment on 4 subjects, that showed the direct relation between sleep and energy, and I changed up the sleeping hours in order to find the connection. My findings indicated that the more sleep the subjects got, the increase in energy and productivity, therefore the amount of sleep a person gets does directly affect the amount of energy they have. The results of this experiment have motivated me to rid of my bad sleeping habits and balance sleep and school.

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a) Answering this question is important so people can know how many hours to sleep, according to (Rosie Osmun, 2016) it has been found that oversleeping links with higher rates of disease and depression. Another reason why this question is important is because according to the National Sleep Foundation (NSF) more than 40% of adults experience daytime sleepiness that interferes with their daily activities. Also, sleep deprivation causes imbalance in hormone activity (Dr Simon Kyle, 2008) which is unhealthy and unwanted.

b) How does the amount of sleep a person gets relate to the energy they have and mood the following day?

c) If a person gets the right amount of sleep then the next day will be the most productive because they will have the most energy. Also, if a person doesn't sleep enough they will not be able to focus and do minimal activities because they will be sleep deprived and very tired.

II. Methods

Followed restricted and precise diet. Began to prepare for bed at 9:00 PM (did not use any electronic screens from this point until morning). Set alarm for 7:00 AM for the following morning. Slept at 9:30. Woke up at 7:00 and eat breakfast. Prepared for and go to school. Filled out one energy measuring chart and one mood measuring chart at 11:00 AM. Ate lunch at 12:30. After returning from school filled out an energy measuring and mood measuring chart at 3:45 PM. Did homework from 3:45 until 6:00 in a private room. Read

a book from 6:00 until 7:30.Ate dinner at 7:30 PM. Used phone/electronic from 8:00 PM until 10:00 PM. Repeated steps 3 times, first time sleeping at 10:30 (preparing at 10), second time sleeping at 12:30 (began to prepare at 12), third time sleeping at 2:30 (began to prepare at 2).

Independent variable: is the amount of time being spent sleeping

Dependent variable: mood and the energy of the subject

Controls:

-Food consumption. I chose this to be a control because the amount of food and type of food we eat in a day greatly impacts out mood and energy for that day. For example, if someone skipped breakfast, their day wouldn't be as enjoyable as oppose to a person who had a full breakfast.

-Activities. I chose to control activities because the activities we do in a day also affect the amount of energy we will have throughout the day. For example, if somebody doesn't get any physical activity in, they will be much more weak and tired than someone who trains every day. Therefore, to make sure that these don't affect the results, I chose it as a control.

-Electronic time. Electronic time (or time spent on electronics) was chosen as a control because electronics/screens are known to greatly impact mood and energy if they are used for a long period of time or at the wrong time. To make sure all my results were as accurate as possible I also restricted time spent on electronics.

III. <u>Results:</u>

When subject #1 slept at 9:30PM and woke up at 7:30AM…

At 11:00 AM the same day he/she felt…

Happy: 5/5 Motivated: 5/5 Confident: 5/5 Energetic: 5/5 Upset: 1/5 Tired: 1/5 Demotivated: 1/5

Then, at 3:25 PM the same day, he/she felt…

Happy: 4/5 Motivated: 4/5 Confident: 4/5 Energetic: 4/5 Upset: 2/5 Tired: 2/5 Demotivated: 2/5

When subject #2 slept at 9:30PM and woke up at 7:30AM…

At 11:00 AM the same day he/she felt…

Happy: 5/5 Motivated: 4/5 Confident: 5/5 Energetic: 5/5 Upset: 1/5 Tired: 2/5 Demotivated: 1/5

Then, at 3:25 PM the same day, he/she felt…

Happy: 5/5 Motivated: 5/5 Confident: 5/5 Energetic: 4/5 Upset: 2/5 Tired: 2/5 Demotivated: 1/5

When subject #3 slept at 9:30PM and woke up at 7:30AM…

At 11:00 AM the same day he/she felt…

Happy: 5/5 Motivated: 5/5 Confident: 5/5 Energetic: 5/5 Upset: 1/5 Tired: 1/5 Demotivated: 1/5

Then, at 3:25 PM the same day, he/she felt…

Happy: 5/5 Motivated: 4/5 Confident: 5/5 Energetic: 5/5 Upset: 1/5 Tired: 3/5 Demotivated: 1/5

When subject #4 slept at 9:30PM and woke up at 7:30AM…

At 11:00 AM the same day he/she felt…

Happy: 5/5 Motivated: 4/5 Confident: 5/5 Energetic: 4/5 Upset: 1/5 Tired: 2/5 Demotivated: 1/5

Then, at 3:25 PM the same day, he/she felt…

Happy: 4/5 Motivated: 4/5 Confident: 4/5 Energetic: 3/5 Upset: 1/5 Tired: 3/5 Demotivated: 2/5

IV. Discussion and Conclusion

The prediction was correct, that if a person gets more sleep compared to less, their following day will be more energetic and productive. The data collected shows that the more sleep they got, the more positively the subjects described their day, using words like; motivated, confident, and energetic. Whereas they lacked sleep, the subjects described theirs days using negative terms such as; unmotivated, upset, tired. Therefore, yes, the amount of sleep a person gets directly relates to the energy they have the following day.

When the subjects got more sleep, they had an overall 30% more positive day than when they got less sleep. This also relates to the research that oversleeping links with higher rates of disease and depression. In conclusion, in order to maintain the most productive and energetic day possible we need to make sure we do not cut down on necessary sleep.

V. Application

This information is beneficial in many different ways. Scientists and non-scientists can both find use in it. My results fit into the big picture because everyone sleeps, and not everyone knows that sleep is important for your health and happiness. The general public would benefit from it by adjusting their sleep habits and creating healthier ones.

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The Effects on Academic Performance in Math and English based on Quantity of Sleep

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I. Abstract

The question that was being investigated was how the quantity of sleep affected a high school student's academic performance in math and English. This was important because a lot of high school students preferred to sleep less and studied more and by doing this experiment, it can make the students aware on the importance of sleep in academics thus resulting in better performance. Four subjects were involved in the experiment. They were asked to sleep for the required amount of time which decreased each day. After sleeping for that time, subjects wrote a math and English test in which they were timed. The results show that has the quantity of sleep decreased, the test results also decreased. Additionally, the amount of time of time subjects took to complete the English tests had decreased as the quantity of sleep also decreased. As for the math tests, the average time increased then decreased as the quantity of sleep also decreased. From this, it can be concluded that, in fact, the quantity of sleep does affect how well a student performs on English and math tests. Since as the subject's sleep time decreased, the time spent doing the test also decreased, it can be inferred that the subjects began to have less patience. In conclusion, this experiment showed that the quantity of sleep does affect a high school student's performance in math and English.

II. Introduction

Most children attend school. At school, tests must be written, students must participate in class, socialize, make decisions, think critically/logically and are also given the opportunity to participate in extracurricular activities. As a result, the student's ability to perform these tasks is extremely important for their academic success. But, a lot of students tend to stay up late studying for tests, finishing assignments the night before or simply being distracted by social media. In fact, about 87% of American students alone sleep for less than the required which is 9 hours (Richter R.,(n.d)). Analyzing this will make these students become aware that by staying up late, they may be damaging their health and as a result, their performance at school.

If a student is lacking sleep, then they will not be able to perform well at school because their brains won't be functioning as it would if it had been fully rested. Lack of sleep is particularly dangerous for

teenagers because in this phase of life, the teenager's body is going through critical development (Gregoire C., 2018). There are two broad stages of sleep called non-rapid eye movement (NREM) and rapid eye movement (REM). NREM sleep is extremely important as it contributes to the ability to transfer short term memory into long-term storage (Tyley J., 2015). It also contributes to cell reproduction and repair by releasing growth hormones in the body (Tyley J., 2015). If the amount of sleep is reduced, then all the functions happening the NREM sleep will not occur thus affecting the functionality of your brain and body which ultimately affects your performance at school. Research shows that when high school students are lacking sleep, then 60% of them will experience daytime fatigue (n.d,2014). Most schools usually occur in the day, from 8-3, so if that many students are experiencing fatigue during school time, then it will surly affect their academic performance.

III. Methods

This purpose of this experiment was to test whether if a student got less than the required amount of sleep, 9 hours, then it would affect their performance in math and English. Four subjects were asked to sleep, on the first day, for 9 hours. This is the required amount of sleep for high school students. Then sometime in between 12:25 p.m. to 12:55 p.m., the subjects wrote a math and English test (Figure 1) in Vincent Massey Secondary School's library, one after the other, and were asked to sleep for 7 hours. During the time period between 12:25 p.m. to 12:55 p.m., subjects wrote the same math and English test as shown in Figure 1 in Vincent Massey Secondary School's library and were timed. On the third day, the subjects had slept for 5 hours. Again, between 12:25 p.m. to 12:55 p.m., subjects wrote the math and English tests in Figure 1 at Vincent Massey Secondary School's library and the amount of time they took was measured. All results from the test as well as the time it took the subjects to complete these tests were recorded on a data table.

timed. Then, after the day went by and it was night time, subjects were

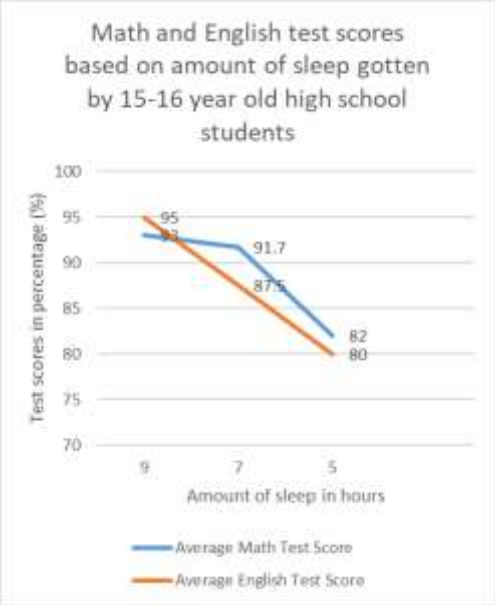
The independent variable was the quantity of sleep that each test subject had as by changing this, it can be tested whether it affects performance in math and English tests. The dependent variable was the subject's performance in the math and English tests as well as the time it takes for the subjects to complete the test. This is the dependent variable because these results depend on the quantity of

(Figure 1) These are the math and English tests subject wrote.

sleep. The math and English test were controlled variables as allowing the four different subjects to write the same tests ensures fair results. The location of where the subjects wrote the test was also a controlled variable. This was controlled because if the subject had taken the test in a noisy area, then the surrounding environment could affect their performance on the math and English test, not necessarily the amount of sleep they had. To avoid this potential issue, subjects had taken the tests in a quite environment in Vincent Massy Secondary School's library. The subjects had also started writing the tests at the same time but ended at different times. This occurred to ensure that results were fair and more accurate. Overall, the controlled variables helped ensure consistency and accuracy of test results.

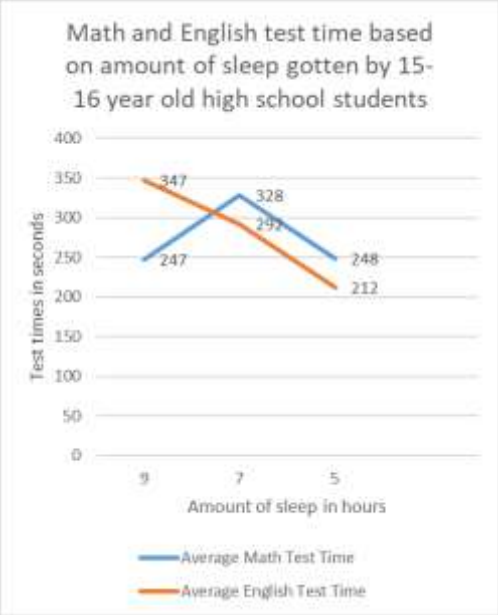
IV. Results

The results show that over time, as the amount of sleep subject got decreased, the test performance in math and English also decreased (Figure 2).



(Figure 3) This shows the test results as subjects got a certain amount of sleep.

When the subjects had 9 hours of sleep, on average, the test score for math was 96.5% and for English was 95%, as can be seen on the graph. Then, when the subjects had 5 hours of sleep, the test score for math, on average, was 82% and for English was 80%. That is a 14.5% decrease in math test scores and a 15% decrease in English test scores. Additionally, as the amount of sleep decreased, the amount of time it took to complete a math test stayed steadily the same but decreased for the English tests (Figure 3).



When a subject had 9 hours of sleep, on average, it had taken 247 seconds to complete the math test compared to 248 seconds to complete when subjects had 5 hours of sleep. For the English test, it took on average 347 seconds to complete when subjects had slept for 9 hours whereas it took 212 seconds to complete when subjects had 5 hours of sleep. Since as the subject's sleep time decreased, the time spent doing the tests also decreased, it can be inferred that the subjects began to have less patience as they had lack of sleep. It seemed like the subjects had wanted to finish the test quickly without worrying about what is right or what is wrong.

(Figure 4) This shows the amount of time subjects took to complete the tests as they got a certain amount of sleep.

V. Discussion and Conclusion

The original hypothesis was proven to be true by the data obtained. The hypothesis essentially stated that having a lack of sleep (i.e. less than the required amount for teenagers in high school which is anywhere between 9-11 hours) means poorer performance in the mathematical and English ability of high school students between the ages of 15 and 16. Overall, the test scores of moth math and English decreased due to the lack of sleep by students and the time also overall decreased, as shown by the data and the general direction of the line in the line graph. Thus, the hypothesis which stated that lack of sleep leads to poorer performance was therefore proven correct.

Studies from McGill and Douglas Mental Health University say that math and languages require the use of the executive functions (e.g. memory, planning, eliminating distractions, etc.) of our brain. Having less amount of sleep affects one's ability to perform well in this subject area because the brain is vulnerable to the effects of lack of sleep. When conducting an experiment between children of ages 7 to 11 by McGill and Douglas Mental Health University, it was discovered that 14% of the

variability (i.e. the reasons for not doing well) in math was due to insufficient sleep. Additionally, a scientific journal regarding sleep and academic performance had stated that lack of sleep and particularly the irregularity in sleep schedule resulted in poorer academic performance, which was the hypothesis presented for this experiment. Observations on 61 undergraduate students showed that those who had regular sleep schedule performed better in academics than those who hadn't. A possible explanation for this is that usually, when people sleep, they tend to be in stage of sleep called non-rapid eye movement (NREM) which is what's called deep sleep. NREM sleep is vital as it is during this phase where cells reproduce by releasing growth hormones into the body and it's also where the short-term memory becomes long-term. If the amount of sleep is reduced, then there won't be a chance for these functions to occur which would affect academic performance. It is very important for teenagers to get the required amount of sleep (9-11) as an average teenager's body is still in the process of development which occur during sleep. As well, it was proven that sleep affects academic performance so in order to reduce poor academic performance specifically in math and English, students need sleep. Having less amounts of sleep result in the cognitive tasks of our brains to become even more effortful. By getting enough sleep, which is anywhere from 9 to 11 hours for high school students, helps the brain to do its best work.

Though this hypothesis was proven correct, there are potential experimental errors that must be taken into consideration. As a result, this experiment may not be precisely accurate. While the test subjects had willingly participated in the experiment, there could have been the possibility that tests subjects did not get the specific amount of sleep as they were not being supervised as they slept. Additionally, the external environment in which the subjects wrote the test as well as anything that happened to them prior to writing the test may have affected test results. So, the test results may not have been purely based on how much sleep subjects had. If that were not the case, then results would be much more highly accurate. In terms of problems regarding this experiment, the number of subjects may have been a problem. Only four subjects were included in this experiment. Consequently, the results did not vary much nor were they accurate enough. If more subject had been involved, there would have been a variety of results and an even more accurate experiment. So, while this hypothesis was proven correct, the results may not have been entirely accurate due to potential errors that may have occurred while conducting the experiment.

VI. Application

This information can be applied to other studies of field such as phycology as sleep affects behaviour, mood and performance. So, psychologists can take sleep into consideration when diagnosing patients. Additionally, for the general public, this

information can be useful because students, people who work or really anyone can use this information to make sure they sleep well and perform better the next day. As well, school boards can use this information to maybe change the school times in order for student to have a better amount of sleep.

My results fit into the bigger picture of the importance of sleep for high school students as they show that lack of sleep does affect academic performance. Sleep is a phenomenon that scientists still study intensely today.

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19 Years Is the Ideal Age for Aiming on a Screen

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I. Abstract

The purpose of this experiment is to find the best age of which a person will aim the best on their screen the most accurately and quickly. This helps doctors who help gamers who play professionally to train their fine muscles so that their aiming skill would not deteriorate as they age. The subjects in the experiment took an online aim tester called www.aimbooster.com, all subjects had one minute to hit randomly generated targets accurately and quickly. The results were then recorded. The data showed that as a person ages, their accuracy lowers and their time to hit a target becomes higher. Before 19 years old, a person's accuracy becomes higher and their time to hit a target lower. It can be concluded that, the age where a person's accuracy is the highest while their time to hit a target is the lowest is at 19 years old.

II. Introduction

The project explores the physical aspects of gaming, more specifically, the finesse of shooter pc games. Shooter pc games are games that are played on a computer along with a mouse and keyboard. The user of the computer will take control of the mouse and will often control, a gun usually, on the screen.

This process to move the mouse to move a pointer on the screen is called aiming. Aiming proves to be difficult because of the amount of dexterity it requires. If the mouse moves a bit too far or a bit too short, then the player would not be able to aim well. A player's aiming skills is judged on their accuracy, if their pointer is on top of the target when they click, and their speed, how long it takes to move the pointer onto the target and click.

People who play these games are called professional gamers, they are paid to play these games which is why these players as well as organizations want to know at what age can a person can aim at their best, so that they know their limit due to age and train to surpass that limit of age.

If a person's age affects the person's mouse movements, then people between the ages of 20 and 35 would have the best control over their mouse movements because according to research by Carmeli, Patish, & Coleman (2003), as well as research by Hoogendam et al., (2014), it supports that a human' dexterity becomes worse with age. Shephard (1998) found a human's peak physical age is usually between 20-35.

III. Methods

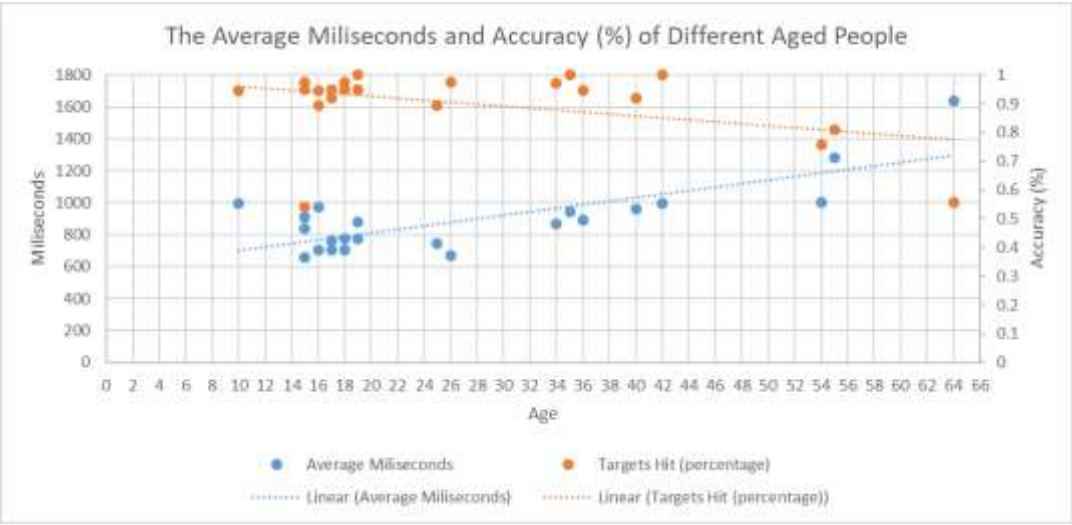
The subject responded to a questionnaire before the test, their answers were recorded. The questionnaire helped us understand how much experience the subject has in shooter video games. The subject opened and started the online aim test at www.aimbooster.com/lWnEvHP. The subject clicked on the targets that appeared on the screen using the mouse for one minute. After one minute, the test stopped by itself, and the results were shown on screen. The results will show the average accuracy of the subject and the average milliseconds it took for the subject to click on a target. The results were recorded. The experiment was repeated with different subjects until data for many ages were gathered. The answers from the questionnaire was counted and categorized based on a range of age or generation.

In the experiment, the independent variables were the ages of the users, for example all subjects born in 2002 are categorized as 16-year olds as of 2018. In the experiment, the dependent variables were the average accuracy and the average milliseconds the subject took to click on a target. Other dependent variables were the answers for each question in the questionnaires. In the experiment, the controlled variables were the time the user spend on the program. The time the user spend on the program was a controlled variable because if the subjects ended on different times, the subject would aim less accurately due to factors such as tiredness in the hand or stress.

IV. Results

Table 1 shows a clear linear trend, that as one ages, the lower the accuracy and the higher the time it takes to click on the target.

The trendlines indicates that the best age to aim is at the age of 10, however, the trend lines are linear, so that is not true. Table 1 does not obviously show which age had the best aiming skill. However, comparing the average results of one age group to another, it is found that people aged 19 showed the best accuracy and the lowest time to click on a target. At age 19, the average subject hit 97% of the targets with an average of 792.1 milliseconds for each target.



The answers to the questionnaire (Figure 1) provided more insight on why younger people are better aimers.

Questionnaire

1. How many hours a day on average do you use a personal computer?
   a. <2 hours b. 2-4 hours c. 4-6 hours d. 7-9 hours e. >9 hours
2. Do you play any video games that requires intense aiming (to move the pointer to a specific point of the screen eg. Fortnite, Osu!, Call of Duty franchise). (If No skip to question
   a. Yes b. No
3. If you answer question 2 "Yes", how many hours a day on average do you play?
   a. <2 hours b. 2-4 hours c. 4-6 hours d. 7-9 hours e. >9 hours
4. What do you use the computer primarily for?
   a. Education b. Work/Business Related c. Reading d. Videos e. Other
5. What biological sex are you?
   a. Male b. Female

Figure 1- The questionnaire all subjects are required to answer.

Table 2 shows that subjects from Generation Z tend to use the computer for more than 9 hours a day as 5 subjects from Gen Z chose that answer and play video games for either 2 to over 4 hours a day as there are 4 answers for playing 2-4 hours and 4 answers for playing more than 4 hours. This is in contrast with the other generations, as none of the other generations use the computer for more than 9 hours a day or play video games daily even when adjusted to proportion. Since Generation Z includes age 19, it makes sense as the subjects would have developed the appropriate motor control prior to the test and be well experienced in aiming.

Table 2- Table showing the number of answers of the subjects in response to the questionnaire.

Generation Z (8-23)									
Question 1		**Question 2**		**Question 3**		**Question 4**		**Question 5**	
A	0	A	11	A	4	A	9	A	9
B	1	B	1	B	4	B	1	B	3
C	3	C	0	C	2	C	0	C	0
D	3	D	0	D	1	D	2	D	0
E	5	E	0	E	0	E	0	E	0
Generation X (39-53)				Cannot Answer	1				
Question 1		**Question 2**		**Question 3**		**Question 4**		**Question 5**	
A	0	A	0	A	0	A	0	A	2
B	1	B	2	B	0	B	1	B	0
C	1	C	0	C	0	C	0	C	0
D	0	D	0	D	0	D	0	D	0
E	0	E	0	E	0	E	1	E	0
Generation Y (24-35)				Cannot Answer	2				
Question 1		**Question 2**		**Question 3**		**Question 4**		**Question 5**	
A	4	A	2	A	2	A	2	A	2
B	0	B	3	B	0	B	3	B	3
C	1	C	0	C	0	C	0	C	0
D	0	D	0	D	0	D	0	D	0
E	0	E	0	E	0	E	0	E	0
Baby Boomers (>54)				Cannot Answer	3				
Question 1		**Question 2**		**Question 3**		**Question 4**		**Question 5**	
A	2	A	0	A	0	A	0	A	1
B	0	B	3	B	0	B	2	B	2
C	1	C	0	C	0	C	0	C	0
D	0	D	0	D	0	D	0	D	0
E	0	E	0	E	0	E	1	E	0
				Cannot Answer	3				

V. Discussion and Conclusion

The hypothesis is incorrect. The hypothesis stated that people between the ages of 20 and 35 would have the most control over their mouse movements to reliably follow an object on screen, Table 1, however, shows that people at the age of 19 have the best aim

when accounted for average milliseconds and targets hit.

The results can be explained because people at age 19 at this time and age are more exposed to the use of computers and first-person shooters which trains hand muscles and hand dexterity, while older people are less exposed or does not play as many first-person shooters as they did before looking at the data from the questionnaire. The background information tells us that people between 20-35 will have better hand control, but it does not account for other factors such as time it takes to move the pointer or being familiar with the use of technology. The questionnaire reflects this as people from Generation Z tend to play more video games that requires intense aiming and plays more hours overall than other generations.

There are some possible sources of errors, motivation can be a factor, as the test did not tell the subjects to do the test in the best of their ability. If all subjects participated trying their best, then the results would see an increase in accuracy for all ages. It is unsure if the time would increase since aiming faster increases the chances of missing and thus, decreasing the accuracy. It is also unsure if the best age to aim would change to a younger age or an older age or stay at 19, since all participants will be trying their best.

VI. Application

This information can be used for kinesiology, as the experiment deals with the human body and dexterity. The public can use this information to be aware when they can aim the best in their life, as many gamers are people under the age of 19.

Gaming is a recent trend that is happening worldwide right now. As the popularity of viewing other people play video games much like traditional sports, the study of gaming would also begin. My results can help future researchers who may work for an organization, in determining how to improve a person's aiming ability, and find the best training methods to surpass the age of 19 to maintain their aiming accuracy and time as the players become older.

Effects of Chess on the Memory and Critical Thinking Skills of a Player

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I. Abstract

The purpose of the experiment was to observe how the memory and critical thinking skills of experienced chess players with at least 1 year of experience compared to those of students with no experience of playing chess. This experiment was important because it proved the intellectual benefits of playing chess. To compare the two categories, two groups of ten students in grade 9 and 10 were formed – one group having students with at least 1 year of chess experience in formal tournaments and one group having students with no chess experience – and each student was given two tests. The first test was a critical thinking test which consisted of 10 questions and the second test was a memory test which consisted of 6 questions. The data collected showed that the students with chess experience accumulated test score averages that were approximately 6% better on both the critical thinking and memory tests. The implications of this data can range from many things, from education to medicine. Implementing chess in the elementary school curriculum or as an option as a high school course would allow for students to enhance these skills as they are developed from learning and playing the game, as that is what the data proves.

II. Introduction

This experiment is important because, for one, it has a correlation with the multiple health issues that have seen an increase. For example, as Ramsey (2017) explains, from 1999 to 2014, the number of deaths related to Alzheimer's disease has increased by 55 percent – up to 25.4 deaths per 100,000 people now – and that by 2050, 13.8 Americans will be affected by Alzheimer's disease, compared to the 5.5 million affected now. Research has been done on how board games, such as chess, affect dementia and Aubrey (2010) reveals that although stimulating the brain with activities such as chess slows down dementia, the protection does not hold up and it later speeds up. If it is proven more in-depth that chess helps with memory and critical thinking, scientists will potentially do more research. Also, it could lead to new strategies of learning, in school or in other activities, concerning chess being introduced and implemented, if proven that chess does, in fact, improve these skills.

How do the memory and critical thinking skills of experienced chess players (1+ year of

experience) compare to those of people with no experience of playing chess?

If people that have been playing chess for at least one year, then they will have better memory and critical thinking skills because chess is a strategy game that, as Kaufman (2015) describes, that uses both sides of the brain. The right side – the visually focused side – to recognize patterns and positions from past games and what the player had studied and learned; this is associated with memory. Chess players, especially at an advanced level, must use the left side of their brain as well – the side that analyzes – to determine possible moves, their benefits, their consequences, possible counters, etc. Chess requires the player to be engaged mentally, thus players that play normally will have better memory and critical thinking skills.

III. Methods

A group of 20 students from grades 9 and 10 was gathered – 10 of which had at least one year of experience playing chess in formal tournaments, and the other 10 had no experience playing chess. The students were all brought into a quiet room with minimal distractions and they were spread arm's length apart so that they would not cheat off one another.

Each student was given a pencil, an eraser, and a copy of the printed critical thinking assessment (provided by https://online.columbiasouthern.edu/csu_content/courses/general_studies/lss/lss5100/14b/lessons/unitiii_criticalthinkingassessmentpracticequiz.pdf) that was flipped face down. Then, it was explained to the students that they would have 15 minutes to write the critical thinking and that there should be no communication between one another.

The students were told to begin the assessment and the timer started. After 15 minutes passed, the assessments were collected from the students. The students were then provided with the link to the online memory (https://faculty.washington.edu/chudler/stm0.html) and it was explained that the same rules applied to this assessment. After they finished the test, the students were told to mark down their results and these were collected from them.

After this, the results of each student's performance on each test were compared and the percentage difference between the average scores of the students with chess experience and the average scores of the students without chess experience on each test was calculated.

The independent variable in this experiment was the chess experience. The students that were tested were all in the same age category (grade 9 and 10 students), but the main difference between the two groups of the students tested was that one of them had at least one year of experience playing chess while the other did not.

The dependent variable in this experiment was the students' performances on the short-term memory and critical thinking assessments.

One of the controlled variables of this experiment was the environment in which the assessments were written. All the students took the assessments in quiet rooms with minimal distractions because factors such as noise, temperature, and available light could affect each test subject's performance. Another controlled variable was the age group of the students who were tested as they were all in grades 9 or 10 so that they all had a similar mental capacity. The controlled variables also included the tests that were written by all the test subjects, so that the results could be appropriately compared. Additionally, another controlled variable was the school at which all the students studied because it was more likely that the same school would have a more uniformed base level curriculum compared to students from different schools. Furthermore, the amount of time allotted to each student to write the tests was a controlled variable because it would make it fair as no one would be getting any advantages and thus making it possible for observations to be drawn from the results.

IV. Results

Table 1 – Scores of students with at least 1 year of experience playing chess on the memory and critical thinking tests and their average scores.

Student	Score on memory test	Score on critical thinking test
Student #1	6/6	9/10
Student #2	4/6	7/10
Student #3	5/6	7/10
Student #4	4/6	8/10
Student #5	3/6	8/10
Student #6	4/6	9/10
Student #7	5/6	8/10
Student #8	5/6	10/10
Student #9	6/6	9/10
Student #10	4/6	8/10
Average Score:	**4.62/6**	**8.2/10**

Table 2 - Scores of students with no experience playing chess on the memory and critical thinking tests and their average scores.

Student	Score on memory test	Score on critical thinking test
Student #1	4/6	7/10
Student #2	4/6	8/10
Student #3	5/6	9/10
Student #4	4/6	7/10
Student #5	3/6	7/10
Student #6	6/6	8/10
Student #7	3/6	7/10
Student #8	4/6	6/10
Student #9	5/6	9/10
Student #10	4/6	7/10
Average Score:	**4.26/6**	**7.6/10**

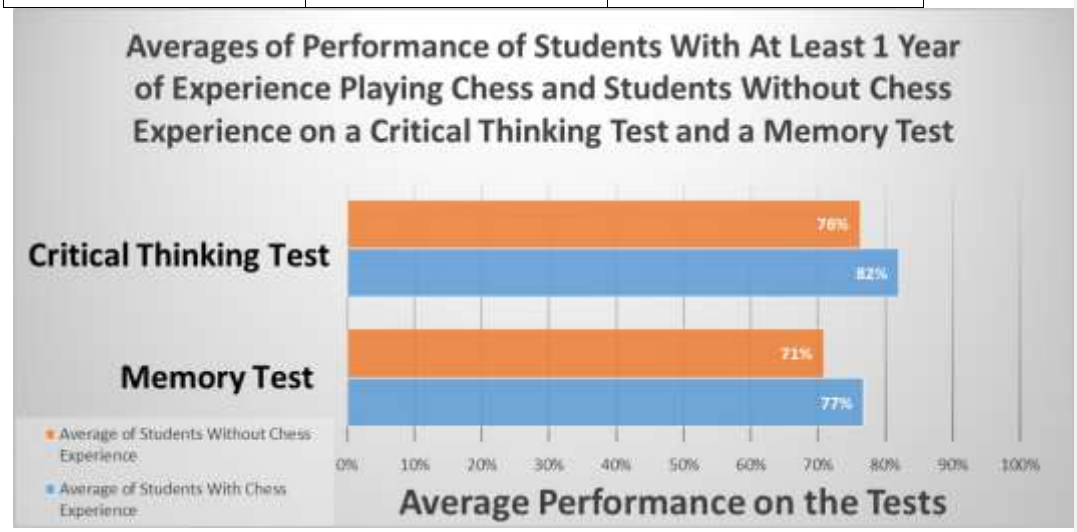

Figure 1 – Comparison of the average scores of the students with chess experience to those of the students without chess experience on each the critical thinking and memory test.

V. Discussion & Conclusion

The hypothesis was correct. The memory and critical thinking skills of experienced chess players (1+ year of experience) were, on average, better than those of people with no experience playing chess. This was concluded by comparing the results of the students on the memory and critical thinking tests. The scores for experienced chess players on the memory test formed an average of 77% and this was approximately 1.08 times greater than the 71% average on the same memory test for the students with no chess experience. In terms of the scores on the critical thinking test, experienced chess players accumulated an average of 82% and non-experienced students formed an average of 76%, showing that the average of the experienced players was, just like the memory test, approximately 1.08 times larger.

The question that was driving this experiment was "How do the memory and critical thinking skills of experienced chess players (1+ year of experience) compare to those of people with no experience of playing chess?" The results showed that the critical thinking and memory skills of the chess players are in fact more developed than those of non-experienced students. This was most likely because chess is a game that requires lots of application of different skills with memory and critical thinking being a couple of them. In games, the players have to memorize different openings, positions, endgames, etc. and they have to think ahead so that they can plan for possible attacks or defenses. A pattern in the results was that the average of the scores of the experienced players on the tests was greater than those of the students with no experience playing chess. Another relationship was that the students who scored higher on one test usually managed to obtain a high score on the other test as well.

Something that could have caused an error in the experiment was the fact that some students – a few of the students that wrote the tests representing the no experience students – wrote the tests in a different place at a different time. This could have had led to errors as the environments in which they wrote the tests varied which could have possibly affected their performance. Also, the students that took the tests were from both grade 9 and 10 and it could be argued that the younger students have not learned as much in school.

If this experiment were to be conducted again, some changes that could be done to the experiment include making the tests longer. Also, the number of tests that the students complete can be increased and this would allow for more accurate conclusions.

VI. Application

With technology becoming something that society depends on greatly, memory is being less depended on and thus less developed. Same goes for critical thinking – it is also becoming less depended on, mainly because of technology. If further research is conducted, chess could possibly

be implemented to help develop these skills and help with diseases such as Alzheimer's disease. Furthermore, it could be implemented in the school curriculum. This would lead to a somewhat fun class in which the students' cognitive skills are developed. Overall, if there is more research conducted in this field, future implications of the game could be countless and could carry on for generations.

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How People are Biologically Wired to Like Art

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I Abstract

This study was used to demonstrate that art affects the brain due to a biological inclination to art. This is used to prove that one does not have to be an art critique to be able to appreciate art. To demonstrate this, a series of images were created with different styles. Each image followed a different compositional pattern. It was then put into a survey; participants were asked to choose the image they like best. If an image was chosen more often that another it would follow that the art piece is more visually appealing, therefore people must naturally like one image more than another. The study found that people generally preferred the images with a defined compositional pattern as oppose to the ones that did not. This proves that art is not solely based upon culture, and that biology most likely plays an important role whether people can naturally appreciate art.

II. Introduction

Art plays a significant role in society. By learning about the effects art has on the brain, people will be more encouraged to spend more time looking at art therefore increasing their mood. It would also encourage cities to put more funding into things such as art museums (Rachel Spence).

Is there a biological reason for someone liking art? If an image that is altered to have three different compositional patterns has a variation that is chosen more often, then it is predicted that biology plays a role in what art people like because it proves that one does not need to dissect a piece of art to be able to appreciate it. A researcher named Professor Semir Zeki used a MRI machines to see the change in participants mood when shown specific pieces of art. His study shows that there was correlation between a good painting and an increase in mood. Another study from the University of Westminster found that if students took lunchtime visits to a local art gallery, their levels of cortisol and self-reported stress diminished.

III. Method

To be able to replicate this study, one must have downloaded the file from this link https://admin.typeform.com/form/kvkuuD/create and hosted a survey. For the best results, one must have shared it with as many participants as possible. Then one would have recorded the data and compared the images. If an image was chosen significantly more than the other images, then the experiment was a success.

The independent variable was the degree that the image was balanced for the first set of images, whether the image had a clear focal point for the second set of images, and whether the image had structure or not for the third set of images. In each set of images, the control variables were the order in

which the participants see the images, the images that the participants saw, and the school in which the participants attend or work in. These control variables were important to the experiment because it would not make sense to show different images to different people. If that was not a control variable, and surveyor could choose which images to show which participants, then the experiment would have been excluding results from some participants. The location in which the survey was held however, made little to no difference on the study because the experiment was trying to The dependent variable was the participant's preference of one image in a series over another.

IV. Results

Figure 1- The graph represented the percentage of Massey's students/faculty who chose a balanced image over an unbalanced image. The blue bars represented the percentage who chose the balanced image, the red bars represented the percentage who chose a left-leaning image, and the yellow bars represented the percentage who chose a right-leaning image.

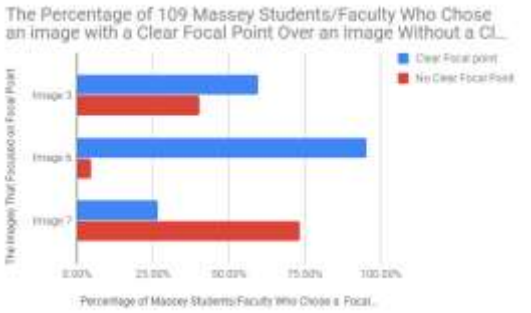

Figure 2- The graph represented the percentage of Massey's students/faculty who chose an image with a clear focal point over those who did not. The blue bars represented the percentage who chose the image with a clear focal point, the red bars represented the percentage who chose the image without a clear focal point.

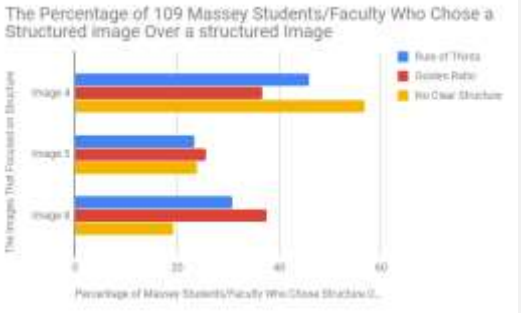

Figure 3- The graph represented the percentage of Massey's students/faculty who chose an image with a clear focal point over those who did not. The blue bars represented the percentage who chose the image that followed the rule of thirds, the red bars

represented the percentage who chose the image that followed the golden ratio, and the yellow bars represented the percentage who chose the image that did not follow structure.

V. Discussion and Conclusion

The experiment did prove the hypothesis because according to the results there seems to be a direct correlation between composition and how people liked a piece. This study showed a variety of different art styles and themes which proves that, because most images have a large majority of people choosing one image over another, there is most likely some sort of standard to a good work of art. Therefore, there must be more at play than cultural and personal biases. This was illustrated best in image number 9 because a majority of people (66.1%) preferred the balanced image. The reason why this is particularly significant is because nothing else was changed about this image except for the location of the airship. The initial purpose of this project was to determine whether biology played a role in how people view art. While this experiment can not say that without a doubt biology plays a role, it can say that there is a likelihood of a connection between art and natural biological preferences.

This study relates to the other studies researched in this project because they both support the hypothesis of art being related to biology. The article titled *Art and brain: insights from neuropsychology, biology and evolution* measured participants dopamine levels and did see a rise when the participants viewed different pieces of art. This experiment used various methods (such as an MRI machine) while the one for this project used a survey. It is expected that the results would be more conclusive in Dahlia Zaidel's study because it is not reliant on participants being honest during the study. This is because sometimes people will choose what they think is right, rather than which image they actually like more. Also, the images created for this project were based more on the creator's understanding of composition, so it is possible that one compositional component may have been replaced for another. To remedy this this the creator made as many images as possible in the time given and had many participants.

Not all images found in the results however, supported the claim. In image 4, for example, the image that was not structured was favored by most. It is important to note that when the two structured images are combined, they will outweigh the unstructured image. It is likely that the reason it was the image chosen more often was because the focal point was centered, thus making it easier to look at. Image 7 also produced undesirable results most likely because making the focal point being made more vibrant added more visual interest. It was initially intended to create two focal points due to the tent stealing focus, however the tent was not saturated enough, therefore the more colourful image was chosen more. The final image that produced unexpected results was image 3. The

numbers were very close to each other, which implies that the participants randomly picked an image. This is most likely because there was not enough distinction between the two images.

