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The Most Effective Drill to Improve Squash Movement

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Abstract

The question investigated was "What is the most effective drill to improve movement and agility around the squash court?" Movement around the court is the foundation of squash, good movement can be a big game changer in competitive squash. In this experiment, the three most popular squash drills were tested for effectiveness: shuttle runs, court sprints, and ghosting. The first week three subjects were each assigned a drill to do once daily, the second week they swapped drills and the third week they swapped again till each subject had done each drill. At the beginning of each week the subject would do a ball pickup test, they'd repeat the test at the end of each week, then, their improvement percentage between the beginning and end of the week was calculated After conducting three week-long trials, shuttle runs resulted in a 4% average improvement rate compared to ghosting with a 3.69% rate and court sprints with a 3.26% rate. These results reflect scientific evidence: shuttle runs build speed, agility, acceleration and endurance. The experiment proved that shuttle runs are the most effective drill to improve movement and agility around the squash court.

I. INTRODUCTION

Quick movement around the court is the foundation of squash and it's a very important aspect of the game. It's a key factor that distinguishes different levels of players (Warren, 2015). A squash player is only as good as their movement (Nicol, 2018). Squash can be like running a marathon and winning by milliseconds (Professional Squash Association, 2018), therefore it's crucial that movement training is as effective as possible.

What is the most effective drill to improve movement and agility around the squash court?

If the drills to improve movement and agility: court sprints, ghosting and shuttle runs are compared, then shuttle runs will be the most effective and garner the best improvement because they build speed, agility, explosive acceleration and endurance needed to continuously stop-and-go (Quinn, 2018) which is good for a high intensity sport like squash that involves repeated short bursts of speed.

II. METHODS

This experiment was conducted over 3 weeks with 3 subjects. At the beginning of the first week each subject did a test called the ball pickup test (refer to figure 1 to see the set up for the testing). It was designed to mimic squash movement. The subject started at the T, ran to one of the squash balls, lunged to pick it up, ran back to the T, and placed it in the bucket. They then repeated this till all the squash balls were collected in the bucket. They were timed doing this test.

Figure 1-This image shows how the 32 squash balls were placed around the court, where the bucket was put and where the T is.

For 1 week each subject had to do a drill once daily. Subject A did court sprints. They started at the glass wall (back wall) of the squash court then sprinted to the front wall. Then they had to sprint from the front wall back to the glass wall. That counted as 2 sprints, they had to do 90. Subject B did shuttle runs. They started at the glass wall, ran and touched the back of the service box by lunging, ran back backwards to the glass wall, ran and touched T line by lunging, ran back backwards to the glass wall, ran and touched the tin by lunging, ran back backwards to the glass wall, ran and touched the service line on the front wall, turned around and sprinted back to the glass wall. That counted as 1, they had to do 25. Subject C did ghosting. Ghosting is mimicking the action of hitting a squash ball without the actual ball. The subject started in the middle of the court with a racquet, ran to the 4 corners of the squash court one at a time and after each corner came back to the middle. At each corner they had to lunge and swing their racquet. This counted as 1 set, they had to do 18 sets. At the end of the weak all the subjects repeated the ball pickup test and the improvement percentage between the beginning and end of the week was calculated.

This entire procedure was repeated for another 2 weeks the only change was that the subjects swapped drills. During week 2, subject A did ghosting, subject B did court sprints and subject C did shuttle runs. During week 3, subject A did shuttle runs, subject B did ghosting and subject C did court sprints.

The type of drill (shuttles, ghosting, and sprints) was the independent variable. How long it took to do the ball pickup was the dependent variable. The same number of squash balls were collected during each ball pickup test. This was controlled to make it fair because if the subject has less squash balls to pick up they would finish the test faster. The same size bucket was used in each test. This was controlled to make it fair because if the bucket is bigger or smaller it will be easier or harder to drop the squash balls inside. The balls and bucket were positioned in the same spot in each test. This was controlled to make it fair because if the balls are placed closer to the T they would be picked up faster therefore the test results wouldn't be accurate. The same squash court was used in each test so that all the subjects are in the same environment when they do the testing.

III. RESULTS

Table 1-This table contains all the balls pickup test times from the beginning and end of each week. It also contains the improvement percentage between the two.

	Subject	Drill	Ball Pickup Time (Day 1)	Ball Pickup Time (Day 7)	Improvement Percentage
Week 1	A	Court Sprints	1:44.97	1:40.28	4.47%
	B	Shuttles Runs	1:50.95	1:45.30	5.09%
	C	Ghosting	1:53.34	1:48.67	4.12%
Week 2	A	Ghosting	1:39.14	1:35.20	3.97%
	B	Court Sprints	1:46.56	1:43.82	2.57%
	C	Shuttle Runs	1:49.21	1:45.46	3.43%
Week 3	A	Shuttle Runs	1:36.94	1:33.58	3.47%
	B	Ghosting	1:43.04	1:39.97	2.98%
	C	Court Sprints	1:44.31	1:41.45	2.74%

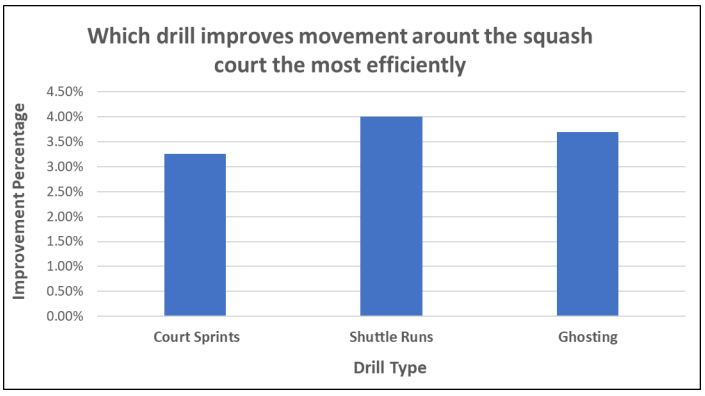

Figure 2-This graph shows the average improvement percentage for each drill from the three-week trials

IV. DISCUSSION & CONCLUSION

The hypothesis that shuttle runs would garner the best improvement was correct. After conducting three different week-long trials, it was shown that the shuttle runs resulted in a 4% average improvement rate while ghosting had a 3.69% rate and court sprints had a 3.26% rate. Shuttle runs achieved the best results in the first and third trials, and were not far behind in the second trial either. The experiment proved that shuttle runs are the most effective drill to improve movement and agility around the squash court.

These results make sense based on the scientific background information. Shuttle runs build speed, agility, explosive acceleration and endurance needed to continuously stop-and-go (Quinn, 2018). This is very beneficial for a high intensity sport like squash that involves several bursts of speed. For the ball pickup exercise testing designed to mimic squash movement the shuttle runs helped the subjects work on specific components. Their ability to continuously stop and go from the T to the balls and vice versa, to quickly bend down and pick up the balls with agility, make them quicker to improve their times and build endurance to help them push through and stay strong till the end of the test. For these several reasons it makes sense that the shuttle runs were successful in achieving the best results.

V. APPLICATION

These results would be useful for several other sports. They can be used by other racket sports that have similar movement patterns to squash like badminton and tennis. Shuttle runs build speed, agility, and endurance, this can benefit several other sports including soccer, basketball, and football to name a few. Kinesiologists could dig deeper into why these results occurred.

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Different Effective Studying and Memorizing Techniques That Help Students Study Faster for Biology

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I. ABSTRACT

The question being investigated is: "What are different effective studying and memorizing techniques that are faster and more effective for students to use?" Many students have developed a habit of procrastinating until the night before to study for a test and suffer large levels of stress and anxiety. This problem was brought to light and answered through a set of experiments. The experiment tested how subjects scores were affected after trying different studying and memorizing techniques to study for two different tests with different questions on Biology. Each student received the same amount of time to study for each test for maximum efficiency and to eliminate biasness. The experiment proved that some techniques like the "Feynman method" and "Loci Method" were more effective that standard techniques students use such as reading notes. The experiment also proved that students who used these "superior" methods had lower stress levels before and during the tests and had larger than normal levels of confidence. Therefore, these methods were proved to be a better option for students who have made the mistake of only studying the night before and were proven to be able to lower their anxiety levels and help their mental health.

II. INTRODUCTION

Many students suffer from stress and overwhelming work which can negatively impact their anxiety levels and mental health. A survey conducted by the University of New York indicates that 48% of high school students are regularly faced with more than 3 hours of homework a night, and that 49% of students report being faced with a lot of stress daily (Leonard 2015). If more effective ways to study and to memorize are introduced to students, it may cut their time spent on studying and lower their stress levels and increase their grades. To continue, too much stress can decrease sleep quality and can lower focus which contribute to poorer test results and lower grades (Carlson 2016). It is beneficial for students to create good studying habits that will benefit the in the future. Whether it is University or work, good memorizing techniques will make many people's lives a lot easier.

In topics like science and especially Biology, memorization and understanding are very important to achieve high grades and it is like many subjects whereas the student needs to grasp a lot of information. The question formed by this problem is: Which of the scientifically proven methods for studying and memorization are the most effective for learning biology?

If students use methods like the Feynman technique and Loci method to study and memorize for a Biology test, the subjects will achieve higher scores and lower levels of stress because are more efficient, faster and help with student's confidence in themselves. For example, the Loci method, is a

mnemonic device where you would connect words to other memories, images etc. and create a story that enhances serial recall and creates stronger neural pathways which makes things harder to forget (Legge 2012). The Feynman technique is used by writing down difficult concepts as if you were teaching yourself to pinpoint exactly what you do and don't understand. Some other techniques that are used are reading notes, retrieval practice by studying in increments of time, chunking (memory palace) by grouping information and making connections to previous knowledge.

III. METHOD

A group of five students all in 10th grade science was given two different studying techniques to use. The students each spent half an hour studying with their first method and then wrote a biology test written out for them that encompassed human organ systems, organs, functions, tissues and plants. After the first test was written, the subjects spent another half hour studying for a second biology test using the second method. It was arranged so each memorizing technique was used twice by two different students. The second biology test encompassed cells, organelles, functions and stem cells. Each method received an average percentage increase or decrease from the subject's chemistry marks to the biology Scican test.

The independent variable in this experiment was the different studying techniques used. It was the one variable that was changed on purpose. Students used different studying techniques and depending on those techniques, their results were different. The Dependent variables observed in this experiment were the test scores which were observed and measured as different memorization methods are more efficient for some than others. Using the test scores, the techniques were compared to see which ones worked the best and are more favorable. Furthermore, stress and anxiety levels were noted because students were asked to rate their stress and confidence levels from 1 to 10 (on writing the test) to see which techniques built up more confidence in subject's abilities.

Moreover, a controlled variable was the age of the students to prevent intellectual disadvantages and advantages between test subjects, as older students are better at memorizing and grasping information than younger students. To continue, allowed studying time was controlled to prevent subjects of having more time to study (and do better) and cause a biased experiment with faulty results. Likewise, students were given the same notes to base their studying off (not read them but only get their information) so no student had the advantage of having access to better information or material and score better on the tests. Finally, subjects received the same tests to ensure that there are no differences in difficulty which could have potentially affected the range of improvement. This way, the methods were fairly compared.

IV. RESULTS

Table 1. Time spent studying and first method used by each subject was noted. This table demonstrates the score on the first Biology test of each subject using different techniques.