VI. Application

In conclusion, the results of the experiment suggested that biology is a factor in people's appreciation of art. This study encourages people to view more art, as one does not need to understand the fundamentals of art and design in order to like looking at a piece of art. This study relates to other studies in psychology because understanding how art effects the brain biologically will help other studies determine why people find art appealing. The results can also be used to gain a better understanding of the complexities the human brain by allowing scientist to have a better idea of why people are wired up the way they are.

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The Effect of Loot-boxes on gamers in games that have loot-boxes compared to games without loot-boxes.

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I. Abstract

Gambling addiction rate have increased in recent years and the aim of this experiment was to see whether loot-boxes did indeed have an impact on the experience of the video game player. The results of this experiment indicated that loot-boxes have indeed impacted the gamers. The gamers have been playing for longer amounts of time and seem to lose track of how much time have passed while playing the game that had a loot-box element. The conclusion is that loot-boxes were a form of gambling and should be restricted until a certain age limit.

II. Introduction

Addictions to gambling have become a large problem around the world. World leaders have woken up to a new form of gambling among young adults and children: loot-boxes. Some governments are considering banning all video games that contain a loot-box since they are technically gambling, but are not loot-boxes. Many current video games include some form of loot-box. This could help game developers when they are trying to please a wide audience range. Classifying loot-boxes as gambling could also help create new regulations to make loot-boxes require an age limit to play.

The question this experiment was meant to answer was: How do video games that include loot-boxes affect a person's experience compared to a game without a loot-box?

If a video game had the element of chance built in, then the users would lose track of time and keep playing even after they used all the allotted amount of money because loot-boxes will create a release of dopamine, which will cause the test subjects to continue playing.

III. Methods

First activate the game "I Can't Believe It's Not Gambling!" on the computer that is being used to test the subjects. Give the test subject the computer once the game is activated and ready to start. Inform the test subject that they have 20 minutes to play the game. Then, set the modified timer to 20 minutes and tell the subject that the time and the experiment have started. Record time (t- or t+) once the test subject determines that their 20 minutes have passed and ask whether 20 minutes has passed already. Next, give the test subject the game experience questionnaire to complete. Repeat the steps taken above but with the games called Pokémon: Diamond. Write down results of the questionnaire and observations in the data/observation tables. The variables that the experimenter would change each time the

experiment is conducted is: the video game (I Can't Believe It's Not Gambling! By Mutant Entertainment Studios and Pokémon: Diamond). The variable that should be recorded so it would have compiled into graphs and data are the time that it took the test subject to ask whether their experiment was done, game experience (The average of the test subjects answers concerning four separate sections about their gameplay). Some variable that should be controlled in a similar manner so that they don't interfere with this experiment are: the environment where the experiment has taken place because some rooms could be loud and distracting while others quiet and still. This makes the testing fair and should lead to similar results in all test subjects for one mode of game. The next controlled variable is the computer model because computers have different controls and the use of other computers could impact the results of the experiment since some computer run slower or have flashing lights. Time of day would also have to be controlled because if the test subjects do this at different times of the day, they could be either tired or attentive, which would change the results of the experiment.

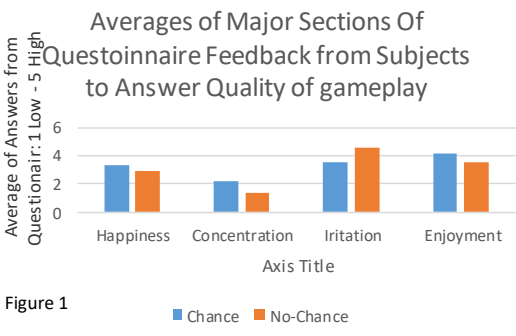
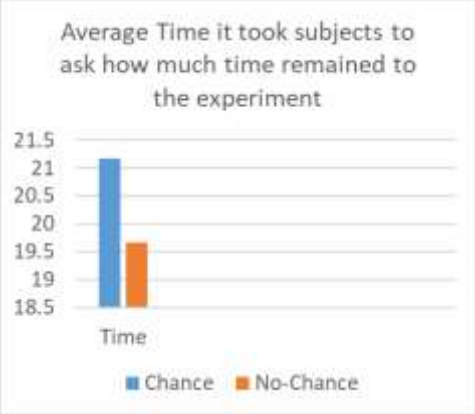


Figure 1

IV. Results

All subjects circled an average of 3.3 on the question 'I felt content' with was asked after the subjects played the game that included chance (I Can't Believe It's Not Gambling! By Mutant Entertainment Studios). The satisfaction rating went down to an average of 2.9 (Figure 1) after playing the game without chance (Pokémon: Diamond).



The play time was greater by while playing the chance game than the Pokémon game. (Figure 2)

V. Discussion

The hypothesis proved to be correct. Players took more time before asking whether their allotted time ran out. The experience of the players pointed towards a greater enjoyment of the game with loot-boxes rather then the other game without chance.

Figure 2

For example, all subjects circled an average of 3.3 on the question 'I felt content' with was asked after the subjects played the game that included chance (I Can't Believe It's Not Gambling! By Mutant Entertainment Studios) (Figure 1). The satisfaction rating went down to an average of 2.9 after playing

the game without chance (Pokémon: Diamond). In a similar trend, the play time was greater while playing the chance game than the Pokémon game. This could indicate a form of reaction from the subjects to chance games since they appear to be happier and more concentrated on 'I Can't Believe It's Not Gambling!' (Figure 2).

An explanation for this phenomenon is that this is a form of gambling and that all gambling influences the brain in a 'positive way' that releases serotonin and dopamine hormones by simply thinking about all the positive results that could happen. As your brain continues to think about all the different possibilities, it loses track of time and concentrates on possible results. Since the Chance side beat the no-Chance side in almost every category of questions from the questionnaire, the games of chance appear to boost the enjoyment of players more than the games without chance.

Some possible sources of error in this experiment is human error, specifically when the one doing the experiment is a bit slow and stops the timer at the incorrect time. This would move the time back and the results of the experiment would have changed. If this would have happened in this test, loot-boxes would have been called gambling, with no other cases than going over the 20-minute limit. Another possible source of error is that the test subjects lied on the questionnaire or misread and answered the questions incorrectly or without properly thinking about the question. This would offset the answers by point one of two since all the answers from all the subjects were averaged. All in all, this source of error would not have changed the result of the experiment by a large amount.

VI. Application

This information could be useful to government and video game developers so that they add an age limit since loot-boxes are considered gambling even in other governments around the world. This information could help with the world's gambling addiction since young children and teenagers are being exposed to the idea of gambling in games and videos of games. This could later emerge in their life as an addiction to gambling and so loot-box containing games should be regulated under some sort of law to protect young adults. On the other hand, if more video game developers implemented this loot-box idea, they would earn a great deal of money and the company would prosper. This is another application of this information from the experiment that could be used to improve someone's life. The sooner that governments or companies start acting on this information, the better it will be for the separate entities.

Other contributions this research / experimentation can do are to the field of psychology because video games have not been around enough to fully know the effect of video games on children and young adults so this may give an idea to greater minds in the field as to the effects of technology on the human mind.

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The Effect of Playing Chess on Academic Performance in English and Math Classes

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I. Abstract

The question investigated is how would playing chess for a minimum of an hour a week affect high school success in math and English? The relevance of the experiment revolving around this question lies in the declining math and reading scores for students. There has been a huge drop from 2013 to 2015 (Camera, 2015) and there isn't a clear solution as to why this happened, so changes clearly need to be made. To find a possible verdict to this question, math and English marks were recorded of 10 grade 10 students. These students began to play chess for 1 hour a week for four consecutive weeks, this will allow for analyzation of what exposure to chess does. Once the four weeks were over, their updated math and English marks were recorded. The results of the data collection show that overall, the students' math marks increased by an average of 1.4%. While the students' English marks increased by an average of 0.4%. The implications of this study are the effects of chess to students' academic success in math and English. Implementing chess to a students' weekly schedule would allow for greater understanding in math and English.

II. Introduction

This question is important to answer because it has been shown that math and reading scores for students have dropped from 2013 to 2015 (Camera, 2015) and there isn't a clear solution as to why this happened, so changes clearly need to be made. If changes are not made, there will be a huge chance academic scores will continue to drop lower. If changes are made and scores start to increase, it would be a very great thing for all students who are struggling to keep up with school.

How does playing chess for a minimum of an hour a week affect a student's ability to perform better in overall academics (math & English)?

If students play chess for at least an hour a week then overall academic scores in students will increase because overall cognitive ability is improved in those who play chess (Foley, Gobet, & Sala, 2017). Chess will also provide a way for students to improve their concentration skills because when they are in a game of chess, they block out all distractions and focus more on the board and pieces (Gardiner Chess, 2018). This will

allow students to become more focused and successful in school.

III. Methods

10 grade 10 students that have had no experience with chess and were currently taking math and English were collected. The students' most up to date math and English marks were recorded. The students were gathered every Friday at the chess club for four consecutive weeks. The test subjects were then taught/played chess for 1 hour. After the four weeks were over, any tests, quizzes, and assignments that were done during the four weeks were collected. Their updated marks were also recorded. The data that was received was then inputted into data tables. The marks of the students before and after playing chess were then analyzed/observed.

In this experiment the independent variable was not playing chess and playing chess. The 10 grade 10 students started off not being exposed to chess at all. During the experiment, they gained the experience through playing chess.

In this experiment the dependent variable was the math and English marks of the students over the testing period. Another dependent variable was all of the tests, quizzes, and assignments that were collected and observed Also, another dependent variable was the average increase (%) in the students' marks.

In this experiment one of the controlled variables was the same amount of time playing/learning chess at the meetings. Another controlled variable for both groups were the lessons/tips taught to everyone. Another controlled variable is the number of games played per student in the hour that they got each week. The ages of the 10 grade 10 students will also be another controlled variable. In this experiment, the ages of the students will be set to the year they were born. The type of math and English courses will also be kept the same. In this experiment, they will be Academic level courses. These variables were controlled because it insured that the results were as accurate as possible.

IV. Results

Table 1- This is a table of the recorded math and English marks of the 10 grade 10 students

Updated Marks for Ten Grade 10 Students After Playing Chess for an Hour a Week for Four Consecutive Weeks		
Student #1	Math Mark:88 English Mark:76	Math Mark (updated):90 English Mark(updated):80
Student #2	Math Mark:92 English Mark:94	Math Mark (updated):92 English Mark(updated):86
Student #3	Math Mark:80 English Mark:87	Math Mark (updated):77 English Mark(updated):88
Student #4	Math Mark:65 English Mark:70	Math Mark (updated):70 English Mark(updated):72
Student #5	Math Mark:86 English Mark:83	Math Mark (updated):88 English Mark(updated):82
Student #6	Math Mark:95 English Mark:91	Math Mark (updated):95 English Mark(updated):90
Student #7	Math Mark:78	Math Mark (updated):82

	English Mark:71	English Mark(updated):75
Student #8	Math Mark:84 English Mark:90	Math Mark (updated):85 English Mark(updated):93
Student #9	Math Mark:76 English Mark:90	Math Mark (updated):80 English Mark(updated):88
Student #10	Math Mark:88 English Mark:93	Math Mark (updated):87 English Mark(updated):95

Table 2- This is a table of the recorded marks from math and English tests, quizzes, and assignments

Collected Tests, Quizzes and Assignments from Ten Grade 10 Students After Playing Chess for an Hour a Week for Four Consecutive Weeks		
Student #1	Math Test, Quiz, and Assignment scores: Math Test: 93% Math Quiz: 95%, 95% Math Assignment:	English Test, Quiz, and Assignment scores: English Test: English Quiz: English Assignment: 86%, 89%
Student #2	English Test, Quiz, and Assignment scores: Math Test: 93% Math Quiz: 90% Math Assignment:	English Test, Quiz, and Assignment scores: English Test: English Quiz: 75% English Assignment: 72%
Student #3	Math Test, Quiz, and Assignment scores: Math Test: 73% Math Quiz: Math Assignment:	English Test, Quiz, and Assignment scores: English Test: English Quiz: English Assignment: 90%
Student #4	Math Test, Quiz, and Assignment scores: Math Test: 77% Math Quiz: 73%, 72% Math Assignment:	English Test, Quiz, and Assignment scores: English Test: English Quiz: English Assignment: 78%
Student #5	Math Test, Quiz, and Assignment scores: Math Test: Math Quiz: 92%, 93%	English Test, Quiz, and Assignment scores: English Test: 85% English Quiz: English Assignment: 72%
Student #6	Math Test, Quiz, and Assignment scores: Math Test: 96% Math Quiz: 94% Math Assignment:	English Test, Quiz, and Assignment scores: English Test: 88% English Quiz: English Assignment: 85%
Student #7	Math Test, Quiz, and Assignment scores: Math Test: 86% Math Quiz: 83%, 80% Math Assignment:	English Test, Quiz, and Assignment scores: English Test: 78% English Quiz: English Assignment: 90%
Student #8	Math Test, Quiz, and Assignment scores: Math Test: 87% Math Quiz: 85% Math Assignment:	English Test, Quiz, and Assignment scores: English Test: English Quiz: 95% English Assignment: 100%
Student #9	Math Test, Quiz, and Assignment scores: Math Test: Math Quiz: 86%, 87% Math Assignment:	English Test, Quiz, and Assignment scores: English Test: English Quiz: English Assignment: 83%
Student #10	Math Test, Quiz, and Assignment scores: Math Test: 86% Math Quiz: 90%, 85% Math	English Test, Quiz, and Assignment scores: English Test: 100% English Quiz: English Assignment: 100%

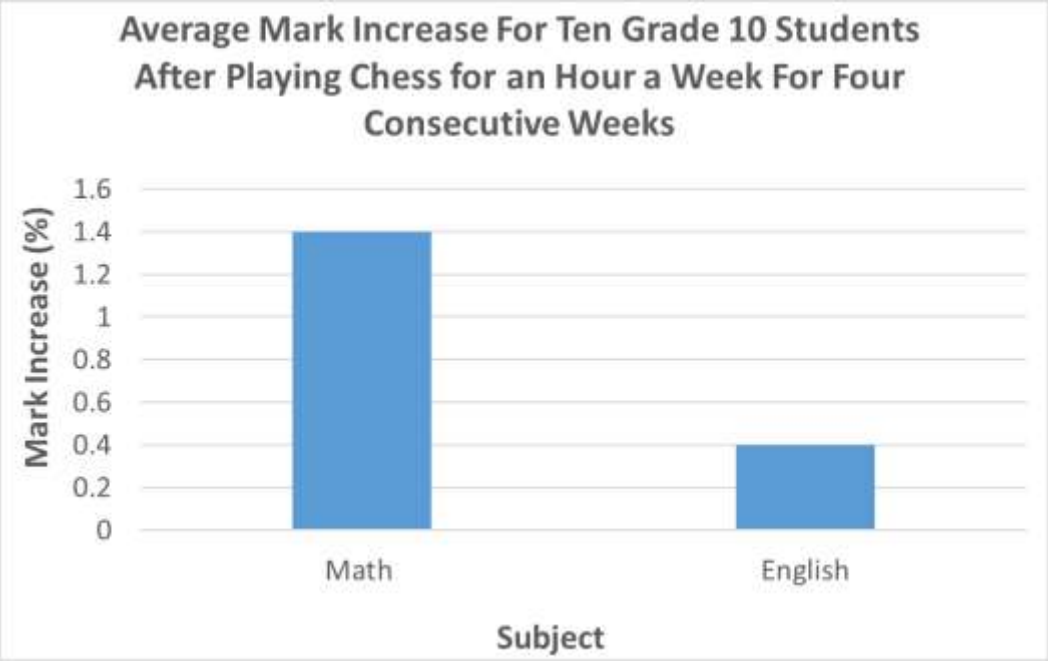

Figure 1- Comparing the average increase (%) in the students' updated marks in math and English classes after playing chess for 1 hour a week for four consecutive weeks

V. Discussion & Conclusion

The hypothesis was correct. Playing chess for a minimum of an hour a week allowed students to perform better in Math and English. From the data collected, six out of ten of the students either had an increase in their updated Math or English Mark. For the Math portion, it was found that it had a bigger effect on the students than it did to the English portion. Overall, the math portion had a total improvement of fourteen percent while the English portion had an overall improvement of four marks. Also, the average improvement per student in the Math portion was 1.4%, while the English portion had an average improvement of 0.4% per student.

The explanation to the results refers back to the fact that playing chess can improve cognitive abilities and academic performance in students. Chess also provided a way for students to improve their concentration skills because when they are playing a game of chess, they will block out all

distractions and focus more on the board and pieces. This allowed students to develop concentration to become more focused and successful in Math and English.

A problem or source of error that was encountered was that on the days of the meetings, some students had to go home early. Which makes it so that a little less than an hour is actually spent playing chess. They may have affected my results because less time is actually spent playing chess. Since less time is spent playing chess, the smaller the impact that chess had on the students. Which would have caused the data collected to not be 100% accurate. If this problem was not faced, the average increase (%) in the students' marks would be higher because the students would be spending more time playing chess, thus allowing the brain to improve its cognitive abilities and allow the students to perform better in their classes.

VI. Application

The information from this experiment suggests that chess does somewhat affect a student's ability to perform better academically (specifically Math and English). The general public could use this information to give themselves a reason to try and play chess. Before they wouldn't have had a reason to attempt to play a game of chess. However, from the data collected, it's very possible that people would want to try and benefit from chess. In the grand scheme of things, chess is not just a game, it's can be used as a tool to help raise an individual's academic scores.

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Difference in comprehension and reading speed between electronic and paperback reading

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Abstract

The purpose of this experiment was to determine the difference in reading speed and comprehension between paper and electronic mediums to find which method was superior in terms of reading proficiency. In today's world, deforestation is a large issue and the production of paper at the current rate is unsustainable. This information helped determine whether there exists any advantage to reading paperback and whether paperbackbooks should be abandoned. This information was gathered by giving each subject a paper sight passage and then an electronic sight passage of similar difficulty . Each subject's reading speed was timed and then they were given a comprehension quiz to test understanding. The results proved that electronic reading was superior in both comprehension and reading speed which means that there is no benefit to reading paperback. All reading should be done with electronics as it is more beneficial and has less of an impact on the environment.

I. Introduction

Traditional books and textbooks are being replaced with their digital counterparts because they seem like the perfect solution and they don't have any downsides. Regardless of this fact 90% of readers prefer paperback books (The reading habits of Canadians, 2017). The question that arises is: should paperback books be altogether abandoned? This is an important question because making paper has various environmental impacts as nearly 35% of the world's trees are cut down to produce paper (Martin, 2011). If it's shown that paperback books have no advantage, it may convince people to stop buying paperback books. To answer this, the question what is the difference in the comprehension and reading speed of a passage when a person reads electronically vs. reading paperback was investigated. The hypothesis is if a person reads paperback, then they will outperform the person reading electronically in terms of comprehension, but will be outperformed by the person reading electronically in terms of reading speed. Reading paperback is better for comprehension because on an electronic screen, scrolling is necessary. According to Mangen et al. (2012), scrolling causes spatial instability in the reader's mind making it harder to focus and understand. Also, the tangible quality of paperback books helps readers remember what they read (Mangen et al., 2012). Reading electronically however provides the user with better screen contrast, therefore improving the discriminability of the text (Kretzschmar et al., 2013) and scrolling allows you to move between pages a lot quicker.

II. Methods

Two 800 word sight passages of the same level were used to test the reading speed and comprehension of each subject with different mediums. The paperback sight passage was given first and the suject was timed on their reading speed. Then the subject was given a comprehension quiz which tested their knowledge and understanding of the story as well as the ability to remember details. The steps were repeated for the same subject except the medium and the story as well as the comprehension quiz were switched. The

determine reading proficiency. The controlled variables include the environment as a noisy environment would reduce concentration, the reading level which would impact the results on the comprehension quiz, previous knowledge of stories would affect scores and speed as the subject has already read it, difficulty level of questions and passages, font and the ability to use technology effectively since this could be a handicap for the prson which may slow down their reading speed. These variables were chosen to be controlled because they could all have a major impact on the results.

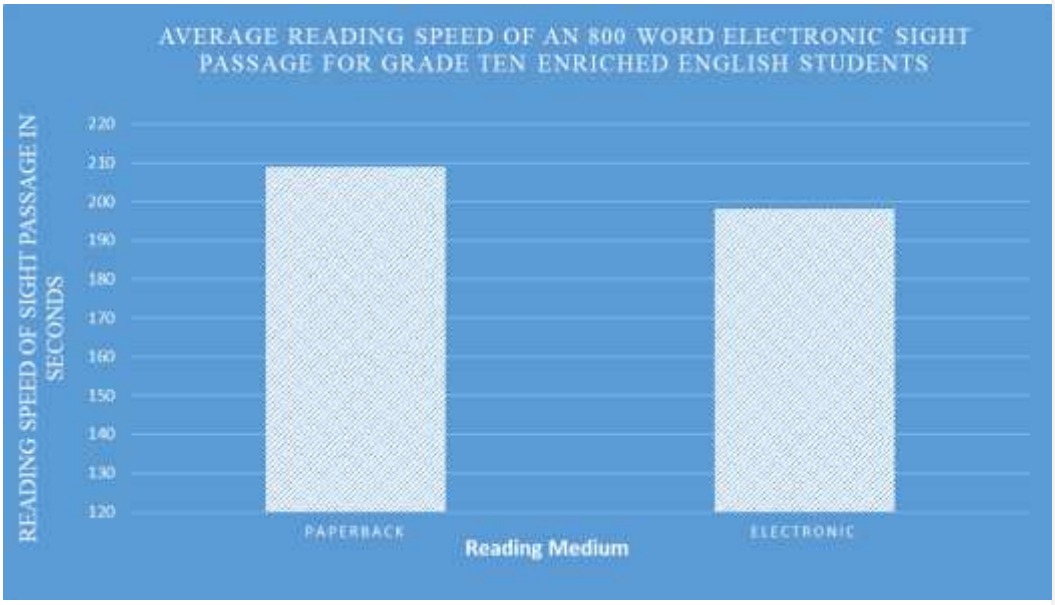

Figure 2 This graph compares the average reading speed between electronic and paperback reading in seconds

electronic sight passage was displayed on a laptop. The independent variable was the reading medium, The dependent variables were reading speed and comprehension as both are the largest factors which

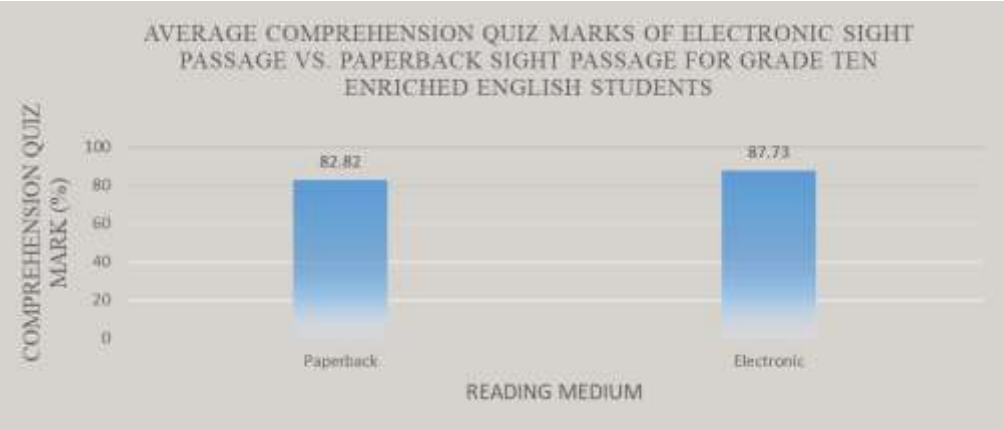

Figure 3 This graph compares the average scores on the reading comprehension quiz between the two methods of reading in percentage

The results of this experiment show that electronic reading is better in both reading comprehension and reading speed as the average score in comprehension was lower for paperback reading (Figure 2) as well as the average speed was faster for those who read electronically (Figure 1).

IV. <u>Discussion/Conclusion</u>

The first part of the hypothesis was incorrect but the second part was correct. It was hypothesized that reading paperback would outperform reading electronically in terms of comprehension and this was proven incorrect by the experiment. It was also hypothesized that reading electronically outperformed reading paperback in terms of speed and the this was proven correct by the experiment. The difference in the comprehension and reading speed between reading paperback and reading electronically is that reading electronically is faster and is easier to comprehend. On average, Students were 11 seconds faster when reading the electronic passage compared to when they read the paperback passage. Electronic reading also outperformed paperback reading in terms of reading comprehension on average by 5%. The data suggests that electronic reading is superior to paperback reading in both comprehension and reading speed. This experiment proves that electronic reading is superior to paperback reading. Electronic reading outperformed paperback reading due to the fact that the contrast of each character is sharper when reading electronically as has higher contrast which improves

discriminability and the scrolling improves speed. Electonic reading outperforming paperback reading in terms of reading comprehension shows that special instability and the tangible quality of paper is not a factor in reading comprehension and rather that the

contrast may be a factor in reading comprehension as it allows the words to be seen a lot clearer.

Some variables that may have affected the results include the subject being stressed about being timed. Subjects may have felt the need to hurry up due to wanting to perform better. This would have affected the times as well as the comprehension mark as the subject may not have read the passage thoroughly. Another variable that may have affected the test was that the subjects did not know the difficulty of the test so they might have read as thoroughly as they were supposed to. This may have affected the marks as it could have caused the student to read more thoroughly on the second sight passage. If the experiment was done again, there would be a much larger subject group and the subjects would have done some practice passages beforehand. Also, the medium that was tested first could have been switched every other time. This would make the data more accurate and would allow the subjects to perform to the best of their abilities.

V. Applications

This information may convince people to buy electronic books more often. This could cause a drop in the number of traditional books sold which would cause a positive effect on the environment because less trees would be cut down. This data would convince people that there is no longer a need for paperback books as they are inferior to electronic books in many ways. This data could also be used to the gain of e-book companies as this data suggests that e-books are superior.

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Spice-Can: The Effects of Daily Capsaicin Intake on Spice Tolerance

Pat

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Abstract

People all around the world struggle with spicy food, many of them do not grow up with spice at home or just not enough of it. These people fail to develop a natural tolerance during childhood, but is it possible for them to develop one now? Research subjects underwent daily exposure to capsaicin, the ingredient that gives food it's spiciness, to test if it was possible. Subjects were given bags filled with capsaicin rich-food for a 2-week period and they were instructed to consume one a day for 14 days. The subjects' reaction to the spice on a scale of 1-100 was recorded at the beginning of the trial and at the end of every following week, these results were recorded and averaged. After the end of the two weeks, it was discovered that the subjects felt an average decrease of 15.8% from their original rating compared to the one they gave at the end of the 2 weeks. This shows that it is possible to increase a person's spice tolerance by increasing the amount of capsaicin they eat, a valuable solution to the everyday problem that affects billions of people.

Introduction

The problem of low spice tolerance is one that affects many people across the globe. For those it affects, it causes the tongue to burn, the eyes to water and it leads to a great deal of pain (Jasper Hamill 2015). These people cannot handle even the slightest amounts of spice and they must always be aware of meals that could contain the painful seasoning. This is especially difficult when there are people that use heat as an essential part of flavor profiles (Allison Ford 2016). This would lead to some pretty painful meals for those whose senses are not adapted to handle spice.

Is it possible to decrease a person's negative reactions to spice by increasing the amount of spice they ingest regularly by a definite amount?

It is hypothesized that if the amount of spice consumed daily is increased by 20g for 2 weeks, then the person's spice tolerance will increase, because the ability to eat spicy food isn't an inborn personality trait; it comes through exposure and culture (Ford 2016). With exposure to spicy foods on a regular basis you will be able to improve your body's immunity. This is because the heat is caused by a chemical known as capsaicin, which binds to cells in the tongue called TRPV1 receptors (Hamill 2015).

The chemical confuses the receptors and causes them to send signals to your brain warning of high temperature. However, it is possible that exposing these receptors to spicy food can desensitize their nerve endings (Agneeta Thacker 2013). The desensitized receptors would not react as heavily to the capsaicin and would lead to a higher spice tolerance.

Methods

The aim of this experiment was to test the effects of capsaicin exposure on a person's spice tolerance. For visible results a trial period of a minimum 2 weeks and portion size of at least 15g of a capsaicin-rich food is recommended. For this experiment a group of 10 people were subjected to 20g of Flamin' Hot Spicy Cheetos (approx. 1. 5g of capsaicin) daily for 14 days.

The selected spicy food was divided into 20g portions and was given out to the research subjects, 14 portions for 2 weeks. After consuming their first portion, the participants were required to submit a rating of how the spice felt for them. A scale of 1-100 was used to rate spice perception. The subjects were instructed to consume one of these portions a day for the rest of the trial period. The participants were also asked to submit a rating at the end of every week after that, to monitor progress.

The independent variable in this experiment is the amount of daily exposure to the chemical capsaicin. The dependent variable is the subject's rating of pain tolerance. Throughout this experiment it was important that the amount of spicy food should stay consistent for every day of the trial period, because the aim was to see how that certain amount would affect spice tolerance over time. The same capsaicin-rich food should also be used throughout the entire experiment to ensure that the subjects are receiving the same amount of capsaicin everyday. The length of the trial period was also kept consistent across all research participants to ensure that the exposure to capsaicin for each subject was kept regulated.

Pain Tolerance Rating:

Subject #:

Start	Week 1	Week 2
10 20 30 40 50	10 20 30 40 50	10 20 30 40 50
60 70 80 90 100	60 70 80 90 100	60 70 80 90 100
Other:	Other:	Other:

Figure 1: Example table used to record data from research Participants.

Results

Table 1: Spice perception ratings gathered from research participants over 2-week period.

Participant:	Start:	Week 1:	Week 2:
Participant 1	50	30	20
Participant 2	85	65	60
Participant 3	20	10	7
Participant 4	100	79	75
Participant 5	25	20	20
Participant 6	30	40	15
Participant 7	65	55	55
Participant 8	20	10	5
Participant 9	70	70	70
Participant 10	80	68	60

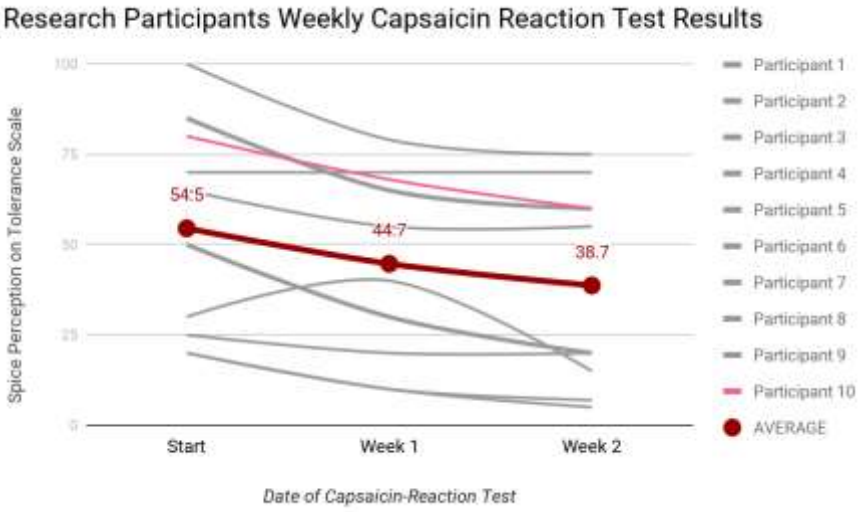

Figure 2: A graph that shows the average decrease of spice perception over the 2-week exposure period.

Table 2: Average decreases in spice perception from gathered data.

Week:	Average decrease in spice perception weekly:	Average decrease in spice perception from initial test:
Week 1	9.8%	9.8%
Week 2	6%	15.8%

Discussion & Conclusion

Yes, this hypothesis was correct. It was found that all subjects stated they found the "spicy feeling" to be significantly less painful at the end of the trial compared to when the experiment started.

To answer the original question, yes, this is a possible way to improve a person's tolerance towards capsaicin. The average decrease for the participants spice perception was 15.8%, with a few participants experiencing a decrease in spice perception of up to 30%. This proves that this could

be used as a viable solution to the problem that inhibits many people from enjoying all the spicy food they want. Data shows that if the subjects were to continue ingesting a regular amount of capsaicin daily they could increase their capsaicin tolerance even more, allowing them to eat increasingly hotter foods.

The reason why the participants found the capsaicin to be less spicy at the end of the week is because the tongue has a natural ability to build up a spice tolerance. The participants "felt the burn" because of a chemical known as capsaicin, which confuses the tongue's taste receptors that send signals to your brain warning of high temperature. However, it is possible that exposing these receptors to capsaicin repeatedly can desensitize their nerve endings, making the test subject not feel the pain as badly. This is the same reason why children born into families with spicy food diets can endure high amounts of capsaicin rich foods.

After the experiment was completed, it was discovered that a couple of the subjects had been eating the Cheetos throughout the course of an entire day instead of all at once, as instructed. The results that they gave would have been slightly inconsistent compared to the results of the people who ate the Cheetos all at once and then gave a rating. To resolve this issue in a future experiment, it is advised that a set time to ingest the capsaicin be given to the test subjects to achieve consistent data between volunteers.

Application

The use of this solution could change the way that people with low spice-tolerance eat. It will enable these people to finally enjoy all the spicy cuisine that his world has to offer. This gives the people with high spice sensitivity the chance to enjoy international cuisines and opens the doors to many different flavor profiles. It will also stop them from having to suffer through a spicy meal with friends

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Are Cultural Influences or Societal Influences More Prominent When Defining an Individual's Definition of Beauty?

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I. Abstract:

How does the prominence of biological culture and societal culture affect beauty and beauty standards? Answering this question is important because by understanding why people have different beauty preferences it will lead to more open-minded people because they now understand what affects other people's preferences and how their beautiful can be someone else's ugly. To tackle the question of which of the two influences is more prominent, a survey was conducted to find the background culture of eight subjects. From there the subject was shown two images, an image of their cultural and societal beauty, and asked to choose the photo that was the most beautiful to the subject. Five out of the eight subjects chose the image of the cultural beauty showing cultural influences, also known as vertical transmission of culture, is more prominent when defining a person's definition of beauty. The opposite of this would be horizontal or oblique transmission of culture, where the subjects are more influenced by societal influences. The cultural influences the subjects are affected by can be family, parents, and the traditions, cultures and values instilled in the subject since childhood.

II. Introduction:

There is beauty in every inch of the Earth, but it is never questioned why people find things more beautiful than others. Factors that nurture a person's perception of beauty include cultural and societal influences. But how does this affect a person's definition of beauty? Answering this question is important because by understanding why people have different beauty preferences it will lead to more open-minded people because they now understand what affects other people's preferences and how their beautiful can be someone else's ugly. It can also stop stereotyping men as shallow for liking society's standard of beauty for women because humans are born with biological beauty standards. A man is born to find the most fertile female attractive. The things men find attractive in a female, such as an hourglass figure, indicate that the female is healthy which is why males are attracted to those certain features. Therefore, we cannot judge or categorize these men as shallow for liking these certain types of women. By understanding what we find beautiful, we can understand ourselves better as well. But out of the cultural and societal influences, how does the prominence of biological culture and societal culture affect beauty and beauty standards for an individual person? **If** societal culture is one's

basis of beauty, **then** society's influence will be more prominent in a person's definition of beauty standards **because**, over the years societal preferences become ingrained in a person's mind. For example, if a man in the U.S. is told that he would not prefer women with shaven legs if he lived in France, he could not explain why he believes shaven legs are more beautiful and he would have a difficult time believing you. The same way he would have a hard time believing that he would be attracted to a women 50 pounds heavier than him if he lived in the Victorian era. This is because of the deeply ingrained preferences that society has put upon people since they were born.

III. Methods:

Figure 1 was given out to eight subjects, four male and four female. From the survey, the cultural background of each of the subjects were identified. Then an image of the subject's corresponding cultural beauty and societal beauty was shown and the subject was asked to choose which one was more beautiful.

Figure 4: These questioned determined what the biological cultural of the subject was. All eight subjects received the same survey.

The independent variable for this experiment was the subject's culture. The dependent variable was measuring the subject's standard of beauty by looking at gender, religiousness, cultural background, culture of friends, cultural majority of community, previous connotations and what females and males look like on media. The controlled variables included environment, pictures shown and questioned asked. A quiet environment is often more comfortable for the subject to open about their responses and all subjects must be shown the same societal standard of beauty picture. The questions asked to the subjects must get an overview of their culture and personality to determine where their beauty standards come from.

IV. Results:

At the end, five out of the eight subjects choose their cultural beauty image to be more beautiful, as can be seen in Figure 20. Two of the male subjects chose the societal beauty with the remaining two choosing the cultural one. Where for the females,

three of the subjects chose the cultural beauty image, and the last subject chose the image of the societal beauty.

Figure 5: The image of societal beauty shown to all subjects.

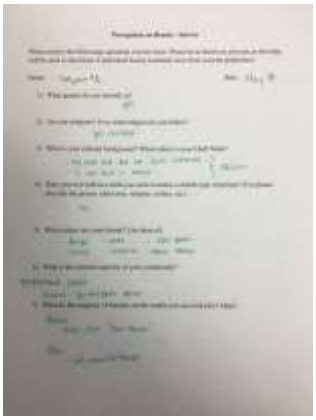

Figure 3: Subject 1 chose the cultural beauty image.

Figure 4: Subject 1's cultural beauty photo.

Figure 5: Subject 2 chose the cultural beauty image.

Figure 6: Subject 2's cultural beauty photo.

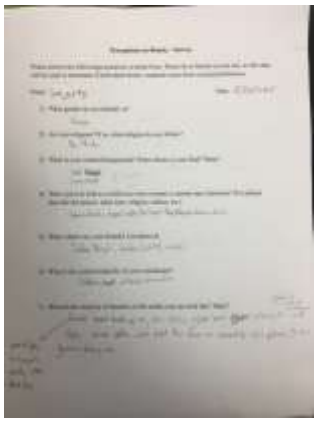

Figure 7: Subject 3 chose the cultural beauty image.

Figure 8: Subject 3's cultural beauty photo.

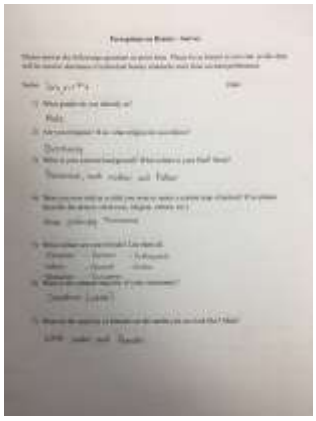

Figure 9: Subject 4 chose the societal beauty image.

Figure 10: Subject 4's cultural beauty photo.

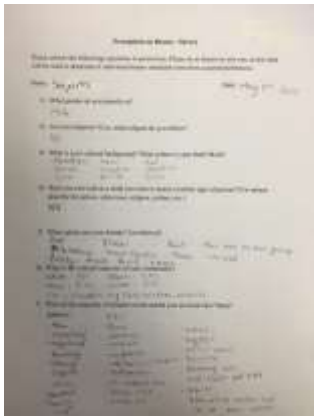

Figure 11: Subject 5 chose the cultural beauty image.

Figure 12: Subject 5's cultural beauty photo.

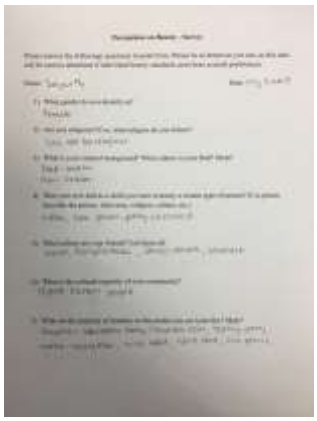

Figure 13: Subject 6 chose the societal beauty image.

Figure 14: Subject 6's cultural beauty photo.

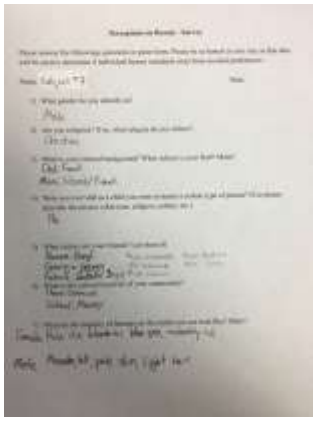

Figure 16: Subject 7 chose the societal beauty image.

Figure 17: Subject 7's cultural beauty photo.

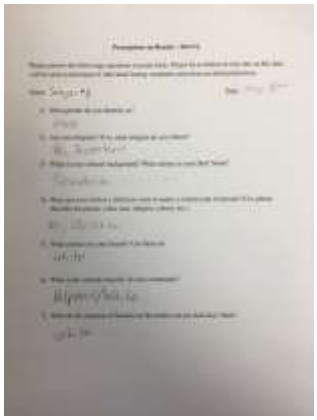

Figure 18: Subject 8 chose the cultural beauty image.

Figure 19: Subject 8's cultural beauty photo.

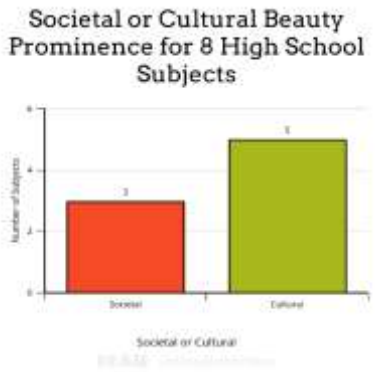

Figure 20: Compilation of data.

V. Discussion and Conclusion

No, the hypothesis was not correct. From the data collected, it can be deducted that when answering the question how does the prominence of biological culture and societal culture affect beauty and beauty standards, more people are affected by biological culture rather than societal culture. From this it is known that biological cultural is more prominent when defining an individual's definition of beauty. This is proven because 5 out of the 8 subjects choose the picture of the woman that represented their cultural beauty. If 4 subjects had chosen societal beauty and 4 had chosen cultural beauty, it could have been deducted that when looking at biological culture influences and societal cultural influences, both are equally prominent. So, it was important that this study had an even number of subjects, so the experiment could be that much more accurate by seeing if societal beauty and biological beauty work hand in hand. This experiment also comprised of 4 females and 4 males. Out of the 4 males, 2 chose cultural beauty, and the other 2 chose societal beauty. The females' consensus favoured the cultural beauty with 3 out of the 4 females choosing the cultural beauty and 1 choosing societal beauty. From this, it can be predicted that men are more affected by societal influences, such as the media, because there were 2 men who chose the societal beauty image, and only 1 female.

Providing a quantitative explanation on why cultural beauty is more prominent that societal beauty is beyond difficult because it ultimately boils down to how much time a subject spends with the two influences. When a subject primarily spends time with parents and family, then biological culture

matters more, which is referred to as vertical transmission of culture. But, when a subject primarily spends time with friends, media, ect, then societal culture or the culture outside of the home matters more, which is referred to as oblique or horizontal transmission of culture. Most of the subjects are affected by vertical transmission of culture, which means the subjects are more exposed to parents and family, altering the viewpoint on beauty standards than a subject who is more exposed to horizontal transmission.

A source of error in this experiment was choosing all students from Vincent Massey Secondary School to do the experiment. Because Massey is a very diverse school, the subjects are exposed to their cultural backgrounds at school as well as at home. Because of this, the ratio of vertical transmission and horizontal transmission becomes secured because the biological cultural the subjects are exposed to at school can be considered vertical transmission of culture. The subjects are also less exposed to societal norms because of this as well. If this experiment was done at a different school with a less diverse student body, the results could have been in favour of horizontal or oblique transmission of culture. This is because often students spend more time at school or in the community around societal norms, which would have a bigger impact on the subjects than the culture the subjects experience at home. An error that could potentially occur when doing this experiment is not having an even number of subjects. As stated earlier, it is important to have an even number of subjects to see if societal beauty and biological beauty work hand in hand and have equal impact.

VI. Application:

Understanding where beauty stems from and what an individual person is prone to being influenced by is vital because it not only allows people to understand themselves better, but it allows people to understand the world better. This is because with the knowledge of cultural and societal influences, a person can deduct why someone has the definition of beauty they do. This helps create an open-minded society because by comprehending where beauty comes from, someone can understand how their beautiful can be someone else's ugly. Not only does this help society but it also benefits other fields of study such as psychology. Trust is associated with things that are familiar, and things that are familiar are associated with beauty. The more prominence of horizontal or vertical transmission of culture, the more a person is impacted by it, the more familiar it is, and the more the individual finds it beautiful. By comprehending what a person is more affected by when it comes to oblique or vertical transmission, it can be deducted what that person is most likely to trust. But regardless of psychology and creating an open-minded society, grasping where beauty comes from is essential simply because there is beauty everywhere, so people will always be affected by it. It is time the world starts to question and fathom where it is that all these beauty perceptions come

from, starting with questioning their own perception of beauty.

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Effects of Internet Videos on Teenagers and Gender Stereotypes

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I. Abstract

How does the content in certain genres of Internet videos affect the ideals of different demographics? By inquiring the interests of fifteen to sixteen-year-olds, it was found that many stereotypes and other social constructs could be observed in their viewing habits – which was important to determine the amount of influence YouTube and other video networks had on teenagers. A survey was conducted among three male and three female subjects with a total of seven available options. Each option could be split into two similar genres of internet videos (e.g. "Music and Dance" was one option), and the subjects were asked to mark three boxes that reflected their interests in internet videos. It was found that male subjects had a much wider range than female subjects, while the only unanimous vote for one genre in either gender was Cooking/Food, which supported a major stereotype. This gender stereotype, along with several others, supported the idea that YouTube and other networks could influence teenage behaviour.

II. Introduction

YouTube and other popular streaming websites can have a huge impact on society, mostly portrayed through the content creators' own opinions or ideas. Although a lot of the content available on YouTube is made purely for entertainment reasons, there are plenty of tutorials adhering to the needs and wants of people that may be using the website for the first time. Beauty tutorials, video game walk-throughs, and cooking lessons are posted daily for the viewing pleasure of people that may have stumbled across videos while Googling solutions to their everyday struggles, or for regular YouTube-goers that visit the site every chance they get (Fortson, 2015). Being open sources for anyone to access, video sites can allow both malicious and helpful information circulate the Internet and affect people all over the world, as observable through the various statistics most websites offer to their content creators. Advertisements often play before a viewer's desired content, as ad royalties are a major reason why content creators post their various public videos (Sharif, 2012).

The question that arose from the possible influence of online videos on human behaviour was: “How does the content in certain genres of Internet videos affect different demographics?” More specifically, how are teenagers of different genders changed by what they watch?

If the different genres of video content can affect certain demographics, then society can be changed depending on what genders videos are published for and what genres they are connected to. Because of the easy access of most streaming

services, anyone can make change in the world if they focus on specific demographics. It is predicted that the most influential genre will be Gaming/Animation due to its resounding popularity in teenagers, and females may be affected the most due to their more prominent responses to society's beliefs.

III. Methods

The minimum number of subjects for this survey to be conducted was four people, but this experiment was done with six. Three fifteen to sixteen-year-old teenagers of both genders were found and asked the same question: "What three categories of Internet videos are you most interested in?" They were then provided a survey paper to be filled out with the subjects' genders and ages. For future experiments, these credentials can be altered for specific details and questions about the subjects.

Gender & Age	Gaming/ Animation	Music/ Dance	Education/ Technology	Comedy/ Pranks	Fashion/ Beauty	Design/ Art	Cooking/ Food

Sample Table

Once the required data was filled out, the table was separated into both genders and compiled in a cluster bar graph to distinguish between female and male selections. A precaution was set in place: if any of the subjects didn't identify with either gender: a coin would be flipped to determine their gender on the survey. Fortunately, this precaution didn't need to be taken.

By observing the data and graph, conclusions concerning the preferred video genres of both genders could easily be determined.

The variables in this experiment all contributed to finding accurate results. The independent variable was the people surveyed (Canadian teenagers), while the dependent variable was the selection of preferred Internet video genres. The control variables included: survey options, survey question, minimum number of participants, and the classification/information of the subjects (Gender & Age).

IV. Results

Table 1.

Subjects: Gender & Age	Gaming/ Animation	Music/ Dance	Education/ Technology	Comedy/ Pranks	Fashion/ Beauty	Design/ Art	Cooking/ Food
M: 15	✓	✓					✓
M: 16	✓	✓	✓				
M: 16			✓	✓			✓
F: 15	✓				✓		✓
F: 15	✓					✓	✓
F: 15		✓		✓			✓

Table 1 showed a significant difference between male and female interests. Empty spaces could be observed in drastically different places on the table. Few to no males on the table. Few to no males selected the options from column 5 (Comedy/Pranks) to column 7 (Design/Art), while the only option that was unanimously left blank for females was column 4 (Education/Technology).

Figure 1, on the other hand, provided less visible details about the subjects' interests.

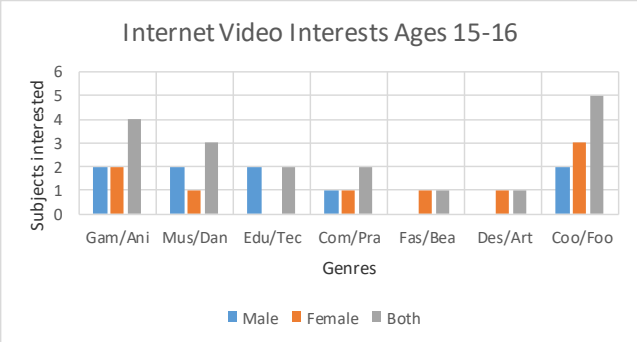

Figure 1. Each option was shortened to fit on the graph

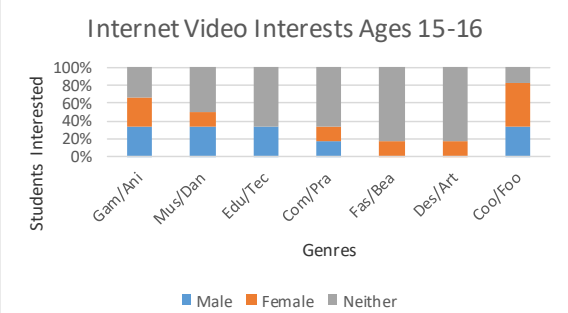

Figure 2. Stacked graph (100%)

After inspecting the data, it was determined that there wasn't enough pertinent information to study. A second graph (Figure 2.) was created with the third bar representing the empty cells on the table rather than the total number of students that picked an option. It was easier to see the most/least popular genres through this stacked bar graph.

V. Discussion and Conclusion

Although this study wasn't conducted in the most effective way possible, it showed that different genders have differing opinions on preferred Internet video content. The hypothesis mentioned that Gaming/Animation would soar above the rest of the options on the survey, which proved to be incorrect. Cooking/Food videos were the most interesting genres of videos for adolescents aged 15-16 years old. Gaming/Animation came in second, showing that teenagers may be more focused on health and wellness or culinary education in 2018.

Another interesting observation was the fact that females are most interested in Cooking/Food compared to males. Without solid evidence, it can only be theorized that people tend to adhere to stereotypes when deciding on what they want to watch; however, this theory also coincides with many studies on neurological behaviour performed by scientists all over the world (Whishaw, 2006).

Nonetheless, this experiment could've been conducted in a more efficient manner by separating the options into different categories, even if they were extremely similar (Fashion *and* Beauty rather than Fashion/Beauty). A larger sample size could also make the information more comprehensive.

VI. Application

The information in this experiment is helpful in many fields, including psychiatric, educational, and entertaining industries.

The general public (parents in particular) could use this data to predict their children's interests: understanding the next generation is always important for all adults. If a future business wants to hire employees, statistics of all types would be required to determine the optimal amount to let in. That's why YouTube uses these types of statistics all the time when suggesting new content or creating advertisements.

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Does Anxiety Affects Oral Presentations in Front of an Audience?

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I. Abstract

Do people who are diagnosed with anxiety have more difficulties when presenting than someone who is not? Answering this question was important because anxiety is one of the most common mental disorders people suffer with. Many people think the severity of the effects of anxiety are minute because it is used so loosely and is more common than other disorders. To see if anxiety does affect a subject's presenting skills, twelve people presented a speech in front of an audience of fifteen people. Six of the subjects were diagnosed with anxiety and six were not. The speaking skills, time, eye contact and body language were deducted from the presentation and compared between both groups, subjects with and without anxiety. All the subjects were asked to rate how anxious they felt before their presentation. It was shown that the subjects with anxiety struggled to look at the audience and speak clearly and slowly, and on average, had a quicker presentation time than the subjects who did not have anxiety. The average of the levels of anxiousness for the subjects with anxiety was higher than the average for the ones without. From the outcome of this experiment, it can be concluded that people with anxiety tend to struggle more when it comes to oral presentations.

II. Introduction

The purpose of this experiment os to inquire on the effects of anxiety on oral presentations. It is important to understand and investigate this topic because anxiety is one of the most common mental disorders and finding a solution would be beneficial to many people (cmha.ca, 2018). Almost 75 percent of the population struggles with speech anxiety to a certain degree, making it one of the most common phobias that exists (Ethos3, 2017). Many jobs in our society today revolve around our ability to communicate effectively (chron.com). In the U.S, more than 70 million students are either in school, college or university, where oral communication is common (nces.ed, 2016). Understanding how anxiety can affect public speaking and oral communication can affect the future of many people in our competitive society. The main question in this experiment is to determine if anxiety disorders affect the quality of oral presentations. **If** a person is struggling with anxiety **then** their oral presentations would be of lower quality (i.e. stuttering, shaking, moving, speed talking) **because** anxiety can cause increase in heart rate, shortness of breath, dizziness, sweating and causes you to think of the worst outcome, all which can be detrimental to

presentation and effective communication. People who suffer from anxiety usually have the fear of being judged that is difficult to get rid of when self-doubts and knowing people are being forced to listen to you are combined. Anxiety overall causes people to avoid things that makes them more anxious, like talking (calmclinic.ca). Oral presentations directly target that weakness, causing a person to have difficulties communicating in front of an audience.

III. Methods

A four-paragraph speech (https://bit.ly/2l96kGB) was given to twelve subjects, six who were diagnosed with anxiety and six who were not. The subjects were told to practice and memorize the speech and then present it to an audience of fifteen people a week later. All twelve of the subjects were asked to rate their level of anxiousness prior to the presentation. One by one, each of the subjects present the speech in a quiet area. For each subject, the presentation is timed and observed. All observations–eye contact, body movement, speaking skills– were recorded in an organized chart. The independent variable in this experiment is the type of person–subjects who are diagnosed with anxiety and subjects who are not. The dependent variable is the quality of the presentation. Did the subject mumble, forget lines, talk too fast or shake the whole time? Did the subject maintain eye contact and speak with clarity? The controlled variables included the environment, style, speech and audience. A quiet environment allows the speaker to be heard easily and it provides less distractions for the subject. The same speech will be given to each of the subjects to avoid any bias and ensure the level of difficulty is consistent. The same audience in this experiment avoids any bias between the subjects. Some subjects may present poorly solely based on fear of one person in the audience judging them, so the same audience ensures that each subject receives the same experience. Ensuring that every subject memorized the speech and was evaluated the same was important for accuracy and fairness.

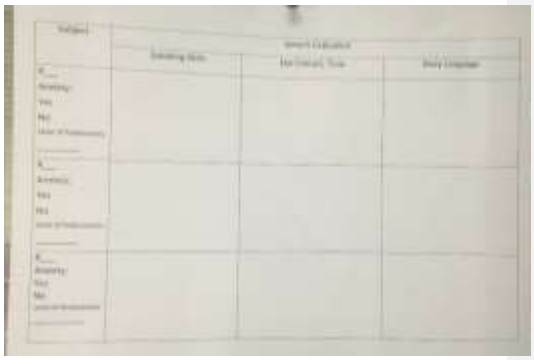

Figure 6: This recording chart was used for the observations from each presentation.

IV. Results

Figure 3: The presentation observations for subjects 4-6.

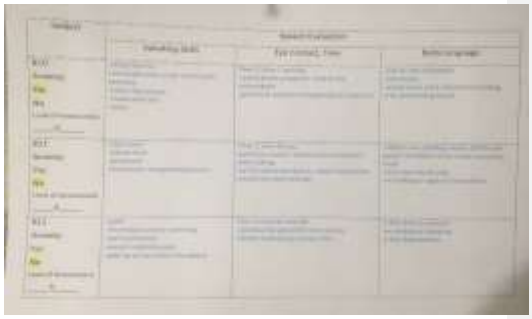

Figure 5: Presentation observations for subjects 10-12.

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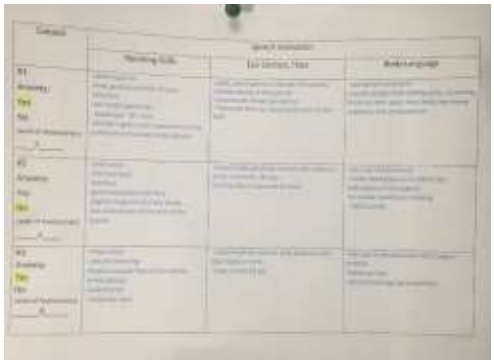


Figure 4: Presentation observations for subjects 7-9.

Figure 7: Presentation observations for subjects 1-3.

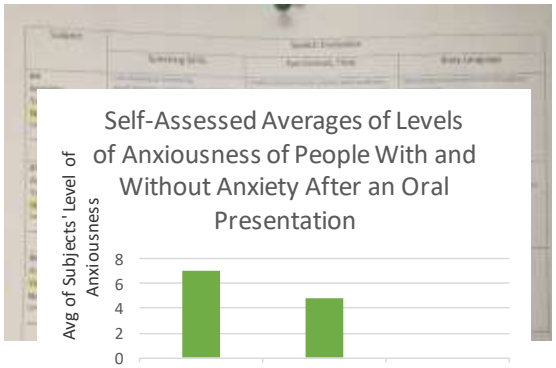
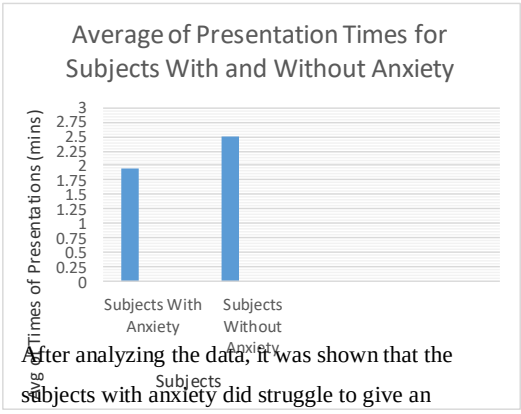


Figure 8: Average of levels of anxiousness for both types of people in the experiment.



After analyzing the data, it was shown that the subjects with anxiety did struggle to give an effective oral presentation compared to the ones

Figure 9: Average of presentation times between subjects with and without anxiety.

who did not. The average of the levels of anxiousness for the subjects diagnosed with anxiety was 7, whereas the average for the subjects who were not diagnosed was only 4.4. There was also a significant difference between the average times of presentations for both groups. The average time for the subjects diagnosed with anxiety was 1 minute and 57 seconds and the average for the subjects without was 2 minutes and 33 seconds. After analyzing the recording charts, it is evident that the subjects with anxiety often mumbled, forgot their lines, stuttered, avoided eye contact and overall, did not seem confident presenting. However, the subjects with anxiety mostly maintained eye contact, talked with expression and were engaged in the presentation.

V. Discussion and Conclusion

The data suggests that a person who is diagnosed with anxiety tends to have difficulties giving an effective oral presentation in a class. After analyzing the collected data, it was shown that the hypothesis is correct. The subjects who are diagnosed with anxiety would commonly talk fast and quietly, avoid eye contact, and move their body a lot. The subjects without anxiety usually had a calm, relaxed composure and talked at a good pace. There would be some minor movement, but they did make good eye contact for most of the presentation. There was a significant difference between the average times of presentations of both groups. The average time for the subjects without anxiety was 2 minutes and 31 seconds, whereas the average time for the subjects with anxiety was 1 minute and 57 seconds, resulting in a 33 second difference between the subjects with and without anxiety. The average of the levels of anxiousness recorded for the subjects without anxiety was 4.83 and the average for the ones with anxiety was 7, showing a 2.2 difference between the two types of subjects once again. As expected, the quality of presentations for the subjects diagnosed with anxiety was not to the level of the subjects without. People who have anxiety tend to fear mockery, judgement, negative evaluations and can't handle the pressure of being the center of attention. In this experiment, all the subjects were being closely assessed and each move and sound was critical for the results. The subjects with anxiety were in front of an audience and an evaluator, causing worry of not presenting well and possibly an uncomfortable feeling. Anxiety causes symptoms like sweating, speed talking and excessive movements, all that were shown from the subjects with anxiety in this experiment. For the future, creating a survey for the subjects to get a closer look on how they felt from the experiment and what influenced them to present well/poorly would be a clever idea. A disadvantage from this experiment was the audience. The experiment was focused more on presenting in a physical classroom, but it is not known if classroom presentations are difficult for people with anxiety because of the school environment or the people. For this experiment, the subjects did not know the people in the audience. However, it is possible that

there would be different outcomes if the audience was full of people the subjects knew.

VI. Application

Knowing that people with anxiety tend to have difficulty with oral presentations can provide an open mind to our society. It can help people understand how important mental health is and how it is something a person cannot control or simply get rid of. Scientists researching anxiety, specifically social anxiety can benefit from this information. Anxiety is one of the most common mental disorders in the world which means the more information we have about it, the better. The more we can understand these mental disorders, the more we can realize the impact they have on people.

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How Adding Backward Spin on a Basketball Effects Shooting Percentage

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Abstract

Can adding backward spin to a basketball increase shooting percentage?

This question is which we wish to answer. Scientist never stop to ask questions so by looking at something that is often overlooked as a skill and creating an explanation for it is brilliant. The findings will help coaches teach young basketball players how to shoot properly because basketball is one of the most popular sports in the world. In America it is projected to be the most popular sport in the nation with that being said, there is a large number of kids aspiring to be basketball players; learning the proper shooting technique can be the difference from them making the professional leagues or not. To explore the effects of the backward spin on a basketball, shot five people were asked to shoot twenty basketball shots; ten without backward spin and ten without. To say the least the backward spin was dominant, when shooting without backward spin none of the subjects made 50% or more of their shots however, when they shot with a backward spin 80% of the subjects made 50% or more of their shots. This concludes that adding a backward spin increases shooting percentage as the subjects recorded better numbers when they shot with a backward spin.

I. Introduction

This question is important because it shows that there is science in everything. Scientist never stop to ask questions so by looking at something that is often overlooked as a skill and creating an explanation for it is brilliant. This also helps coaches teach young basketball players to shoot properly.

How can adding backward spin to a basketball increase shooting percentage?

If backward spin is added to a basketball, it will increase the shooting percentage because it makes it more likely to go in. Ignoring all the shots that are perfect and go right in without touching the rim, and focusing on the shots that hit the rim, when the ball has spin, (Bhatia, 2014; Orzel, 2017,p.2) it will slow down the velocity of the ball due to the friction between it and the fingers so that when it hits the backboard, it won't bounce too hard. This increases the chance of the ball bouncing in the basket. However, a shot with no spin will hit the backboard very hard because of minimal loss of energy causing the basketball to bounce out.

II. Methods

Five subjects were asked to shoot a basketball ten times without intentionally adding a spin, and ten times adding a backward spin. After each method, their score was tallied.

Variables:

Independent variable: spin applied on the basketball

dependent variable: shooting percentage

controlled variables:

distance from net-needs to stay the same so the results are not biased

weather-weather affects overall performance. Heat is irritating, snow is freezing, rain makes the ball slippery and hail injures people.

basketball used: different basketball models weigh and bounce differently, and have different textures, which can affect shooting.

noise level: can distract people

clothing: sleeveless shirts or loose-sleeved shirts allow for better arm movement, making it easier to shoot.

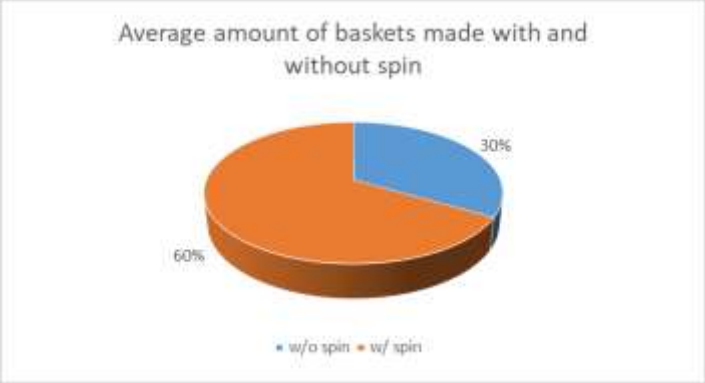

Figure 1- comparison of average shooting percentage with backward spin and without backward spin

III. Results

Subject	score without spin	Score with spin
Person1	4 /10	5/10
Person2	3/10	7 /10
Person3	4/10	3/10
Person4	2/10	8/10
Person5	2/10	6/10

Figure 1

Figure 2

Figure 1- Number of baskets made by each subject with and without adding a backward spin

IV. Discussion and Conclusion

The hypothesis is correct. Adding backward spin on a basketball increases shooting percentage because the subjects made more baskets when they added backward spin to the basketball than when they didn't. When they shot without adding backward spin on the basketball, the average score was 3 out of 10. However, when the subjects added backward spin on the basketball, the average score was 6 out of 10 which is twice the amount of shots made without spin. This translate to a 100% increment in shooting percentage. Secondly, 0% of the subjects made 50% or more of their shots, whereas 80% did when they added backward spin. With these massive improvements in shooting, it is evident that adding backwardspin on a basketball increases shooting percentage.

The reason why the subjects shot better when they added backward spin on the basketball is because the ball followed a tighter path and it had a smaller angle of deflection. Spinning the ball exerts a lot of force on the ball in a set path therefore it is less likely for the ball to go astray. Shooting without backward spin requires less force which makes the ball more likely to change its velocity as its force is not strong enough to counter-act the other forces. It is still possible for an individual to have a good shooting percentage even if the individual doesn't add a backward spin because being a good shooter ultimately comes down to practice however, adding a backward spin increases shooting percentage regardless of an individual's shooting form because it is a better form.

V. Application

This information can be useful for coaches and anyone aspiring to be a good basketball player. A lot of kids begin shooting basketball with a bad form however, if they are taught to use the proper form at an early age, they will be better shooters in the future because their hands will have been conditioned to shoot properly. In sports, using proper technique correlates to better performance therefore sports scientists can use these findings to educate coaches and trainers on how shoot a basketball properly. This will increase the individual's chance of making it to the big leagues as there is more emphasis in shooting. In the NBA, the best teams all have great shooters(Golden State Warriors, Houston Rockets, Toronto Raptors, Boston Celtics…etc)

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Coloured Soda Tricks People into Tasting Flavours

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Abstract

This study explored the question, how do colours affect one's perception of flavour? Colour, along with other various factors, can change the way one perceives flavour. The experiment used a soda without flavour that was coloured red, orange, yellow, green and purple. Subjects drank the coloured soda and recorded the flavour that they tasted. Less than 40% of subjects tasted a flavour when drinking the red and purple sodas and more than 50% of subjects tasted a flavour when drinking the orange, yellow and green sodas. Colour plays an important role in flavour perception. Changing the colour of a food can change how one tastes the food item.

I. Introduction

Gastrophysics can change the way chefs make food, by cooking for people's minds instead of their mouths, which can improve the flavour of their food (Spence, 2017). According to Terry E. Acree, Ph.D., parts of the brain that involve taste, odour, touch, and vision contribute to flavour (Bernstein and Woods, 2013). Another thing that gastryphysics could change is the sale of food. When restaurants switched the name of the Patagonian toothfish to the name Chilean sea bass, sales went up by over 1,000% in different markets of the world, including North America, Australia, and the U.K. (Spence, 2017).

If the colour of a food changes, one's perception of the flavour of the food will change because taste is created by many different factors ("Does The Way We See Food Affect Its Taste?", 2012). Humans have up to 10,000 taste buds, each taste bud has about 100 taste receptor cells, which send signals to the brain as taste ("How Do You Taste?", n.d). However, humans only have five tastes: sweet, salty, bitter, sour and umami. The rest of what one thinks is taste is actually flavour, which is created partly by smell (Spence, 2017). Sight also influences one's perception of flavour. According to Terry E. Acree, Ph.D., colour can even overpower other senses by tricking one's brain into tasting a certain flavour (Bernstein and Woods, 2013).

If a neutrally flavoured food is coloured, then the subject will taste a flavour associated with that colour, because sight is a direct factor in flavour.

II. Methods

A neutrally flavoured soda was coloured red, orange, yellow, green and purple. Then, the subjects were separated and given an equal amount of each colour of soda in separate cups. The subjects then drank the soda and filled out a survey. The survey asked the subjects what flavour they associated with the soda's colour, what the subject tasted and a rating of the soda on a scale of one to five. Subjects

were also asked to rank the sodas from their favourite to their least favourite.

The independent variable of this experiment was the colour of soda. The dependent variable of this experiment was the perception of the soda's flavour. One of the controlled variables was the type so soda, so the actual flavour of the soda didn't influence the subject's perception of the different coloured soda. Another controlled variable was the amount of soda, so the amount of soda didn't influence flavour, because having more of a food makes the food more appealing. Another variable was the type of cup holding the soda because sight influences one's perception of flavour, so using different cups would have changed the subject's perception of the soda's flavour. Another controlled variable was the survey questions because using the same questions made it easier to record and compare data. Another controlled variable was the amount of time the subjects had to drink and answer the survey questions which was ten minutes. This was a controlled variable because feeling rushed when eating can affect one's perception of flavour, so giving subjects different amounts of time would have affected the data. The final controlled variable was the environment which was a quiet empty classroom. This was a controlled variable because having the same environment for each subject was the best way to ensure that the environment did not affect the data.

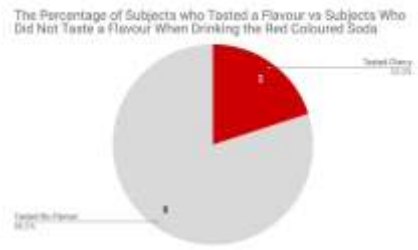
III. Results

The number of subjects who tasted a flavour for each soda and the number of subjects who did not taste a flavour for each soda.

	Red	**Orange**	**Yellow**	**Green**	**Purple**
Subjects Who Tasted a Flavour	2	5	7	7	3
Subjects Who did not taste a Flavour	8	5	3	3	7

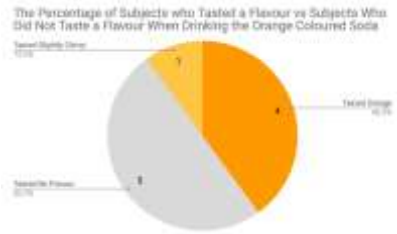
Table 1

Figure 1



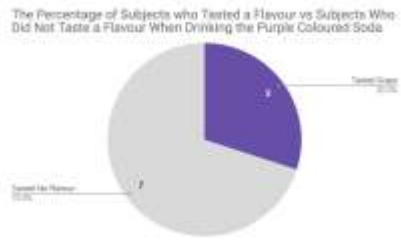
The results of subjects drinking the red soda. When subjects drank the red soda, two of the subjects tasted cherry, while eight of the subjects tasted no flavour.

Figure 3



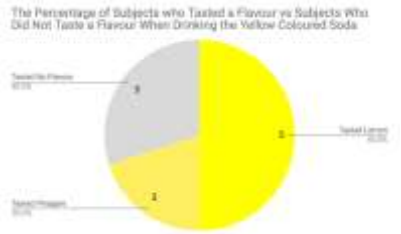
The results of subjects drinking the orange soda. When subjects drank the orange soda, one subject tasted a slight citrusy flavour and four of the subjects tasted orange, while five of the subjects tasted no flavour.

Figure 2



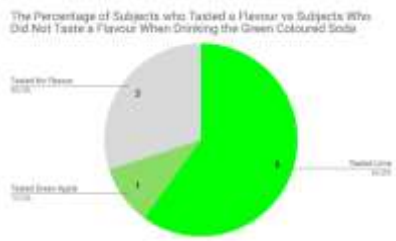
The results of subjects drinking the purple soda. When subjects drank the purple soda, three of the subjects tasted purple, while seven of the subjects tasted no flavour.

Figure 4



The results of subjects drinking the yellow soda. When subjects drank the yellow soda, two of the subjects tasted pineapple and five of the subjects tasted lemon, while three of the subjects tasted no flavour.

Figure 5



The results of subjects drinking the green soda. When subjects drank the green soda, one subject tasted a green apple flavour, and six of the subjects tasted lime, while three of the subjects tasted no flavour.

IV. Discussion & Conclusion

The hypothesis was partially correct. The hypothesis stated that if a neutrally flavoured food is coloured, then the subject will taste a flavour associated with that colour because sight is a direct factor in flavour. However, only some of the subjects tasted a flavour associated with a certain colour. For the red coloured soda, only 20% of the subjects tasted cherry, and 80% did not taste anything, however, for the yellow coloured soda, 50% of the subjects tasted lemon, 20% tasted pineapple, and only 30% of the subjects did not taste anything. For the orange coloured soda, 50% of the subjects tasted orange, for the purple coloured soda only 30% of the subjects tasted grape, and for the green coloured soda, 60% of the subjects tasted lime and 10% of the subjects tasted green apple. This data shows that the hypothesis was not entirely correct, however, it does prove that there is a correlation between sight and flavour as most subjects did taste a flavour, even though there were no flavours.

This experiment explored how colour relates to flavour, and according to previous research, sight is a direct factor in flavour, however, it is not the only factor. Other things like taste, sound, smell, texture, and a preconception of a food can influence flavour. Even other things that relate to sight, like size and shape relate to flavour because if one thinks they have more food, the food will taste better, which is an evolutionary trait that human have developed over time. While colour is undoubtedly a factor in flavour, it does not play as large a role as predicted, as proven by the experiment. Some subjects, although not all, tasted a flavour associated with the colour of the soda. For example, only 50% of subjects tasted an orange flavour when the subjects drank the orange coloured soda. This proves that colour is an important factor in the perception of flavour, but it is not the most important one, as 50%

of the subjects did not taste orange, despite the colour. If this experiment were to be conducted again, it would be better to test other factors that influences taste as well. For example, another factor that influences flavour is sound. This can be tested by listening to different types of music or different frequencies. Another factor that influences flavour is smell, which can be tested by using different scents.

One source of error in the experiment was that the soda carbonation levels were different for each colour. This is because the soda bottles were left unsealed for different amounts of time. This caused the subjects to focus more on the carbonation, instead of the colour. If the soda carbonation levels for each colour were the same, subjects would have focused less on the carbonation and more on the flavour, leading more subjects to taste flavours. Another source of error was that some of the subjects knew that the soda had no flavour. This meant that the subjects who knew that the soda had no flavour were less influenced by the colour of the soda. If none of the subjects knew that the soda had no flavour, more subjects should have tasted flavours.

V. Application

Colour appears to influence how one perceives flavour. This information can be used for further research in gastrophysics. Scientists can use this information as a reference when testing other factors that influence flavour, or scientists can compare this information with other factors that affect flavour or scientists can compare this information with neurological studies. This knowledge can also be used by chefs, as chefs can make their food taste better by changing or enhancing the colour of their food.

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Effect of Religion on Meat Consumption and Size of Carbon Footprint

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I. Abstract

This experiment explored the effect that religion has on meat consumption habits how those habits affect the size of carbon footprint of an individual. This is a relevant topic because climate change is a major problem in the world and carbon emissions are one of the main contributors. The experiment involved surveying people of various religions and asking them about how often they eat different types of meat within a three-month (84 day) period. Their responses were then used to calculate the size of their carbon footprint and averaged out for each religion. They were also asked about how much they believed in climate change and responded on a scale of one to five. The experiment concluded that those who identified as "Other Christian" had the largest average carbon footprint when comparing amount of meat eaten in a time frame of three months, and those who identified as "Hindu" had the smallest. Because of these results, it can be concluded that Hindus are the least responsible for emitting carbon into the atmosphere when it comes to their meat-eating habits and those who identify as “Other Christians” contribute the most.

II. Introduction

Livestock are a major cause of climate change, contributing the equivalent of trillions of kilograms of carbon dioxide to our environment each year, and making up 14.5 percent of all anthropogenic greenhouse gas emissions (“Key facts and findings,” n.d.). As well, some religions have restrictions on the types and amount of meat they are allowed to eat, meaning that there must be some correlation between religion and size of carbon footprint. People are always looking for ways to minimize their carbon footprint nowadays, though they do not usually think of what they eat as having an impact on the environment.

So, the question being asked is simple: how does religion affect meat consumption of an individual within a three-month period, and how does that meat intake relate to the size of their carbon footprint?

If religion and carbon footprint based on meat consumption are compared, then it is predicted that Hindus will have the smallest carbon footprint out of the compared religions because India has more vegetarians than the rest of the world combined (Edelstein, 2018). Also, it is predicted that the religion that has the largest carbon footprint will be either “Other Christian” or “Catholicism” because the Unites States has the largest Christian

population (Cooperman, et al., 2015) and is also the country that eats the most meat per year.

III. Methods

1. What is your current religion?
   - Catholicism
   - Other Christian
   - Islam
   - Hinduism
   - Non-religious
   - Other
2. How often do you eat pork?
   - Every day
   - A few times a week
   - About once a week
   - A few times a month
   - Once a month
   - Less than once a month
   - Never
3. How often do you eat chicken?
   - Every day
   - A few times a week
   - About once a week
   - A few times a month
   - Once a month
   - Less than once a month
   - Never
4. How often do you eat beef?
   - Every day
   - A few times a week
   - About once a week
   - A few times a month
   - Once a month
   - Less than once a month
   - Never
5. How often do you eat lamb?
   - Every day
   - A few times a week
   - About once a week
   - A few times a month
   - Once a month
   - Less than once a month
   - Never
6. How often do you eat turkey?
   - Every day
   - A few times a week
   - About once a week
   - A few times a month
   - Once a month
   - Less than once a month
   - Never
7. How often do you eat fish?
   - Every day
   - A few times a week
   - About once a week
   - A few times a month
   - Once a month
   - Less than once a month
   - Never
8. How much do you believe in climate change?
   - A great deal→A lot→A moderate amount→A little→Not at all

Figure 10

	gCO_2e per 75g* of food (U.S. stats)
Pork	907.5
Chicken	517.5
Beef	2025
Lamb	2940
Turkey	817.5
Fish	120

*75g is one serving of meat

Figure 11

Post the survey *(Figure 1)* to Edsby's "School Talk" group. Gather data from the survey. Continue gathering data until 100 students/staff members have submitted the survey. (note: if there is not more than one response for a religion after 100 responses, continue until there are at least two responses per religion). Calculate size of carbon footprint using data given *(Figure 2)* and survey responses. Compile the gathered information. Compare religion to

size of carbon footprint on meat consumption of a typical 3-month (84 day) period and compare religion to attitude towards climate change. Determine the relationship between religion and size of carbon footprint- both contribution and attitude towards it.

Independent variable: survey participant's religion. Dependent variables: amount of meat consumed, CO2 emissions based on meat consumption, attitude towards climate change. The Controlled variables are the questionnaire because each survey participant must be given the same questionnaire to fill out, the calculations relating meat consumption to CO2 emitted to produce the meat, because the calculations must remain the same otherwise the results are not comparable, and the definition of the frequency terms for the survey (what "a few times a week" means, etc.), because the frequency of consumption needs to remain the same otherwise the results are not comparable.

IV. Results

Survey Responses from Question 8

	Catholicism	Other Christian	Islam	Hinduism	Non-Religious	Other
A great deal	**3-** 60%	**1-** 25%	**19-** 44.2%	**4-** 50%	**12-** 52.2%	**11-** 73%
A lot	**1-** 20%	**2-** 50%	**7-** 16.3%	**4-** 50%	**7-** 30.4%	**1-** 7%
A moderate amount	**1-** 20%	**1-** 25%	**12-** 27.9%		**4-** 17.4%	**2-** 13%
A little			**3-** 7%			
Not at all			**2-** 4.6%			**1-** 7%

Table 1

Question 1-7 Calculated Survey Responses and their Averages

Catholicism (kgs)	Other Christian (kgs)	Islam (kgs)	Hinduism (kgs)	Non-Religious (kgs)	Other (kgs)
88.1	116.74	34.34	26.9	56.47	30.51
98.11	65.09	98.65	0.0-	114.16	40.12
79.96	51.64	65.81	0.0-	95.09	143.2
69.55	112.49	19.82	0.0-	31.99	0.0-
7.87		165.41	1.67	7.21	59.37
		65.79	10.33	155.83	16.46
		41.23	62.53	91.18	25.34
		165.92	24.44	45.28	0.0-
		39.95		85.38	138.4
		108.34		88.56	84.88
		41.11		55.72	82.12
		18.23		134.38	107.1
		19.12		78.38	140.92
		0.52		114.88	0.0-
		462.43		92.88	4.66
		45.09		42.68	
		46.53		0.0-	
		26.9		12.29	
		106.34		28.24	
		11.91		35.89	
		69.79		121.95	
		77.36		68.8	
		165.41		42.63	
		81.7			
		68.05			
		7.6			
		40.76			
		3.62			
		146.59			
		67.46			
		188.56			
		165.65			
		165.92			
		72.63			
		61.97			
		33.08			
		0.0-			
		75.11			

		80.03			
		104.63			
		17.55			
		108.24			
		272.56			
TOTAL: 343.59 AVG: 68.72	**TOTAL: 345.96 AVG: 86.49**	**TOTAL: 3657.71 AVG: 85.06**	**TOTAL: 125.87 AVG: 15.73**	**TOTAL: 1599.87 AVG: 69.56**	**TOTAL: 873.08 AVG: 58.21**

Table 2

Data from Table 2 interpreted into Figure 3.

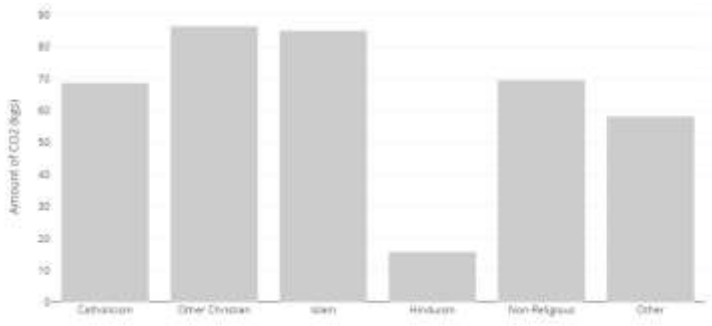

Figure 12

V. Discussion/Conclusion

The initial hypotheses were correct. The "Other Christians" had the largest carbon footprint, with the average amount of carbon emitted in a three-month (84 days) time period being 86.49 kgs, while "Hinduism" had the smallest with only 15.73 kgs. This experiment cannot be compared to other experiments as other ones did not compare religion to climate change in the same way that it was compared in this experiment.