Subject:	Time spent studying:	Method:	Score on first experiment test:
Subject A	30 minutes	Loci method	95%
Subject B	30 minutes	Reading notes	90%
Subject C	30 minutes	Story telling technique	80%
Subject D	30 minutes	Memory palace	96%
Subject E	30 minutes	Feynman Technique	89%

Table 2. Time spent studying and second method used by each subject was noted. This table demonstrates the score on the second Biology test of each subject using the second method.

Subject:	Time spent studying:	Method:	Score on second experiment test:
Subject A	30 minutes	Feynman Technique	97%
Subject B	30 minutes	Loci Method	88%
Subject C	30 minutes	Reading Notes	76%
Subject D	30 minutes	Story Telling Technique	91%
Subject E	30 minutes	Memory Palace	88%

Table 3. This table shows the average increase or decrease in marks of each studying technique. The numbers were calculated using the subject's Chemistry marks and the two biology tests.

Method	Average Percentage increase/decrease:
Feynman	+12%
Reading Notes	-7%
Story Telling Technique	+4%
Memory Palace	+8%
Loci Method	+5%

Subject and Method	Average Stress and Confidence Levels before Both Tests (1-10)
Feynman	Stress: 2 Confidence: 9
Reading Notes	Stress: 8 Confidence: 5
Story Telling Technique	Stress: 6 Confidence: 6
Memory Palace	Stress: 4 Confidence: 7
Loci Method	Stress: 3 Confidence: 9

Table 4. This table shows the average stress levels of the students who used each technique.

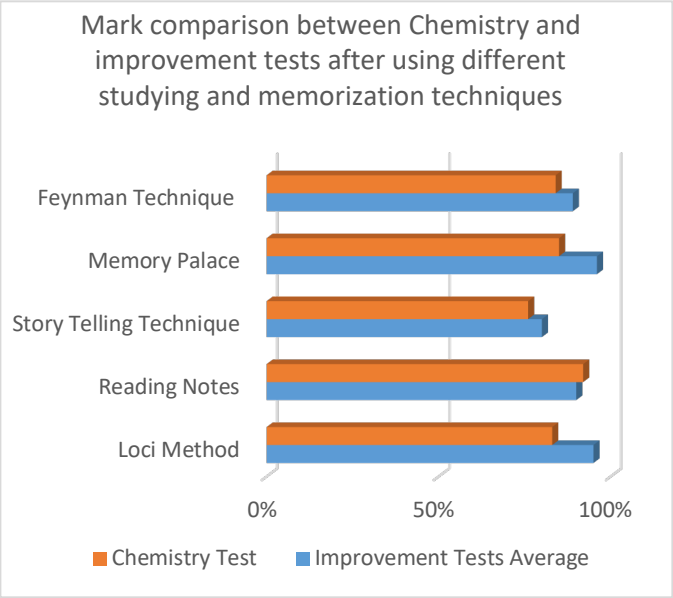

Figure 1. This graph illustrates difference in percentages between the Chemistry marks and the improvement tests by each technique.

V. Discussion and Conclusion

The hypothesis was correct. Using studying and memorization techniques such as the Feynman technique and the Loci method are more efficient at studying for biology than reading your notes. The data supports this, as the student reading their notes had a 4% decrease in mark from their Chemistry to improvement test while students who used other techniques improved their scores. The student that used the Loci method to prepare for the test was more successful and improved more than the one reading notes by a difference of 14%. Furthermore, students using efficient studying techniques had lower levels of stress and anxiety before writing the improvement test. Subject B who was reading notes had a stress level of 7 out of 10 while the others ranged from 2 to 6. To answer the initial question, the Loci method, memory palace, Feynman technique and Storytelling technique are very good strategies that students could use that are proven to increase test scores and reduce test anxiety levels.

These methods are linked with higher test scores because they use spatial memory, and familiar information about one's environment to efficiently

recall and remember information. Neural pathways get stronger when doing retrieval practice and the brain encodes more information in long term memories (Davidson 2017). Neurons fire in a specific pattern in the limbic system and hippocampus, and these studying techniques help create stronger patterns. By tying and relating already encoded memories with new ones (tying with familiar information), your brain does not need to work as hard to encode it and go through the process of consolidation (stabilize patterns for long term memories). Using these techniques also cause lower stress levels because it raises the subject's confidence (the subject does not need to work as long and try as hard to remember information). When the subject is feeling more confident and accomplished, less stress hormones like cortisol and adrenaline are released, causing the heart to beat much slower than when the user is not confident in his memory which in turn reduces stress and anxiety (Huston 2017).

Many professionals and investigators have reported that these studying techniques are more efficient and quicker at forming neural pathways and the experiment reinforces these discoveries. Some possible sources of error are that at the time when the subjects have written the tests, the science program at school was already starting to cover some aspects of biology and therefore some of the information had already been memorized. Additionally, people have different preferences and cognitive differences and so the experiment is not one hundred percent accurate. The different personalities and multiple intelligences of different people have caused some methods to have advantages with certain subjects and disadvantages with others. The variable of subjects having these differences was not accounted for and was left to chance.

VI. Application

Further research that could be done to continue this experiment is studying the effects of multiple intelligences (visual, artistic, interpersonal etc.) and which studying techniques are most effective for people who have those types of intelligences. To further this research, the experiment could also be expanded to hundreds or thousands of people to account in the inaccuracy of personal differences. This in consequence would lead to a more accurate result where the most efficient method would represent a larger fraction of the population.

This information could be applied to other fields such as psychology neurology in which scientists and psychologists could use to discover more about the human brain and how it works. Psychologists could use this information to teach students how to properly study and maintain good mental health without a lot of stress. The public could use this information could use this information in their daily lives to make them easier. For example, students in high school or University could use these proven techniques to study for tests (especially when it is close to the deadline or test date) and improve their performance. Every day people could use this information at work or at home to memorize long

lists quickly or to improve memory. Whether it is memorizing ingredients, shopping lists, important facts, birthdays, this tested information can be very useful.

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How advertising techniques effect the way teenagers think about a product

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Abstract

Marketers are always trying to find new ways to attract teenagers towards purchasing their products. Marketers embed different techniques in advertisements to attract teenagers. The question investigated in this project was how different advertising techniques affect the way teenagers thinks about a product. Studies have shown that teenagers are a vulnerable group with many insecurities. Marketers detect and target these insecurities to benefit off of them in terms of selling a product. This experiment focused on two types of advertising techniques, celebrity endorsements and simple advertisements. To conduct this experiment four subjects were used and were required to fill out a questionnaire based on two advertisements which were selling the same product. The experiment was repeated with the same four subjects however with two new advertisements for more accurate results. As a result, the celebrity endorsements did make the subjects want to buy the products more than the other advertisement. It made the subjects think of the product as good quality and worth buying. These results are important to understand because it illustrates how teenagers fall for these tricks in advertisements and how marketers are continuing to benefit off of them.

I. INTRODUCTION

This project is important to research because advertising products are everywhere and comes in all different forms. Teenagers are advertisers' main target for popular products. Advertisements are more efficient when they create insecurities about buyers. Marketers target teenagers because they are very insecure about most things since they are still growing and uncertain on who they are or worried if they "fit in" amongst others in society. (Chris, 2010). Understanding the impact that advertising brands have on teenagers is important because they are the future generation that will shape society.

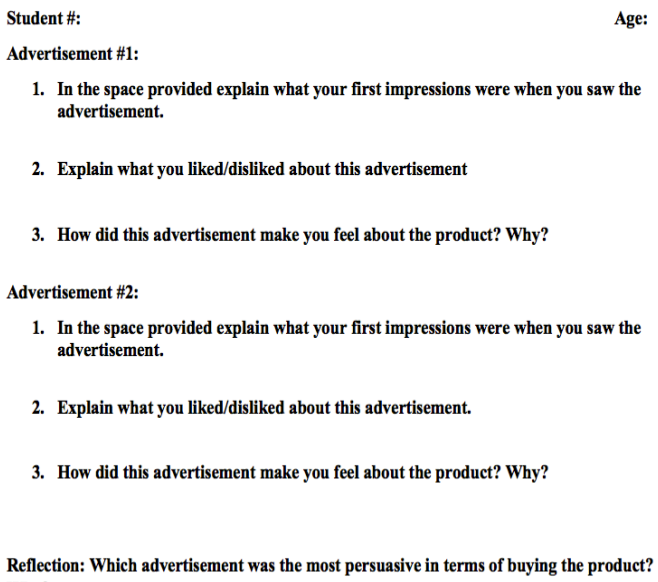
How do different advertising techniques affect the way teenagers think about a product?

If different advertising techniques affect the way teenagers think about a product then using a celebrity endorsement to advertise a product will make a teenager want to buy that product more because when teenagers see models and celebrities wearing popular brands, they feel the urge and pressure to wear them as well. The article Mysterious Teenagers, Mysterious Marketing: Time to Rethink states that, behaviours of younger people on social media are changing when they see celebrities endorsing advertisements. Advertisers are trying to track and predict these behaviours in order to deliver successful brand marketing. (James Erskin, 2017).

II. METHODS

The subjects began with the first trial of the experiment. At 7pm the subjects were required to sit in a quiet area and look at the first set of advertisements sent from the experimenter by email. With the questionnaire sheet that was provided, the subjects were required to complete all the questions for advertisement #1. After this was completed the subjects were required to look at advertisement #2 and using the same questionnaire sheet, complete all the questions required for advertisement #2. The subjects could not spend any more than 10 minutes max on each advertisement (20 minutes in total for both). Afterwards when the questions were completed the subjects looked at the two advertisements side by side for 3 minutes. After 3 minutes the device was turned off and the subjects answered the reflection question in the questionnaire. The experiment was repeated at 7pm, three days after the first trial with a new set of advertisements which was sent by the experimenter.

The independent variable used in this experiment was the advertisement technique used since this variable was constantly being changed. The dependent variable used in this experiment was the subjects' responses to the questions because this is what was being observed throughout the experiment. The controlled variables in this experiment were firstly the number of advertisements given to the students because if this number kept varying than the experiment and the results would not have been constant and organized. Secondly, the amount of time given to look at each advertisement was controlled because if the subjects had no set time then the results would not have been accurate since the subjects could continuously change their answers. This experiment focused mainly on their thoughts when they first looked at the advertisement. Finally, the environment around the student was important to be controlled because if the environment was loud and distracting the subject would not have been able to concentrate fully which could have greatly affected their answers. These variables were selected as controls because all of these variables must stay constant throughout the experiment otherwise if changed, they would have had an effect on the results. These variables also confirmed that the experiment was the exact same for each subject, so the results could be equally compared.



Student #: **Age:**

Advertisement #1:

1. **In the space provided explain what your first impressions were when you saw the advertisement.**
2. **Explain what you liked/disliked about this advertisement**
3. **How did this advertisement make you feel about the product? Why?**

Advertisement #2:

1. **In the space provided explain what your first impressions were when you saw the advertisement.**
2. **Explain what you liked/disliked about this advertisement.**
3. **How did this advertisement make you feel about the product? Why?**

Reflection: Which advertisement was the most persuasive in terms of buying the product?