Of course, the results of this experiment are not a reflection of the entire population of any of the particular religion, due to the sample size being only 100 people. For completely accurate results, every person from every country around the world would need to be surveyed, but that is nearly impossible. Instead, to minimize the sources of error in the experiment, it is recommended to have a sample size of at least 1000 people. By not having a large enough sample size, the results may not be completely accurate to the wider population.

Another possible source of error is that the students and/or teachers answered the survey inaccurately compared to what their actual eating habits are.

They might have put responses as a joke, or not have known exactly how often they eat each type of meat. This also could have lead the results to not be completely accurate.

VI. Application

This information can be useful to anyone wishing to lessen their carbon footprint, as well as those who disbelieve in climate change and global warming, because it can make them more aware of the damage they are doing to the environment. Government agencies could use this information to educate particular groups of people on what they are doing to the earth and get them to change their habits.

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Figure 3 - attempting to freeze water by boiling it

Figure 4 - Comparison between normal popcorn (left) and vacuum popcorn (right)

Figure 5 - Insulated water with cup and towel

Figure 6 - 25 pieces of each type of popcorn counted out and compared

IV. Discussion/Conclusion

The original hypothesis for this experiment was that if food was cooked under a vacuum, the result would be larger in size, as there is less pressure pushing on the outside of the food than from the inside. The hypothesis is proven to be correct, as shown by the popcorn in experiment 2. It was evident that the average size (not mass!) of vacuum corn was larger than the normally popped corn when the same amount of each type of corn was placed in a glass and compared. The quality of the vacuum popcorn also appears to be better, as they were softer and whiter. This result is achieved because there are less particles in the chamber, allowing for a larger "potential difference", in other words, bigger expansion. The purpose of the experiment was also to determine the difference of vacuum chamber cooking and pressure cooking. Vacuum chamber cooking increases the visual appeal of food (as in size), but not the overall quality of cooking. As shown by experiment 1, the boiling point is lowered, reducing the maximum heat something could get before it turns into gas,

which causes it to be not well cooked. However, with pressure cooking, the boiling point is raised which increases the amount of heat the food retains while cooking, resulting in a better cooked food.

Experiment 1 - Freezing water by boiling

At about 2 minutes, the water started boiling violently, but no heat was added. Therefore, the temperature of the water wasn't heated to its boiling point, the vacuum lowered water's boiling point to the temperature of the water. This is shown by the glass of water boiling, but cooling dramatically. However, the vacuum pump used overheated before the water could get a chance to freeze solid. The water, however did get to as low as $3° C$.

Experiment 2 - Vacuum Popcorn

It was very evident that the vacuum popcorn had a larger average size. This is most likely due to the lower amount of matter inside the chamber, and the expanding water vapour inside the popcorn have more room to spread out more, and faster, (as they want to achieve equilibrium inside the chamber), which causes the popcorn to have a larger volume.

Possible Errors

Possible errors in the experiment are that when air is let back into the chamber, the pressure change may have crushed the vacuum popcorn, causing it to be smaller than what it should have been. Also, the seal most likely had a leak in later experiments, as shown by the water not getting below $10°C$, although the pump was left running longer than earlier experiments, as shown by Table 1.

V. Application

As shown by experiment 2, the size of food increases along with the quality, which could be useful for filling popcorn bags with less kernels, effectively saving money. Otherwise, this method could be used to quickly remove moisture from something or reduce the temperature, as long as there is water present inside the substance. As shown by experiment 1, water boils away too quickly to gain any heat, so the temperature decreases.

The biggest problem with vacuum cooking is the low amount of heat that can be retain

from the food (17), if it required water to cook. For example, if noodles were being cooked with a pan of water and external heat, the noodles wouldn't cook, as the water cannot retain heat under vacuum, however, if a slice of pizza was placed under vacuum, with external heating, the pizza would cook fine, and will benefit from being cooked under vacuum (as in larger size and higher quality).

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External Factors Affecting Concentration

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I. ABSTRACT

How do surrounding factors affect a person's ability to concentrate on a task and how can efficiency and accuracy be maximized? Subjects complete identical tests in different environments with different amounts of noise and types of music. The results are recorded, averaged and compared. Subjects preform the worst when working in a room with noise and chatter, but the best when tested with classical music playing in the background. When words were prominent within the surroundings, results display that the performances were weaker than without. Subjects' performance was peaked when classical music was playing while tests are simultaneously completed.

II. INTRODUCTION

The average concentration span for a person is approximately 20 minutes (Alex En, n.d). Distractions surrounding a person are the reason for low levels of productivity and efficiency. How are a person's concentration levels affected by their surrounding environment and how can people improve their concentration spans? External factors are changed to test which surrounding is the best and worst for the brain's concentration.

It is hypothesized that if someone is studying in a quiet environment rather than one with noise and chatter, their ability to concentrate is better and they are able to retain more information than the latter. This is because while you study, your brain is concentrated on one main thing, and the background noise subconsciously increases general stress levels and encourage headaches. Research with noise levels showed that most people studying in quiet environments preformed with higher results than those studying with background noise, therefore it is theorized that having noises in the background distracts the brain and causes a drop in performance.

III. METHODS

Prepare four different math tests with the same level of difficulty throughout the four questions and provide environments to test the subject in. The subject is tested in four different

environments: one with classical music in the background, hip hop music in the background, a completely silent room, and one with plenty of noise and chatter surrounding the subject. Seven subjects are needed between the ages 14-16 with a variety of grade levels. The time the subject uses to complete the test will be recorded as well as the score received when done the test. Methods are repeated for all four different environments with the four different math tests for seven different subjects.

The independent variable in this experiment is the noise that surrounds the subject as the test is simultaneously completed. The dependent variable is the amount of time the subject uses to complete the test. The controlled variable is the person taking the test, the type of noise present in the testing room, and the type of test given to the subject in a particular room. To use the same person throughout the length

of the test guarantees results are not changed by individual aptitude, but by external factors. The type of test given when in a specific environment ensures that no one had an advantage to the different questions on each test, making certain results can be compared accurately.

IV. RESULTS

CLASSICAL ROOM (**Table 1**):

NAME	**SCORE (out of 4)**	**TIME (minutes)**
Ellen	4	3.40
Jessica	1	3.17
Annie	3	2.59
Sahana	4	3.00
Judy	4	4.35
Nour	2	9.47
Abuk	3	5.06

Table 1: Scores and recorded time usage for seven subjects completing the test while in an environment when classical music plays in the background

SILENT ROOM (**Table 2**):

NAME	**SCORE (out of 4)**	**TIME (minutes)**
Ellen	3	5.13
Jessica	2	5.02
Annie	2	5.01
Sahana	2	4.33
Judy	4	6.40
Nour	1	6.24
Abuk	3	6.45

Table 2: Scores and recorded time usage for seven subjects completing the test while in an environment when absolute silence.

HIP HOP ROOM (**Table 3**):

NAME	**SCORE (out of 4)**	**TIME (minutes)**
Ellen	4	4.44
Jessica	1	4.39
Annie	1	4.41

Sahana	3	3.46
Judy	4	6.20
Nour	0	10.39
Abuk	2	6.16

Table 3: Scores and recorded time usage for seven subjects completing the test while in an environment when hip hop music plays in the background.

NOISY ROOM (**Table 4**):

NAME	**SCORE (out of 4)**	**TIME (minutes)**
Ellen	2	5.42
Jessica	1	5.02
Annie	1	4.21
Sahana	1	4.27
Judy	3	7.30
Nour	0	9.23
Abuk	1	4.21

Table 4: Scores and recorded time usage of seven subjects completing the test while in an environment with lots of noise and chatter within the room.

(**Figure 1**)

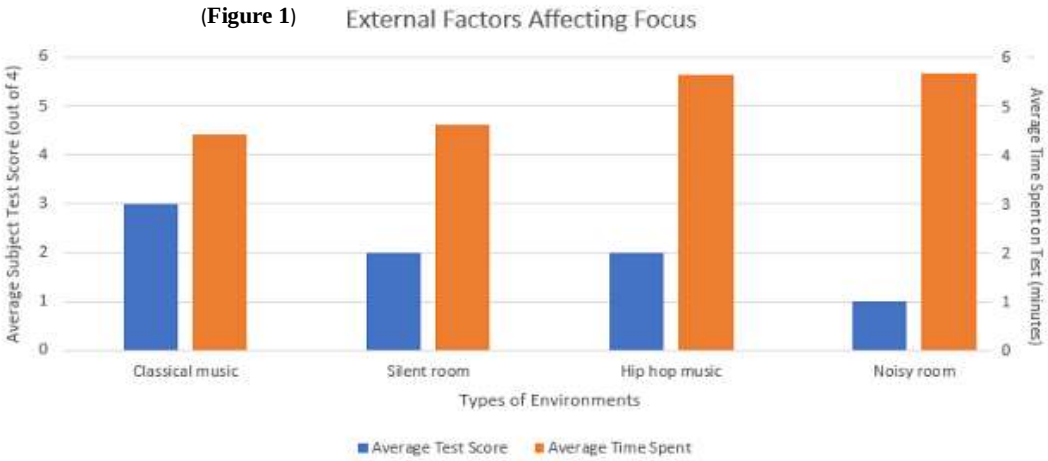

Figure 1: Average of all the scores and recorded times in every individual type of change in external environment. Placed on a graph together for easy comparison.

V. DISCUSSION/CONCLUSION

The hypothesis was incorrect. It was hypothesized that the result would be better for someone working in a quiet environment free of noise, but the data collected shows that the highest and most efficient test scores were when subjects were given classical music to listen to while simultaneously doing the test.

The data collected is categorized into two parts. One for the accuracy of the subjects thinking process (the score of their test) and their efficiency (the time it took to complete the test). The results of the collected data display that subjects perform the highest on the test, in both sections, when listening to classical music with an average accuracy of 75%. When the test was completed in the completely silent room, the accuracy and the efficiency were both lowered compared to the completion with classical music by 33%. While completing the test simultaneously while listening to hip hop music, compared to results from the silent room, subjects performed with the same accuracy of 50% but with less efficiency. When subjects were asked to complete the test in a noisy room, accuracy was lowered to an average of 25% and the efficiency was the lowest compared to the other tests. The initial purpose of this experiment was to see how a person's levels of concentration was affected by their surrounding environment and to see in what ways someone can improve it. The collected data shows that the level of concentration is most negatively affected when in a room complete with noise and chatter. Accuracy was around the same when working in a silent room and listening to hip hop music, but efficiency was higher

in the silent room. The facts show that to have the highest level of concentration, accuracy, and efficiency, the subject should listen to classical music while completing their work.

In a study done in 2015 a group of students were monitored while given classical music and hip-hop music while studying. The results display that hip-hop music has an interference with the brains ability to concentrate on a singular task for extended periods of time. (Mark A. W. Andrews, 2010)

Some problems and sources of error that may have affected the results is the stress of being timed. When the subjects were told they are being timed during the test, stress levels rose, and they rushed to complete the test shifting some of their attention to the time. If subjects had not known about the timing of their test they would have preformed without the stress factor and results could have been more accurate.

VI. APPLICATION

This information would be valuable to the general public because concentrating on a task is one of the things that people must face everyday. People suffer from lack of concentration on a task and their mind will spend hours, wandering away when a deadline lies looming ahead. With this new information being applied into a normal life productivity levels would increase, and more time could be left for enjoyment purposes. If classical music is played while concentrating, accuracy and efficiency will be maximized.

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The Effects of Practice on an Individual Practicing a Specific Skill Set

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Abstract

The purpose of this study is to find out if practicing a given skill will improve that skill and how long it will take for the skill to show improvement. The skill studied skill to determine the results is shooting accuracy in hockey using different shots. Four targets are placed in the corners of a hockey net, the test subject than shoots fifteen shots from 10ft, 15ft, 25ft, and 35 feet while aiming for the corners. This process is used for wrist shots, slap shots and snap shots. After the shots are taken the average amount of pucks shot into the corners is averaged out to yield the shooting average. Results are recorded over a one-month period and analyzed afterwards. The resulting trend in data after one month is a continual upward trend in all three shots' shooting accuracy. Improvement in shooting accuracy is shown almost immediately and continues upward after almost every practice session. The conclusion of this study is that practice plays a significant role in the development of a skill and improvement can be seen almost immediately and consistently after consistent practice.

Introduction

The purpose of this study is to determine if practice is really a useful method of improvement. Determining this would allow for better use of time and more efficient paths to achieving a skill. If the success point is unknown, it is much harder to know when and how a goal will be achieved. In hockey, professional players practice hours per day but are also naturally gifted. Young players may not be quite as gifted but are just as committed and it is important to know how much progress can be made over a given period to set proper goals. "One properly-run practice is the equivalent of 11 games when it comes to puck touches," says ADM (American Development Model) Regional Manager Ty Hennes. By finding out if practice is the real key to improvement it is possible to format practice schedules towards a more specific point to increase effectiveness. This then begs the question; how does practice affect the skill that being practiced? If it improves the given skill, how long will it take to show improvement?

The hypothesis for this study then is; If consistent practice shooting a puck is achieved, then improvement will show in shooting ability. Practice involves constant repetitions, “Repetition will make the motions seem natural,”” The key is repetition, repetition, repetition.” (Stephenson, M) If consistent practice schedules are not followed and practice becomes less and less frequent, improvement will slow and potentially regress. Since the “10 years and 10,000 hours of purposeful practice for an individual in ANY field to achieve expert mastery” (Neeld, K.) will not be reasonable, mastery of the skill can not be achieved but substantial progress can.

Methods

The methods for the study are very simple and can be repeated as many times as there is a need for data. It is also important to remember that this process can be used for wrist shots, snap shots, and slap shots. To begin the board that the hockey pucks will be shot from needs to be placed 10ft from the front of the hockey net. After the board is set 15 hockey pucks are to be shot from the board, aiming for the targets set in the corner of the net. After the shots are taken make note of the amount of shots that hit the targets and proceed by moving the board back another 5ft, so it is fifteen feet from the goalmouth. Repeat the shooting sequence once again shooting 15 pucks and tallying the amount shot into the corners. This method is then repeated for shooting pucks from a board 25ft and 35ft from the front of the net. Once the shooting is finished and all the results are tallied, calculate your overall shooting average by adding all the pucks shot into the corner targets and dividing them by the total amount of shots taken.

The variables for this study are outlined here and should be followed closely to yield the most accurate results. The independent variables consist of the distance from the net when shooting and the type of shot used. The dependant variable is the shooting accuracy of the test subject. The control variables are the size of the targets, amount of shots taken, net size, stick used, regulation pucks used, shooting board used and the ground conditions at the time the shots were taken (wet/dry etc.). The control of the regulation pucks allows a guarantee that the pucks all weigh the same, therefor not skewing results. The ground conditions are also controlled to ensure that there is always the same amount of friction on the puck when it is shots because water from the ground could get onto the pucks and shooting board.

Results

At the end of the data collection, all three types of shots improve substantially as can be seen in Table 1. Over 9 practice sessions with each shot, the wrist shot improves the most as can be seen in Table 2. The overall trend in the data through each session is upward though there are some abnormalities when the practice session recorded a worse shooting average than the one before it. The wrist shot accuracy showed a 12% increase from the first practice session, the snap shot 16%, and the slap shot by 18%. The average increase shooting accuracy per session for the wrist shot was 2.63%, for the snap shot 2%, and the slap shot 2.25%. As can be seen in all 4 graphs, the initial increase in shooting percentage after the first two practice sessions was greater than the increase in the last two weeks. This shows that the increase in skill gets harder as the person's individual skill in that area increases.

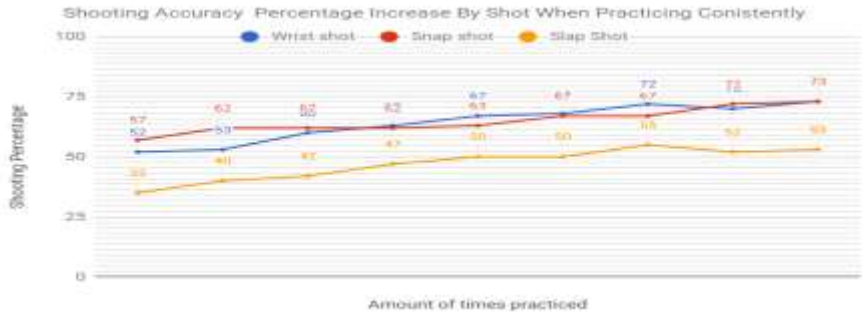

Table 1: This graph shows the overall shooting acccuracy percentage improvement for the three types of shooting over a month. Each percentage on the graph demonstrates the overall shooting accuracy for that one practice session.

Table 2: This graph demonstrates the overall shooting accuracy increase for just wrist shots over a month. Each point on the line demonstrates the shooting accuracy for the one practice session.

Table 3: This graph demonstrates the overall shooting accuracy increase for just snap shots over a month. Each point on the line demonstrates the shooting accuracy for the one practice session.

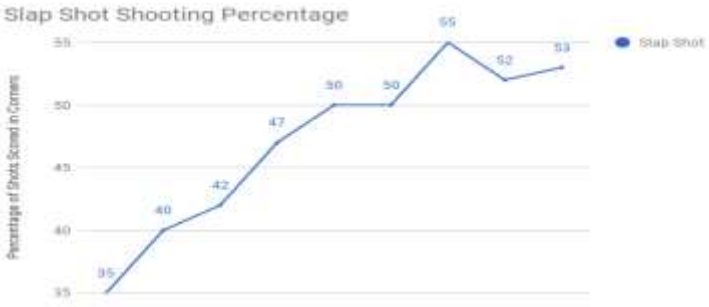

Table 4: This graph demonstrates the overall shooting accuracy increase for just slap shots over a month. Each point on the line demonstrates the shooting accuracy for the one practice session.

Conclusion

In the end the hypothesis was correct. The hypothesis stated that if consistent shooting practice is achieved, then improvement will show in shooting accuracy throughout all three types of shots. The data collected over the course of this study shows that all three shooting accuracies improved by greater than 15%. The purpose of this study was to see if practice truly improves the skill being practiced, and how long it would take to see improvement in that skill. This study answered both questions, practicing shooting did cause an improvement in the shooting accuracy of the shot

types practiced. Improvement was also seen within the first two practice sessions for the shots.

The results of this study have proven that practice does lead to improvement, this is mainly due to muscle memory. As practice was achieved, the muscle memory of the technique was developed allowing for a more consistent shot with less shots missing the targets and therefor improving the shooting accuracy. This can be seen in the data as the shooting accuracy of wrist shots, snap shots and slap shots improved and as the muscle memory was built the amount of abnormalities in the data decreased, showing that the improvement in the shot was mainly in consistency. These results resemble the results of many other investigators proving that practice does really work to improve a skill.

Application

This study could be applied to many other fields outside of hockey. In any other sport this data would be equally useful and accurate as there is the capability to develop muscle memory anywhere in the body. Though the muscles affected by the practice may be different in another sport they development of muscle memory would happen there as well, resulting in improvement. These results could also be applied to manual labour such as factory work because the repetition of a task would also build muscle memory and therefor result in less errors and potentially faster completion of the task.

As every study has errors in some form it is important to identify what could be changes to further improve the accuracy of the study. Though these errors may have slightly changed the exact numbers, they do not affect the overall data trend or the results of this study. One of the errors was that the test subject's other hockey schedule was not considered, this meaning that the subject received more practice at hockey arenas that were not counted. This could have allowed them to show greater improvement in shooting accuracy than they would have otherwise. The other error was that the subject was not always equally rested when practicing, this potentially allowed for more abnormalities in the data due to fatigue.

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The Effects of Three Distinct Case Designs with Equal Mass when Fitted on Pieces of Glass when Dropped at Certain Heights

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Abstract:

The purpose of this experiment is to observe the effect on pieces of glass when fitted with three distinct case designs and dropped at certain heights to ultimately determine the most protective design. Drop tests were conducted thoroughly with each case design. The first case design only focused its protective matter on the corners, the second case focused its protective matter on the edges and the third case focused its protective matter on the back and on the edges. It was observed that the case with its protective matter focused on the corners performed the best (a few scuffs at most) when graded on a crack-severity criteria. This is likely due to the fact that rectangular (smartphone shaped) objects rarely fall perfectly flat or on an edge but mainly on a corner and if protective matter is only put on portions where the phone is most likely to meet the ground first, the case will perform the best, as it did in the experiment having at most a few scuffs. The implications of this study are the effects on the mindset when a new case is ought to be purchased for the purpose of protecting a device. If it is known which portions of a phone case are useless (meaning the portions serve no protective functionality), it would be common knowledge to buy the right case for a device and not waste money on a case which uses an excess amount of material.

INTRODUCTION

The purpose of this experiment is to observe the effect on pieces of glass when fitted with three distinct case designs and dropped at certain heights to find which case is the most protective.

This problem is important to solve because a lot of money is spent on buying bulky cases for devices even though the cases may not be very protective. According to Amazon's best-selling phone case list, two types of cases are the most popular. The first option is a case which is

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example would be the Otterbox Defender Series, bulky all around the edges when it should only be bulky on certain parts. The other option would be a phone case w
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etically pleasing (Spigen Ultra H
er on Amazon as of January 201
were to be solved, money
money not being spent on purchasing expensive cases and convenience could be achieved by having a case that isn't very bulky but is also protective.

Case 1

Case 2

Case 3

Question:

Where should the protective matter of a phone case be located in order to ensure maximum protection?

Hypothesis:

If phones rarely fall perfectly flat and usually on a corner, then a phone case which has its protective matter concentrated at the corners would be more protective than any other design because if the matter was concentrated on the place which phones tend to crack at, no material would be wasted on spots which serve no protection and maximum protection may be reached.

METHODS

Case Designs:

Procedure to Make Silicone Material:

Put on a surgical mask to avoid breathing in acetic acid fumes from the silicone. Then, pour out 150 mL of silicone into a measuring cup.

Measure out 10 mL of food colouring (colour does not matter) and pour it onto the measuring cup containing silicone. Mix the silicone with the food colouring using a mixing stick until all food colouring is evenly distributed within the silicone. Immediately after mixing, measure out 20-30 grams of cornstarch and add it to the silicone-food colouring mixture. Put on latex gloves and mix the cornstarch with the silicone-food colouring mixture using hands, mix the silicone-food colouring mixture and the cornstarch until there is no more visible corn starch. Now, once no cornstarch is visible in the mixture, mold the material onto a piece of glass in one of the case designs. Once the clay like mixture is molded into the desired shape, let it sit for about 5 minutes and when the mixture is rubbery, it is now ready for testing (The King of Random, 2012).

Experiment Procedure:

Put on safety glasses as there is a chance of glass breaking. Take the four corners of the first case design and fit the pieces onto a piece of glass. Then drop the piece of glass with the first case design from a height of 50 cm and note damages. Take the four corner pieces off the piece of glass and set the dropped piece of glass aside. Then, fit the four corner pieces onto another piece of glass and drop from a height of 50 cm. After noting damages, remove the four corner pieces off the piece of glass which has just been dropped and drop test one more piece of glass with the corner pieces at a height of 50 cm. Take the second case design and fit it around a piece of glass. Drop the case from a height of 50 cm and after taking note of damages, fit the same case around a different piece of glass and drop once more at a height of 50 cm. After dropping the second case for a second time, take case two and fit it around another piece of glass and drop it for a third time at a height of 50 cm. Finally, take case three and fit it around a piece of glass and drop at a height of 50 cm and note damages. Take another piece of glass and fit case three around the new piece of glass and drop at a height of 50 cm. After noting damages, take the ninth piece of glass and fit the third case around it, drop it once more from a height of 50 cm and note damages.

Finally, repeat previous paragraph but dropping at a height of 100 cm for every drop test for a total of 18 drops.

Independent: In this experiment, the independent variable is the case around the glass. The purpose of the experiment will be to see how the different shapes of a case can affect the protection of the glass piece, so the case design will be changed.

Dependent: The variable being measured in this experiment is the condition of the glass after the drop. How many cracks/deepness of cracks.

Controlled: The controlled variables in this experiment are the glass manufacturer, height for every sequence of tests, surface being dropped on, and the material which the case is made of. The material in each case used is the same mass.

The piece of glass was controlled because some glass manufacturers may have thicker or denser glass than another manufacturer causing one type of glass to be stronger than the next. The pieces of glass used in the experiment were from Dollarama photo frames (all frames purchased

were the exact same). The height of every drop was controlled because the higher an object is dropped from, the faster its speed will be the moment before it drops, meaning the piece of glass will have a harder impact when falling on the ground and be more damaged than a case which was dropped at a shorter height. The material was regulated due to the fact that some materials absorb shock better than others, the type of material could not change as it could skew results.

RESULTS

Figure 1 is a criteria which is used to quantify the severity of damages of pieces of glass when dropped. Refer to criteria for numbers in Table 1 and Table 2

1	2	3	4	5
Completely Shattered into Many Pieces	Many Cracks, Shattered into a Few Pieces	Multiple Cracks	Parts are Scuffed	No Damage Done

Figure 1: This criteria above is referred to as the "crack severity criteria".

Severity of Drops at 50 cm	Case 1		Case 2		Case 3
Severity of Drop 1	5		4		3
Severity of Drop 2	5		4		3
Severity of Drop 3	5		4		2

Table 1: The table above refers to the severity of drops at the height of 50 cm.

Severity of Drops at 100 cm	Case 1		Case 2		Case 3
Severity of Drop 1	4		4		2
Severity of Drop 2	5		3		1
Severity of Drop 3	5		3		1

Table 2: The table refers to the severity of drops at the height of 100 cm.

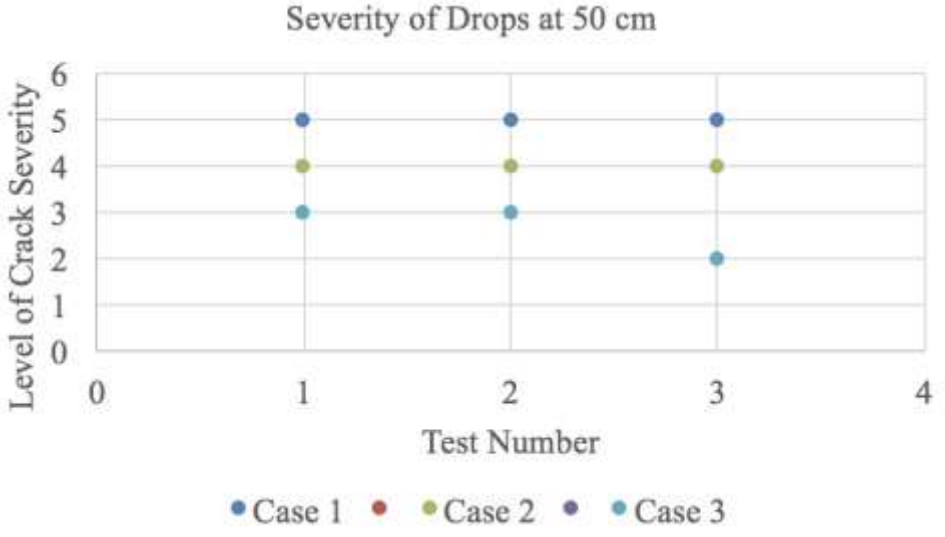

Figure 2: Graphical form of **Table 1**

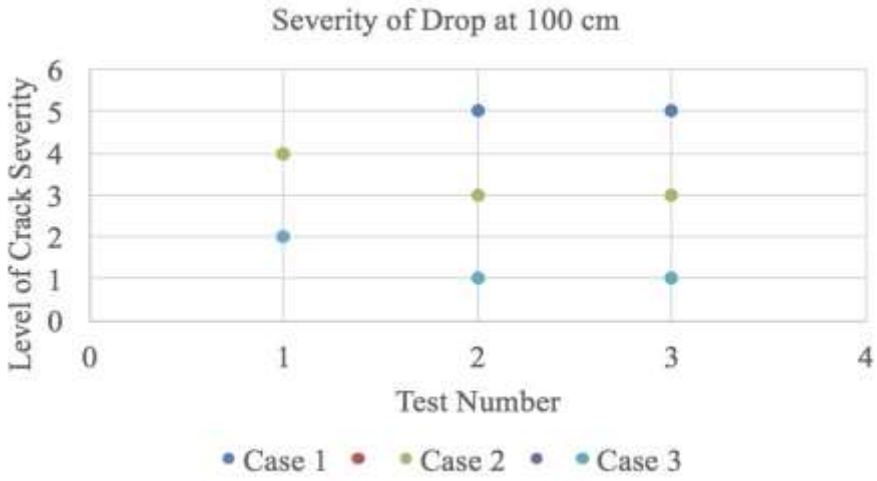

Figure 3: Graphical form of **Table 2**

	NUMBER OF TOTAL CRACKS
CASE 1	0
CASE 2	7
CASE 3	>15

DISCUSSION/CONCLUSION

The hypothesis is correct. The case which has its protective matter concentrated on the corners performed the best. In all tests, the first case design had no cracks but occasional scuffs. The initial problem was that when buying a phone case for the purpose of protection, cases would be bought which focus the protective matter on portions which served no functional purpose (determined to be anywhere but the corners). If case manufacturers focused all of their material on the corners of phones, lots of money could be saved. Most case manufacturers that promise the best protection bulk up the edges of their phone cases which can add unnecessary weight.

The results of the experiment proved that the design of the first case was the most effective meaning that a device case manufacturer should focus the protective matter of the created cases only on corners. To minimize the margin of error, the same amount of material was used for all three case designs (114g – 118g) and it was observed that the third case was extremely obsolete and broke at every drop. This was because the protective matter was spread across a wide surface which left all parts of the phone prone to breaking as no spot was specifically strong. Although it did not perform the best, the second case was the most visually appealing and would be the perfect sacrifice, nice looking and moderately protective. The measures taken to ensure minimal error were that the material is the same on every case, the amount of materials which ultimately make up the final material were the same, the surface on which the pieces of glass landed on, and the technique of drop were all regulated as well. The slight difference in each case was that each case design used a different type of food colouring (case one used red food colouring, case two used orange food colouring, and case three used a light orange food colouring) due to the limited supply of food colouring.

APPLICATION

Now that it is determined that the best location to put protective matter is on the corners of a device, it must be pondered which case manufacturer is putting an excess amount of material on a product (Otterbox) or which case manufacturer is being efficient with materials by not putting protective matter on edges and back (Utomic). In the following images, Otterbox (Figure 4) focuses much the protective matter for its case on the edges, similar to case two (which was proven to be not as effective as focusing mass on corners), furthermore, Griffin (Figure 5) focuses substantially on the corners as well as a

little bit on the edges (protective matter on edges proven to not serve any protective functionality) and finally, Utomic, which produces cases that only focus on corners (Figure 6). To a degree, both Griffin and Otterbox put protective matter on portions which are proven to be considered useless. This could be done for the sole purpose of having an excuse to charge a higher cost for a product (excuse being that there is more material).

Figure 4 **Figure 5** **Figure 6**

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Figure 4:

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Figure 5:

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Figure 6:

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The Reason For Poor NBA Team Performances

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Abstract

NBA Teams are very interesting. Some of them are amazing and some of them are bad. Fans of the NBA hate it when their team loses despite knowing that the team is bad. Why are these professional teams doing poorly and how can they be fixed?. À simple simulation using NBA2K could give these teams à clue on why their team is doing poorly. Setting the season standards at 82 games and turning injuries off is the best possible method of testing this experiment. The results that were acquired through this experiment provided some interesting details. Teams with à higher offensive rating had won on average 10 more games than teams with à higher defensive rating. Even if the teams higher offensive emphasis had à sub-par defense, they were still very successful. According to these findings, teams would prefer to look at the offensive stats or rating of à player when scouting rather than the Defensive rating and an offense that is more

Introduction:

This is a major problem within the NBA. Currently only five NBA teams have a legitimate chance at winning the championship. These five teams have at least 1 superstar player, therefore making the rest of the NBA and their fans watching their team lose multiple games. As fans want to find a method that helps smaller and weaker teams succeed without spending too much money or praying for the draft lottery. According to basketball reference, all of the superstars from the best team make the most money and therefore deprive other teams of their star power. An example are the Golden state warriors who finished with a record 67-15 while having 3 all stars in Stephen Curry, Kevin Durant and Klay Thompson last year while the Brooklyn Nets suffered a painful 20-62 record with their best player being Jeremy Lin.

The Cleveland Cavaliers are also one of the best teams in the NBA with a 51-31 record and losing just one game on their journey to the finals. Even though in the regular season they were ranked as 25th overall in defense and at one point during the season they were dead last in defensive rating, but they were able to make up for it with their amazing offense. On the other hand, the Los Angeles Lakers had the 10th best defensive rating in the 2016-2017 season while having the worst offensive rating in the entire league. How can bad NBA teams be more successful without superstar players?

if supposedly bad NBA teams who have a low offensive rating and a high defensive rating struggle to win games, then they could adjust their offensive playing style emphasizing offense and getting better offensive players, because it is statistically proven that offense wins games

A very good example are the Toronto Raptors, who in the past four years have struggled in the playoffs, mostly because of their offensive playing style. In the 2017-2018 the raptors have had their best record in history at the midway point of the season, because they changed their offensive playing style to emphasize passing and shooting. This is all despite not having Legendary Superstars.

Methods:

Select an NBA Team that has not made the playoffs and has struggled (Below .500) for at least 2 years (Ex: Phoenix Suns) And/orCreate an NBA Roster with a maximum of 1 NBA All-Star (Excluding Lebron James, Kevin Durant or Stephen Curry) and the rest must be from an NBA team that has been struggling. Set Season Standards. 82 game seasons, best of 7 playoffs and 3 playoff rounds.

Set up Independent, Dependent and Controlled variables (Listed below) Run at least 100 simulations per session for accurate results. (1 session = Approx. 1 week). Record Findings in separate Journal. Independent variable will be the Roster of simulated NBA teams, the Dependent variable will be the record or playoff success of each team and the Controlled: variable will be the Roster of unused NBA Teams and season standards

Results:

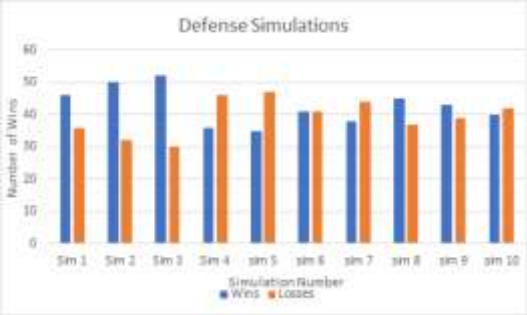

Figure 1 : The number of wins with teams with an offensive emphasis. 10 simulations. Blue represents the number of victories and Orange represents the number of losses. On average the Defensive teams won 42.6 games per season

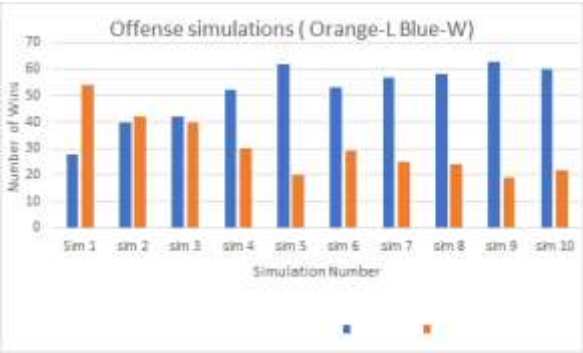

Figure 2: Teams with Higher Offensive emphasis. 10 simulations. Averaged about 52.5 wins pers season with the highest being 63 wins.

Discussion/Conclusion:

After approximately three weeks of these experiments of NBA Teams. The results suggest that Offensive Emphasis has a much bigger chance of future success. Most of the teams that were on the Offensive Emphasis consisted of players that are better shooters and offensive rebounders. This seems to be key as Offensive rebounds provide more opportunities for scoring. Another reason is the possibility of Offenses playing at a much faster pace. Even in the current NBA Season, there is a clear correlation between the pace(Possessions per game) and Wins Per game. The Rebounding teams often failed to even make the playoffs. A reason this may be is because rebounding teams require much more 'Big Men' (6'9 or Taller) for Rebounding shots. Due to the large amount of 'Big Men', they were playing much slower than most of the 'smaller' teams and were outscored.

This experiment did not completely satisfy the hypothesis that was suggested at the beginning of SCICAN!. The hypothesis was that teams that could gather more well rounded players would succeed. This did not work as there are not many well-rounded players in the NBA and is the reason the offensive teams did so well. The offensive teams still had some defensive ability and rebounding ability, but the defensive players had much weaker offensive game which lead to them losing often. The data shows that the teams with well-rounded players did mediocre as they averaged only a 60% win percentage. This may be because, although the players may be well-rounded offensively and defensively they did not have as much skill. In conclusion, superstar players are not necessary for a successful team, but can be the difference between contenders and champions.

Application:

The information found in this journal will be very helpful with basketball coaches. This information does not need to be NBA specific as it can be used for other teams such as high school or college basketball teams. Implementing this type of research in highschool or college will also help players have à better understanding for the game. NBA fans themselves can't do much other than spread the information out to coaches or managers of teams if possible.

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Correlation Between Book Genres and IQ-Measured Intelligence

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Abstract

The question this experiment is based around looks to investigate whether the book genre read by a person influences that person's intelligence. This is being tested because reading has been proven to affect a person's intellect, but no studies have been done to determine if the genre has a part in it. An IQ test is used to establish the intelligence of the subjects, along with a survey of preference of book genre. The results are that the more complex the genre, the higher the IQ of the subject. Various elements of a book are the reason for variations of intelligence. This information can be used by readers to figure out what books are best for intellectual stimulation.

Introduction

The purpose of this project is to find out how book genres correlate with intelligence. Reading is proven to have many benefits on the brain such as memory development and being able to focus easily (Reader's Digest). However, books are split up into genres and some studies have found that reading certain genres can improve the reader's empathy and emotional intelligence or EQ (Scientific American and APA PsycNet). This is important because since a person's EQ can be affected, it's possible a person's IQ can be as well, a valuable tool when assessing someone's intelligence.

The question is "How does preference of book genre correspond with intelligence?". The hypothesis is that if people read books that necessitate the use of imagination to visualize the story, then those people will have a higher intelligence, because the more a person visualizes and thinks about what is happening, the more that person's brain will be stimulated (Reader's Digest).

Methods

IQ is being used as a measure of intelligence because it accounts for some important parts of brain utilization and allows for quantitative comparison of results. Have the test subject take an IQ test with a time limit of twenty minutes. This IQ test should be of fifteen questions. Within the test, there must be questions that test spatial intelligence, short-term memory, processing speed, logical reasoning and mathematical ability. Record the score of each test. Ask what the subject's favourite genre is. Repeat these steps for each subject tested. All subjects must be of the same age and grade.

The independent variable is the test subject, which is changed to observe the results. The dependant variable is the IQ score. This is dependant on the test subject's preference of genre. The controlled variables are the IQ tests, the quiet working conditions, and the time given for the tests. The tests and time must be identical so it is a fair assessment for each subject. The working conditions must stay quiet so subjects can attain the same level of concentration.

Results

Table 1

IQ Score and Genre

Table 1: IQ score and Genre separates all the data by test subject, genre and score.

Test subject	Genre	IQ score
1	Comedy	82
2	Adventure	98
3	Mystery	100
4	Sci-Fi	105
5	Fantasy	111
6	Literary Fiction	118

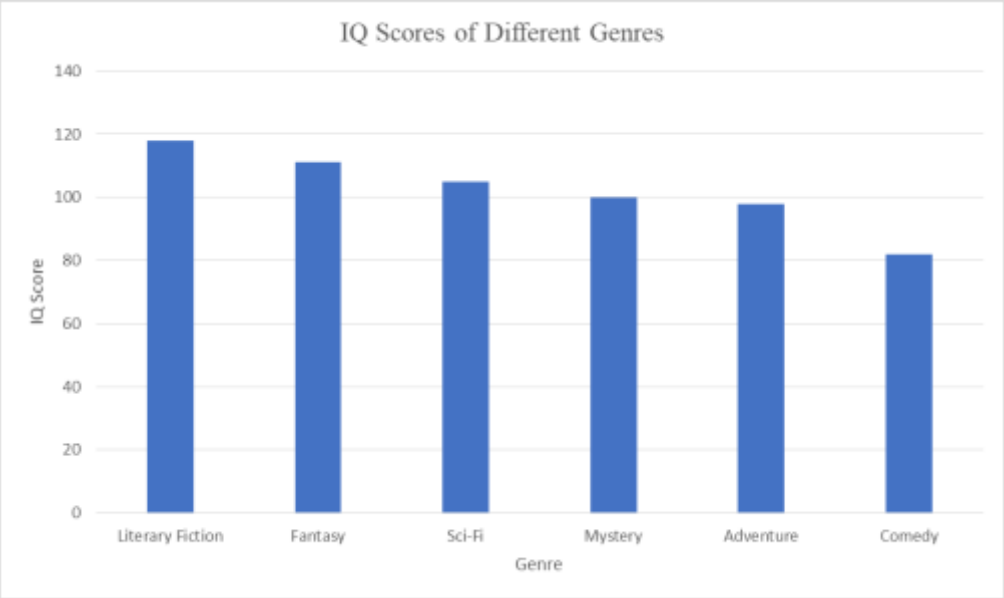

Figure 1: IQ Scores of Different Genres compares the IQ scores of the book genres from highest to lowest

Discussion

The hypothesis is wrong since it predicts that genres that force a person to extensively use imagination would be the highest. Although Fantasy (111) and Sci-Fi (105) were the runners-up, both were bested by Literary Fiction (118). To answer the question, the data suggests that the more complex the genre, the more likely the reader will have higher IQ. For example, the highest IQ is from Literary fiction (118), which is very sophisticated because it analyzes the character's personality and motivations. On the other hand, the data proposes that Adventure has a lower score of 98 because it's often focused only action, and lacks the critical thinking (Literary Fiction, Mystery) or imagination (Fantasy, Sci-Fi) that other genres demand.

The genres become more intricate as the IQ scores go up, which could suggest a correlation. This relates to the original question that asked whether there was any correlation. Although the hypothesis was incorrect, the data does allude to some accuracy since the second-highest score was that of Fantasy, which does require visualization. No other investigations have experimented with this question but research consistently shows that reading develops the brain (Reader's Digest).

An issue with this investigation is that the sample size was very small. If the sample size is larger, the results would be much more reliable and would give a much better representation of the readers of each book genre

Application

Fields of study that deal with the brain, such as Neurology could benefit from this study. Information about which book genres stimulate the brain more could help with delaying cognitive decay and start more research on how to stimulate the brain. The public also could apply this information because the advancement of the brain is something of interest. The big picture here is that the brain is the most important part of the body, and these results provide an opportunity to improve its functions.

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Effect of Different Amounts of Social Media Usage on High School Aged Teenagers

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Abstract

This study aims to study how different amounts of social media usage affects metrics such as grades on high school aged teenagers, which is extremely important in the 21st century, as more and more time is being consumed on it. This is doubly true for high school aged teenagers, as they spend some of the highest amounts of time on social media. This study has been conducted by sending a survey to Vincent Massey Secondary School through the e-learning platform

‘Edsby’. A Python program was written to analyze the data. This study has found that teenagers who were the happiest were those who went on social media the medium amount, and the teenagers with the best grades were the ones who went on social media the least amount. This data confirms the fact that social media is not necessarily unhealthy if used in a moderate amount but could be dangerous if used too much. This is possibly because social media starts to interfere with school work and other tasks as it is addictive.

I. Introduction

Teens are spending more and more time every day on social media, and 24% of teens self-identify as going online "almost constantly", and it is still not well known what the effects of that is. There has been a study (Wolpert 2016) done on social media by UCLA that shows teens are more likely to "like" a post if it has received many likes. This kind of behavior, along with the fact that face-to-face interactions are decreasing could have potentially drastic effects on teen behavior and social interactions (Ehmke N.d.). Fully understanding the effects of social media is necessary for understanding how teens behave, when they consume large amounts of social media. This study aims to survey the effects of social media on happiness and grades. If teenagers consume less social media, then they will be more likely to be happier and have better grades. If teenagers use more social media, they will have worse grades and less happy lives. This is because social media is addictive and presents an unrealistic window in to others’ lives, and time spent on social media takes away from time studying, which will result in lower grades.

II. Method

First, a short survey that takes under 30 seconds to complete will be created to prevent potential survey takers from leaving due to a long survey length. Questions that are asked include: Gender, Age, How often do you go on social media?, Which social media sites/apps do you primarily use?, How satisfied are you with your life, How well are you doing in school? (Grades). Then, questions that measure happiness, and mark averages in school will be collected. Non-identifying personal information such as age and gender will also be collected. The survey will be sent through Edsby School Talk to reach as many people as possible. A Python program will then be created to analyze data and return the average scores of each of Average Marks, Life Satisfaction for each of the social media usage amount categories. Finally, a graph will be created for each Average Marks, Life Satisfaction. Average

scores will be analyzed and conclusion of effect of social media will be drawn. The independent variable is the number of hours of social media per day, this is because the purpose of this study is to measure and study the effects of different amounts of social media usage. The dependent variable is the rating of happiness and grades, this is because these variables are what the study will use to compare the effects of different amounts of social media usage. Finally, the fixed variables would be the place where the survey is taken, because if the survey was taken in different places, it can affect the data. For example, if the survey was given both offline and on Facebook, those who are on Facebook potentially spend more time on social media than those who took the survey offline. Age and gender will also be controlled for if a noticeable difference is found.

III. Results

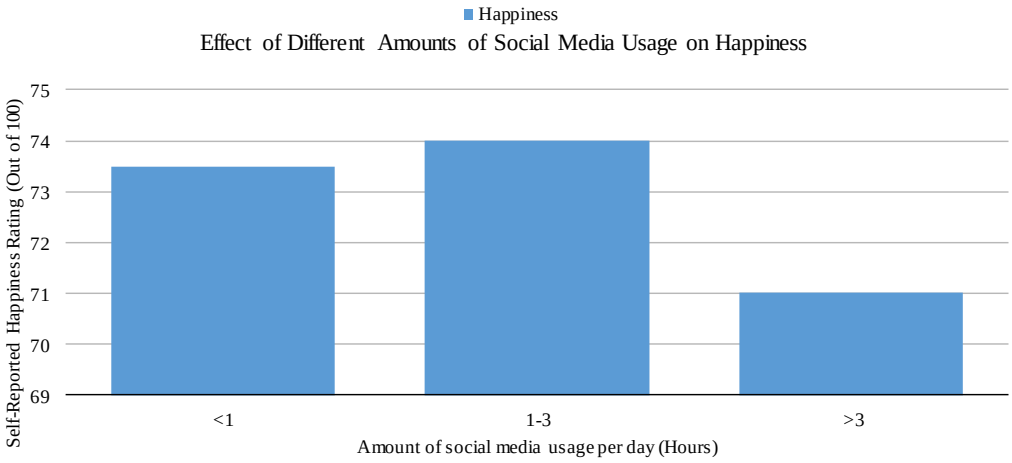

Figure 1: A bar chart showing the effects of different amounts of social media on self-reported happiness.

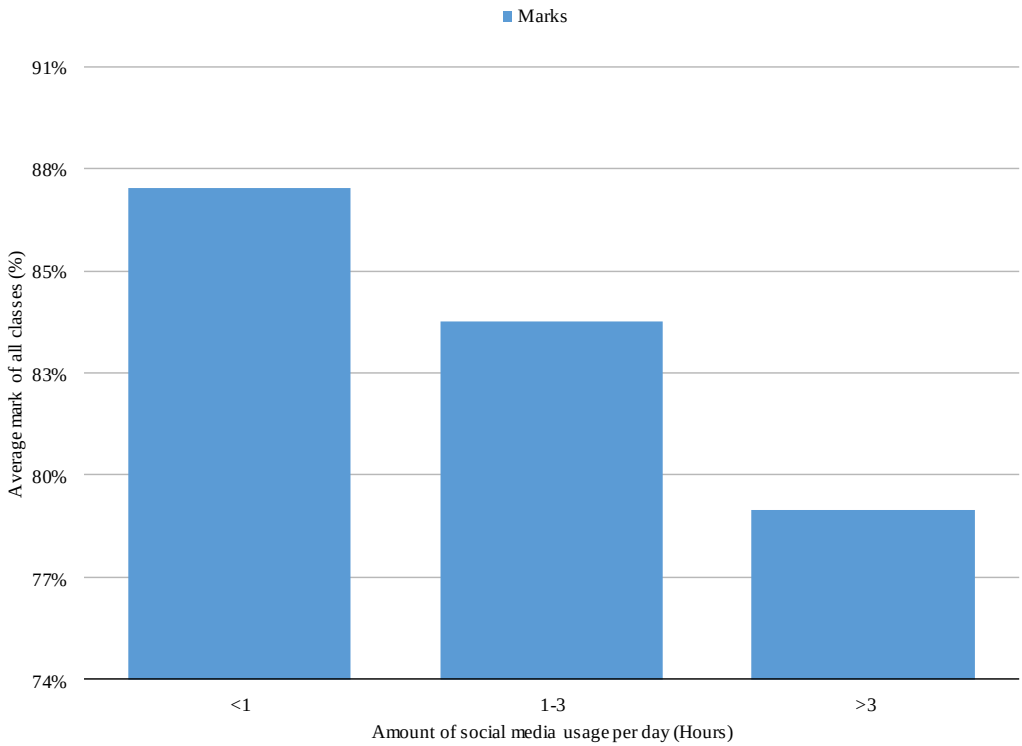

Figure 2: A bar chart showing the effects of different amounts of social media usage on the average of all class marks.

The results of this study shows that teenagers who go on social media for less than one hour per day had the best marks, those who went on social media for between one to three hours per day had the second highest marks, those who went on social media had the lowest marks. (Figure 1). The teenagers who went on social media for less than one hour had the second highest happiness rating, and the teenagers who went on social media for between one to three hours had the highest happiness rating, and those who went on social media for more than three hours had the lowest happiness rating (Figure 2).

IV. Discussion/Conclusion

The hypothesis was partially correct as it was said that those with less social media usage would have the most life satisfaction. This was proven to be false (Figure 2), as those with medium social media usage had the highest life satisfaction. An explanation for this is that those with little social media usage don't socialize enough, which is important for life

satisfaction. Heavy social media usage was predicted to result in the lowest life satisfaction, and this was proven to be correct by the data. This can be explained by the fact that over usage of social media causes a person to feel bad about themselves due to comparing themselves with others. The prediction of marks based on social media usage was proven to be correct. This is logical as those who do not engage in extensive social media usage will have more time to study and/or with less distractions. The initial purpose was to determine the effects of extensive social media usage on teens. That has now been answered by comparing the average scores for 'Life Satisfaction' and 'Marks', the survey has indicated that extensive social media usage leads to low life satisfaction and poor grades, while a light to none social media usage leads to the best grades, but not as good life satisfaction compared to medium social media usage. A tradeoff will have to be decided between life satisfaction and marks, which is a personal decision and beyond the scope of this project. It can be seen from the data that those with light to none (<1 hour per day) social media usage had the highest marks out of the categories of '<1 hour per day', '1-3 hours per day', '>3 hours per day'. Medium (1-3 hours per day) social usage followed very closely with only a difference of 0.36/100. Heavy (>3 hours per day) social media usage had a comparatively heavy drop-off of 1.58/100. In terms of life satisfaction, medium social media usage had the highest reported life satisfaction score of 73.92/100, which was then closely followed by light to none social media usage with a score of 73.50/100. Again, heavy social media usage had a large drop-off down to 71.64/100. This study did not account for the fact that it was submitted through Edsby, a type of social media, which could have affected the balance of results. This is because frequent users of Edsby logically have a greater chance of caring more about their marks, while simultaneously spending more time on social media, thus affecting the results.

V. Application

The results of this study can be applied to fields of studies such as adolescent psychology. Knowing how teenager's grades and happiness react to different amounts of social media usage allows for deeper studies to target and research why those effects such as medium amounts of social media usage causes the highest happiness rating occurs. Not only is this research significant to other researchers, it is also of interest to the general community. Many parents of teenagers are concerned about their child's social media usage, as this research presents a new train of thought that contrary to popular belief, some social media usage might be beneficial to happiness. The importance of social media to society at the present is undeniable, more and more of the world is now occurring in the digital sphere. Understanding the physical and mental effects of social media on teenagers is crucial, especially as more and more time is being spent on it, with 92% of teens reporting going on social media daily (Lenhart 2015), and as access to internet further increases around the world.

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Exploring the Uses and Ways of Potential and Kinetic Energy by Making a Fish Feeder

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ABSTRACT

Potential and kinetic energy are forms of energy that are more common and useful than most think, and can be used to create things like a fish feeder. Making the fish feeder was a complex process using various material skills such as: pipes, wood, elastics, an air dart, a plastic spoon, a marble, and tools. The materials are then put together in a way that the user starts the feeder making the air dart hit the marble in the spoon, which falls down the pipe and hits the box holding the fish food, dropping it into the fish bowl. Creating this fish feeder shows the ways and how energy can be used for numerous things in the world today.

INTRODUCTION

This project works with potential and kinetic energy and establishes its different ways and uses. This way of physics can cause one to notice the multiple ways it can be included into the life of any person by becoming a solution towards problems and reassuring the lives of future generations. Physics is also called “the fundamental science” because of its way of helping create theories and successful experiments related to the numerous other topics similar to potential and kinetic energy,

many of which are beneficial to people and will causes small but extremely effective changes to one's life. The purpose of this experiment is to learn how to use potential and kinetic energy to creatively make a fish feeder that is started by the user and goes through various steps before eventually dropping the fish food into the bowl, showing the possibilities and goals that can be achieved by using potential and kinetic energy. If height effects the amount of kinetic energy that is released (from potential energy

gained), then a certain height should allow the ball to fall and to gain and release enough energy to drop a decent amount of food into the bowl. This is because the height increases the amount of potential and kinetic energy with respect to the center of gravity which is where the total weight of the body may be thought to be concentrated. A "dropped" object converts its potential energy obtained from its height into kinetic energy as it accelerates. Therefore, the greater the height, the more kinetic energy will be released. (Sarah Friedl 2003-2018)

METHODS

Creating this fish feeder starts by cutting long pieces of wood, that are in the shape of rectangular prisms. Cut two 26cm long ones, one 36.5cm long one, one 17.5cm long one, two 93cm long ones, and one 84cm long one and put a hook on each of the pieces with lengths 26 and 93cm approximately 2 cm from top. First glue the two 26cm ones against the edge of a wooden base and the 93cm ones 28.5cm from the same end with both pairs 4 cm apart on either side of the center line of the base. Then glue the 17.5 cm one 21cm from the same end and 0.5cm from the center line, the 84cm one 45cm away from the end and 2cm away from the center line, and the 36.5cm one 8.5cm from the same end and also 2cm away from the center line. It is best to put all the pieces that are individual and do not have another piece the same length as them on the same side of the center line. Take the small wooden slabs/pieces and use pivot arrangements (one on each side) to connect one to each of the pairs of wood that are 26cm long and 93 cm long. Then use elastics to connect the fish food box to the platform on the 26cm piece and the spoon to the platform on the 93cm piece by putting it around the slab and spoon or box, along with using another elastic to put around the slab and bring around the hook. Bring the pipe to the top of the 84cm tall wooden stick and curve it a bit towards the spoon. Lead the pipe towards the fish food box and use clamps and duct tape (put along 17.5cm and 84cm long wood pieces) to secure it and keep it in its proper position. One place a clamp is needed is right underneath the slab with the fish food (on the 36.5cm tall piece) where the pipe will end. Some other possible places for the clamps and tape are close to the top of the 17.5cm tall piece of wood and along the 84cm long piece. Connect the funnel to the top of the pipe where the marble falls. It is important to make sure that both ends of the funnel

are big enough for the marble to fall through. Stick the stand of your dart to the 17.5cm long wood piece and make sure to angle it towards the small wooden slab that holds the spoon. Put the marble in the spoon, push down on the pump of the air dart and watch the feeder do its job.

The independent variables in the experiment are: the structures and objects leading to the food being put in to the bowl – the objects do not change their state or use in any way. They constantly remain the same and are used that way as well. The dependant variables are: how one obstacle triggers the next or another, and how each of the obstacles works and uses the potential and kinetic energy based off of the obstacle that was before them. The controlled variables are the fish food, materials, and what obstacles are part of the overall experiment.

Where each of the wooden pieces are in the diagram:

Dart stand – 36.5cm

Pipe support – 17.5cm

Pipe start and beginning support – 84cm

Marble stand – 93cm

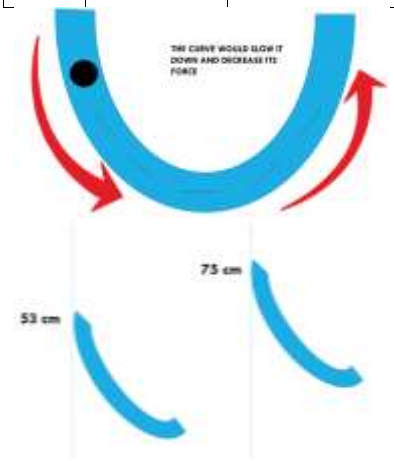
Fish food box stand – 26cm

RESULTS

Table 1: Observations of the Pipe that the Marble Falls Down

Trial #	Description	Outcome/Results
Trial 1	Pipe starts at a height of 53cm and has more of a shallow curve. Pipe goes all the way down and against the bottom wooden platform before curving back up towards the feed box	- Hits feed box with very little force - makes very little amount of food fall out. - Sometimes barely touches the feed box - Elastic around the feed box does not cause to much of a tightness - Pipe is sturdy and stays in place
Trial 2	Increased height at which the ball starts falling to 75cm. Pipe still goes down all the way and is against the wooden platform	- Hits feed box and makes more food fall out than in Trial 1. - Box moves as if it was hit with more force – ball hits it harder. - Elastic around the feed box does not cause to much of a tightness

	before curving. Curve sharpens very slightly because of the pipe being pulled up.	- Pipe is sturdy and stays in place
Trial 3	Kept height where ball started at 75cm. Created a sharper curve for the ball by not making the pipe go all the way down to the wooden platform and raising it up by holding so the ball has to travel less of a distance up after it falls from the top and reaches its lowest point.	- Hits feed with a good amount of energy - drops a good amount of food in the bowl (more than in Trial 2). - More force hits the box and - Elastic around the feed box does not cause to much of a tightness - Pipe is sturdy and stays in place



Observations of other parts of the experiment that didn't really include as much potential or kinetic energy:

Table 2: Adjusting the Stand Holding the Marble at the Top of the Slide

Trial #	Description	Outcome/Results
Trial 1	Wooden platform measuring 8.5 cm with a plastic spoon taped on top. The handle against the wooden surface and the part of	- When the end of the wooden platform (end with out the spoon) is hit with the dart, there is not enough force to allow the marble to fall out of the spoon and down the pipe.

	the spoon that holds the food sticking out and adding 6cm. This part of the spoon will hold the marble and leads in to the pipe that the marble will fall down.	- It moves but remains in the spoon. - Does not bend forward enough to allow the marble to fall
Trial 2	Kept the structure of the wooden platform and spoon the same but added on popsicle sticks to the end. Taped four of them together along their long side and glued it to the wooden platform. Added about 8cm to the overall length of the structure holding the marble.	- When the dart hits the platform holding the marble, the marble is able to fall out of the spoon and down the pipe. - Rest of the steps continue smoothly

Table 3: Tightness of Elastics Affecting the Movement of the Fish Food Box

Trial #	Description	Outcome/Results
Trial 1	The elastic was twisted a few times before being put on to the hook to tighten the grip on it and hold it in place.	- The box was difficult to move - Required more force to hit it enough (so fish food would fall out) - Felt as though there was lots of tension and stiffness when it was moved
Trial 2	Decreased the number of twists in the elastic(s) before placing it on the hook	- The box was easier to move - Flowed a lot better when it moved - Required less of a push from the ball to get a decent amount of food out

There are also other basic things that require trials and experiments. The tightness of the elastic connecting the fish food box to the two poles holding it up – changing the tightness by twisting (to tighten) or untwisting (to loosen) the elastic. The tighter the elastics would be, the more force it would take from the ball to hit the box enough and make the food fall out.

DISCUSSION/CONCLUSION:

Building a fish feeder that is started by the user and goes through various steps to eventually drop fish food into the bowl, proves that the hypothesis of height affecting the amount of kinetic energy released and that there is a height measurement that allows the ball to drop a good amount of food in the fishbowl, was true and possible. The result of the collected data proves that when the height is increases, it releases more kinetic energy and therefore the ball hits the food box harder because the greater the height, the more food would fall in to the bowl. It also proves that having the longer curve leading to the fish food decreases the amount of energy and force the marble releases by the time it reaches the food box. Whereas having a shorter curve allows the ball to keep its energy and hit the box with more force. Getting the correct measurements requires testing by increasing or decreasing the height at which the marble begins to fall at and finding which height allows the marble to gain enough force to drop a decent amount of food into the bowl. Increasing and decreasing the height is what proves that the potential and kinetic energy changes and that in the case of the fish feeder, the height that causes the most productive fall and drop of food is the height of 75cm.

These results show an accomplishment of the original purpose and proves that the use of potential and kinetic energy is possible. The experiment and results prove two major things. The first which connects back to the known fact of how the greater the height that the ball starts falling from, the more fish food falls from the box and into the bowl is that there is a height that allows the ball to hit the fish food box and drop a decent amount of food into the bowl with the design of this feeder – 75cm. The second major thing is that when the curve at the end of the tube that the ball goes through changes, it also affects the force of the ball. At first the curve is longer and continues all the way down, touching the base of the fish feeder and then resuming its way up until it reached the fish food. The other way it was set up was that the curve was quicker and shorter so that it also shortens the distance the marble has to go against its original path. It goes up to the box before touching the base and makes the point where the marble and fish food box meet a lot closer to the end of the curve (shortened the distance the ball had to go in an upward direction). With this change, the curve is

much more effective, and more food falls into the bowl. This data and the experiment supports the hypothesis by proving that there is a specific height that allows the ball to gain enough force to hit the box and drop a good amount of food and also by proving, based off of previous research and results, that the height affects the force the ball gains and hits with. (Kidz World 2017)

APPLICATION

Potential and kinetic energy are only a few of the many different examples of energy that are common in everyday lives, and with a little creativity it is possible to take these ways of energy and turn them into things that the world can get the most of whether it's for plants, animals or people. Building this fish feeder shows just a teensy example of how far one can go when they have the knowledge they need. From expanding the use of renewable energy sources, to finding a possible substitute for gasoline, to preventing the destruction of natural resources. The number of ideas that these concepts can be used for are endless and with a lot of dedication and a hint of creativity, it can make a difference. On can never forget that just like the energy, every person has potential!

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Comparing Python, Java and C++ under the Identical Command

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Abstract:

There are thousands of programming languages in the world each made to perform a specific task. It is very important to understand their differences in order to select the most appropriate language when inventing software. This experiment runs several programming languages under identical functions to compare each language's pros and cons. The result of the experiment shows Python is comparatively worse than Java and C++ in terms of the fluency of the program, which proves the hypothesis to be incorrect. The result of the finding also teaches a lesson of to not judge a program by the simplicity of its code structure.

Introduction:

The purpose of this experiment is to recognize that different types of programming languages are made for different purposes; some work best in creating simple programs use within the computer like Java and Python, others are meant to code robots such as C and C++. Programmers should be aware of the differences between the languages and choose the one that best fits their project.

Which programming language in the experiment causes the most harm to the computer?

If a language is generally used to program devices outside of a computer, then it will cause the most damage to the computer because these languages tend to be realistic. For example, C++ assign specific address to store each value. However, values such as integer 1 cannot be exactly represented in the memory but is instead stores in bits such as 0.99999999451. This complexity of the program may require more memory usage, therefore causing more harm to a computer.

Methods:

Experiment 1:

Set up a while loop for Python on Repl.it with a variable called x that has a value of 0, and for every loop it runs, it adds 1 to x and outputs x's current value. The computer use in this experiment should be an old, outdated one to maximize the difference

between the results. Restart the computer, and login onto Repl.it to set up the code. Record the percentage of memory usage before the code is run. Run the code and start a timer counting down from 60 seconds simultaneously. Once the timer reaches 0, stop the program and record the x value as well as the increase of the percentage of memory usage. Repeat the above procedures two more times then switch to Java and C++ with the same amount of experiment.

Experiment 2:

The computer use in this experiment should be a new, recently released one to prove the solidity of the results, showing a pattern that occur in every computer. Restart the computer and set up the identical while loop as in Experiment 1 for Python on Repl.it. Run the code and start a timer counting from 0. Once the x value reaches 300000, stop the timer and record the time. Repeat the above procedures two more times then switch to Java and C++ with the same amount of experiment.

The independent variables in the experiment are Python, Java, and C++. Dependent variables are the amount of lines output in 60 seconds, the percentage of memory usage increase, and the time it takes to output 300000 lines. The control variables in the experiment are the computer and the codes for each programming language. The computer must be control because the fluency of each program will be different if they are test with different computers, therefore causing the result to be inaccurate. The codes also need to be control because if the languages are not performing the same function, then the comparison between the results will be irrelevant to the purpose of this experiment.

Results:

Table 1

Comparisons Between Python, Java, and C++			
	Python	**Java**	**C++**
Loops ran in 60 seconds (Computer 1)	#1. 0 #2. 15648 #3. 0	#1. 1268419 #2. 1332829 #3. 1334199	#1. 1572330 #2. 1478048 #3. 1451508
Maximum memory increased in 60 seconds (Computer 1)	#1. 11% #2. 11% #3. 12%	#1. 12% #2. 14% #3. 16%	#1. %16 #2. %16 #3. %17
Did it crash (Computer 1)	#1. YES #2. YES #3. YES	#1. NO #2. NO #3. NO	#1. NO #2. NO #3. NO
Time (in seconds) takes to output 300000 lines (Computer 2)	#1. 147.29 #2. 177.69 #3. 185.71	#1. 30.96 #2. 38.17 #3. 30.64	#1. 19.40 #2. 16.83 #3. 18.35
Did it crash (Computer 2)	#1. YES #2. YES #3. YES	#1. YES #2. YES #3. YES	#1. YES #2. YES #3. YES

Figure 1- This graph shows the number of loops ran in 60 seconds of Python, Java, and C++; numbers on the left represents the number of

loops.

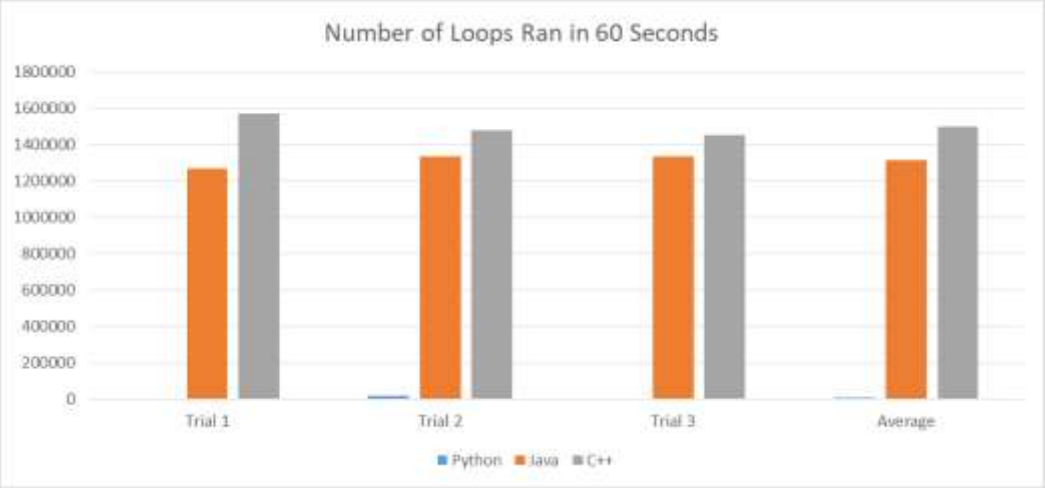


Figure 2 – This graph shows the maximum percentage of memory increase in 60 seconds of Python, Java, and C++; numbers on the left represents the number of memory increase in percent.

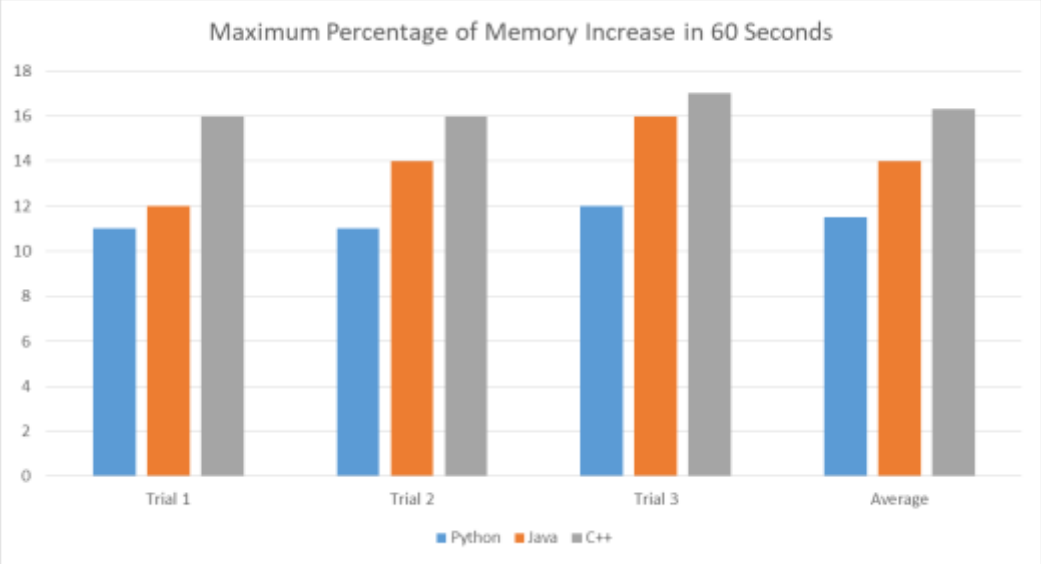
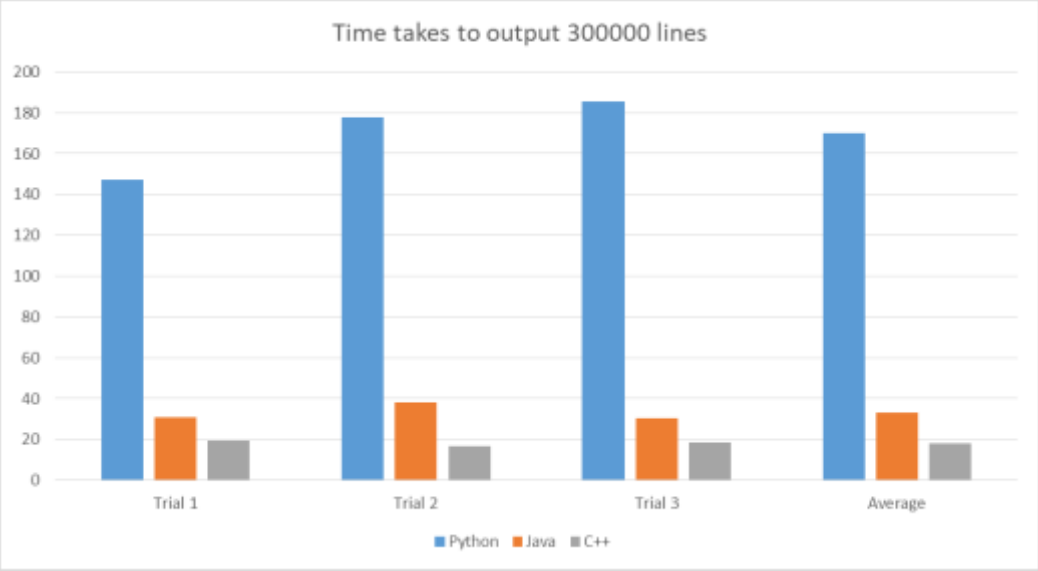


Figure 3 – This graph represents the amount of time takes to output 300000 lines of Python, Java, and C++; numbers on the left represents amount of time in seconds.



Discussion/Conclusion:

The hypothesis is incorrect because even though C++ is mainly use to program technologies outside of the computer, the results prove that C++ in fact causes the least harm to a computer (outputs ~1500000 lines in 60 seconds fluently), while Python on the other hand, is the one who does the worst in this experiment (crashes during the trials, takes the longest to output 300000 lines). Therefore, the experiment concludes that it doesn't matter whether if a language is targeted specifically toward computers or not. Every program is different, and the internal interaction inside the program has no relation to its apparent code structure.

By looking at the data gathered in laptop #2, Python took a significantly longer time (2 min 45 sec) to run (300000 lines) when comparing with Java (35 sec), who was also slower than C++ (18 sec) in general. With this in mind, it made sense for Python to crash in laptop #1 while the other two languages did not, since Python in the experiment let the already struggling laptop even slower to a point it could no longer be running properly. C++ had the most memory usage (16%) in laptop #1 not because

it caused the most harm to the computer but instead it ran the most lines. Overall, although C++ used up the most memory, it causes the least harm to the computer; and with Java in the middle, Python is the program that causes the most harm to a computer.

Analysing the results gather in computer 2, Python took a significantly longer time (2 minutes and 50 seconds) comparing with Java (33 seconds) and C++ (18 seconds) when asking them to output the same amount of lines. The results gather in computer 1 makes it seem like Python uses the least memory when running (11.5%), but the fact that it crashes repeatedly makes the statement unlikely to be true, and instead, a more preferable possibility is that Python has the least percentage of memory increase in computer 1 because it does the least amount of work, on the other hand, C++ acquires the most memory usage (16%) not because it does the most harm to the computer, but instead it runs the most lines. Overall, the order of harmfulness from the greatest to the least is Python, Java, and C++, proving the hypothesis to be incorrect.

Some problems are occurring during this experiment to make errors, one is the timing of pressing the timer, which causes the results to be different in terms of few seconds, the other problem is the fact that the condition of each computer can never be the same throughout the entire experiment, because there are times when the computers just lag for no reason, or the Wi-Fi is interrupt while running the program. The above problems do change the results by a little bit, but because the purpose of this experiment is targeting a general pattern in each program, these errors are too little to be consider.

Application:

The information discovers in the finding is useful for computer scientists, because they can now compare the languages and pick the one that works best with their project. For example, a computer science lecturer may choose Python as a beginner language to teach his/her students, while a university student may choose C++ as the core language for his/her robotics assignment. If this experiment is continuing with more programming languages being compare, it can create a well-organized system for the entire community to view, so that every individual is able to select the most fitting language for their use of teaching, researching, or inventing, and is ultimately very beneficial.

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Effects of a Plant-Based Diet on the Human Body

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Abstract

The question investigated was how eating a plant based diet and omitting animal products can affect the health of the human body. The importance of this experiment is to improve a person's health and potentially decrease the chances of experiencing certain diseases such as heart disease, diabetes and other illnesses that can be related to eating habits. The experiment was conducted on three people of the same family throughout the course of three weeks. The amount of animal products consumed gradually decreased throughout the first two weeks and on the final week all foods consumed by the subjects were plant based. No significant changes were yielded and all subjects felt no difference in their health. Results could have been different and more precise if the experiment was prolonged and further measurements such as blood levels were tested.

INTRODUCTION

The purpose of this project is to determine if there is a way to improve health and limit the risk of experiencing serious illnesses by changing the way a person eats. Many people are experiencing serious and life-threatening diseases such as heart disease, diabetes and cancer and these may be linked to the types of foods consumed. Processed foods and many animal products that are incorporated in the diets of many people today are generally high in saturated and trans fats and include chemicals and harmful ingredients. (Golden, 2015). Very little foods consumed have nutritional value such as a wide variety of whole grains, nuts and seeds and fruits and vegetables. These foods are very nutrient dense and full of essential vitamins, minerals and fiber that are beneficial to the human body and contain antioxidants that may lower the risk of various health problems including high blood pressure, diabetes, heart disease and obesity (Tuso, Ismail, Ha, and Bartolotto, 2013). The question is how eating whole, plant based foods and omitting animal products can improve how a person feels and their overall health. The hypothesis is that if a person follows a diet consisting of whole, plant based foods, then their overall health will be improved because these foods are more nutrient dense, and contain many essential vitamins and minerals for a healthy body. Plant based foods are low in saturated and trans fats, and are also free of cholesterol, which are factors that contribute to chronic disease (Melina, Craig and Levin, 2016).

METHODS

The experiment was conducted for three weeks on three people of the same family. The weight and height of each subject were measured as well as their state of health. During the first week, one of three meals eaten was completely plant based, and any additional foods consumed contained no animal products. All foods consumed each day of the week were recorded. After the first week, the weight, height and how each subject felt physically and mentally were recorded as well as any new changes that had occurred during the first week. During the second week, two of three meals eaten were completely plant based and contained no animal products as well as any additional foods consumed. All foods consumed each day of the week were recorded. After the second week, the weight, height and how each subject felt physically and mentally were recorded as well as any new changes that had occurred during the second week. During the third and final week, all foods consumed by subjects were plant based, and no animal products

were consumed at all. All foods consumed each day of the week were recorded. After the final week, the weight, height and how each subject felt physically and mentally were recorded as well as any new changes that had occurred. The independent variable was the diet, the dependent variable was the physical and mental changes in the subject's health and the constant variable was the person being tested and their overall lifestyle. These were controlled so that the results would be more precise and true. If one person's lifestyle were to suddenly change during the experiment, the effects of the experiment may be altered from before and would not be reliable.

RESULTS

Results show that no significant changes had occurred in any of the subjects. All subjects incorporated more whole foods, fruits and vegetables into their diets throughout the three weeks of the experiment.

Nov. 24	Breakfast	Lunch	Dinner	Snacks
A	-porridge (soybeans, whole grains, nuts, seeds, red dates) -whole wheat bread	-radish pastry -cucumber and tahini -roasted asparagus	-salmon -avocado and tomato salad -noodle soup	-nuts and fruits
B	-whole wheat bread with banana and peanut butter	-2 egg rolls with vegetables -cucumbers with hummus	-salmon -noodle soup	-vegan cheesecake -granola bar -pear
C	-same as A	-same as A	-same as A -lentil salad	-pear

Table 1 shows a sample of what each subject ate in one day throughout the first week.

Dec. 1	Breakfast	Lunch	Dinner	Snacks
A	-nuts and fruits	-vegetables and hummus	-ribs -roasted cauliflower -congee -fermented vegetables	-nuts
B	-cinnamon apple morning rounds -almond milk -nuts	-cucumber and hummus	-ribs -roasted cauliflower -congee	-granola bar -seaweed -fruit jello -kiwi
C	-same as B	-rice and mixed vegetables	-same as A	-nuts and fruits

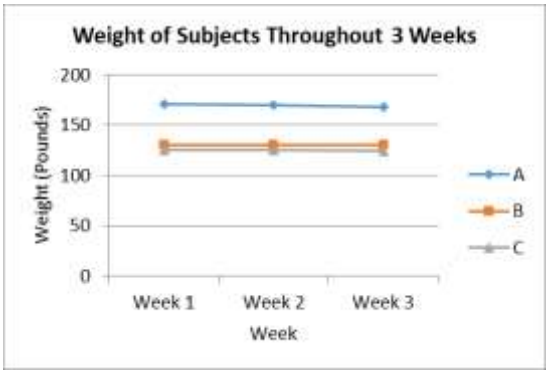
Table 2 shows a sample of what each subject ate in one day throughout the second week.

Dec. 3	Breakfast	Lunch	Dinner	Snacks

A	-sticky rice balls with nut/seed/date paste	-wrap with vegan soy meat -red pepper with hummus	-curry with carrots, potatoes, tofu, mushrooms, curry paste -roasted broccoli	-granola bar -BBQ quinoa chips -clementine -dry roasted nuts
B	-same as A -strawberry soymilk	*Same as A, cucumber with hummus*	-same as A	-vegan ice cream sandwich -BBQ quinoa chips -granola bar -clementine
C	-same as A	-congee with whole grains, beans, peanuts and red dates	-same as A	-sunflower seeds -apple -dry roasted nuts

Table 3 shows a sample of what each subject ate in in a day throughout the third and final week.

The heights of all subjects remained the same, and Subject A and C had a slight decrease in weight-Subject A had a decrease of 3 pounds and C had a decrease of 1 pound. The weight of Subject B remained the same.



Graph 1 shows the weight change of each subject throughout the experiment.

All subjects claimed to have felt no major difference in their physical or mental health throughout the course of the three weeks, but halfway through the experiment Subject A felt more fatigue than usual. On the third week Subject A had the same energy levels as before.

DISCUSSION/CONCLUSION

In conclusion, the hypothesis was incorrect-none of the subjects tested felt any better or any worse during the experiment. No significant physical or mental changes or improvements in their

health were experienced either. Subject A may have experienced some fatigue and a slight change in weight due to the fact that they ate very little food in the morning for many days of the week. The results were not as expected; instead of yielding health improvements and benefits, no changes were yielded at all and the reason may be because prior to the experiment, all subjects were already eating a well-balanced diet and limited the amount of heavily processed foods in their diets so the change in the way each subject was eating was not a big difference to before. Also, the amount of time tested may not have been long enough to yield any noticeable changes. Eating a plant-based diet cannot improve the health of a person right away and it may take weeks or months to experience the benefits. Improving the health of a person is not necessarily achieved by following a plant based diet but can also be from incorporating more whole, plant based foods and minimizing the amount of processed foods consumed. The experiment could be improved by prolonging the duration by a minimum of two weeks because more significant changes could have occurred during the extended period. Also, more subjects of different diets and states of health should have been tested to truly determine the effects of a plant based diet. A wider variety of tests should have been included such as blood tests and blood pressure prior, during and after the experiment. These adjustments would obtain more accurate results and changes.