Figure 1. Sample of questionnaire sheet given to subjects

Figure 2. First trial. Advertisement #1

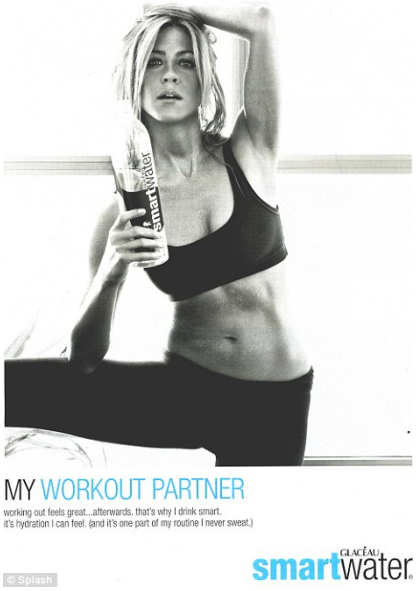


Figure 3. First trial. Advertisement #2

Figure 4. Second trial. Advertisement #1

Figure 5. Second trial. Advertisement #2

III. RESULTS

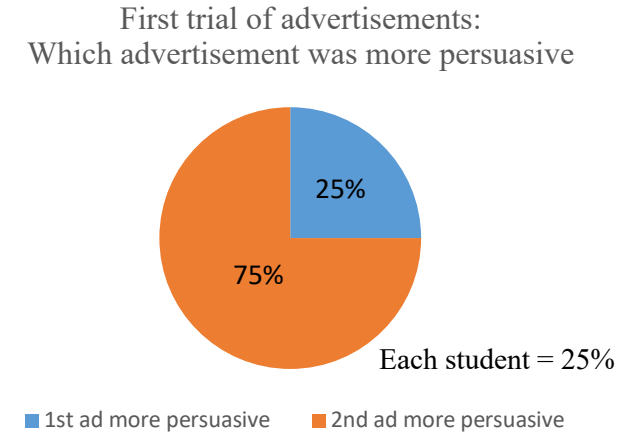


Chart 1. How persuasive advertisements were based on subjects' opinions

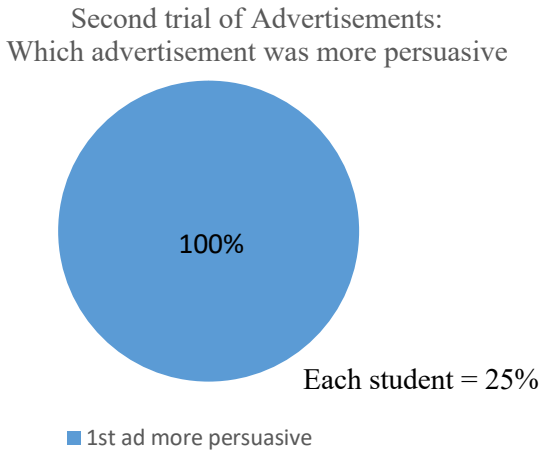


Chart 2. How persuasive advertisements were based on subjects' opinions

First Trial: Advertisement #1

Summarized overall thoughts:

Advertisement was simple and got the point across quickly. Not very interesting or appealing look. Catchy use of words.

First Trial: Advertisement #2

Summarized overall thoughts:

Fit figure made water look very healthy and fresh. Good use of words. Black and White colour scheme was interesting. Words were too small

Second Trial: Advertisement #3

Summarized overall thoughts:

Zendaya looked very beautiful. Mascara looked high quality and expensive. Very attractive and bright colour scheme. Good overall look.

Second Trial: Advertisement #4

Summarized overall thoughts:

Very bare compared to first advertisement. Simple but not very appealing. Did not feel like it was selling the product enough.

IV. DISCUSSION AND CONCUSION

The hypothesis was proven correct because the hypothesis stated that using a celebrity endorsement in an advertisement will result in a teenager having the urge to buy the product. For the first trial 3/4 subjects stated that the advertisement with Jennifer Aniston was more persuasive to buying SmartWater more than the 1st advertisement. It was stated on the questionnaire sheets that Jennifer Aniston made the water look healthy and fresh because of the fit and healthy figure illustrated in the advertisement resulting in the urge to want to buy SmartWater. For the second trial all of the four subjects stated that the advertisement using Zendaya was much more persuasive in terms of buying the mascara over the 2nd advertisement which had no celebrity. This was because Zendaya is well-known and famous celebrity which made the subjects think that the mascara being advertised was good quality and "high-end". These results prove that the hypothesis is correct and celebrity endorsements persuade teenagers to want to buy a product more.

These results relate back to the original question because the results clearly outline that using celebrity endorsements makes teenagers feel the urge to want to buy a product more. Scientists and researchers do have similar results to the results in this experiment. Celebrities influence teenagers both positively and negatively in various ways. Celebrities have a large and dominant impact on teenagers' decisions, their views towards something and how they view themselves. (Newport Academy, 2019). At the end of the experiment, the results were clear and did support the hypothesis however issues and errors did come out throughout the experiment which could have changed the results. Some of these errors include not following the procedure correctly step by step. One of the subjects did go over the allotted time limit without realizing. In addition, two of the subjects did not complete both trials three days apart. One subject did 5 days apart and the second subject completed it 7 days apart. These errors might have changed the results for this experiment. However,

they were minor errors therefore the results could have only slightly changed.

V. APPLICATION

These results can be used for future research in various ways. These results demonstrate how teenagers are influenced by celebrity endorsements and different advertising techniques do affect the way teenagers think towards a product. Teenagers are known to be a vulnerable audience and therefore are marketers' number one target when it comes to advertising. The different methods of advertising to them are growing. Marketers are finding ways to use those methods and continue to expand and find more. Pediatricians and researchers are concerned about the strategy's advertisers are using to influence children and adolescents to buy certain products. (Megan A Moreno, 2018). Studies similar to this experiment can assist in finding ways to help do further research and fix this issue. This information can be very useful in the fields of marketing and psychology mainly focusing on teenagers. There has been many experiments conducted similar to this and the research on this topic will continue since the influence that advertising has on teenagers is a current issue which only keeps on growing.

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The Effects of Procrastination in Contrast to Working Ahead for Projects and Assignments

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Abstract

The question which was investigated was, what are the effects of procrastination in contrast to working ahead? This was to better understand the common habit of many people, procrastination, and if it is a viable work habit by providing those who use it with benefits. To test this, two students with similar academic performance and exposure were selected to study and write a test along with a post-test reflection using two entirely different work habits. One student was to procrastinate on the studying, while the other was made to study on a consistent basis over the period of a week. After the study period and the test writing concluded, the results from the test and the data from the reflection were taken in and evaluated. Based off the data, it became evident that procrastination helped the subject using it by acting as a form of stress management. Since it reduced their stress, it proved to have a more beneficial effect on its subject than the "studying ahead" method had on the subject using it. The method of "studying ahead" showed to increase stress (despite the popular belief) of its subject.

I. INTRODUCTION

Procrastination is a habit adopted by 85% (Cherry, 2007) of all high-school students across the world with 50% (StudyMode, 2014) of that group claiming that their utilization of the habit is problematic. The habit can originate from a multitude of different things from being stressed to just not caring enough. It puts people into high difficulty situations where they try to complete certain tasks in a short period of time before the assessment or due dates. Working ahead can prevent this sort of situation as the work is spread out over a period and not concentrated into one night.

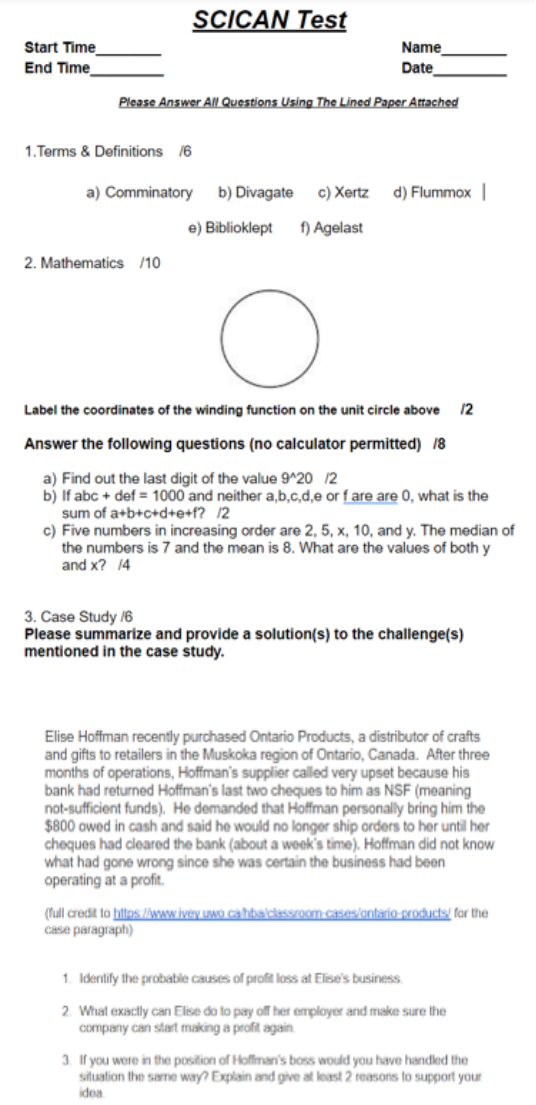
If procrastination and working ahead are compared, then procrastination is more beneficial in terms of its ability to help its user develop skills such as stress and time management. Procrastination is something that puts the individual in a situation where they are working to the very last minute. This forces them to plan out in a short period of time to ultimately end up getting things done. It causes them to stay on the ball constantly as every second counts thus improving the person's time management and task prioritization skills. Working ahead may also improve time management skills but procrastination puts the user in a situation where those skills develop more efficiently because

they're in a much more tense and stressful environment.

II. METHODS

The experiment required 2-4 students (of similar age and academic capabilities). Upon finding the subjects, a test and review guide was made consisting of material not previously exposed to the subject. Students participating were notified about the test and given the review 1 week prior to the writing of said test. Over the 1-week period each student was tasked with a specific work habit, procrastination or working ahead. The student told to procrastinate was to put off the studying until the night prior to the test writing while the student who was told to work ahead was to study every day of the week for an hour. After the week concluded it was time for the test. Both students were placed into a quiet and isolated environment where they wrote the test. Once the test was written, the students were made to right a reflection on their study period, test experience and level of stress regarding the test over the 1 week. The test and reflection were then collected and evaluated.

Evaluation Given:



SCICAN Test

Start Time_____ **Name**_____
End Time_____ **Date**_____

Please Answer All Questions Using The Lined Paper Attached

1.Terms & Definitions /6

a) Comminatory b) Divagate c) Xertz d) Flummox |
e) Biblioklept f) Agelast

2. Mathematics /10

Label the coordinates of the winding function on the unit circle above /2

Answer the following questions (no calculator permitted) /8

a) Find out the last digit of the value 9^20 /2
b) If abc + def = 1000 and neither a,b,c,d,e or f are are 0, what is the sum of a+b+c+d+e+f? /2
c) Five numbers in increasing order are 2, 5, x, 10, and y. The median of the numbers is 7 and the mean is 8. What are the values of both y and x? /4

3. Case Study /6
Please summarize and provide a solution(s) to the challenge(s) mentioned in the case study.

Elise Hoffman recently purchased Ontario Products, a distributor of crafts and gifts to retailers in the Muskoka region of Ontario, Canada. After three months of operations, Hoffman's supplier called very upset because his bank had returned Hoffman's last two cheques to him as NSF (meaning not-sufficient funds). He demanded that Hoffman personally bring him the $800 owed in cash and said he would no longer ship orders to her until her cheques had cleared the bank (about a week's time). Hoffman did not know what had gone wrong since she was certain the business had been operating at a profit.