APPLICATION

This information can be applied to fields of study in nutrition and dietetics, so that they can find more ways of improving the health of humans through diet and a variety of foods. The information can help them determine ideal foods to consume for optimum health. It is useful to those who are seeking ways to improve their overall health, but are not sure how to find the best way to achieve this goal. Families with children can also apply this information into their daily lives by knowing which foods they should incorporate more and balancing their meals so that the children can grow up eating healthy and feeling well.

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Healthy Alternatives in a Cookie Changes the Way It Tastes

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Abstract

The question investigated was how can different healthy alternatives could affect how a cookie tastes. Finding the answer to this question is important because healthy alternatives is a simple answer healthy eating without having to go on a strict diet and helps lower the amount of junk food that goes in the body. An experiment was conducted where subjects were given two different types of a cookie, a healthy and unhealthy version, to try. After finishing the cookies were asked to answer questions about the difference between the two types. The results showed that people found the healthy version of the cookie less appetizing than the non-healthy version and would not choose to have the healthy version again. In conclusion, even though healthy alternatives are better for the body than the original unhealthy versions, adding them to a cookie makes it taste less tempting and did not taste better than the unhealthy version.

Introduction

The purpose of the experiments was to substitute different ingredients of a cookie with healthier options to try and make it healthier, and see how the taste is affected. Healthy alternatives are very important because they can reduce the prevent chances of health issues. Eating foods that are unhealthy and that are bad for the body can cause obesity along with heart disease, diabetes, kidney failures, and strokes (5 Harmful Effects of Junk Food). Due to the number of calories found in junk foods, it can cause blood pressure and blood sugar levels to rise and the excessive amounts of fat and lead to the clogging of arteries (What Happens When You Eat Too Many Sweets & Fast Foods?).

Therefore, the question that was asked for the experiments was how can different healthy alternatives affect how a cookie tastes. The hypothesis conducted from the questions was, if healthy alternatives is used in baking the cookie then it will be distasteful because foods that have a lot of sugar taste a lot better than the dull foods that have no sugar. Foods that have a lot of sugar or that are sweet light up the pleasure parts of our brain, making us enjoy foods that taste sweet (Why Sugar Makes Us Feel So Good?).

Methods

The first step to conduct the experiment is to follow a chocolate chip recipe step by step making the first batch (The Best Chewy Chocolate Chip Cookies). Another batch needs to be made from the same recipe, however this batch will have some ingredients that will be substituted. Substitute the flour in the recipe for whole wheat flour, using the same amount used in the recipe. The butter and chocolate chips should be switched out for coconut oil and raisins, still using the same amounts from the recipe. Then bake the second batch as instructed in the recipe. Once both batches are done, have subjects try a cookie from the healthy alternatives batch first. Then have them try a cookie from the batch without the substitute. Have subjects answer the questions prepared for the experiment as referred to in Figure 1. Then record the answers as well as observation so they can be analyzed later.

Figure 13- Questions that were asked during the experiment

The independent variable throughout the experiment was the two different recipes. Even though, the same recipe was used, there was ingredients that were switched out, essentially making it two different recipes. Therefore, one recipe would be made without any alterations. The second recipe would also be from the same recipe, but it would include the substitutes of flour, butter, and chocolate chips to whole wheat flour, coconut oil, and raisins.

The dependent variable includes how the original cookie tastes compared to the one with substitutes. Each subject has their own acquired tastes that could be different from the other subjects. They also different preferred flavours that

light up their pleasure centers of the brain. This variable can be used for the results at the end of the experiment.

The controlled variables were the baking times and temperature, the recipes, and the oven the cookies were baked in. This makes sure that the baking process does not get changed and the cookies are made the same way These controlled variables make sure the results are accurate and that nothing becomes altered. If these were not controlled, it could affect how the cookies tastes and it could change the overall results.

Results

After conducting the experiment, the conclusion that was drawn was that 75% preferred the taste of the unhealthy cookie over the cookie with the healthy alternatives. As shown in Figure 2.

All subjects were able to identify that was a difference in the two cookies. As shown in Figure 3 and
4.

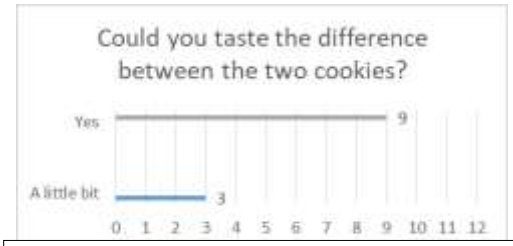
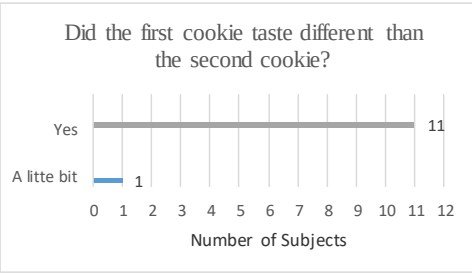
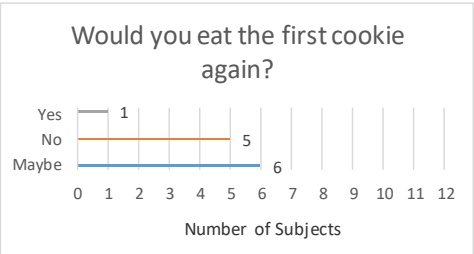


Figure 14- Shows the number of subjects that preferred the first one (healthy alternatives version) and the second one (the unhealthy version)

Figure 4- Shows the number of subjects that could taste a difference between the first cookie (healthy alternatives version) and the second cookie (unhealthy version)

Figure 3- Shows how many subjects could taste the difference between the two different types of cookies





first cookie (healthy alternatives version) again only 8% said yes while the rest of the participants either said no or maybe (Figure 5).

They were also asked if they would consider making the healthy alternative cookie and about 60% said no, the rest of them either said yes or maybe (Figure
6).

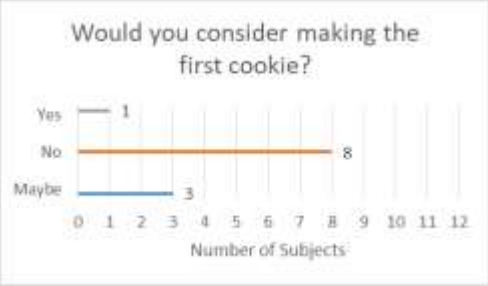


Figure 16- Shows the number of subjects that would consider making the first cookie (healthy alternatives version) again

When asked how good was the first cookie (healthy alternatives version), 58% of subjects said it was ok, about 33% found it not very good and only 8% thought it was amazing (Figure 7). The people who did not find it amazing were asked why it was not good or ok. Subject's 2,5,10, and 12 found the cookie to be very bitter and subject's 4,7,8,9, and 11 all thought the cookie was lacked a lot of sugar and just didn't taste as good as the unhealthy version.

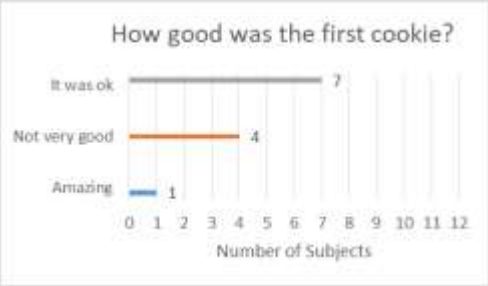


Figure 17- Shows how subjects felt about the taste of the first cookie (healthy alternatives version)

Discussion/Conclusion

The overall results confirmed the hypothesis, that was conducted in the beginning of the experiment, was correct. From the experiment, the initial question that was asked was, how can different healthy alternatives affect how a cookie tastes. The results showed that many people could differentiate between the unhealthy version and the version with the healthy alternatives. The healthy alternatives that were used was whole wheat flour for the flour, coconut oil for the butter, and raisins for the chocolate chips; added a bitter flavour to the cookie since all the substitutes used were plant based and they are known to taste bitter. Therefore, most people found the healthy alternative version of the cookie unpleasant because of how adding the substitutes changed the overall taste and it was not at all sweet and savory like the unhealthy version.

Even though, they hypothesis was correct the results did not make a big impact. The healthy alternative version did not taste better than the healthy version because it didn't have the same amount of sugar. Another reason people found it distasteful was because people were not use to the taste of the healthier version like they are with the unhealthy version. People have been eating the unhealthier version longer than the healthier version, and their brains recognize that sweet taste and that lights up their pleasure centers. Therefore, if people were to slowly increase their intake of healthy alternatives, it would make their brain recognize and be used to the taste, making their pleasure centers light up from the healthy alternatives.

Application

Making sure to include healthy alternatives in food ensures people to improve their diet without being on a strict diet. If healthy alternatives were used more in food and people enjoyed them, health issues would go down and would benefit everyone. It would also benefit food industries if they could include more healthy alternatives that make a difference and is good for the body, because people would buy them over the original versions. In the

end, healthy alternatives could be very beneficial for everyone if people spend more time getting use to healthy alternatives and enjoying them.

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Features of Baleen Whales Can Be Mimicked To Enhance Water Filtration Systems

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ABSTRACT

This study investigated how can humans sterilize dirty water more efficiently by mimicking baleen whales to improve the water crisis. Research states that baleen whales can filter feed, thus the project was examining on how features of a baleen whale influence a filtration system. People who live in undeveloped countries suffer and die each year from waterborne illnesses such as diarrhea due to the inadequate water. To investigate the question, a filtration bottle named the Whattle is made using basic materials such as paintbrush bristles, a pump, activated carbon and more. The function of each material would mimic the filtration system of a baleen whale. According to the results, water is filtered cleaner using features of a baleen whale and could remove contaminants found in dirty water. In conclusion, the results may help people get sanitary water to drink. Furthermore, the experiment proved that biomimicry is an integral step to solve human problems.

INTRODUCTION

Water is an essential component every human being needs to survive. In 2004, the Asian Tsunami hit the Southeast of Asia and forced people to drink contaminated water or eventually face death. The devastating news brought upon the purpose of this project, which is to find a solution to the water crisis by improving water filtration systems. In many undeveloped countries, obtaining clean water is impossible. Valerie Webber (2015) declares without clean water, humans can experience extreme diarrhea, nausea, vomiting and stomach cramps because the water contains viruses and other microbes, which kills cells and disrupts the cell's function. According to the Water Project, half of the world's hospitals are filled with patients suffering from waterborne illnesses (2016). By treating and

sterilizing the filthy water, people can get cleaner water. Research indicates that baleen whales contain unique features such as baleen plates and tongues that allows them to filter feed. Thus, inspiration to create a filtration device mimicking a baleen whale sprung up. This project may be the solution to the water crisis and decrease the amount of people suffering from waterborne illnesses. After gaining an abundance of knowledge, the question how can humans sterilize dirty water more efficiently by mimicking baleen whales to improve the water crisis was investigated.

If water filtration devices mimic features of a baleen whale, then water could be cleaner, because baleen whales has features that makes them able to filter their own food. According to Biologist Alexander Wreth (2013), baleen whales efficiently filters out debris from their food. Furthermore, scientists have conducted flow tank experiments, which tested how baleen whales control water flow through their mouth. The scientists figured that they use small lift forces of their tongues to pass water lateral between their plates for easier swallowing (Goldbogen, J., Cade, D., Calambokidis, J., Friedlaender, A., Potvin, J., Serge, P., and Werth, A) .

METHODS

The following procedures were followed to produce the filtration bottle, the Whattle.

To begin with, a lid was taken off from the top of the plastic bottle and the center of the lid was located. The pump from the coffee press was taken and a drill bit that has the same diameter as the metal rod on the coffee press was found. Then, a hole was drilled on the center of the lid so that the metal rod of the coffee press can fit through it. The metal rod was inserted through the drilled hole on the lid.

Next, two dots were drawn equidistant apart at the middle of the plastic bottle. The bottle was turned to the opposite side and the same steps were repeated as before. The two dots were aligned with the other two dots from the other side of the plastic bottle.

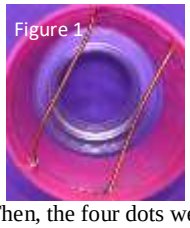

Figure 1 illustrates how the copper wires were inserted through the middle of the bottle.

Then, the four dots were drilled using a drill bit the same diameter as a copper wire. Two pieces of copper wire were inserted through each pair and are parallel to each other. To ensure safety, the plier was used and it bended the copper

wire around the circumference of the plastic bottle so that no copper wire is poking outwards. Hot glue was used to seal the four holes to ensure no water is leaking. Figure 1 shows how the copper wire is supposed to be constructed in the bottle.

To make the filtration system, a gauze pad was taken and sewed into a circular pouch. The circular pouch was filled with activated carbon filter and the opening was sewed closed to make sure nothing falls out (Figure 2).

In addition, two circles were cut out with the same diameter as the plastic bottle from plastic plate using scissors. Two holes were made using needles on one of the circle and larger holes were drilled in the other. A sponge was used, and a circle was cut with a larger diameter than the plastic circles cut out from before. From the circular sponge, a circle of the same diameter as the plastic circle was cut. The sponge was hot glued to the circumference of plastic circle with drilled holes (Figure 3).

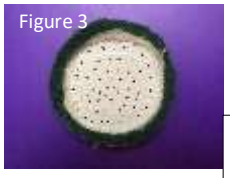
Figure 3


Figure 4

Figure 2 portrays the appearance of the circular pouch sewed with activated carbon.

Figure 3 and 4 depicts the filtration features created.

Moreover, two circles with the same diameter as the plastic bottle was cut out from a barbecue net. The bristles on the paintbrush were then cut off and a cut out from the barbecue net circle. The other circle cut out from the barbecue net was placed on top of the bristles and this assembly was sewed altogether using a needle and thread (Figure 4). The bristles sticking out the metal circle was trimmed.

The plastic circle with drilled holes and sponge was inserted into the plastic bottle so that it lays just above the copper wire. The activated carbon pouch was put on top of the plastic circle with drilled holes. A thick elastic band from a thermos container lid was hot glued to the circumference of the plastic circle with needle-made holes. This circle was inserted on top of the pouch. Lastly, the barbecue net and paintbrush bristle assembly were put on top of the plastic circle with needle-made holes. The lid and coffee press were put back onto the top of the bottle. The finished product looks like Figure 5.


Figure 5

Figure 5 portrays the innovation's appearance after following the procedure.

To test how efficient the Whattle would filter, dirty water mixed with mud and leaves was poured into the filter. The dirty water was pumped and observations were noted. Paintbrush bristles were then taken out of the filter and dirty water was put in the bottle once again. Observations and differences was noted once more after the water was pumped.

T

paintbrush bristles. The dependent variable was the cleanliness of the water. The controlled variable in this experiment was the Whattle and type of water used to filter. These variables were controlled to ensure that the experiment gave accurate results and it was not biased in any way.

RESULTS

After constructing the Whattle (Figure 5), experiments were conducted to study whether baleen features influenced filtration systems.

The experiment was repeated several times to verify that the results were accurate. After several attempts, the Whattle proved that it could filter water much cleaner using features of a baleen whale. The main baleen mimicked function is the paintbrush bristles in the Whattle. Figure 7 shows the comparison of how the dirty water looks like before and how it filtered with and without the paintbrush bristles.

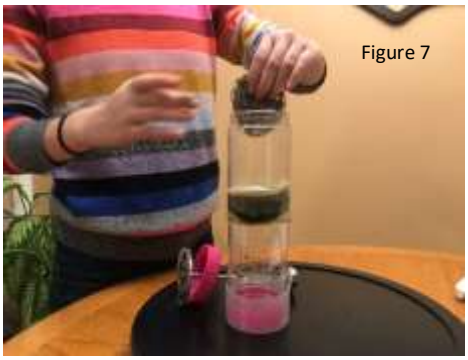

Figure 7

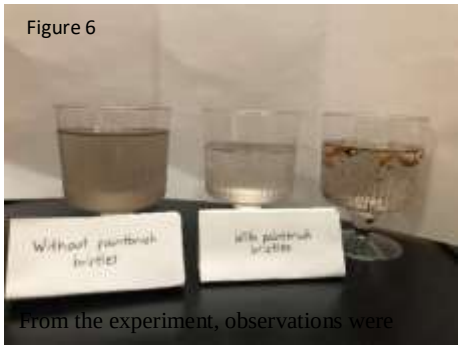

Figure 6

Figure 6 shows the difference in water quality using baleen features, the paintbrush bristles, and without.

Figure 7 shows how the paintbrush bristles were taken away from the filter.

From the experiment, observations were gathered as shown in Table 1. The observations conclude that baleen features filter dirty water much cleaner than without baleen features.

When the paintbrush bristles were taken away, an obvious observation of the speed of filtration was noticed. As seen on Table 1, the filtration process is slower when paintbrush bristles were added to the Whattle.

Furthermore, the results shown from Figure 6 depicts the original water seemed to look even dirtier when it was filtered without paintbrush bristles. On the other hand, the original water was filtered crystal clear using the paintbrush bristles.

Table 1

Filtering with paintbrush bristles	Filtering without paintbrush bristles
-Clean water is produced	-A muddy colored water is produced
-Filtering process is a little slower	-Filtering process is a little faster
-Large sediments were filtered right away in the very beginning of the filtering process	-Large sediments were filtered, however smaller sediments easily flowed through the filtering process
-The coffee press pump mave the filtering process a little faster	-The coffee press pump made the filtering process go faster as well

Table 1 shows the observations recorded during the experiment.

Figure 8

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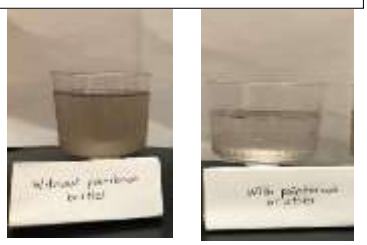
Figure 8 demonstrates a closer look to the water filtered after the experiment with the Whattle.



DISCUSSION/CONCLUSION

The hypothesis is correct. In the hypothesis, it states that the addition of a substance mimicking the baleen whale would filter water much more efficiently. Scientists set forth that the smaller the holes in the filter, the better they would filter out dirty sediments, bacteria and viruses (2016). However, the small holes would make the filtering process much slower. Baleen whales use their tongues to make filtering process faster by applying pressure. Using this feature, a pump was added to the top of the filter (Figure 9). This not only speeds up the process of filtering, but also, made sure that the Whattle filters pure water.

Figure 9

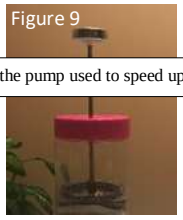


Figure 9 shows the pump used to speed up the filtration process.

Furthermore, the addition of paintbrush bristles would mimic the feature of baleen plates. Baleen plates produces a mesh-like strainer for the whale to catch its prey while it filters out water. Paintbrush bristles are similar to baleen plates. To make the paintbrush bristles work more like baleen plates, it was overlapped in layers to create the mesh-like strainer so that it functions just like baleen plates. This experiment validates that mimicking baleen whales could help us to improve water filters.

When the paintbrush bristles were taken out of the filter, the water was not filtered as clean as when the paintbrush bristles were used. Since baleen plates are tightly packed together, the paintbrush bristles were mimicked to have smaller pore holes. The paintbrush bristles kept the small sediments out of the water as it filtered. When the paintbrush bristles were taken away, the pore holes were enlarged (Figure 10). This would've made the water seem much dirtier than the original dirty water. The paintbrush bristles created a large difference and filtered the water much cleaner when it was added to the filter.

Figure 10

Figure 10 gives a visual representation of the pore holes being enlarged as the baleen feature, paintbrush bristles, were taken out from the Whattle.

The most significant result is when the dirty water was filtering with the baleen feature of paintbrush bristles, it was able to filter small and large sediments found in the contaminated water right away. On the contrary, when the paintbrush was not used, smaller sediments easily flowed through the filtering process because the pore holes were enlarged without the baleen features. This result proves that baleen features can efficiently filter out dirty water. Furthermore, the pump was observed to filter the dirty water much faster by applying pressure. The experiment shows that the Whattle can be trusted and distributed to areas lacking clean water sources. People could use it to get sanitary water to drink from.

Despite, the results proved the hypothesis to be correct, some possible errors might have occurred and affected the results. From Figure 6, the dirty water that was filtered without baleen features was much dirtier than the original dirty water. The dirty pollutants could have slipped pass the filtration system as it was not as secure. This might have been the reason why the water looked dirtier than the original water. If this experiment was repeated, hot glue would fill in any cracks in the bottle.

Furthermore, since the dirty water is mixed with dirty sediments such as mud and leaves with debris, the pump might have crushed the mud into smaller sediments which allowed it to pass through the filter. If the pump was excluded from the experiment without using paintbrush bristles, then the results might have been more accurate.

Application

This project proves the importance of biomimicry. People should discover nature's beauty and capture its creativity to turn it into something amazing that may better the world. Biomimicry is everywhere so not only the baleen whales can be mimicked, but other animals also include unique features that can be mimicked from. This valuable project may be the solution to the water crisis in undeveloped countries and help those in need. This information could be applied to the field of biology and water treatment faculties for them to improve with this idea and save those suffering from waterborne illnesses.

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The effects of diet versus mental state

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Abstract

The purpose of this study is to compare the effects of state of mind and diet on health to see which one has a greater effect. This is important because it can change the way sick people are treated. It could mean that a cure to chronic diseases and one of the best ways to prevent heart attack can be just by changing how happy someone is. To test the effects of the diet versus the mental state an experiment was conducted. The participants would take a survey and go on a one-week diet and then they would retake the survey to see how it changed. The participants expressed through the second diet that physical health got better but mental health got worse and stress levels stayed the same. Using the information from the study, the result for the previously posed question is that diet has a greater effect on physical health. Although the experiment showed that diet had a greater effect on physical health the fact that mental health was rated lower indicated that the perception of being healthy is the true determinant of health.

Introduction

This project tries to test the ideology behind the saying ‘mind over medicine’; food, depending on what we eat can be used as medicine; for example, honey to soothe a sore throat or chia seeds for high cholesterol. But what if there was a better way to treat the human body and still get to eat the stuff that actually tastes good. According to the Mayo clinic a positive mental state comes with an increased life span, lower rates of depression, lower levels of distress, greater resistance to the common cold, better cardiovascular health and reduced risk of death from cardiovascular disease. With all those benefits mental state has shown to be very powerful so does state of mind have a greater effect on health than diet. For the purpose of the experiment the hypothesis was that if state of mind has a greater effect on health than diet, then the state of health should stay the same after a new diet.

Methods

To test the hypothesis an experiment was conducted, the experiment required a minimum of four participants preferably with diverse age ranges and mixed genders. Also, a Survey and a Writing utensil, the SCICAN Instruction sheet provided and two tables to record the results. To begin conducting the experiment start by creating two tables, on a sheet of paper, one named 'before diet results' and one named 'after diet results', the rows will represent the question number and the columns will represent each candidates' answers. This table will be used to tally the survey results collected. Then each candidate will take the survey provided before starting the experiment, once the surveys are collected record the results of each question in the 'before diet results' table. Next each candidate will be given the diet instructions and one week to complete the diet, candidates will then re-take the survey provided one day after the last day of their diet, once the second survey is collected, record new results in the 'after diet results' table.

The independent variable during this experiment is the diet, the dependent variable is how the candidates rate their physical and mental health and the control variable is the survey. The survey had to be controlled because it was a record of each of the participants' results and by not changing any of the questions it showed if there were any significant changes after the diet.

Figure 1.

Results

numbers inside the table is a tally of how many people answered what

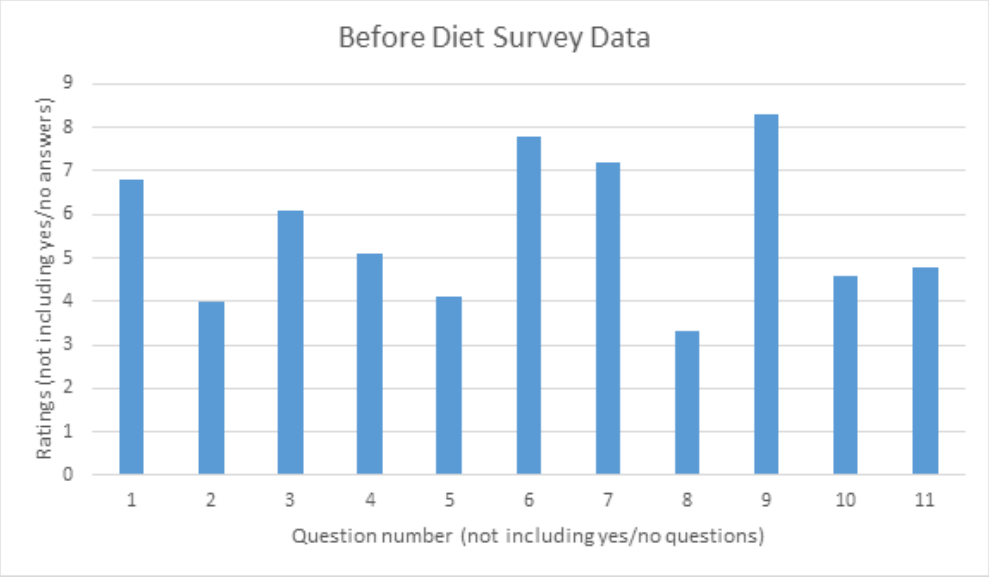
Table 1.

BEFORE DIET RESULTS:

Question #	Answer/ Rating

	1	2	3	4	5	6	7	8	9	10	Yes	No	Average
1						2	3	1					6.8
2	1		1		3	1							4
3				1		2	3						6.1
4			2	1	3	1							5.1
5	1		2		1	1	1						4.1
6					1		1	2	1	1			7.8
7			1				2	2		1			7.2
8		1	2	3									3.3
9							2	2		2			8.3
10											6		yes
11			1	1	3	1							4.6
12			1	1	3	1							4.8

Figure 2



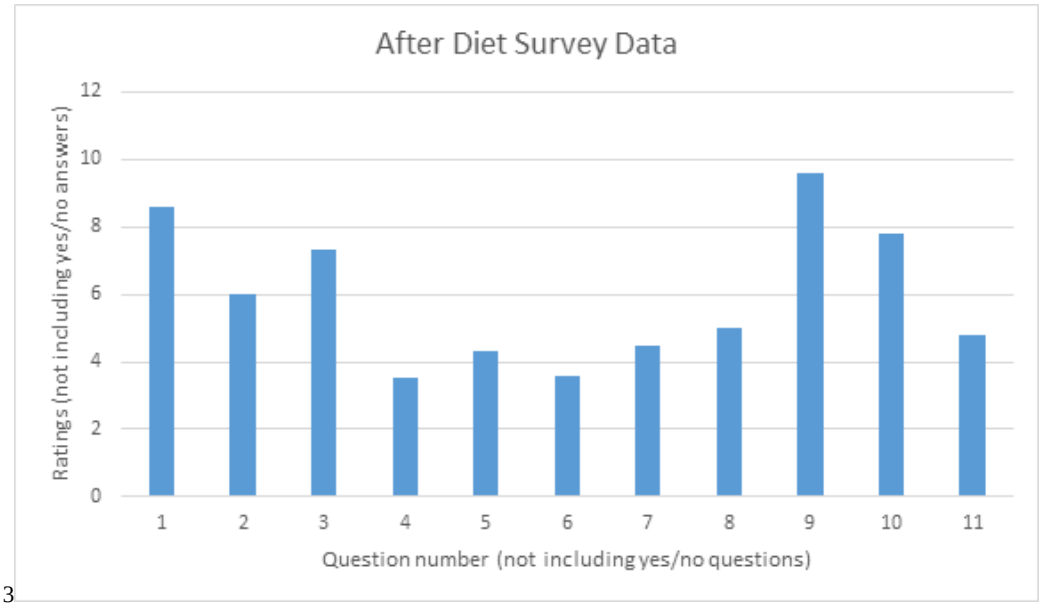
AFTER DIET RESULTS:

Table 2.

Question # Answer/Rating

	1	2	3	4	5	6	7	8	9	10	Yes	No	average
1					1		3	2		1			8.6
2				3	1	3							6
3				1			2	2		1			7.3
4	1		2	1	1	1							3.5
5	1	1		1	1		2						4.3
6	1		2	1	1	1							3.6
7					1	3	1		1				4.5
8		3		2	1								5
9											6		Yes
10									2	4			9.6
11					1	1	1		1	2			7.8
12			1	1	2	2							4.8

Figure



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Conclusion

In conclusion, the hypothesis was incorrect; the experiment indicates that diet has a greater effect on physical health than a person's mental state. This is evident because after the diet the average rating for physical health increased by 1.8 out of 10 and the average stress rating stayed the same.

During the analysis of the data it was also evident that the average rating for mental health got worse after the diet. It went from approximately 8.2 out of 10 to approximately 7.6 out of 10. Also, the average rate for physical health got better, the average rose from approximately 6.8 out of ten to 8.6 out of ten; the average rating for a candidate's diet got better from 6.1 out of ten to 7.3 out of ten and stress levels stayed the same with both surveys having an average of 7.2. During the first survey, the individual ratings for most candidates' stress levels differed by 1 from their physical health, even the average only differed by 0.4, this suggested that the quality of a person's physical health can be closely determined by how much they are stressed. But after the second survey the individual ratings for physical health increased and the average stress ratings stayed the same which suggests that a person's diet has a greater effect on their physical health. This is because people associate physical health with a good diet so even though some people hate the taste of healthy food people ate it in hopes of becoming healthier; it's more about the perception of the action and that it why people seemed to rate mental health lower after the diet. The use of the stress ratings is important because it, along with some other rates give a good idea of the people's mental state when contributing to this experiment.

Application

This information could be valuable in medicine because it could change the way people with chronic illnesses are treated. For example, along with the medicine maybe there would be a therapy session to go with it. A lot of times people who develop chronic conditions will develop depression as well and that could actually make them worse; according to Dr. Lissa Rankin people can actually heal themselves just by being positive. This experiment could also open up many doors in the field of neuroscience. The power of the human brain is beyond the capacity of

humans to understand and this experiment is just one more example of that. In neuroscience an experiment could be held to see if it's possible to make someone like the things that are good and eliminate the problem with unhealthy eating.

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One's past experiences impact Ones present decisions

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Abstract

Do humans have free will and the ability to make decisions without being influenced by their surroundings? To answer this question, something that would dramatically affect someone's life had to be chosen, and the chosen experience was divorce, there also had to be something that would challenge and test someone's ability to make a decision based on morals. One could set up a bill with high value and have test subjects with divorced parents walk past it, and afterwards have an actor follow them to see if they would return the bill. Most test subjects with divorced parents decided not to return the bill and admit they had seen a bill on the ground at all. Most of the test subjects without divorced parents returned the bill, this in return proves that ones past experiences affect ones present decisions. With this information, we can only acknowledge the fact that ones mistakes does not define that person, but is a reflection on their past. This information should in result have humans more understanding of each other.

Introduction

The purpose of this research is to determine if people have free will and if one is able to control one's thoughts. One may hypothesize that people do not have the ability to freely make decisions out of pure understanding of the world, instead our feelings and past experiences greatly affect the outcome of our decisions. Answering this problem is crucial because if we find the roots of people's decisions and what causes one to behave in certain ways rather than just referring back to the ancient human believe that if one does something wrong it is straight up ones fault and that person should be punished, we may be able to understand and physiologically alter our beliefs and ones bad decisions as they are happening or maybe even before they happen. This in result would

Introduction Continued

create a more peaceful world because if our society can understand the human mind and what causes people to behave the way they do we could prevent murder and find better ways to deal with the emotions and thoughts that causes people to act that way. This would also create a more understanding world, if not world maybe a more understanding and more justice full court system and school system.

If we do not have free will and all our actions are based on previous actions, thought and feelings that pop into us because of our surroundings, then one could find more effective means of punishments and ways to prevent people from repeating their actions and creating a moral fear rather than a fear of jail to stop us from doing bad.

Introduction Continued

This is because if we know what causes affects us and influence us into doing bad, then we could use psychological means of dealing with these thoughts and

feelings, and having one more aware of his thoughts and actions. If one was to ask anyone “do you want a good life or bad life” the answer will certainly always be good If one ask someone if they think living in jail is a good life or bad life the answer will certainly be bad life. Then why do people still go to jail, I mean no one wants to go to jail, therefore we are not completely free in our decisions. Our feelings and thoughts influence our behaviour and these feelings and thoughts come from pervious experiences.

Methods

Research either in a school or neighborhood or any other social place where one can run this experiment, the research should be to find children between ten and fifteen years of age who had their parents divorced. One can find out whose parents have been divorced by asking people around friends or family if they know anyone in the neighbourhood or the

place you are conducting this experiment if any of

the children around has had their parents divorced. Afterwards, research the times that the children with

divorced parents leave their home (I.e. to walk to their friend’s house) and the path they take. Set up a bill with a high value preferably a one-hundred-dollar bill in the path they take. Stabilize the bill with a rock or stone keeping the bill clearly visible but

Methods Continued

making sure it will not fly away by the wind. Hide behind a bush or green electric box and wait for the test subject to pass by the bill, if the test subject doesn’t even pick up the bill but clearly acknowledges it mark it down as I they didn’t steal the bill, if the test subject takes the bill walk behind the test subject as if you were just casually walking in the area and ask if he or she has seen a bill, if the test subject replies with *no*, mark it down as if they stole. If the test subject returns the bill mark It down as if they didn’t steal. The independent variable is the bill placed on the ground, the dependant variable was wither the test subjects stole the bill or not. Finally, the controlled variable was the test subjects, this variable had to be controlled because the experiment needs people with divorced and non-divorced parents.

Results

The results were as expected, in this case all test subjects with divorced parents stole the bill, though not all test subjects were expected to steal.

Only one of the test subjects without divorced parents stole the bill. Test subjects with divorced parents were expected to steal and test subjects without divorced parents were not expected to steal which was proven true with this experiment.

(figure 1) This proves the original hypothesis to be true, that past experiences and feelings greatly affect present choices. The information gathered shows no correlation between when the test subjects parents

Results Continued

were divorced and wither or not they stole the bill. Though the kids with parents divorced earlier were theoretically expected to steal the bill less often, because there is a higher chance that they would have forgot or at least it would have meant less to them, and would not

have been as significate as having one parents getting divorced not too long ago.

Though the information shows no correlation between the age of the parents' divorce, there is a slight connection between wither the test subject was a male or female, the one female that stole the bill looked around before taking the bill and the males not as often also the results show that males stole the bill more often and that no male did not steal the bill.

Figure 1- This table shows the age of the test subject wither or not their parents are divorced, if they stole the bill or not the age when their parents got divorced and finally their gender.

Age	Parents Divorced or not	Stole the bill or not	Age of child when parents got divorced.	Gender
15	divorced	Yes	6	Male
15	divorced	yes	12	Female
15	Not divorced	Yes	--	Male
16	Divorced	yes	7	Male
15	Not divorced	No	--	Female
15	Not divorced	No	--	Female

Discussion/Conclusion

Yes, the hypothesis was correct, that our

surroundings affect our actions and behaviours, and

that every previous incident or event that has happened in our lives affect our decisions and our thoughts/feelings. To answer the initial question asking if we have free will and wither or not we control our thoughts, no we do not make decisions out of the blue based on if we are good or bad people

but that previous experiences heavily affect our choices, this was proven because the people with the divorced parents stole the bill much more often than the people that did not have their parents divorced.

The results show that people with divorced parents have a higher chance of stealing the bill than people with non-separated parents. All ages were the same except for the error of having a 16-year-old mixed with the other 15 year olds. Males also seemed to have stolen the bill more frequently as well, though this could have just been a lack of data, because there was not enough data to justify that males steal more

than females.

These results relate to the original question by proving that the age and gender do not have as big as an impact to committing crimes as ones past does. Research has been done in previous years where a test subject would read an article that states that cheating on an exam is not necessarily a bad thing and it encouraged the idea of cheating, there was

Discussion/Conclusion Continued

another group of test subjects that read an article stating that cheating was a very bad thing and it exaggerated the fact that cheating was wrong, these test subjects were called In weeks after to write an exam where the answers were simple to obtain but the instructor told them clearly to not look at the answers. Evidentially the group that

read the article stating cheating was wrong looked at the answers much more often than the group that read the article stating cheating was wrong.

This information shoes that your actions can be altered by experiences and information given to you not necessarily long ago. This information also proves that peoples decisions and moral structure may be altered by something as small as an article, so what if it was a friend you look up to, that would indeed make a much larger impact on your decisions and morals. This fact has been acknowledged in schools and families, the fact that you should select good friends that will guide and show you the right way.

Application

This information could be very affective if everyone was to accept it which is near impossible, this is

Application Continued

because we have lived our lives with the idea that all our decisions and mistakes are our free decision, which is correct to a certain point. That is where the struggle to have most people understand begins, but in an idle world this information would be useful

because in school systems instead of punishing a student, we should punish a student and find the

reason that caused the outcomes of his actions and have other students understand that these experiences/ feeling lead to this type of behaviour

and just by acknowledging this information we may be able to understand our selves more and control our actions more.

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because we have lived our lives with the idea that all our decisions and mistakes are our free decision, which is correct to a certain point. That is where the struggle to have most people understand begins, but in an ideal world this information would be useful

The Effects of Running on the Mental Health and Study Habits

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Abstract

In this study, the purpose of this experiment was to inquire the benefits of consistently running compared to any other physical exercise. The question investigated was 'how does running affect the mental health and study skills?'. Stress is a world-wide prevalent issue among all ages, and finding the solution to this is very critical. An experiment was formed to inquire how consistently running impacted one's stress level and study skills. The data was gathered from 15 different people through a stress tracker journal that was filled out daily at two different occasions. They did it daily before running, playing a sport or not doing any physical exercise and after doing the exercise. The stress level written for each category, was then averaged and data was compared to subjects participating in other sports (physical activity) and subjects that didn't participate in any physical exercise. The results for assessing the participants' study skills were gathered through a survey which was filled out before and after the 2-week study to ensure accurate results. The outcome of the experiment answered the initial question, running has a great advantage on the mental health, and a moderate benefit on one's study habits by alieving stress and improving many academic skills needed in the everyday life.

Introduction

The purpose of this experiment was to inquire the benefits of consistently running compared to any other physical exercise.

It is vital to inquire on this topic, as stress is increasing globally among all ages and finding a solution to it is required to lead a productive life (Running competitor). To move forward in this fast-paced world, running will

play a pivoting role in reducing mental stress, and enhancing mental abilities during the education years.

The question researched was how does running consistently affect a person's mental health and study skills.

The hypothesis for this investigation is, if people run more often, their mental health

and study habits will increase because running produces an endorphin rush, which in return reduces pain, combats stress, relaxes the mind, and even increases the neurons in hippocampus in the brain which is the control centre of memory and knowledge (Rodalewellness). Not only does running decrease a person's stress, but also improves and sharpens the brain. Some benefits on the brain directly impacted by running are, quick recall, improved focus, decision making, planning, organizing, and juggling mental tasks are all easier to accomplish (Team Airia).

(Figure 1) on the left shows a girl running on a bridge. Image retrieved from google images. (Figure 2) on the right shows a high-school runner racing at provincial championships (OFSAA) at Petawawa, Ontario.

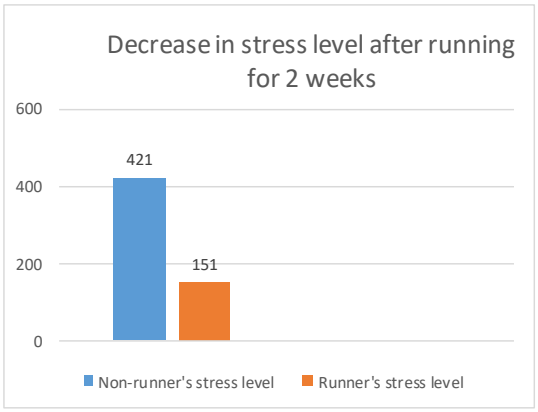
Methods

The experiment was done under a two-week study for participants who were either consistently running, playing different sports, or not exercising at all. This study was done by a stress tracking journal to accumulate accurate results. To collect data for this study, 15 participants were chosen, five subjects who consistently ran, five subjects who played different sports other than running and five subjects who did not participate in any physical exercise. All participants were asked to rate their stress from 0-10 (0 being no stress, 10 being the most stress) daily for 2 weeks before and after the participating in exercise. To collect data for study habits, the same participants were asked to fill out a study habits questionnaire. The subjects answered questions based on academic skills such as testing/reading, time management/ procrastination, concentration/memory, test anxiety, information processing and motivation/attitude. For constant runners, stress level was written down twice daily, on a scale of 1-10 (no stress is 0, highest stress is 10) and stress triggers (homework, exams, competitions, etc.) for that day in 'Stress Reduction Journal'. This was done prior to running and filled out again after running. 'Stress Journal Questionnaire' was filled out after the 2 weeks of marking down stress levels and stress triggers in 'Stress Reduction Journal'. The level of stress reduction in 'Stress Reduction Journal' was observed and how it was changed before and after running. The different options regarding the study habits were chosen in 'Study Habits Questionnaire' to find out how they were affected. Finally, all types of journals and questionnaires were compared to find out how running affected the mental health and study habits among the participants who played different sports or none at all. Subjects were asked to repeat steps 1-7 if they played other sports and substituted running for the sport they play. If no sports were played, stress level was marked down after getting home from school/ work and just before sleeping.

Majd Hailat

(Figure 3) shows the stress level of participant consistently running for 2 weeks (421) compared to participant who did not exercise (151)

In this study, three types of variables were kept into consideration. The dependent variable for this study is the amount of stress decreased after a run/other sports and the decrease or increase in study habits such as concentration, memory, and efficiency. These are dependant variables because they change depending on the participants physical activity. The independent variables were identified as the different type of participants. The participants in the study were changed so the results gathered for this experiment would be precise and more accurate, rather than gathering limited results. The constant variable throughout this study is the survey, the number of participants, and length of experiment. These factors were kept constant to keep a complete record of their stress level and study habits during the period of experiment. Another reason they were kept as controlled variables, was to ensure the accuracy and reliability of this procedure.



Results

At the end of the study, the data was collected and analyzed. After the stress levels and study skills were accumulated, the data suggests that after running for two weeks consistently, a person's mental health increased, study habits improved and stress decreased dramatically. Participants reported different stress levels in this two weeks study according to the scale, minimum stress level was 0, and maximum stress level was 1400 in total. As an added average, the five runners' stress level was 421 before running, and it declined markedly to 151 after two weeks of running. The participants engaging in other sports had a moderate reduction in stress from 354 to 253. As excepted, the stress level in the 'no physical activities group' remained almost unchanged, declining only marginally from 357 to 335. Results gathered in the study skills, were similar to the data in the stress reduction questionnaire (highest skills- 32, least skills - 0). The participants 'consistently running' achieved an average of 26-29, participants in other sports group scored an average of 24-27, and the 'none physical activity group' reached a score of 21-24.

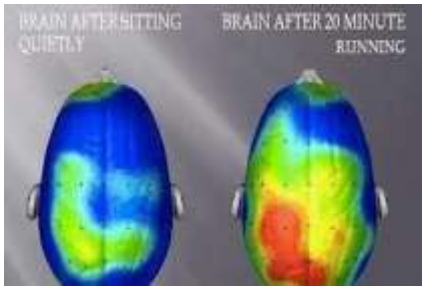
Discussion/Conclusion

After analyzing the data collected, the hypothesis was proven correct. The initial purpose was to determine the impact of running on a person's academic abilities and mental health. Two problems were encountered through this process. Although this questionnaire was done appropriately, some participants responded to the questionnaire to the best of their recall abilities, in case they filled out the questionnaire at a different time (later). Another problem was the different workloads of

assignments on different days. Participants having smaller homework to finish on certain days, noticeably felt less stressed as compared to the heavier homework days, regardless of their physical sports participation. Comparing the three groups (runners, other sports, no physical activity), academic skills seemed to be improved more in runners followed by other sports activities and stayed the same in the no physical activity group. The more marked improvement was observed in concentration/memory, motivation/attitude, test anxiety, and information processing. Whereas academic skills like writing and testing/reading improved only moderately. The time management/ procrastination skills were the most varied result collected. For future applications, this experiment could be done differently by expanding the time understudy, from two weeks to a few months to improve reliability, and increasing the number of participants. To gather data more accurately, for future this experiment could be done differently by gathering data from participants who had roughly the same amount of stress triggers such as homework, assignments, or projects to begin with, so the results will be accurate for all participants.

Application

Running can play a beneficial role in different aspects of life. It can be incorporated in many different areas such as stress reduction, physical health improvement, increased academic skills such as increased focus and concentration, and prevention of chronic medical diseases. Running will specifically help those who are prone to stress. It will also help a group of patients suffering with mental illnesses such as generalized anxiety disorder, depression, impulse control, addiction disorder, and substance use and abuse. Alleviating stress can minimize and prevent these mental illnesses besides impacting the physical health in a positive manner. In order to increase the students' academic grades, running can be used to improve study habits and eventually the overall school performance.



(After sitting still) (After running for 20 minutes)

(Figure 4) shows more brain activity on the right when the participant ran for 20 minutes, compared to when participant sat still for 30 minutes. Image retrieved from (http://newsroom.gehealthcare.com/week-3-getfit-update-campaign-gains-momentum/)

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Missing Consecutive Basketball Shots in Relation to Shooting Slumps

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SNC2DN, Vincent Massey Secondary School – Windsor, ON

Abstract

The question that was asked was whether missing a few consecutive shots in basketball can cause a shooting slump. The study was conducted by watching NBA players play and investigating the pattern of their shots made/missed. From the results gathered, it can be derived that if a player misses 3 or 4 consecutive shots, it causes a difference in their playing ability and they continue to miss for a while. Therefore, from these results and the analysis, it can be confirmed that missing a few consecutive shots in basketball can indeed caused a shooting slump.

Majd Hailat

Introduction

This project is about missing basketball shots and how they can cause shooting slumps. Researching and experimenting with this problem is important because it can help players who miss their shots often. It can help the player by letting them know how they can change their playstyle or mindset if missing their first shot negatively impacts their game. An example of why this is important is when Stephen Curry, one of the greatest shooters of all time, had a string of games last season where he shot very poorly and, so he needed to improve upon his shooting (Silverman, S (2017, September 11th) Does Your Body Angle Affect Your Basketball Shooting?).

The question that is asked is whether missing a few consecutive shots in basketball can cause a shooting slump for the rest of that game. A "shooting slump" is defined as a period of time in which a player misses every single shot that they take. The amount of shots missed for it to be classified as a shooting slump is 4 or more because that makes it a larger and more reliable sample size. Also, if a player misses a shot while playing basketball, then their performance in that time frame will be negatively affected as well. This is because if you shoot poorly, then your muscle memory of making shots and the memories of having the ball fall through the net will not be there. This is backed up by the fact that muscle memory makes it so that an action that you do very often is imprinted in your mind. However, if you don't make shots for a while, then your muscle memory will be messed up.

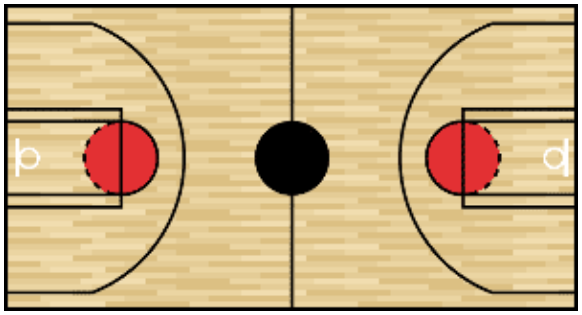
Methods

The procedure for this experiment is conducted through a manner of steps. First, a list of NBA players that want to be studied must be made. Then, a game in which that player is playing in must be watched to determine their shooting patterns. Afterwards, every time the chosen player makes or misses a shot, it must be recorded. At the end, the shooting patterns of the players can be looked at and compared.

The independent variable that will be used in this experiment is the chosen player. This is because every player has a different average for points per game, rebounds per game, assists per game, etc. Also, every player has a unique playstyle. Some players can be very aggressive

defenders, great shooters or all-around formidable athletes. Finally, some players can hit a lot of shots depending on their height compared to their defensive matchup, their own skill or their team's ability to get them good, open shots.

The dependent variable in this experiment will be the shooting percentages of the player, the amount of shots per game they take, the ability of the team of they're playing on, the quality of the shots they are taking and the ability of the opposing team on defense. The controlled variables will be the basketball (all the same size), the size of the court (all NBA courts are the same size) and the nets (all the same height).



Majd Hailat

Results

Player Name	Team	Opponent	Total Shots Taken	Shots Made	Shots Missed	Pattern of Missed and Made Shots (Made Shots=X,Missed Shots=O)
James Harden	Houston Rockets	Utah Jazz	23	15	8	XXXXXXXXXXOOOXXXXXXXOOO
James Harden	Houston Rockets	Memphis Grizzlies	25	11	14	OXOOXOOXXXXOOXOXOOXXOXOXOXO
James Harden	Houston Rockets	Cleveland Cavaliers	21	8	13	XOXOXOOXXXOXOOXOOOOOO
LeBron James	Cleveland Cavaliers	Houston Rockets	24	15	9	XXXOOOXXXXXXOXXOOXOXXOXO
LeBron James	Cleveland Cavaliers	Washington Wizards	34	23	11	XXXXOXXXOOOXXOXXXOOOOXXXOOOXXXOOOX
LeBron James	Cleveland Cavaliers	Atlanta Hawks	17	10	7	OOOXXXOOXXXOOXXXXX
Bradley Beal	Washington Wizards	Portland Trail Blazers	37	21	16	XOXXOXXOXXXOOOXXOXOOOXXXXXOOXXOXXOXXOXX
Bradley Beal	Washington Wizards	Utah Jazz	15	4	11	OXXOXOOOOOXXOOOX
Bradley Beal	Washington Wizards	Detroit Pistons	11	4	7	OXXOOOXXOOO
Paul George	Oklahoma City Thunder	Chicago Bulls	15	4	11	OXOXOOOOOOOOOXX
Paul George	Oklahoma City Thunder	San Antonio Spurs	16	5	11	OXOXOOOOOOXXOXOO
Paul George	Oklahoma City Thunder	New Orleans Pelicans	17	9	8	XXXOXXOXXOXXOOXXO
Kyrie Irving	Boston Celtics	Brooklyn Nets	20	8	12	OOXXOXXOOXXOOOOOXXOO
Kyrie Irving	Boston Celtics	Golden State Warriors	16	4	12	XOOOOXOOOOOOXXOO
Kyrie Irving	Boston Celtics	Atlanta Hawks	12	10	2	XXXOXOXXXXXX
Andrew Wiggins	Minnesota Timberwolves	Dallas Mavericks	15	7	8	XOXOOOOXXOXXOXX
Andrew Wiggins	Minnesota Timberwolves	Detroit Pistons	18	11	7	XOXOOXXXXOOOOXXXO
Andrew Wiggins	Minnesota Timberwolves	Charlotte Hornets	14	5	9	XXXOXOXXOOOOOO
Donovan Mitchell	Utah Jazz	Brooklyn Nets	15	5	10	OXXOOXXOXOOOXOOO
Donovan Mitchell	Utah Jazz	Orlando Magic	9	4	5	XOXOXOOOX
Donovan Mitchell	Utah Jazz	Philadelphia 76ers	19	6	13	OXOOOOOOXXXXOOXOOOOO
Kyle Kuzma	Los Angeles Lakers	Phoenix Suns	23	11	12	OOOOOOXXXXXOXOOXOXXOXOOX
Kyle Kuzma	Los Angeles Lakers	Denver Nuggets	11	7	4	XOXOOXXXXXO
Kyle Kuzma	Los Angeles Lakers	Chicago Bulls	15	7	8	XXXOXOXOXOOXXOOO
CJ McCollum	Portland Trail Blazers	Memphis Grizzlies	17	8	9	OXXOXXOOOXOOOXOXX
CJ McCollum	Portland Trail Blazers	Philadelphia 76ers	14	1	13	OOOOOOOOXOOOOO
CJ McCollum	Portland Trail Blazers	Brooklyn Nets	19	10	9	OOOXXXOOOXXXXXXOXXOOX
Robert Covington	Philadelphia 76ers	Houston Rockets	8	2	6	OOOXOOXO
Robert Covington	Philadelphia 76ers	Atlanta Hawks	15	7	8	XXXOXOXOOOXXOOO
Robert Covington	Philadelphia 76ers	Indiana Pacers	13	8	5	XOXXOOXXOXXOXX

Table 1. A table which shows the data collected from NBA players and their shooting stats as well as their pattern of misses/makes.

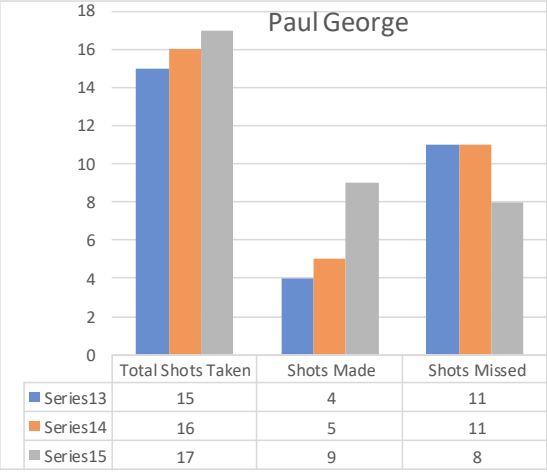


Figure 1. The numbers of misses per attempts of the NBA player Paul George

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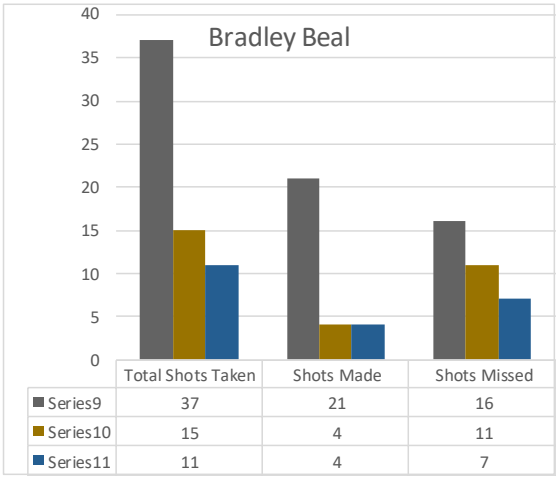

Figure 2. The numbers of misses per attempts of the NBA player Bradley Beal

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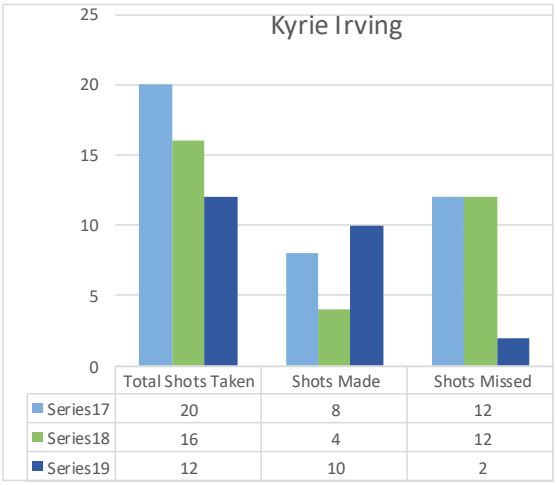

Figure 3. The numbers of misses per attempts of the NBA player Kyrie Irving

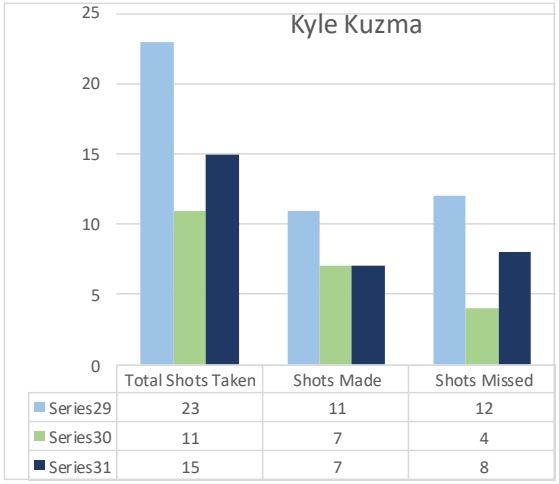

Figure 5. The numbers of misses per attempts of the NBA player Kyle Kuzma

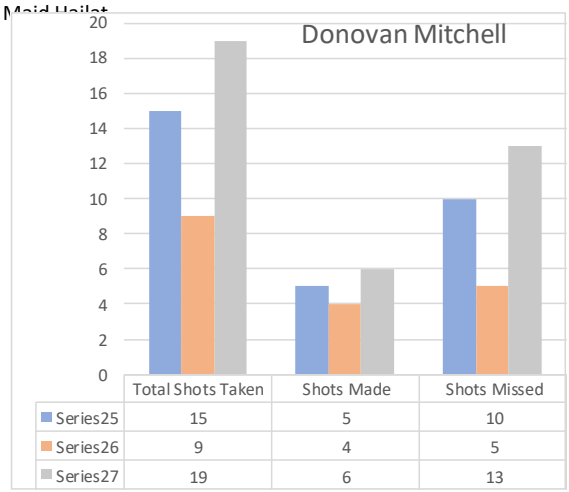

Figure 4. The numbers of misses per attempts of the NBA player Donovan Mitchell

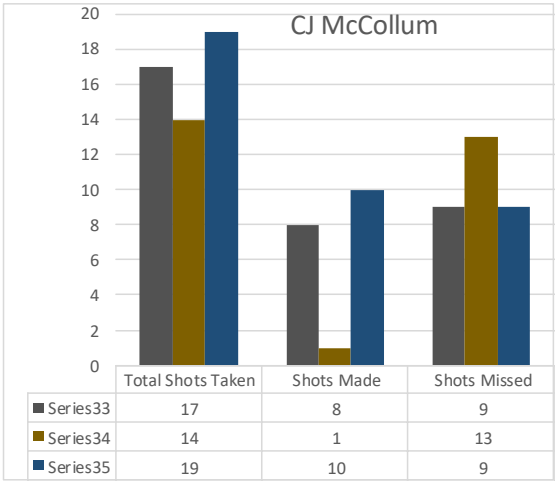

Figure 6. The numbers of misses per attempts of the NBA player CJ McCollum

Majd Hailat

Discussion/Conclusion

In the end, the hypothesis of the question of whether missing a few consecutive shots in basketball can cause a shooting slump was proven to be correct. This is proven in the data which is highlighted in Figure 2. James Harden proves the hypothesis when he missed a few shots in a row against the Cleveland Cavaliers and ended up finishing the game with 6 consecutive misses. It is also evident in Paul George's performances against the Chicago Bulls and the San Antonio Spurs. In the first game, he missed a few shots and ended up missing a grand total of 9 consecutive shots and in the second game, a similar situation occurred, and he missed

6 consecutive shots. However, the game in which I found this most evident in is in CJ McCollum's game against the 76ers, in which he missed 7 consecutive shots, made one shot and missed another 5 shots. This relates to the question because it provides an answer to the question of whether missing a few consecutive shots can cause a shooting slump. It relates to the hypothesis because it proves that it is correct and that missing a few consecutive shots indeed causes a shooting slump. However, it also shows that this doesn't occur often to players that are at an elevated level such as James Harden and LeBron James. They can be considered as outliers.

Player Name	Team	Opponent	Total Shots Taken	Shots Made	Shots Missed	Pattern of Missed and Made Shots (Made Shots=X, Missed Shots=O)
James Harden	Houston Rockets	Utah Jazz	25	19	6	XXXXXXXXXXOXXXOXXXXXXXOOO
James Harden	Houston Rockets	Memphis Grizzlies	25	11	14	OXOOXOOXXXOOXXOOXXXOOXXO
James Harden	Houston Rockets	Cleveland Cavaliers	21	8	13	XOXXOXOOXXXOXXOXOOOOOO
LeBron James	Cleveland Cavaliers	Houston Rockets	24	15	9	XXXOOXXXXXXOXXOOXOXXOXO
LeBron James	Cleveland Cavaliers	Washington Wizards	34	23	11	XXXXXOXXXOOXXXOXXXXXXXXXOOXXXXXOOX
LeBron James	Cleveland Cavaliers	Atlanta Hawks	17	10	7	OOOXXXOOXXXOOXXXX
Bradley Beal	Washington Wizards	Portland Trail Blazers	37	21	16	XOXXOXXOXXXOOOXOXXXXOOXXXXXXXOXXOOXXOX
Bradley Beal	Washington Wizards	Utah Jazz	15	4	11	OXOOXOOOOOXOOOX
Bradley Beal	Washington Wizards	Detroit Pistons	11	4	7	OXOOOXXXOOO
Paul George	Oklahoma City Thunder	Chicago Bulls	15	4	11	OXOXOOOOOOOOOX
Paul George	Oklahoma City Thunder	San Antonio Spurs	16	5	11	OXOXOOOOOXOXOOO
Paul George	Oklahoma City Thunder	New Orleans Pelicans	17	9	8	XXXOXOXOOXOXOXXO
Kyrie Irving	Boston Celtics	Brooklyn Nets	20	8	12	OOXOOXOOXXOOOOXXXXOO
Kyrie Irving	Boston Celtics	Golden State Warriors	16	4	12	XOOOOXXOOOOOOXXXOO
Kyrie Irving	Boston Celtics	Atlanta Hawks	12	10	2	XXOXXOXXXXXX
Andrew Wiggins	Minnesota Timberwolves	Dallas Mavericks	15	7	8	XOXOOOOXOXXOXX
Andrew Wiggins	Minnesota Timberwolves	Detroit Pistons	18	11	7	XOXOOXXXXXOOXXXOXO
Andrew Wiggins	Minnesota Timberwolves	Charlotte Hornets	14	5	9	XXOXOXXOXOOOOOO
Donovan Mitchell	Utah Jazz	Brooklyn Nets	15	5	10	OXXOOXXOXOOOXOOO
Donovan Mitchell	Utah Jazz	Orlando Magic	9	4	5	XOXOXOOOX
Donovan Mitchell	Utah Jazz	Philadelphia 76ers	19	6	13	OXOOOOOOXXXXOOXOXOOOO

Table 2. The highlighted rows indicate the most evident examples of shooting slumps

Application

This information could be useful for fields of study such as neurology to explore the mental aspect behind this problem. Also, it could be used in the fields of study of biology to study whether the problem has something to do with the muscle movements of the player. This information could also be used by the general public or the scientific community to show that shot selection really is crucial and if you miss one shot, it could turn out to a disaster. These results ultimately fit into the big picture of the NBA because these players could use the information gathered on them to improve their game and not get into as many shooting slumps.

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How does practicing affect your natural handwriting?

Rachel Yan

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Abstract

The question that started this whole experiment was to find the answer to if practicing will make any significant differences to our natural handwriting. If people are not satisfied with how their writing looks, then this would provide them with a chance. To see if there was an affect, in a set period of time participants were asked to practice their handwriting in pen and pencil. The handwriting would then be compared and analysed to see if there were any differences. The results showed no significant or major changes in the participants handwriting. according to the results it can be concluded that practicing your handwriting makes no significant difference.

Introduction

Handwriting is a huge part of our daily routine and sometimes people aren't satisfied with it. If people are willing to change how they write, then this experiment will allow them to see if it's possible. There was a study that was done that indicated that personality is linked to handwriting. If people change the way they

write it can be possible that it can affect your personality in a good way. Another study showed that people are quick to judge and that includes how they perceive other's handwriting. If people want to be perceived in some way, then changing their handwriting can help.

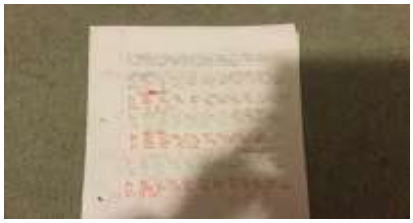
The big question is how practicing will affect natural handwriting. If people practice their handwriting then there will be a significant change because if they have the will and determination to do it, the brain will most likely accept these changes. It has been proven that the reason that people's handwriting can change no matter the age is because they have the will to do it. If we reverse this process, then in theory you can change your handwriting. When you write something down the brain sends electrical impulses to the hand muscles. When people do things frequently then the brain will remember them, and it will slowly morph into everyday habits. Hard practice and practice go a long way when doing something. There are lots of situations where practice show improvement.

Methods

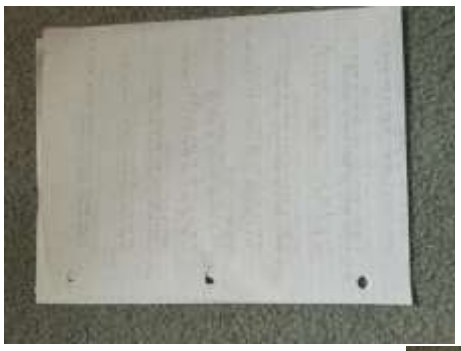
The experiment was conducted in a period of 21 days. Participants were asked to write down an initial sentence to give a base line of what their handwriting looked like naturally. Then they were asked to write down the alphabet two times once a day in both pen and pencil to see if different utensils made a difference. The participants were also asked to time themselves to see if time had any factor in how participants would write. Participants were also asked not to erase anything since the raw data was preferred. On the last day of the experiment participants were asked to rewrite the base sentence again to be compared to the first time the sentence was written down. The participants are asked to keep all the papers safe and then hand them in on the designated day. The handwriting was then analysed and compared. The participants were then asked to answer a few questions to find out how they felt about the experiment. The dependent variable is the handwriting that each participant produced. It was what needed to be measured to answer the big question to see if practicing affects how the person's handwriting turned out. The independent variable of this experiment is the utensil that the participants used and the time it took to write things

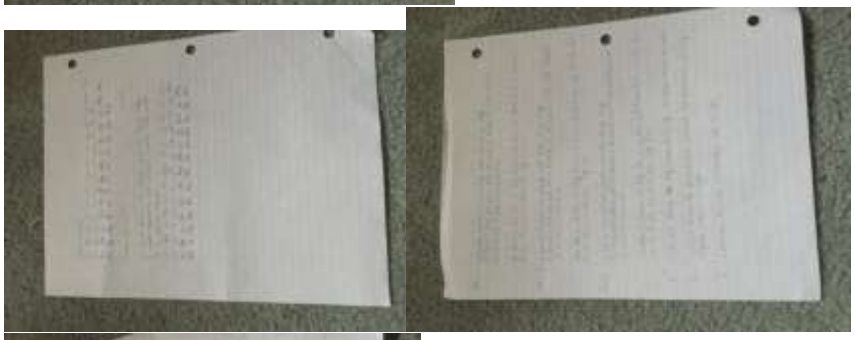
down. Those were changed to see how it would affect the outcome of the participants' handwriting. The controlled variable was the practice and the initial sentence because it was to give all participants an equal footing to do the experiment, so there were no advantages or disadvantages

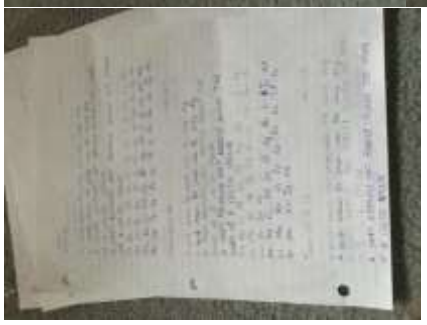
Results



Majd Hailat







Question	Answer	Answer	Answer
1. Do you think your handwriting changed in anyway? If so how?	Style didn't change, but got neater	Did not think handwriting changed much	Handwriting got neater
2. Did the practice help?	It might've	Didn't think it helped	Found it helpful

3. Did you find writing with a different utensil help you and make anything easier or do you prefer the one you regularly use?	Prefer pencil and didn't help, but it depends on what surface is being written on and what is being written	Didn't think it was helpful and prefer the utensil normally used	Didn't think writing with different utensil helpful and prefer the normal one

The pictures on the left is the handwriting that participants started out with and the pictures on the right is the handwriting once they were done the writing practices. There were side by side comparisons to see if there was any difference between the two. The table contains the answers of the questions that were asked.

Discussions/Conclusion

My hypothesis was not correct if people practice their handwriting then there will not be a meaningful change. According to the data collected people did not think that practicing handwriting changed anything. According to experts It is completely up to the person who is writing and how they are growing and developing or if they have physical or mental changes, so there are other factors that can affect how handwriting is changed and not just will. There was a lot of demanding work and practice that went with this experiment and it didn't really help. This might not morph into people's daily handwriting since nothing significant happened. There wasn't a wide range in age, so it is not clear if the same results would happen in different age groups. The answer to the question "how will practice your handwriting affect your daily handwriting" according to my data is that it doesn't do a lot to affect your daily handwriting.

The analysis if the handwriting is quite subjective, so this analysis is according to personal views. Analyzing the practice that was done not much change was noticed from the beginning of the test and the ending. All results show that the most this test did was make the handwriting neater and according to data collected participants did not think that this test helped. Although according to experts it usually takes 30 days to show any significant difference in handwriting. Also, it is mentioned that to change your handwriting people must be willing to change it, and the participants might not have had the will to change

anything. Also, other factors were not taken into consideration like mood and others. This experiment went on for only three weeks, so maybe if it was extended there would be a more significant difference such as slating, change in size etc. The timing of the practices also went down as time, as weeks progressed, but it was not in a steady consistent flow downwards sometimes the time would rise back up from time to time by one or two seconds, but that is to be expected. The use of pen did not help or change anything in the daily handwriting of people according to data.

Application

This information can be used by people who want to change their handwriting and want to know if practicing can help in anyway. Handwriting is directly linked to the brain, so the data that was collected may help in the psychology of handwriting. It might also spread awareness to the importance of handwriting since it's been dying with the more technological advances in our society. Also, it could show how practicing things repeatedly may not always have the affect that you think it does.

APA Citation

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What is the best way to get faster

(ABSTRACT)

The purpose of this experiment was to find the best way to gain speed. This project is important because athletes will be able to utilize this information to help them and people alike. To do this, there was a comparison between two workouts to determine which one was better. One of them was custom made, and the other was professionally made. Subjects would test these workouts, by using them and then switching them later to see which one had improved more. The results that were determined were that the custom-made workout had better results than the professional workout. 4/6 of the subjects had better results than the 2/6 that improved more in the other workout. The custom workout was better than the professional workout.

(INTRODUCTION)

Many student athletes, professional athletes, and people alike try to achieve a goal when they exercise. The biggest question on their mind is “how to improve or get better”. This is important to these people because for student athletes; they need to get better to help win team games or independent sports. For professional athletes they would want to be the best and achieve new human heights. For athletic people, they could use this to help them, do better if they participate in marathons. When you exercise your muscle fibers get damaged and so your body tries to repair it with a cellular process. The muscle fibers are formed with new muscle proteins and, so that increases muscle mass and strength.

For those who are more focused on the running aspect of fitness, they try to get faster and increase their endurance. Then the real question is (“What is the best way to get faster?”) In the shortest and most efficient way possible. That’s where this project comes in. So, to find what is the best way to get faster, this project compares a professional workout to a custom workout.

If changing the method of training by rearranging and adding more exercises such as core exercises, arm exercises, calve exercises, and back exercises, than this should increase speed for running because these exercises focus more on the movements of body while running. With more exercises the results should be better due to the increase of intensity.

(METHOD)

To start this experiment initially there are supposed to be a minimum of 6 or more subjects, with even numbers. The total amount of subjects are then separated into two groups, one that focuses on the professional workout first then the other group focuses on the custom-made workout. Record the

subjects start times after placed into groups. Group one, follows the custom-made workout according to (Figure 1). Group two, then follows the professional workout according to (Figure 2). Once both groups finished their start workouts, group 1 then follows (Figure 3) track workout, and group 2 starts their track workout (Figure 4). Once a all workouts are finished, continue the next day and record the data again. Continue this project for at least a minimum of 2 weeks or more, for both workouts. The independent variables are the two workouts. The dependent variable is the end speed of the subjects. The controlled variables are the weather, clothes, location, and equipment (timer).

(FIGURE 2)

1. Squats – *15 reps*
2. Barbell Squats – 4 sets of 10 reps
3. Leg Press – 3 sets of 6 reps
4. Calf Lifter – 4 sets of 10 reps
5. Wall Squats – 1 min with a weight of 50-80 max of carry
6. Dead Lift – 5 sets of 6 reps
7. High knees – 1 min

(Figure 3)

1. Skips - *50m*
2. Backward Skips - *50m*
3. High Knees - *50m*
4. Butt Kicks - *50m*
5. Backward runs - *50m*
6. Leg swings (front and back) - *10 reps*

Track training session I

Conditioning Run

8 x 200m. After each sprint, walk back to the start. Rest 2 minutes. Target time for each 200: 30 seconds or under.

Track training session II

Race Modeling Run

250m

150m x 2

Rest 90 seconds in-between reps and 8 minutes between sets.

(*FIGURE 1)*

1. Do Power Cleans - *5 sets of 5 reps*
2. Do Barbell Squats - *3 sets of 6 reps*
3. Do Bench Press - *3 sets of 6 reps*
4. Do Plate and Bodyweight Complex Finisher - *3 supersets of the following:*
5. Do Chin-ups - *10* reps
6. Do Jump Squats w/plate - *12 reps*
7. Do Hanging Knee raise - *20* reps
8. Do Reverse Lunge w/knee drive - *8 reps on each leg*
9. Do Dips - *10 reps*
10. Do Sled Drag (40 ft.)

(Figure 4)

1. Lunges – 50m
2. Sigon squats -1 min
3. Reaching toes – 30 secs

Track training session I

Conditioning Run and Endurance Run

2 x 800m. After each run, walk back to the start. Rest 10 minutes. Target time for each 800: 3 mins or under.

Track training session II

Race Modeling Run

250m

150m x 2

100m

Rest 3 mins in-between reps and 8 minutes between sets.

RESULT

Table 1 "Experiment 2" Professional (Part 1)

Distances

Subjects	Number of Weeks	400m	200m	100m	Percentage of improvement
Baqer	0	1:56:41 mins	38.23 seconds	15.68 seconds	11.1% Increase in speed in 400m
	1	1:48:29 mins	37.56 seconds	15.23 seconds	3.7% Increase in speed in 200m
	2	1:43:47 mins	36.78 seconds	14.24 seconds	9.1% Increase in speed in 100m

Mitch	0	1:09:08 mins	33.76 seconds	14.87 seconds	11.7% Increase in speed in 400m
	1	1:04:87 mins	34.56 seconds	14.24 seconds	2.6% Increase in speed in 200m
	2	1:00:98 mins	32.87 seconds	14.04 seconds	5.5% Increase in speed in 100m
Aria	0	1:37:24 mins	42.67 seconds	16.98 seconds	11.2% Increase in speed in 400m
	1	1:29:28 mins	40.23 seconds	16.36 seconds	6.5% Increase in speed in 200m
	2	1:26:26 mins	39.89 seconds	15.97 seconds	5.9% Increase in speed in 100m

m=meters

Table 1 shows, all three subjects that tested the professional workout achieved around 11% increase in speed in 400m. In 200m, subjects have achieved an increase of 3.7%, 2.6%, and 6.5% in speed. In 100m, the three subjects have achieved increases of 9.1%, 5.5%, and 5.9%.

Table 2 "Experiment 2" Professional (Part 2)

Distances

Names	Number of Weeks	400m	200m	100m	Percentage of improvement
Roger	0	1:01:25 mins	30:78 seconds	13.97 seconds	8.1% Increase in speed in 400m
	1	59:45 seconds	29:89 seconds	13.47 seconds	7.6% Increase in speed in 200m
	2	56:98 seconds	28:43 seconds	13.49 seconds	3.4% Increase in speed in 100m
Felix	0	1:00:24 mins	35:24 seconds	16.11 seconds	5% Increase in speed in 400m
	1	1:00:89 mins	32:56 seconds	15.65 seconds	11.9% Increase in speed in 200m
	2	57:18 seconds	31:03 seconds	14.98 seconds	7% Increase in speed in 100m
Majd	0	2:06:72 mins	47:78 seconds	18.67 seconds	5.1% Increase in speed in 400m
	1	2:05:98 mins	45:43 seconds	18.42 seconds	11% Increase in speed in 200m
	2	2:00:23 mins	42:48 seconds	18.03 seconds	3.4% Increase in speed in 100m

Table 2 shows, the next three subjects that tested the professional workout have achieved 8.1%, 5%, and 5.1% increase in speed in 400m. In 200m, subjects have achieved 7.6%, 11.9%, and 3.4% increase in speed. In 100m, subjects have achieved 3.4%,7%, and 3.4% increase in speed.

Table 3 "Experiment 1" Custom (part 1)

Distances

Names	Number of Weeks	400m	200m	100m	Percentage of improvement
Roger	0	1:13:51 mins	35.43 seconds	15.54 seconds	10% Increase in speed in 400m
	1	1:10:56 mins	32.65 seconds	15.03 seconds	8.5% Increase in speed in 200m
	2	1:05:36 mins	31:98 seconds	14.29 seconds	8% Increase in speed in 100m

Felix	0	1:23:93 mins	45:34 seconds	17.43 seconds	22% Increase in speed in 400m
	1	1:15:27 mins	40:21 seconds	17.02 seconds	15.9% Increase in speed in 200m
	2	1:05:29 mins	38:12 seconds	16.57 seconds	4.9% Increase in speed in 100m
Majd	0	2:27:23 mins	50:87 seconds	23.3 seconds	10% Increase in speed in 400m
	1	2:19:53 mins	52:24 seconds	19.79 seconds	4% Increase in speed in 200m
	2	2:12:24 mins	48:24 seconds	19.31 seconds	17% Increase in speed in 100m

Table 3 shows, all three subjects that tested the custom workout achieved 10%, 22%, and 10% increase in speed in 400m. In 200m, subjects have achieved an increase of 8.5%, 15.9%, and 4.9% in speed. In 100m, the three subjects have achieved increases of 8%, 4.9%, and 17%.

Table 4 "Experiment 1" Custom (part 2)

		Distances			
Names	Number of Weeks	400m	200m	100m	Percentage of improvement
Baqer	0	1:38:78 mins	35.89 seconds	14.20 seconds	11.2% Increase in speed in 400m
	1	1:32:65 mins	35.12 seconds	14.03 seconds	5.5% Increase in speed in 200m
	2	1:27:47 mins	34.23 seconds	13.77 seconds	3% Increase in speed in 100m
Mitch	0	58:78 seconds	32.08 seconds	13.78 seconds	6.7% Increase in speed in 400m
	1	57:45 seconds	30.69 seconds	13.67 seconds	9.3% Increase in speed in 200m
	2	54:89 seconds	28.98 seconds	13.39 seconds	2.8% Increase in speed in 100m
Aria	0	1:23:21 mins	38.34 seconds	15.45 seconds	7.2% Increase in speed in 400m
	1	1:19:45 mins	37.98 seconds	15.49 seconds	1.5% Increase in speed in 200m
	2	1:17:24 mins	37.76 seconds	15.05 seconds	2.5% Increase in speed in 100m

Table 4 shows, the next three subjects that tested the custom workout have achieved 11.2%, 6.7%, and 7.2% increase in speed in 400m. In 200m, subjects have achieved 5.5%, 9.3%, and 1.5% increase in speed. In 100m, subjects have achieved 3%, 2.8%, and 2.5% increase in speed.

DISCUSSION/CONCLUSION

The hypothesis was correct with the results that if changing the method of training by rearranging and adding more exercises such as core exercises, arm exercises, calve exercises, and back exercises, than this should increase speed for running because these exercises focus more on the movements of body while running. With more

exercises the results should be better due to the increase of intensity.

The best way to get faster is to use the custom workout, because the custom workout focuses more on the movements of the body and during the experiment, it showed better results that 4/6 of the subjects improved more. The custom workout also showed the highest amount of improvement with 22% in 400m.

These results relate to the original question because they indicate and show an increase in speed which showed improvement. The custom workout results had better progress than the professional workout results.

The data does support my hypothesis, due to the better increased speed results from most subjects, by adding more essential exercises the better balanced the body is.

My results are consistent with other investigators because other investigators have similar procedures and have the similar idea of balancing the exercises and doing more full body.

For problems and errors that may have affected the experiment, were the weather conditions, the subject's efforts and the subject's diets. The weather conditions would affect the results because the temperatures would tire out the subjects more quickly or tighten the muscles up more. In hot summer temperatures, the subjects would sweat more and get dehydrated. In cold winter temperatures, the subject's muscles would freeze and tighten up and slowing down the circulation in the body, making them run slower. For the subject's diets, having a bad diet could lead to bad energy requirements, poor performance, low hydration levels, and bad macronutrient needs. The amount of effort is also important because it affects the accuracy of the end results, by not going to the full potential. If these problems or errors had not happen, then in the experiment results would have been received faster and the potential increase in speed should have been greater.

APPLICATION

How would this information be applied to other fields of study?

This information would be applied to other fields of study such as other sports, myology and kinesiology. In other sports they could see where and how to use speed to their better advantage. In football for example, they could use this study to help their players run faster and get into their positions quicker. In myology and kinesiology, this information can be used to see, how to train the muscle the most efficient way possible and see how efficient the muscle is used.

How would the general public or scientific community use this information?

The use of this information would help the general public by helping parents help their kids train for their special sport. In the scientific community they could see the most efficient way to train.

How do your results fit into the big picture?

These results can help any future athlete globally trying to achieve athletic goals. This is a very universal workout experiment where any sport can use it to train and get better.

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The Holistic Qualities of Music and Their Influence on the Appreciation of Music

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Abstract

The purpose of this experiment was to find out the most influential qualities of music, in order to determine what causes people to like the songs they like, and why. The plan for completing this experiment was to conduct a survey that would present songs and question the subjects on the qualities of the songs. The subjects would answer questions related to how influential the qualities of music were in the liking of the song, as well as how influential each quality was in relation to all the others. The results proved to be thorough, showing that "melody" was the most influential quality in the process of forming an opinion for a song, being chosen exactly 40% of the time over the other 5 options by the subjects. "Rhythm" was the second most influential quality, being chosen about 20.667% of the time by the subjects as the quality that influenced the subject's opinion on the song the most. "Beat and meter" was a close third, at being chosen about 18.667% of the time. "Tempo" was the most influential at 8% of the time, where as "harmony" was the most influential at 6.667%, and "pitch" was the most influential only 6% of the time. These results show that a listener's opinions on a song are influenced the most by the melody, which is proven by trends in the current industry of music, as melody-driven pop songs are popular. These results imply the most important factor in the forming of an opinion of a song is the melody, the rhythm, and the beat – in that order.