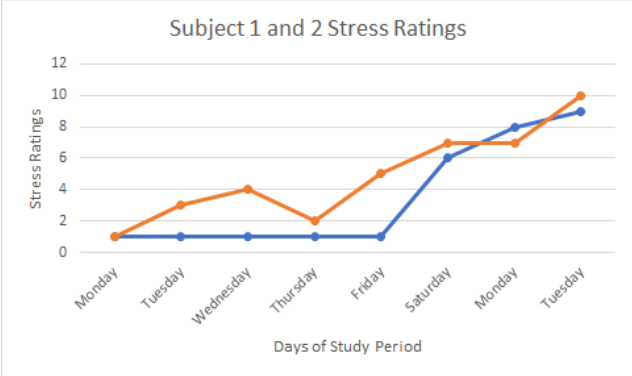
(full credit to https://www.ivey.uwo.ca/hba/classroom-cases/ontario-products/ for the case paragraph)

1. Identify the probable causes of profit loss at Elise's business.
2. What exactly can Elise do to pay off her employer and make sure the company can start making a profit again.
3. If you were in the position of Hoffman's boss would you have handled the situation the same way? Explain and give at least 2 reasons to support your idea.

The independent variable for the experiment was the study habit being forced on to the student. The dependent was the subjects' performance on the evaluation as well as the data recorded on the reflection page. The controls for the experiment were the quiet and isolated environment (resembles a proper test writing environment), the test and review (to give no subject an advantage over the

other, the tests were the same), notice prior to test and test date.

III. RESULTS



Subject 1 refers to the student tasked with procrastinating (shown in blue)

Subject 2 refers to the student tasked with working ahead (shown in orange)

Subject 1 Test Score: 79%

Subject 2 Test Score: 88%

Although Subject 1 scored lower than Subject 2 on the evaluation by 9%, their average stress rating is significantly lower.

IV. DISCUSSION AND CONCLUSION

The original hypothesis posed stated, "If procrastination and working ahead are compared, then procrastination is more beneficial in terms of its ability to help its user develop skills such as stress and time management." Based off the data, it is evident that the hypothesis is supported. When comparing the data from the two subjects, it suggests that procrastination may be the superior work ethic. According to the data collected, the students had test scores differing only by about 9%, had trouble with the same questions and had similar opinions on the test's difficulty. Both students had filled out a table on their test reflection sheet regarding their level of stress/worry prior to the test. While looking at the tables it became very evident that procrastination was working as a form of stress management whereas studying ahead of time simply caused more stress on the student. Minimizing the amount of stress one person has would have huge effects on their mental health and academic performance.

One of the most significant pieces of data came from Subject 2's reflection where it is stated, 'the constant studying led me to overthink and overstress about this test." This piece of data came as a surprise because of how common the work ethic is used and how much praise it receives. Working ahead is often seen as one of the best possible ways to study according many different individuals, so too see a statement so contradicting is very strange. However, as unusual as it may seem, it does explain the much higher stress levels in contrast to the student who was made to procrastinate.

V. APPLICATION

Much of the information collected could prove very useful if used properly. Procrastination can be used as tool by students due to the affects it has on an individual's stress. Although, procrastination does negatively affect the overall quality of the task, the affect is not always major. This is not to say working ahead is not a viable work habit because it is, but it may not be as good as it's made out to be.

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EFFECTS OF THE TYPE OF ACTIVITY DONE DURING STUDY BREAK ON THE ACCURACY OF MEMORY RECALL IN A TEST

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Abstract

The demand for students to spend a large amount of time afterschool studying for tests and assignments had always been high, especially for grade 10 students, whose senior years were approaching closer everyday. Therefore, with the purpose of creating an effective study routine, this experiment investigated the effects the types of activity students would do during study breaks on the amount of linguistic materials learned that could be recalled on a test. To investigate this, 5 activities (i.e. napping, listening to music, exercising, continuing to study, and using electronics) were chosen for students to complete during the study breaks. After each student received 10 minutes to study a set of words, they would perform one of the five activities during a 15-minute study break period before spending up to 25 minutes to write a test that required the students to demonstrate understanding of the words they learned. This process would repeat with a new set of words each time until all students had each performed all of the five activities. Then, the result from the participants showed that students performed the best, with an average score of 76.67% that was 8.54% above average, on the tests when they listened to music during their study breaks as opposed to students who played on their electronics, who performed the worst with an average score of 56.67% that was 11.46% below average. With the knowledge of avoiding activities during study breaks that were shown to have negative impact on studying efficiency, students could increase the efficiency of their studying session, which could lead to better academic performance and reduced workload.

I. INTRODUCTION

According to the Organization for Economic Co-operation and Development (2016, p. 456), students in Ontario spend about an average of 20.4 hours after school every week to learn through methods like studying. Most likely, students take breaks during these sessions to socialize, do other academic projects or chores, or to refocus concentration through doing their hobbies. There has been many records about the relationships between the interval, amount and length of study breaks and how well people can recall memories from the study sessions in between, such as the study conducted in Denmark that shows that students generally perform better with frequent breaks (Sievertsen, Gino, and Piovesan, 2016), there are little to none records about if the type of activities done in between these breaks plays a factor in the results. Individiually, though, there are information that proposed ideas as to how some activities can stimulate the brain and the act of learning. Sleep, for example, helps to organize information the brain has learned during the day, and napping, too, are thought to have similar effect, as demonstrated from the research conducted by Xiaopeng Ji (in LaPenta, 2018). Exercising can also

increase cognitive functions and helps students to better concentrate (Wong, 2016). On the other hand, music has been believed commonly among students as something that can help improve concentration and subsequently, academic performances. However, some researches also suggest that music can have the opposite effect, although there have not been any conclusive answers made (Lehmann and Seufert, 2017). Then, continuing to learn during breaktime may cause the brain to perform worse because the brain has worked a long time without a chance to rest (Sievertsen, Gino, and Piovesan, 2016). Then, using electronics is thought to be a bad influence on academic performance because students are easily distracted by the electronics and this decreases the time students spends on learning. It is also believed that radiation from smartphones can have negative health effects on the brain, although there has not yet any research discovered that provides an absolute proof to the statement (Turki, 2016).

Even though there has been researches that shows some effects the type of activities can have on people's learning performances, there has not been any researches that have examined these effects in the setting of a study session. Thus, it is possible that some activities students do during the study breaks does not help the brain to organize and understand the information learned, and so the understanding of how the activities during study breaks affect the students' understanding of the material can help students to have better academic performances. Therefore, the question for this experiment arises: how does the type of activity done by grade 10 students during study breaks affects the amount of linguistic memory that can be recalled in a test? Based on the previous information, if the activity of exercising, using electronics, napping, listening to music, and continuing to study are done during study break and are compared on the effects of memory-recalling performances, then exercising and napping will help students to have the best understanding or the most recall of the materials because the activities provide positive stimulation to the brain while using electronics would provide the worst because of the possible radiation to the brain. Then, since listening to music along with using electronics have not had any conclusive research made to their effects on learning performances, these activities may not have any positive effects as well.

II. METHODS

In the beginning of this 5-trial experiment, the subject would receive a set of words and study the words and definition (see figure 1.1 to figure 1.5) for 10 minutes in a quiet and well-lit room, forbidden from any assistance (e.g. Quizlet, dictionary) other than from the experiment conductor, and the assistance given were not in visual or written form. If the student was assigned the act of continue

studying for their study break, they would study for 25 minutes without stopping and write a test right after.

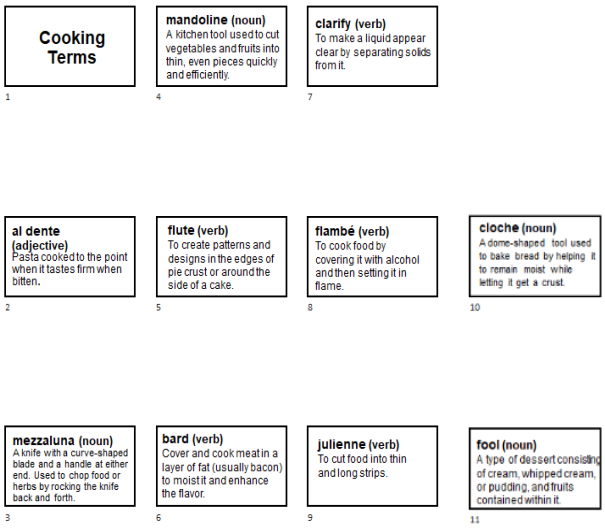
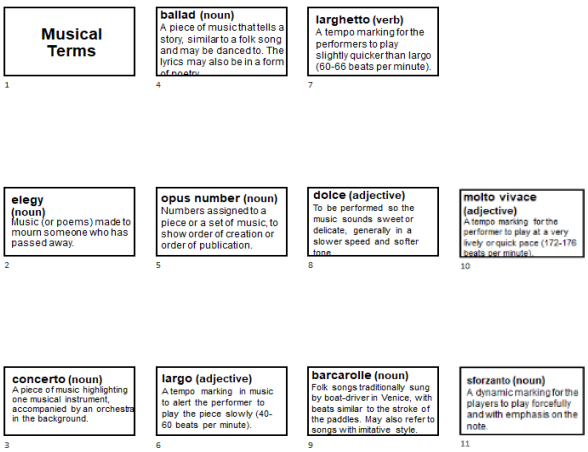


Figure 1.1: The first set of vocabulary, with the topic of cooking. The following sets were in the order of



which the participants would participate in the 5 trials.

Figure 1.2: The second set of vocabulary, with the topic of music.

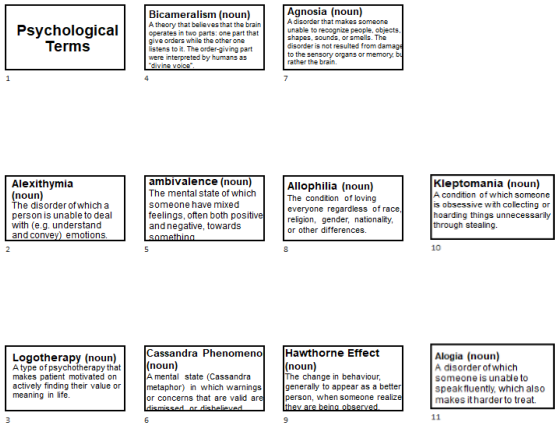


Figure 1.3: The third set of vocabulary, with the topic of psychology.

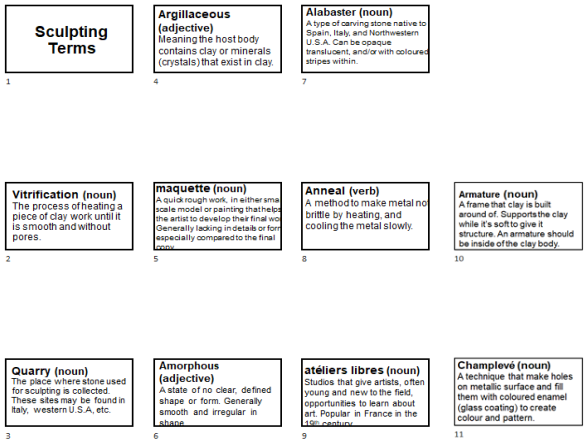


Figure 1.4: The fourth set of vocabulary, with the topic of sculpting.