Introduction

The purpose of this experiment was to get a better understanding for the appreciation of music, and to attempt to make sense of 'good' music, which is inherently subjective, in a way that results in answers that can be quanitified and are objective. In early April of 2017, a scientific article was published that discussed various properties of sound and music, and their effects on creating an aesthetic musical experience for the listener (Brattico et al., 2017). This experiment is an attempt to expand upon the effects of the qualities of music on the experience that is created for the listener.

The question that was formed from this study was the following: What qualities of songs impact the appreciation of the songs by the listener the most? If the way to find the most impactful qualities of songs was to get feedback from many listeners on songs, then creating a survey that provides concise, accurate results on the influence of specific qualities of music, as well as the whether the song is liked or disliked thanks to the most important quality, should be possible. This should be possible because providing questions for specific criteria to collect specific data should be easy to do with surveys, as the surveys can make very specific questions easy to answer by putting them into the format of multiple choice, or numerical scale.

Methods

In order to conduct this experiment, holding a survey would be the most ideal way to collect results effectively. Before holding the survey, multiple subjects who agree to complete the survey need to be obtained (preferably at least 10 or more subjects). Each song quality must have its own section, wherein there must be at least two songs that demonstrate the opposite ends of each quality (i.e. for the quality 'tempo', one song with the primary quality of tempo would have a fast tempo, and one song would have a slow tempo). The survey must allow for the subjects to describe which songs they liked, why they liked them, and what quality of the song impact their opinion the song the most. Once the survey is organised into sections by quality, get the subjects to complete the survey. Once all subjects are done surveying, collect the data and organise it in a readable format (i.e. excel sheets). Once the data is organised, cross-reference the data from all songs to find out what qualities are the most influential from all songs. Additionally, it should be noted which songs are liked or disliked the most, in order to determine exactly how the most influential quality of the song affected the song: whether a quality causes dislike or appreciation more. The primary quality that

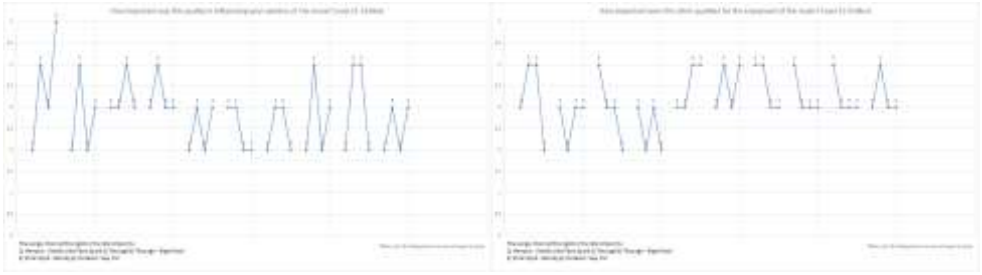
the song is associated with (see the example of the quality 'tempo' from the other column) should also have it's influence on the song recorded – this should determine whether a quality that is very prevalent in a song is necessarily the most impactful factor of that song or not. A simple number scale is fine for these questions , as they allow for the results to be quanitified easier. A number scale for these questions could just be from 1 to 5, where 1 meant that the quality was the least impactful / the song was greatly disliked by the subject, and 5 could mean that the quality was the most impactful / the subject greatly liked the song. Just a multiple choice for choosing the most influential non-primary quality should suffice, and should make analysing data easier. These are all the steps needed to make and collect the results. The independent variable in this experiment is the song that is changed: many songs will be chosen, but only one variable changes – the song that is played. The dependent variable is what the subjects rate the songs they hear. The control variable is the fact that all subjects are listening to and rating the same songs (i.e. if there are 20 subjects, they will all listen to the same selection of songs).

Commented [SM2]: Make sure I change this ending to have a proper ending

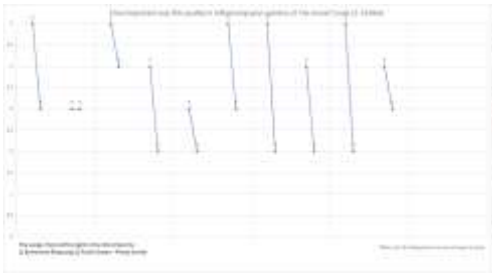
Commented [SM1]: Primary quality – rewrite earlier += tempo example

Results

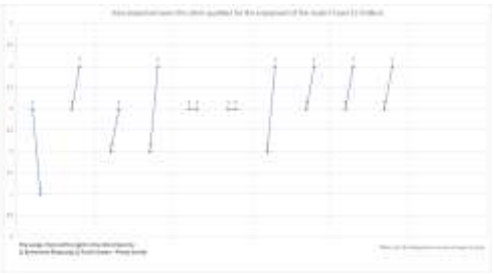
The results proved to be thorough, showing that "melody" was the most influential quality in the appreciation of a song, being chosen exactly 40% of the time over the other 5 options by the subjects. "Rhythm" was the second most influential quality, being chosen 20.667% of the time. "Beat and meter" comes third, being chosen about 18.667% of the time. "Tempo" was the 4th most influential, being chosen 8% of the time. "Harmony" was the 5th most influential, at 6.667%, and "pitch" was the least influential at being chosen only 6% of the time. These percentages were calculated by taking all of the times that specific quality was chosen as the songs most influential quality, divided by the number of times the subjects were asked about which quality was the most influential. This shows the percentage that that specific quality was chosen as the most influential, on average. The results showing how much the main associated quality affected the subject's appreciation of the song on a scale of 1 to 5 are shown below, along with the results for how much all of the qualities that are not the main associated quality affected the appreciation of the song (on a scale of 1 to 5 as well).



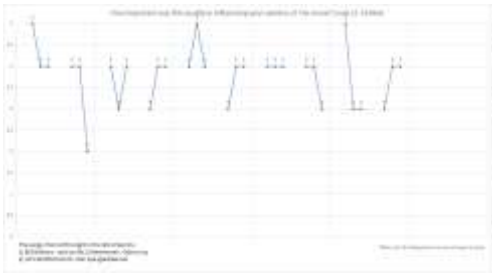
Results for the influence of ‘beat and meter’ on songs where ‘beat and meter’ is the primary quality



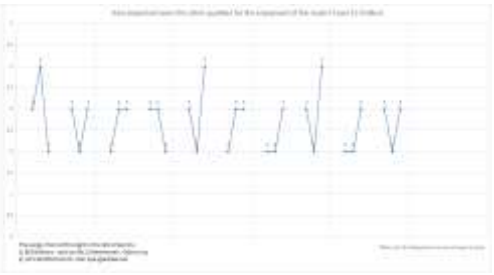
Results for the influence of other qualities on songs where ‘beat and meter’ is the primary quality



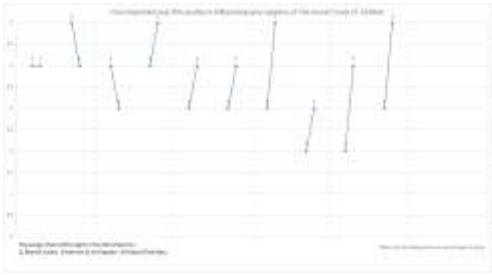
Results for the influence of ‘harmony’ on songs where ‘harmony’ is the primary quality



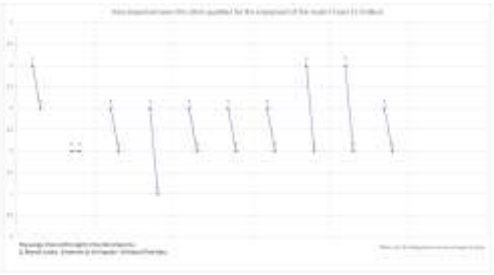
Results for the influence of other qualities on songs where ‘harmony’ is the primary quality



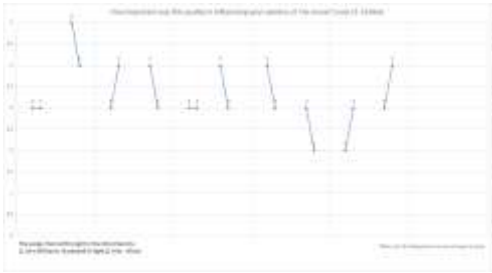
Results for the influence of ‘melody’ on songs where ‘melody’ is the primary quality



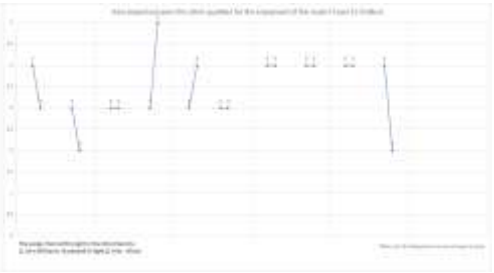
Results for the influence of other qualities on songs where ‘melody’ is the primary quality



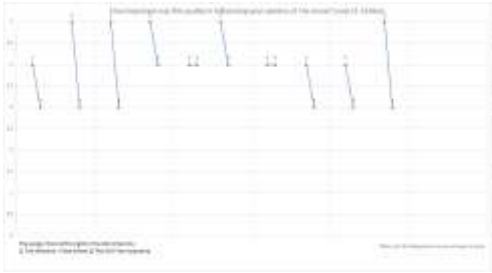
Results for the influence of 'pitch' on songs where 'pitch' is the primary quality



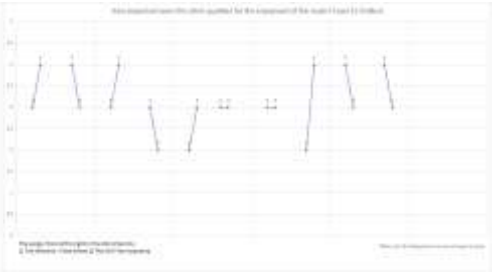
Results for the influence of other qualities on songs where 'pitch' is the primary quality



Results for the influence of 'rhythm' on songs where 'rhythm' is the primary quality



Results for the influence of other qualities on songs where 'rhythm' is the primary quality



Results for the influence of 'tempo' on songs where 'tempo' is the primary quality

Results for the influence of other qualities on songs where 'tempo' is the primary quality

Discussion/Conclusion

The hypothesis that was initially stated was proven to be correct: a survey was created that was able to determine the most influential qualities of music, while also showing which qualities of a song are the most important, and how much the song was liked. The results were clear, and showed how important each quality was in comparison to each other. For example, the quality 'melody' was the most influential quality 40% of the time – this knowledge was contrived from the survey results, and helped to illustrate which qualities were the most important, and when held in comparison with the influence of other qualities (in terms of percentage), can show the importance of the other qualities in relation to one specific quality. The most significant results were the top 3 most influential qualities of a song: 'melody', 'rhythm', and 'beat and meter', in that order. While melody was significantly the most influential, rhythm and beat and meter were

almost equally important in terms of helping a subject form an opinion on a song. These results help to answer the original question exactly, by showing which qualities of music are the most important, through displaying the most influential qualities for the appreciation of a song by a subject. The scientific article mentioned in the introduction suggested that properties such as tempo had a fairly significant influence on the preference and liking of music, where slow tempo would be associated with sadness, and fast tempo would be associated with happiness – and would also be rated more positively than songs with slow tempo (Brattico et al., 2017). However, this suggestion was not mirrored in these results, as the quality 'tempo' was noted to be the most influential about 8% of the time. Another notable difference between the expectations for 'tempo' was that only the song with fast tempo were noticed to be disliked by subjects– the song with slow tempo was consistently liked, and never disliked. There were some problems and sources of error in this experiment. More songs could have been used for each section quality. More songs would've helped to remove the risk of subjects already having opinions on the songs used, that might be based off of things unrelated to the actual qualities of the song. Having more clear examples of songs for less obvious qualities (like the difference between 'rhythm' and 'beat and meter') may have helped to prevent any confusion from the subject in regards to what quality they were actually rating on the survey, so that they wouldn't accidentally judge a quality thinking it represented a different quality of the song. If these problems did affect the results, then being more thorough in the music choice would result in more accurate results. Another possible source of error would be localised taste: since the subjects are all Canadian-based, the responses to the qualities of music might be different than the responses of someone living in a foreign country who has a musical taste of songs that sound very different from the West. The clear solution is to survey many people, world-wide.

Application

This information can be used in other fields of study, such as psychology. A in-depth analysis of how the brain physically reacts during listening to a song, as well as how a brain actually 'enjoys' a song, can use these results from this experiment as reference, because the results provide information about what qualities are most important, and they influence a person's opinion on a song. This information (or at least the methods used) could help to prove why or how a certain quality of a song affects your brain physically, and what changes music can cause to the brain, since the results also describe how a quality influences how someone appreciates a song. In the broad scope, these results cannot be relied upon outside of the western world, as music influences world wide are different than the music styles in the West. This experiment resulted in answers from subjects who had only been immersed in westernised music. To get an accurate representation of

the rest of the world, a wider range of subjects must be used. If this is done, then the results would be globally accurate, and could be reliably used in research. These results can still be used in the western world, specifically for people who intend to create music that panders to people's preferences based off of the qualities of music that this experiment's data deems the most influential. People who make music could look at the collected data and make their songs around the most influential qualities, resulting in (hopefully) songs that are hits. If more subjects take the survey, and there is a wider range of subjects in terms of their experience with music, then the data collected and analyzed from this experiment will become more accurate, and could be used for more things reliably.

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ABSTRACT

Throughout this project, the question that is being researched is on different genres of music and how it can affect teenagers physically and mentally. This is important to be researched because this can show the importance of music by emotions and movements as well as the benefits. To display the results of the question being asked, a survey is given in which students listen to four different samples of popular songs. Afterwards, the participants were asked to describe how they feel and what they would be doing (actions). There were six options under emotions and five options for actions and the participant would fill out which answer best suits them. According to the results which were displayed in circle graphs and separated by song, action, and emotion, some of the participants results did correspond with that specific genre of the song (people chose to happy and would be singing or dancing while listening to upbeat melody), but other results did not correspond with the song. These results showed up this way from the brain, mainly affected by the nucleus amygdala and accumbens (NA) and the neurotransmitter dopamine. These parts help choose the kind of emotion while listening to music, but since everyone's brain functions differently, this can change since people don't always have the same opinions.

INTRODUCTION

This project is based on music. Music has influenced peoples' emotions many times; from crying while listening to a depressing song or dancing to an upbeat melody. The purpose of this is to show how music can help a person express themselves more and show their personality. A person's emotions and movements are very powerful and by listening to a song, it can affect

both things. Music can also be beneficial to people, by helping to reduce stress levels or just being positive. This is because of the power of listening to music.

The question for this project is how does music affect teenagers physically and mentally. Many teenagers have been affected by music many times, especially with today's technology like YouTube and Spotify. Since teenagers' brains have matured a lot from a child and functions better then elder and adults, teenagers are the perfect audience to listen to music to.

The hypothesis that is being stated for the question being asked is if the rhythm is corresponding with the type of genre of music, then the emotion and movement will relate to the genre. An example of this is listening to song about happiness and the person feels happy and wants to dance. Studies show that this can be caused by the brain. The brain helps distinguish the emotion a person feels which can also relate to the body by giving signals and responding to it.

METHODS:

The method used to answer this question is by conducting a survey. In this survey, there will be 4 songs with different genres. The genres that are chosen are pop, ballad, rock, and classical. The songs are *Despacito, Too Good for Goodbyes, Welcome to the Jungle,* and *Symphony No.9.* There will be 2 tables that will be drawn or typed out. The 1st table should have 5 emotions listed which are happy, sad, angry, surprised, confused, and another option called *Other* in the first column and in the second column in the first row, write *Tallies* as the title so the results can be recorded. Do the same with the second table but have 4 different actions which are dancing, singing, studying, and doing nothing and an option called *Other.* The 2 tables should look something like this:

Example of the 1st table

Emotion	Tallies
Happy	
Sad	
Angry	
Surprised	
Confused	
Other	

Example of the 2nd table

Action	Tallies
Dancing	
Singing	
Studying	
Doing Nothing	
Other	

After making the charts, start asking 12 people who are the ages of 13-18. Let each person listen to the 4 songs. Ask the participant how they feel about each song and what kind of action they feel like doing while listening to the song. Tally each option the participant chose for both tables. If the participant chose *Other*, then tally it and write down in brackets their emotion and/or action.

The independent variable for this survey are the participants responses. Not all of responses will be the same so it is changed on purpose. The dependent variable is also the response for each person. Since every participant's responses are different, this will determine the hypothesis to the original question by seeing any trends. The controlled variables are the 4 song choices, the 2 tables and the options on the tables, the questions being asked for each participant, and age group. These lists of variables do not change because the survey results should be fair to each person, so they should have the same charts, songs, and questions being asked.

The age group will always be teenagers since the question is being asked the age group, therefore it wouldn't change.

2 Table 1 (below): These are the participants results (emotions and action) for the upbeat song, *Despacito* (black coated rows) and the sad song, *Too Good for Goodbye* (yellow coated rows)

RESULTS:

Emotion	**Tallies**	**Emotion**	**Tallies**
Happy	|||||	Happy	|||
Sad		Sad	||||
Angry	||||	Angry	
Surprised	|	Surprised	
Confused	|	Confused	
Other		Other	|(tired),|(thoughtful),|(bored),|(calm, tired),|(funny)
Action	**Tallies**	**Actions**	**Tallies**
Dancing	|||	Dancing	
Singing	|	Singing	||
Studying	|	Studying	||
Doing Nothing	|||	Doing Nothing	|||||
Other	| (throwing	Other	|(sleeping), |(eating), |(crying)

	pillows), ‖(tapping),|(shopping)		

Table 2 (below): These are the participants results for the rock song *Welcome to the Jungle* and the classical piece *Symphony No.9*

Emotion	**Tallies**	**Emotion**	**Tallies**
Happy		Happy	|||||
Sad		Sad	
Angry	||||	Angry	|
Surprised		Surprised	|
Confused	||||||	Confused	|
Other	|(disgusted),|(weird)	Other	|(annoyed), |(calm),|(dramatic),|(excited)
Action	**Tallies**	**Action**	**Tallies**
Dancing		Dancing	
Singing		Singing	|||
Studying		Studying	||||
Doing Nothing	|||||	Doing Nothing	||||
Other	|(scream), |||||| (ignore)	Other	| (covering my ears)

Figure 1
Percentage of people feelings: Despacito

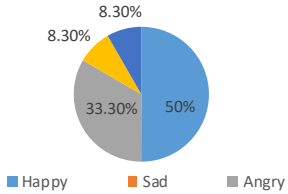

Figure 2
Percentage of people's action while listening to the song: Despacito

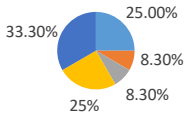

Figure 1 and 2 (above) shows the participants results for *Despacito* (left: emotions, right: movements) in percentage

Figure 3
Percentage of People Feelings: Too Good For Goodbyes

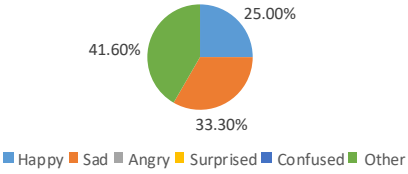

Figure 4
Percentage of people's action while listening to the song: Too Good For Goodbyes

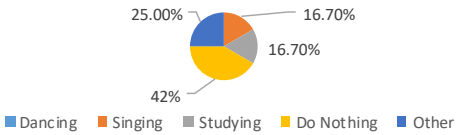

Figure 3 and 4 (above) shows the participants results for *Too Good for Goodbyes* in percentage

Figure 5
Percentage of People Feelings: Welcome to the Jungle

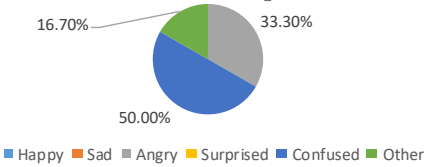

Figure 6
Percentage of people's action while listening to the song: Welcome to the Jungle

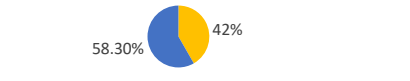

Table 5 and 6 (above) shows the participants results for *Welcome to the Jungle* in percentage

Table 7
Percentage of People Feelings: Symphony No.5

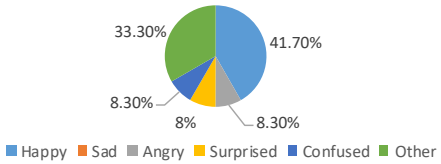

Table 8
Percentage of people's action while listening to the song: Symphony No.5

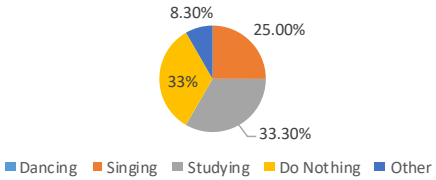

Table 7 and 8 (above) shows the participants results for *Symphony No.9* in percentage

DISUSSIONS/CONCLUSION:

Some of the parts of the hypothesis are correct. By looking at the charts and results, some peoples' emotions corresponded to the genre of music. But the actions and emotions didn't really correspond with other songs. The results that stood up most of the participants that made my hypothesis correct were that half of the participants (50%) were happy while listening to an upbeat melody, half of the participants felt confused (50%) while listening to the rock song, and people would be studying or doing nothing (both options were 33.3%) while listening to classical music.

The most shocking results that contradicted the hypothesis was how most people didn't feel sad while listening to the ballad song and the highest percentage of action while listening to the upbeat song is the option *Other*. These results came out like this because what's affecting a person's emotions and movements is caused by the brain. Two parts of the brain that effect this is the called the nucleus amygdala and accumbens (NA) and the neurotransmitter dopamine (resources from How Music Affects the Brain for the Better, As a person is listening to music the nucleus amygdala and the nucleus accumbens helps decide what emotion suits to the type of music. The neurotransmitter dopamine releases and increases and will give signals to the body. An example of this happening is getting goose bumps when listening to a song in the person's opinion. The nervous and endocrine system will help respond to the body which gives of body movements. Scientists have said that the beat and melody of the music also identifies the emotions. Songs with fast tempo, high pitched voices that a major sounding melody are attributed to happy music which releases happy emotions and actions. Sad songs are the opposite of happy which and give out sad emotions. There will be a higher percentage that the genre of music does correspond with a person's emotions and body movements.

Some of the results before did not come out the way it did. This is also because of a person's own way of functioning in their brains. People have different opinions and different tastes in music. Not everyone's brains all function the same way, so a person won't give out the exact emotions to what another person is feeling. This is how peoples' taste in music is different. For example, a metal rock song could be a relaxing and pleasant to someone but another person might think it's a song to release out their anger.

The errors from the project that affected my results are mostly because of the song choices. The songs have not been the best choices of music because some of the songs are overrated. Songs like *Despacito* is a song that has been playing on the radio for quite some time that people might no longer like; even though they should be feeling happy. Some of the songs might have not been good for a person to correspond with others of people results that didn't relate to the genre of music.

5

APPLICATION:

Using music to help a person release their emotions is using music every day, everywhere at any time a person feels like it. Studying to classical music, working out to dubstep, and relaxing while having an acoustic playlist are examples to make a person happy. An occupation which helps people problems by listening to music is being in music therapy (Reference from About Music Therapy. (n.d.).)

. Studies shows that music can make anyone happy in their own way and help increase their memory (from a part of the brain called the hippocampus). People who work in music therapy help relax others with disorders, health, emotional and mental problems so they can feel happy and interactive by using music.

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Effect of Water Temperature on Speed and Exhaustion Levels in the Pool

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Abstract

The question investigated was: how does water temperature affect speed and exhaustion levels in the pool? This topic is relevant because athletes – specifically swimmers in this case – want to maximize workouts and train to the best of their ability. The experiment done was to compare swimming 50 meters 8 consecutive times in a 29°C (warm pool) and in a 25°C (cold pool). Then, to observe the time taken (seconds), as well as exhaustion levels (level 1-10). The times recorded ultimately increased. The more exercise and physical movement the body is put through, the more tired and slower the body movements will be.

Introduction

The purpose of this project is to differentiate the effects of sprinting in a warm pool vs a cold pool. This project is significant because athletes – specifically swimmers are always looking for ways to improve and maximize workouts. Many swimmers think that hotter pools slow them down, believing that it doesn't remove the sweat they generate, causing the feeling of overheating and exhaustion (Cornerstones). There are different te 7 erature mandates for different aquatic activities such as diving, water polo, and recreational swimming. If there are different rules/regulations fo 7 ol temperatures for different sports/activities, then there must be different effects on the body from different pool temperatures (Livestrong.com).

The question asked is, "How does pool temperature affect speed and exhaustion levels in swimming?" If there are different rules/regulations for pool temperatures for different sports/activities, then temperature *does* affect speed and strokes of swimming, because the FINA regulations must be established not only for the most efficient workouts, but for the health and safety of swimmers.

Table 1

Methods

The swimmer wears a silicone cap, goggles, and FINA approved swimwear.

The swimmer starts in a 29°C, 25 metre pool. The swimmer warms up with a 100 metre relaxed swim, that doesn't need to be recorded. The swimmer pushes off the wall in streamline position and sprints 50 metres Freestyle (Front Crawl), with the choice of performing a flip turn, but must do the same procedure when repeated, to ensure fair results. Another person times the swimmer using a stopwatch. The swimmer records the time taken in seconds, and their exhaustion level on a scale of 1-10 in a table in the *"Warm Pool"* sections *(Table 1)*. The swimmer rests for 1 minute and hydrates during this time. Procedure is repeated 8 times.

Repeat the above instructions in a 25°C, 25 metre pool, and record the results in the *"Cold Pool"* sections *(Table 1)*

Conduct entire experiment at least one more time, for more stable results.

The independent variable is the temperature of the pool. It is being changed through this experiment. The dependent variables are the recorded times, and the exhaustion levels of the swimmer. These are being measured and observed. There are many controlled variables. As mentioned earlier, the silicone cap, goggles, and swimsuit are a few. Another controlled variable is the swimmer, because if the swimmer is changed throughout the experiment, then the results will not be accurate as not all swimmers have the same speed or endurance. The swimmer must swim the same stroke throughout the experiment, as different strokes cause the swimmer to travel through the water at different speeds. The swimmer must have the same rest time and swim the same distance every time, because if the swimmer gets more/less of these, it

Each 50 m Swam	Time (seconds) Taken in a "Cold" Pool	Exhaustion Level (1-10)	Time (seconds) Taken in a "Warm" Pool	Exhaustion Level (1-10)
1				
2				
3				
4				
5				
6				
7				
8				

will affect their exhaustion levels and speed in the next swim. The swimmer must hydrate every time so that there is not interfering with possible outcomes.

Results

Data Comparison #1:

Results of the First-Time Experiment Performed

Each 50 m Swam	Time (s) Taken in a "Cold" Pool	Exhaustion Level (1-10)	Time (s) Taken in a "Warm" Pool	Exhaustion Level (1-10)
1	34.78	1	35.71	3
2	35.20	1	35.96	3.5
3	35.09	2	36.05	4
4	35.73	3	36.83	4
5	36.18	3	36.51	5
6	36.25	3.5	36.79	7
7	36.82	4	37.84	7
8	37.31	5	38.12	8

Table 2

Data Comparison #2:

Results of the Second-Time Experiment Performed

Each 50 m Swam	Time (s) Taken in a "Cold" Pool	Exhaustion Level (1-10)	Time (s) Taken in a "Warm" Pool	Exhaustion Level (1-10)
1	34.29	1	35.39	2
2	35.64	1	35.31	2.5
3	35.16	2	35.89	3
4	35.98	2	36.67	4
5	36.30	3	36.86	5
6	36.79	4	37.03	6.5
7	37.06	5	37.57	7
8	37.15	6	37.64	8

Table 3

Data from Table 2 interpreted into Fig. 1.

Comparing time taken to swim 50 m in a 29°C pool vs a 25°C pool.

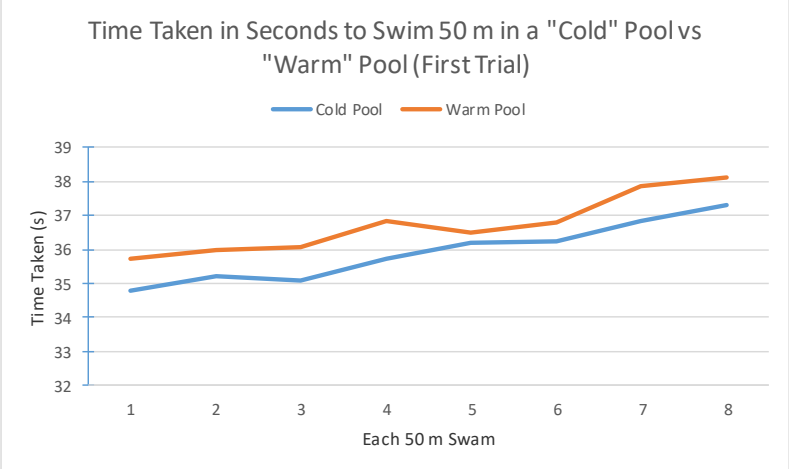


Figure 18

Data from Table 2 interpreted into Fig. 2

Comparing exhaustion levels in a 29°C pool vs a 25°C pool.

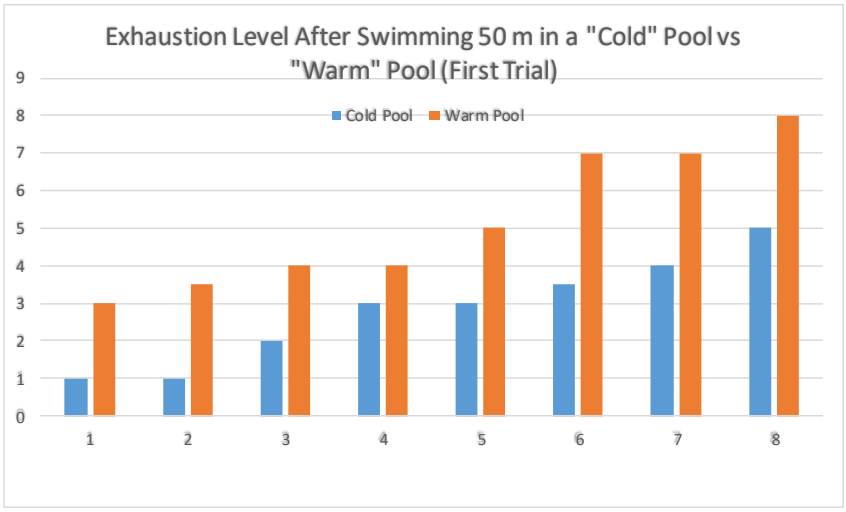


Figure 19

Data from Table 3 interpreted into Fig. 3.

Comparing time taken to swim 50 m in a 29°C pool vs a 25°C pool.

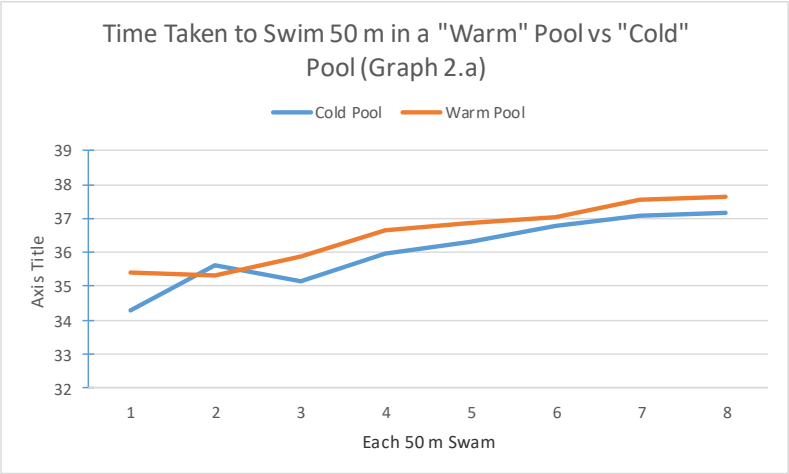
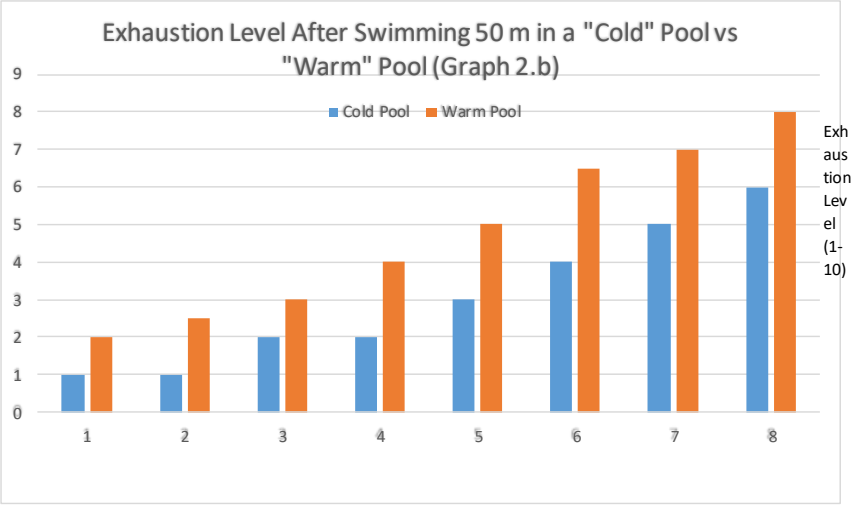


Figure 20

Data from Table 2 interpreted into Fig. 2

Comparing exhaustion levels in a 29°C pool vs a 25°C pool.



Discussion/Conclusion

Hypothesis was correct. In general, not only does "cold" water allow swimmers to swim faster, swimmers also don't get as tired as quickly as they do in "warm" pools. In both "cold" and "warm" pool experiments, the times taken to swim 50 metres ultimately increased. This is consistent with what other scientists have reported and this was expected, as it is known that the more exercise and physical movement the body is put through, the more tired and slower the body movements will be.

However, there were a few outliers in the experiments where the succeeding 50 metres swam was faster. There are many factors that could've caused this, such as starting the stopwatch too soon/stopping the stopwatch too late; pushing off the wall with less force than before; or having an exterior factor (pool equipment or person in the way) while trying to perform the experiment. These are all *controlled* variables.

The data collected supports the hypothesis. The "warm" pool experiment exhaustion levels after each 50 metres swam were always at least 1.5 times higher than the "cold" pool exhaustion levels after each 50 metres swam. The most significant result was how high the exhaustion levels were already within the first few repeats of the experiment, specifically in the "warm" pool.

Given the conclusions, competitive swimmers should always train and compete in "cold" or 25°C pool. It will especially benefit long distance swimmers, because not only will they swim faster, but their exhaustion levels will not rise as quickly as they would in a "warm" or 29°C pool. This allows them to swim for longer distances.

If warranted, the next step in this study should be finding out what stroke (Freestyle, Backstroke, Butterfly, and Breaststroke) is best for swimming long distances. This could be experimented by having a swimmer swim each stroke for as long as they can in a 25°C, 25 metre pool; stopping when they are too tired.

There could've been sources of errors when timing the swims. A way to solve this could be to have two people timing, each with stopwatches. When recording, the average time between both stopwatches can be used. This could help with collecting more precise data and is also convenient if one timer is faulty.

Application

This information can be applied to other cases of study in sports. In track or cross country, it is possible that if the temperature outside is cooler, then the runner will run faster and be less exhausted than if they were in warmer temperatures. This information can also be applied to those who do triathlons or lifesaving sport. In competitive swimming, coaches will use this information when choosing what pools to train at, to maximize swimmers' workouts. These results are overall beneficial to swimmers who wish to swim faster, longer, and conserve their energy.

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Difference in the Perception of Time after Constantly Playing a Video Game for a Set Amount of Time

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Abstract:

The experiment was about the difference in time perception after constantly playing a video game for a set amount of time. The experiment has six volunteers come and preform a single task requiring complete focus for sixty minutes while the others would play for thirty. Once the two groups of three volunteers compared it was found that they both volunteers always preserved that twenty of the sixty minutes hadn't gone by, with two exceptions. This implies that five times out

of six you will see a significant speed up in time if you remain focused on a single task for any given amount of time.

Introduction:

This experiment is to find out if someone will have a changed perception of time if they are focused on something else, and remain focused on that thing entirely. This project is important because it helps us realize how dangerous it is to play for a very long time, and just how much time we really waste compared to how much time we say we do. Is it possible that playing a game for a long period of time much of a certain video game can trick the brain into believing more time passed than the amount of time that passed in reality? If six people were made to play the same fast paced video game for different amounts of time, then the person who played for longer would believe that a large amount of time, because the players perception of time will be faster matching the game they had just played.

Method:

Setup the game and leave it on and ready for the volunteers. Tell the first volunteer to relax explain the following; They are going to play the EFPG for a while, and are not allowed to leave or check the time. The person conducting the experiment will arrive once you're done to ask you a series of questions. Tell them that they must reply with 100% honesty. Tell them they can start. Start the stopwatch the second the volunteer begins playing. Moniter them playing for the first 10 minutes. Afterward leave the room and allow them to play alone. This allows the volunteer to become immersed in the game, providing better and more exact results. Once 30 minutes have passed, return to the room and have the volunteer stop. Once done, turn everything off and sit across from the volunteer the pencil and paper to record results. (this process should only take a maximum of 3 minutes). Begin with asking the volunteer to tell you how much time has passed and record their answer. Repeat the previous steps once more with two more volunteers. Once complete, repeat steps 1 through 12 again with 3 more volunteers, but this time allow the volunteers to play for 60 minutes instead. The Control variables in this experiment are the lack of clocks or time (so the volunteers can't know how much time passes), an arm chair 3 cookies f the

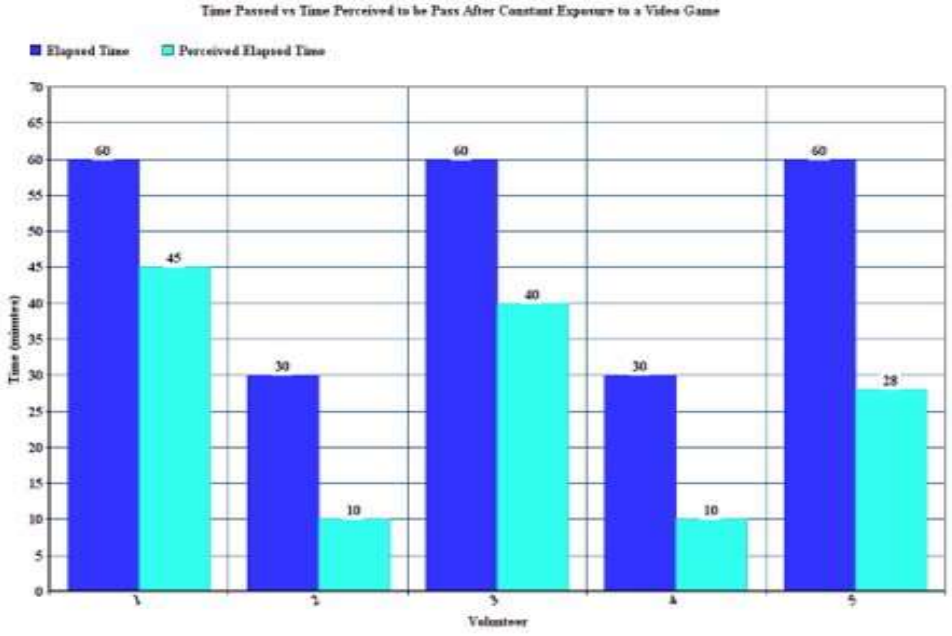
same type, 500ml of clear water (So the volunteer is comfortable and not distracted), headphones, game controller, solitude (To keep them from being distracted by external forces).

Results:

Table 1

Volunteer	Amount of Real Passed	Amount of Time the Volunteer Perceived Passed
1	30 minutes	50 minutes
2	60 minutes	45 minutes
3	30 minutes	10 minutes
4	60 minutes	40 minutes
5	30 minutes	10 minutes
6	60 minutes	38 minutes

Figure 1



The information found in Table 1 is translated into Figure 1 with the exception of my first volunteer, who played for thirty minutes and perceived that the elapsed time was fifty minutes. This was a problem because the volunteer spent a lot of time fidgeting and moving around, and admitted to being distracted throughout the experiment, so their data was considered to be an "outlier" and was not included into either Table 1 or Figure 1.

Conclusion:

Based off of the data, it seems that this experiment did indeed answer my hypothesis which was "If six people were made to play the same fast paced video game for different amounts of time, then the person who played for longer would believe that a large amount of time, because the players perception of time will be faster matching the game they had just played." Even giving me more information than wanted, showing me that the subject indeed went through time, an acceleration of around twenty minutes each time. For example, the third volunteer which played for thirty minutes ended up perceiving that ten minutes had passed. Another case subject six which played for sixty minutes which ended up perceiving that thirty-eight minutes had passed. The experiment should have had more tests, or had more volunteers to help provide better results to make finding correlations easier. For example, The experiment could have had two more volunteers play for ninety minutes to see if the time always dilates twenty minutes again, or if it increases with play time.

Application:

This information would be very helpful in other fields of study because it helps to prove how powerful the brain is, showing that it's strong enough to make you believe that time itself can change, speed up and slow down whenever they want to. I think this could be used in Neuroscience which is the study of the human brain, and it could be used to prove that the human brain could be tricked into believing something, making that thing seem real to the subject.

References:

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