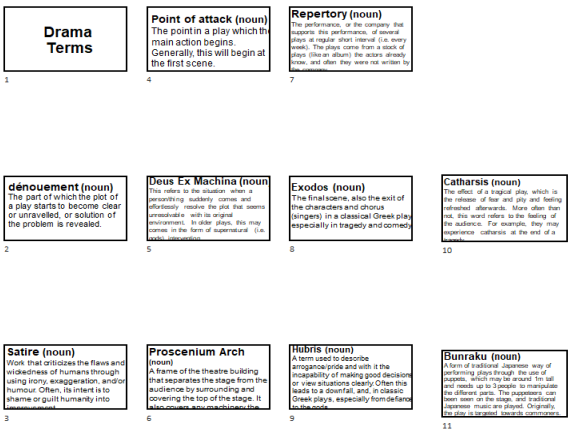


Figure 1.5: The fifth set of vocabulary, with the topic of drama.

Then, the subject had a 15-minute study break. During this period, if the subject was assigned 'exercising', they would perform a routine of 10 push-ups, 10 jumping jacks, 10 squats, and then a 10- to 15-second break before they would repeat the previous routine until the period was finished. If the subject was assigned 'listening to music', they would and only listen to music in music software that does not have visuals or other form of distractions. If the subject was assigned 'napping', they would need to sit on a chair and nap on a table. During this time, the subject was not allowed to talk or perform actions that could stop them from napping. If the student was assigned 'using electronics', they were able to freely use their cellphones, computers, or other electronics to perform any activities as long as they were not studying the vocabulary. Any observation about their behavior or possible change in their mental and neurological activities were recorded.

After the break, the students would have up to 25 minutes to write a 15-question test (see figure 2.1 to figure 2.5) that required them to remember the definition and spelling of the words, determine the correct usage of the words based on the context of sentences, and write sentences using the words. The length of time taken to complete the test and the score on the test were recorded. Then, the subject would write a recorded reflection (see figure 3) on the session. The previous arrangements would then be repeated to the same subject with a different vocabulary set and activities for 5 trials, until all 5 activities were performed. As well, other subjects would receive a different activity for the vocabulary set of the trial, although the order of the vocabulary sets were given were to be the same.

Definitions: write down the definition for the word listed.

1. Cloche
2. Barding

True or False: state if the context of the statement is true or false. State why the sentence is false.

1. Fluting is the cooking term for stuffing pie with delicious jam.
2. The English people generally eat a cup of fool after a meal.
3. A mandoline can be used to julienne the fruits and vegetables.
4. It is perfectly safe to use mezzaluna with one hand.
5. Joyce barded the scallop with juicy bacon and put it in the oven.
6. "The walls are flambéing!"

Fill in the blanks

1. Mrs. Maximoff _____ her prized sweet before sending it off for her son's birthday.
2. I need to _____ the eggs first to mix the egg white with the sour cream.
3. Where do I get my own bread? From the _____.
4. Charles _____ his carrot before putting the product gently into a bowl of salad.
5. Tony ate the _____ fettuccini with special tomato and meatball sauce.

Sentence writing – write 2 sentences using at least 5 words in the vocabulary. Use the terms properly, making sure their definition is or somewhat apparent.

Figure 2.1: The test given for figure 1.1.

Definitions: write down the definition for the word listed.

1. Concerto
2. Opus number

True or False: state if the context of the statement is true or false. State why the sentence is false.

1. The clarinet player almost bit their mouthpiece as they tried to play the sforzando on their notes.
2. The humanoid-like man hummed a barcarolle as he walked towards the living dinosaur.
3. A song played in dolce is as sweet as cactus on a needle.
4. "Your molto vivace is so fast! It's like one note can last as long as my lifetime!" Remy replied *seriously* and *without any sarcasm in his voice*.
5. The hobbits danced to the ballad.
6. I named my 3rd newest song in the album "MyMusic op. C".

Fill in the blanks

1. The band played the song "*Slow* Hands" in _____.
2. The audience watched in amazement at the orchestra's speedy movement as they played through "Never Gonna Give You Up" in _____.
3. The closest thing to largo is _____.
4. Erik played the flute during the _____ as the orchestra behind him watched.
5. Rose sat and played the _____, then she broke into tears and cried sadly.

Sentence writing – write 2 sentences using at least 5 words in the vocabulary. Use the terms properly, making sure their definition is or somewhat apparent.

Figure 2.2: The test given for figure 1.2.

Definitions: write down the definition for the word listed.

1. Logotherapy
2. Bicameralism

True or False: state if the context of the statement is true or false. State why the sentence is false

1. When a car accident made the person injure their ears, they realized that they may have gotten agnosia because they can't hear anymore.
2. After finishing up a very difficult test, John feels both refreshed, but he also fears that he'l fail. This is an example of ambivalence.
3. The psychiatrist encouraged their patients to ingest more pills as their logotherapy.
4. Through oral communication with patients with alogia, they can be quickly and easily treated.
5. In an abusing relationship, the example of Cassandra phenomenon may be seen when friends or families who knows the abusing partners dismiss the worries the abused partner have about the abusing partners.
6. Often, people are able to blend into the crowds because of the Hawthorne Effect, which helps them to observe how other people behaves and change them accordingly.

Fill in the blanks

1. Julian believed that _____ existed in ancient Greek culture because of obedience of literary characters on leadership from the Greek gods.
2. Because of _____, the person has trouble with talking about their feelings because they can't distinguish them.
3. If only everyone has _____, then social discrimination would never exist in this world.
4. When the person goes to their classes, they realized that they can't tell the difference in their classmates' appearance anymore. This is _____.
5. After filling up their basement with Twinkies secretly taken from the grocery store and did not pay for, the person realized this desire of theirs may be resulted from _____.

Sentence writing – write 2 sentences using at least 5 words in the vocabulary. Use the terms properly, making sure their definition is or somewhat apparent.

Figure 2.3: The test given for figure 1.3.

Definitions: write down the definition for the word listed.

1. Catharsis
2. Proscenium Arch

True or False: state if the context of the statement is true or false. State why the sentence is false or, if applicable, why the sentence is true.

1. When Dante's imaginary self finally made up his mind and helped Dante escape from the dream world, this ending is a form of Deus Ex Machina.
2. Arachne's hubris made her claim that she was better at weaving than Athena, who turned Arachne into a spider after Arachne lost their weaving contest.
3. An example of dénouement in Twelfth Night is when Sebastian married Olivia to resolve the love-affair issue caused by his twin sister, Violet.
4. In the Shakespeare play about Cleopatra, who ruled ancient Egypt at one point, she exited the exodos through her death.
5. In satires, often government, the representation of the minds of humanity, is depicted as an evil and wicked organization.
6. The bunraku is played just like the puppets in Sesame Street, except now there is a slightly bigger puppet.

Fill in the blanks

1. In Twelfth Night, the _____ starts when Violet decides to disguise herself as a man and from there, the main story of the play begins to unfold.
2. The local _____ offers different plays every other week, but they would have to get the right to play that play you want to see after it is released.
3. _____ happens because people may feel fortunate that the tragedy didn't happen to themselves and thus feel relieved from the feelings they originally have.
4. When the actress appears to descend from midair onto the stage, the equipment she used was hidden in _____.
5. The end of a Greek play is called _____.

Sentence writing – write 2 sentences using at least 5 words in the vocabulary. Use the terms properly, making sure their definition is or somewhat apparent.

Figure 2.4: The test given for figure 1.4.

Definitions: write down the definition for the word listed.

1. atéliers libres
2. Alabaster

True or False: state if the context of the statement is true or false. State why the sentence is false or, if applicable, why you think the sentence is true.

1. To make a maquette, it needs to go through a long process of vitrification before it is considered complete.
2. It is appropriate to make a sculpture amorphous to make its identity more mysterious to the audience.
3. There is no need for the copper sculpture to be vitrified.
4. For a Champlevé, I can use glaze used for clay and paint over it, and it'd be safe without second thought.
5. Alabaster is a stone native to Canada.

Fill in the blanks

1. I wrapped my clay around the _____.
2. The site of which we collect Alabaster can be called _____.
3. In a clay piece, it would be absolutely impossible for it to not be _____.
4. I sketched a small piece of _____ for my final project in pottery.
5. I _____ my bronze sculpture to strengthen it.

Sentence writing – write 2 sentences using at least 5 words in the vocabulary. Use the terms properly, making sure their definition is or somewhat apparent

Figure 2.5: The test given for figure 1.5.

Student Survey

Scale

1-so easy, you can do this with your toes

2-requires some thinking

3-medium difficulty – not too hard, not too easy

4-requires a lot of thinking and logic

5-Nearly impossible to finish

Questions

1. On the scale of 1 – 5, how difficult was the test? State your reason why.

2. On the scale of 1 – 5, how difficult was it to learn the vocabulary? State your reason why.

3. How well did you think you performed on the test? What score (/15) would you give yourself on the 15-question test?

4.. Did you feel motivated or stressed when writing the test or when learning the vocabulary? Which words did you have the most difficulty learning?

Figure 3: The survey given for the students to reflect in the experiment.

In the experiment, the independent variable was the type of activities student did during study breaks, and the dependent variables being the speed and accuracy of the memory recall the students did during the tests. Then, variables like the format and difficulty of the study materials and tests given as well as the length of each periods in the session (i.e. studying, break, test-taking) were controlled to be the same to ensure that no subjects had an easier opportunity to recall memory because of a lengthened period, a decrease in the difficulties of the materials, or because the format of that particular material set was more familiar to the subjects. Environmental factors (i.e. lighting, noise level, equipment used) were also regulated so that there weren't any noises and lack of lighting that affected the subjects to learn. The students also did not receive special equipment, like couches instead of chairs, to make sure that the comfort level did not influence the subject's concentration on the experiment.

III. RESULTS

Table 1: Recorded score and time of completion of students after napping.

Name	Word Set	Time Of Completion (Minutes With Seconds)	Student's Estimation Of Scores	Actual Score
Subject 1	Cooking	12:48	7/15	8/15
Subject 2	Drama	17:45	7/15	9/15
Subject 3	Psychological	14:36	9.5/15	11/15
Subject 4	Music	10:46	13/15	10.5/15
Subject 4	Sculpting	8:23	12/15	10/15
Subject 5	Music	10:46	13/15	10.5/15

Table 2: Recorded score and time of completion of students after listening to music.

Name	Word Set	Time Of Completion (Minutes With Seconds)	Student's Estimation Of Scores	Actual Score
Subject 1	Music	10:32	10/15	11/15
Subject 2	Sculpting	18:26	7/15	10.5/15
Subject 3	Cooking	9:54	13/15	12/15
Subject 4	Drama	9:32	12.5/15	11.5/15
Subject 5	Psychological	9:12	9.5/15	12.5/15

Table 3: Recorded score and time of completion of students after exercising.

Name	Word Set	Time Of Completion (Minutes With Seconds)	Student's Estimation Of Scores	Actual Score
Subject 1	Drama	8:55	10/15	7.5/15
Subject 2	Psychological	20:09	6.5/15	8.5/15
Subject 3	Music	10:38	12/15	12.5/15
Subject 4	Cooking	9:18	14/15	12.5/15
Subject 5	Sculpting	8:59	15/15	13/15

Table 4: Recorded score and time of completion of students after using electronics.

Name	Word Set	Time Of Completion (Minutes With Seconds)	Student's Estimation Of Scores	Actual Score
Subject 1	Psychological	9:40	11/15	8.5/15
Subject 2	Cooking	21:21	5/15	6.5/15
Subject 3	Sculpting	11:18	8/15	8.5/15
Subject 4	Music	7:36	13/15	10.5/15
Subject 5	Drama	9:06	10/15	8.5/15

Table 5: Result of Students after continue studying

From the reflection of the students' surveys, the average difficulty that the student perceived about the experiment was between 2 and 3 (i.e. 2.46) on the scale of 1 to 5, which represented that the experiment required some thoughts to finish, but was not too difficult according to the scale of the survey. 3 of the 5 subjects believed that listening to music or working with terms related to music helped them to relax or be familiar with the terms, although one subject did not believe so. During the activity of napping, all 5 of the subjects responded in the survey that they did not fall asleep, while 4 subjects each responded for the activity of continue studying that the subjects either did not feel stressed or felt bored during the studying session. During exercising, the subjects performed on average of 9.6 trials of the routine (see section III. Methods), and 4 subjects responded that the act either helped them relaxed or be more comfortable. During the act of using electronics, all 5 subjects responded that there was a difficulty in remembering the information for reasons that included the length and concept of the words to simply forgetting the words.

During the studying sessions, all the subjects were observed to had either scanned their eyes on the flashcards or spoken words out loud to study. There were no significant changes in the facial expression during the studying session and test-taking period. Subjects who asked about the remaining time asked around 5-minute to 2-minute countdown of the studying session.

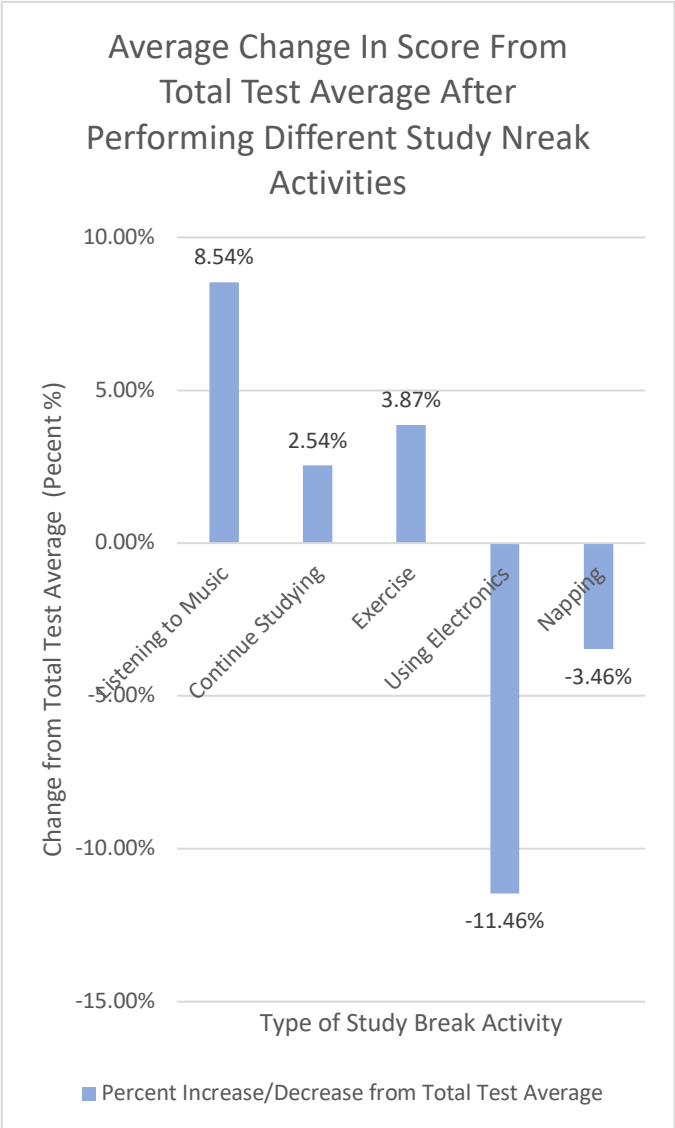


Figure 4: Average increase or decrease from the total average score (68.13%) for each type of study break activities.

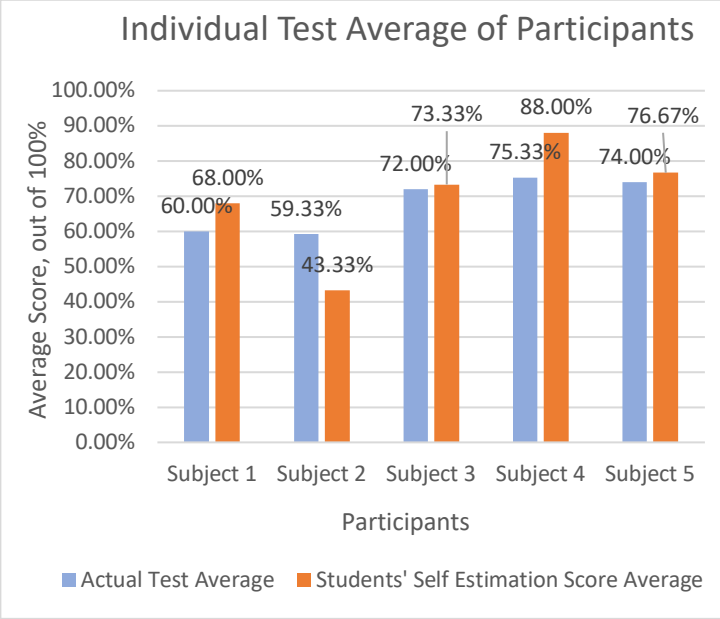
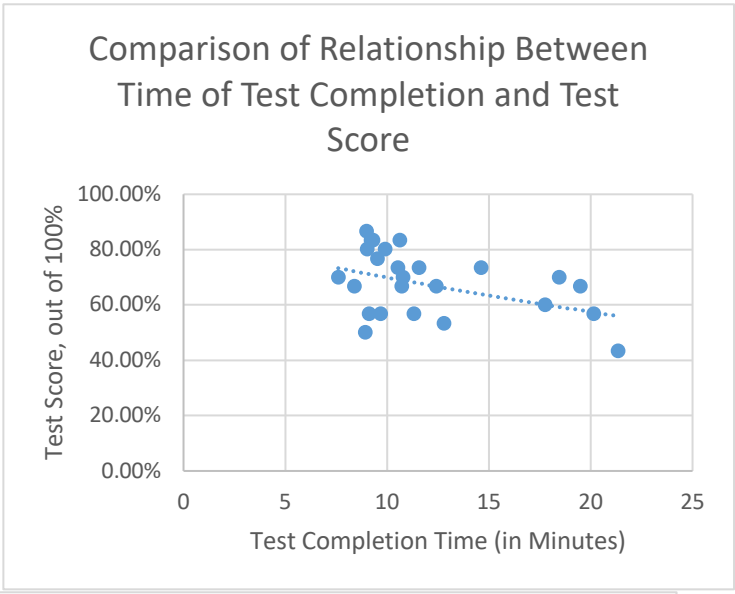


Figure 5: Comparison of the actual average score and estimated score between participants.



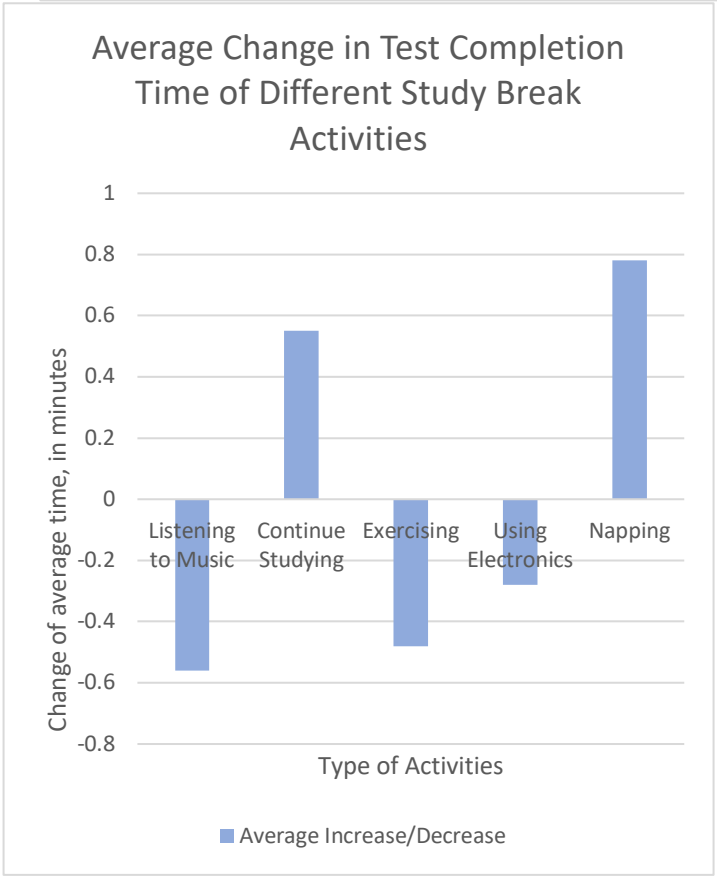


Figure 5: Comparison of the average increase or decrease of time of test completion from total average (12.08 minutes) between the different activities.

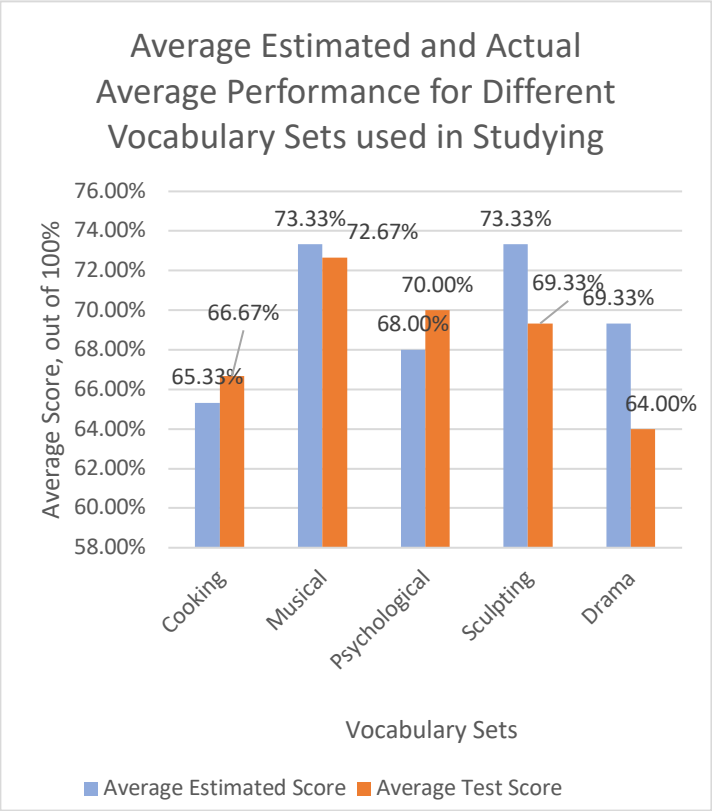


Figure 6: Comparison of the student-estimated test score and actual test score for the vocabulary sets used.

Figure 7: Comparison of the relationship between the speed of completing the test to the accuracy of the memory recall.

IV. DISCUSSION AND CONCLUSION

The hypothesis was incorrect in that exercising and napping during study breaks were stated to create the best performance in a memory-recalling test. Even though students who exercised during their study break performed second-best out of all the assigned activities (3.87% above average), students who napped performed second-to-last with an average mark of 3.46% below average. Instead, the data showed that students who listened to music during their study break achieved the best results on the tests, being able to remember and apply the terms correctly on 76.67% of the test (12% higher than students who napped, 4.67% higher than the students who exercised, and 8.54% higher than the total average performance). As well, the hypothesis stated students who did not have breaks between studying and taking the test would perform worse than average, yet the students in this experiment performed 2.54% above average, which was the third-best result. However, the hypothesis was correct when it was stated that using electronics will make people perform worse, as in this group performed 11.46% below average, which is the worst result out of all assigned activities. Compared to students who listened to music, these students had an average mark that is 20% less.

Originally, napping and exercising are hypothesized to have the best performance because these activities stimulates the brain the best: exercise can help with concentration and cognitive abilities (Wong, 2016), while Xiaopeng Ji's research (in LaPenta, 2018) claimed that napping can help with organizing memories in the brain. While the students who exercised before writing their tests did perform well, none of the 5 participants claimed that they have fallen asleep during the 15-minute nap period, which might be the reason why students in this group didn't perform as well: the intended neural organizing process did not have enough time to happen. Interestingly, 60% of participants claimed that they were familiar with music-related subjects, and according to them it helped them to better visualize the context of the words they learned in the musical vocabulary set. This familiarity with music might be a reason why students who listened to music performed better: the music helped the brain to organize and familiar themselves with the studied terms.

Some source of error might include the inconsistency of the difficulty of the vocabulary sets used. By analyzing figure 6, it could be seen that there was not an equal level of score between the sets, which could be a factor that created the results. As well, all the participants had mentioned that they had difficulty remembering the words when they were using electronics because of word lengths. Although it might be due from an inconsistency of vocabulary difficulty, because of other subjects' different response and the high

number of participants who had difficulty with the activity regardless of the vocabulary set assigned, it might also be because from the distraction and radiation the electronics provided (Turki, 2016). The level of linguistic skills was also not a part of the controlled variables, which could be another reason why the data appeared the way it is. In the graph in figure 6, Subject 1 and Subject 2 appeared to perform worse than the other subjects. The subjects' results, especially Subject 2 with 'Using Electronics', might be the reason why the performance of those who used electronics or napped appeared worse than average. Then, the participants also claimed that they were bored during the session which the subjects were continuously studying for 25 minutes, observations of them had appeared that their minds were able to drift off and relax, which was not listed as the variables that must be controlled. This could reduce the effect of stress that was meant to be placed upon the participants according to Sievertsen's, Gino's, and Piovesan's research (2016) that frequent breaks could improve the performance of students.

V. APPLICATION

To the general public, the effects that the type of study break activities have on how well the students can remember studied materials can significantly help students to plan out a more efficient studying routine. This allows for a reduced workload, and further studies can also use the information from this experiment to understand what kind of schedule or routine helps students to study material more efficiently, thus creating a more effective education system for schools and teachers. The information may also be useful in neurological or psychological studies studying learning, where this data can be used to further examine why certain activities have certain effects on the brain activity. However, due to the inconsistency of the result of this experiment as opposed to the ideas of other scientists, there must be more examination to see if the result of this experiment is resulted from the different sources of errors listed in section IV. Research can also be made, if the results in this experiment is not inaccurate, with specifically on the activity of listening to music and using electronics to see what kind of music or electronic activity can impact memory-recalling performance respectively the best and the worst.

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How Do Different Types And Genres Of Games Affect Your Emotion?

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Abstract

This project was all about testing how different genre of games affect the player's emotions and feelings. How would shooting games and simulation games compare when tested for their influence on someone's emotions. To test this four subjects would play the same game for a week, an hour a day. They would start by explaining how they felt then they would go and play the game for an hour then explain how they felt after playing. They would repeat this procedure for three weeks, one game per week. Referring to my hypothesis, I predicted that shooting games would have a more negative impact and it turned out to be true according to my test results. The game itself had little to no impact on how the players felt. What truly impacted it was how well the players played and the violence levels of the game. These results are significant today since video games are growing in popularity and a lot of people think they are bad. This experiment clears up that question in saying that video game themselves doesn't make people feel a certain way.

I. INTRODUCTION

The purpose of this project is to use different types of games with different genres to find out how they affect the player's emotions. This project is relevant since video games are a very big topic in today's day. The results from this project can be proven beneficial since we can learn whether certain games help people with destressing or if they feel more energized after playing. How will shooting style games compare to simulation style games when it comes to how they make the players feel. That is the question being addressed in this project.

If shooting games and simulation games are compared, then shooting games will have a more negative affect on the player's emotions rather than the simulating games.

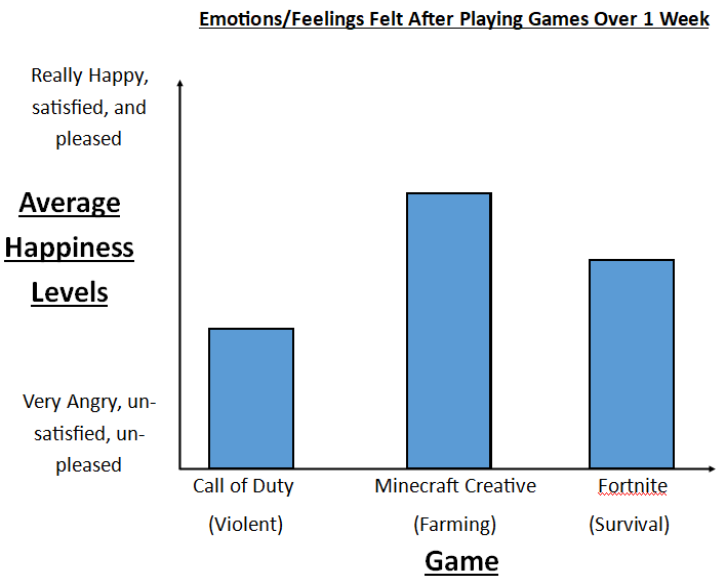
II. METHODS

Four subjects were involved in doing this experiment. The subjects would start by explaining how they feel. After they explained what they were feeling, they would play the same game for an hour. Once they finished playing they would explain how they feel and if they felt and drastic mood change or emotions. They would repeat this every day for a week. Once one week passed, they would switch games. In total, three games were tested over three weeks in this experiment. For this experiment all the variables must stay the same through all of the subjects. For example, for the independent variables is that the game needs to change for the players at the same time for everyone and give them all the same game. Must not switch the amount of play time through the experiment, just keep everything the same. For the observations, record what the subjects say and how they said they felt. The only thing that should be changing is the game, the rest must be

controlled such as the play time, play condition, space in the play area, temperature of the building they were in, and they must play on the same platform whether they play on a console or on a computer. These were controlled since if changed they could alter the data received.

III. RESULTS

There was a lot of data collected for this experiment. The data came from every person and how they felt every day of the week for every person for one game. That's 28 pieced if information for one week, 84 pieces in total.



This is the data collected in the form of a graph. The higher the bar in the graph above, the higher the average happiness level for that game was. On the x-axis is the game and genre of game being compared and on the y-axis is the scale of average happiness. Call of Duty which was a violent shooter game produced the most negative emotions when the players finished played. Minecraft which was the most peaceful game produced the happiest reactions in the players after the finished playing. All of the data seen in the graph is the average of all of the data collected through the weeks.

IV. DISCUSSION & CONCLUSION

The hypothesis proposed at the beginning of this project was indeed proven correct. The original question was "How will different types of games or playstyles of games affect mood and emotions?" Using the data gathered, the conclusion that can be made is that shooting games affect players' mood in am more negative way compared to simulation games. For the violent game, players expressed for anger, rage, and didn't experience much fun.

Most of the data was in line to what was expected except for an outlier for Call of Duty. This player experienced maximum enjoyment and had so much fun. This did increase the overall average happiness for that game. The believed reason behind this was because the player probably had some background in playing Call of Duty games therefore making them better at the game meaning they could perform better resulting in happier results. As for the other games, the results were pretty much exact to what was expected.

V. APPLICATION

This research and data collected can be very useful in further research since these games are in a broad genre such as a shooter or simulation. This data can be used as the base for further research which can go

into more depth with more specific games that portray a specific genre better than these games. This information can be useful to the general public since a lot of parents whose kids play games are against them since they think they affect the child's brain but using this information, they can be proven wrong.

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How the Rubik's Cube Affects the Reaction Time, Memorization capabilities and Mental Health of High School Students

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Abstract

How would solving a Rubik's Cube everyday affect a high school student's reaction time, memorization capabilities and mental health? The topic that has been explored in the study is the result of problem solving on the brain, which is achieved through solving a Rubik's Cube. Three test subjects took a cognitive and math test, and their reaction time, percentage of material memorized, and time taken to complete the math test were recorded. The subjects were then taught how to solve a Rubik's Cube, and solved a Rubik's cube for 15 minutes a day, every day, for 25 days. After the 25 day period, the subjects re-took the cognitive and math test, and the results of both pairs of tests were compared. The results showed a significant improvement in reaction time and memorization capabilities, whereas the time that it took the subjects to complete their math tests showed very little change, which wasn't enough for a conclusion that it was affected by the Rubik's Cube solving to be made. The subjects also said that while solving the cube, they were not stressed and felt happy. In conclusion, the Rubik's Cube solving improved the subject's reaction time and memorization capabilities, however it also improved their mental health for a short period of time. This means that problem solving on a daily basis would benefit the solver's basic cognitive functions and mental health.

I. INTRODUCTION

Learning the affects of the Rubik's Cube on the brain is important because it makes people aware that there is an enjoyable past time that could potentially enhance the user's cognitive ability. Recently, there was a study conducted at Duke University that showed that problem solving can help with anxiety, depression, and cognitive ability in general (Problem Solving Buffers the Brain Against Anxiety, 2018). The study would show how these results are related to the Rubik's Cube, and how much of an impact can be made in one's day to day life just by learning to solve one. How does learning and practicing how to solve a Rubik's Cube affect the cognitive ability of high school students? If Rubik's Cube solving is practiced for at least 15 minutes a day, then a test that was taken before

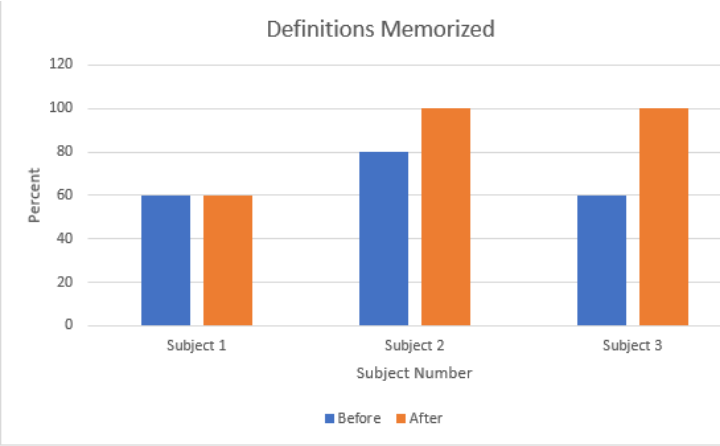
and after the subjects learned to solve the Rubik's Cube would show enhanced problem solving and basic cognitive functions. This is because problem solving has been directly linked to slowing down cognitive decline (Mind Games, 2014) and improvement in cognitive function (Problem Solving Buffers the Brain Against Anxiety, 2018). This data proves that the Rubik's Cube, a very demanding puzzle in terms of problem solving, will improve one's cognitive ability.

II. METHODS

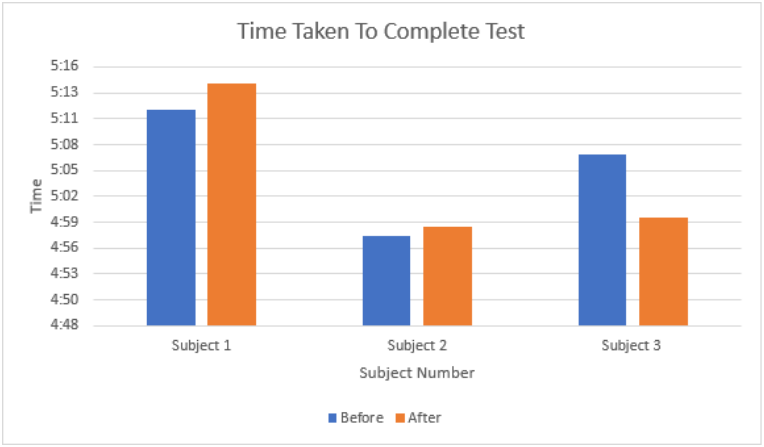
Firstly, create or find a reaction time test, memorization test and grade 10 math test. The reaction time test can be the "human benchmark test", or something similar. Additionally, the reaction time test's results should be in milliseconds. Record the reaction time of each subject. The memorization test should be a PowerPoint presentation with five words and their definitions, then the next five slides should be only the words in a different order than before. Go through each definition and give the subject five seconds to memorize the word and its corresponding definition. After all words and definitions have been shown, show the subject the slides with only the words and have them say the definition. Give them a percentage mark out of 100 and record the data for all three subjects. For the math test, create or find a test that matches the curriculum that they are studying. Have the subjects do the test and record their percentage mark out of 100. After all the subjects have completed the three tests, teach them how to solve a Rubik's Cube. Have all three subjects practice solving the Rubik's Cube for 15 minutes a day, every day, for 25 days. After 25 days, have the subjects complete the tests again, and compare the data of each subject from before and after their practice. Independent and dependant variables include: Independent: Amount of time spent Rubik's Cube solving per day. Dependant: Memorization capabilities, reaction time and ability to solve math problems. Control variables: Tests: If the tests that each student was doing were different, the test would created biased results. Environment: All the test subjects must be in the same type of environment because external factors such as noise and distractions may throw off the results of the test, as the subjects may not be completely focused. Information on PowerPoint: If the information on the PowerPoint are different then some subjects may have easier definitions to memorize, which would throw off the data because one subject's data may be biased. Lesson taught: If different amounts of information are given or the instructions aren't consistent from subject to subject, then it would make the data less accurate. This is important because it may inflate or deflate one of the subject's results and would give the students who received a better lesson an advantage, as they had more information than the other subjects.

III. RESULTS

The reaction time in milliseconds of all three subjects before and after they learned how to solve a Rubik's Cube. (Table 1)



The percentage of definitions that the three test subjects were able to memorize before and after learning how to solve a Rubik's Cube. (Table 2)



Time it took each subject to complete the math test before and after they learned how to solve a Rubik's Cube. (Table 3)

The data shows a clear improvement in reaction time and percentage of definitions memorized. As shown in Table 1, the reaction time of all three subjects showed an improvement of 15 milliseconds (from 226 to 209). This makes sense because when someone is solving a Rubik's Cube they must react to the patterns that they see on the cube as fast as they can, and after a while they will be able to react faster. Additionally, the Rubik's Cube has many algorithms that must be memorized to achieve high speed solves. Certain patterns on the cube allow the solver to use algorithms that make solving the cube easier. The three subjects memorized many of these algorithms, which is likely why their ability to memorize materials improved. The last data type, which is shown in table 3, the time it took the subjects to complete the math test, did not show much improvement. This is because the Rubik's Cube does not require any math to solve, but the data was included in case there was some link

between the two subjects. Although the average time it took the subjects to complete the math test decreased (from 5:05 to 5:02), it did not decrease enough to suggest that it was because the subjects learned how to solve a Rubik's Cube.

IV. CONCLUSION

Yes, the hypothesis was correct. The hypothesis was that basic cognitive functions such as reaction time and ability to memorize information would improve, which was shown in the data. The data showed an average decrease in reaction time of 17 milliseconds, and the memorization test showed an average increase of 20%. However, the time taken to complete the math test did not show enough of an improvement to suggest that it was from the Rubik's Cube solving. However, the average of all three data types did improve, which proves that the hypothesis was correct. All three subjects felt relaxed during the 15-minute period in which they were practicing solving their Rubik's Cubes, which makes sense because the study at Duke (Problem Solving Buffers the Brain Against Anxiety, 2018) came to a similar conclusion. Additionally, the study that showed that mental decline and basic cognitive function would be improved (Mind Games, 2014) also had similar results as this study, which explains why the test subjects of this study had an overall improvement in basic cognitive functions and mental health after the subjects learned to solve a Rubik's Cube.

V. APPLICATIONS

The information in this study can be used to help a wide variety of people. Since problem solving has been linked to better mental health and cognitive function, just about everyone in the world can use problem solving to relax and de-stress. Since everyone problem solves every day, we can use the data collected in this study to take advantage of the benefits of problem solving. If someone is having a bad day, they can turn to a simple problem solving past time that may take their mind away from the stressful environments of work or school. Additionally, problem solving could be used to treat mental illnesses, as patients could use activities such as the Rubik's Cube to relax and improve their state of mind.

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Which Carbohydrate Affects the Body More Positively Regarding Brain Performance, Athletic Performance, and Weight

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Abstract

The question answered in this project was which of the two different carbohydrates (simple and complex) affected the body more positively regarding brain performance, athletic performance, and weight. This question was important to answer because carbohydrates are one of the body's main sources of energy. Understanding which type of carbohydrate positively affects the body the most, allows for maximization of effectiveness of some of the body's main performances, things such as brain performance, athletic performance, and weight. This allows for tasks such as school tests, track races, and weight loss to be performed more effectively. The data that was found showed that the complex carbohydrate provided more effective results in brain performance, athletic performance, and weight than simple carbohydrates. The trend discovered, was that subjects performed better and completed the knowledge test given faster, performed the athletic test faster, and gained less weight, when eating foods with complex carbohydrates rather than simple carbohydrates. These results answered the question that consuming foods with complex carbohydrates affect the body more positively regarding brain performance, athletic performance, and weight than foods with simple carbohydrates.

I. INTRODUCTION

This experiment found the difference in the effects between simple and complex carbohydrates on the body regarding brain performance, athletic performance, and weight. Discovering an answer is important because Szalay (2017) states that The American Diabetes Association notes that carbohydrates are one of the main sources of energy for the body. This means that the body relies on this nutrient throughout the entire day and because of this, researching and experimenting on whether complex or simple carbs affect the body more positively, can maximize productivity. Jessimy (2018) gives a list of benefits of eating foods with the right kind of carbs. Understanding which types of foods contain the right type of carb can not only help make the body feel good, but Jessimy (2018) also says that things like improved brain performance, improved athletic performance, and weight loss, are all additional benefits.

The question of this project is which carbohydrate affects the body more positively regarding brain performance, athletic performance, and weight.

The hypothesis is if simple and complex carbs are compared, then complex carbs will more positively affect the body regarding brain performance, athletic performance, and weight. Jessimy (2018) says that because they break down slower, they provide a more stable and prolonged rate of energy. This will increase brain and athletic performance because the body will have more energy to use, instead of spikes and short bursts of energy like simple carbs provide, because they break down faster. Jessie (2017) also says that complex carbs are also lower in calories,

saturated fat, and sodium than simple carbs which will result in less weight gain.

Simple Carb Diet (1 day)

Breakfast	Lunch	Dinner
1 Slice of White Toast	1 White Bread Turkey Sandwich	1 Plate of Regular Pasta
1 Cup of Apple Juice	1 Grape Juice Box	1 Can of Coke
1 Bowl of Froot Loops	1 Pack of Gushers	

Table 1: Foods contained in the simple carb diet.

Complex Carbs (for 1 day)

Breakfast	Lunch	Dinner
1 Slice of Whole Wheat Toast	1 Whole Wheat Turkey Sandwich	1 Plate of Whole Wheat Pasta
1 Cup of Water	1 Bottle of Water	1 Cup of Water
1 Bowl of Raisin Bran Cereal	1 Whole Grain Granola Bar	

Table 2: Foods contained in complex carb diet

II. METHODS

This experiment contained 4 phases and 4 subjects. Each phase represented a specific diet that each subject followed over the course of 2 days. The first diet was a pre-diet, in which subjects would not change any of the foods being eaten, the second diet was a simple carbs diet, the third diet was a recovery phase in which subjects would return to the normal diet, and the fourth diet was a complex carb diet. After each phase, subjects conducted 3 tests. A knowledge test that was provided, a 50m sprint, and a weighing test. The data that was tracked was the time each subject took to write the test and the percentage of correct answers, how long each subject took to sprint the 50m, and the weight of each subject.

The independent variable of this experiment was the intake of simple and complex carbohydrates.

The dependent variables were the weight, how the subjects felt (energy, mood, productivity), brain performance (better/worse based on complex/simple carbohydrates), and athletic performance (sprint time faster/slower based on simple or complex carbohydrates).

One controlled variable was the kind of food and the intake of food each subject had. This was controlled because different foods have different concentrations of carbs and eating more or less of a certain food will increase/decrease the amount of carbohydrates eaten. Having different intakes of carbohydrates could have skewed the data because of inconsistent energy levels. Each subject consuming the same foods and having the same intake of carbs allows each subject to have the same energy levels, to provide the most accurate data. Another controlled variable was the amount of physical activity done in the day. This was

controlled because doing extra/less exercise could have changed the 50m dash time from what it should have been. For example, if a subject did more exercise on a certain day than another, then the 50m dash result would have a slower time than it should have been because of the extra exhaustion caused by the additional exercise. Physical activities among all subjects were the same throughout the experiment. Another controlled variable was the time of each meal. Each subject ate each meal at the same respective time (breakfast at 7:30AM, lunch at 12:30PM, dinner at 6:30PM). This was controlled because having inconsistent mealtimes could have skewed results. Each subject eating at the same time allows for equal digesting times. Eating earlier or later could have increased or decreased energy levels than what they should have been.

III. RESULTS

Average Results of Test Scores, Test Times,

Weight Gain, 50m Dash Increase/Decrease during Pre-Diet, Simple Carb Diet, Recovery Phase, and Complex Carb Diets (Table 3)

Tests	Pre-Diet	Simple Carb Diet	Recovery	Complex Carb Diet
Test Score (%)	57	61	67	73
Test Time (Minutes)	7:08	5:27	5:23	4:48
Weight Gain (lbs.)	0.7		0.25	
50m Dash Time Increase/Decrease (Seconds)	(Pre-Diet to Simple Carb Diet) +1.24		(Recovery to Complex Carb Diet) -0.32	

Table 3: Average test scores, test times, weight gain, 50m dash increase/decrease for every subject during each diet phase.

Subject 2 Test Scores, Test Times,

Weight Gain, 50m Dash Times during Pre-Diet, Simple Carb Diet, Recovery Phase, and Complex Carb Diets (Table 5)

Tests	Pre-Diet	Simple Carb Diet	Post Recovery	Complex Carb Diet
Test Score	16/30	18/30	21/30	24/30
Test Time (Minutes)	4:40	4:35	5:14	4:24
Weight Gain (lbs.)	164lbs	164.4lbs	163lbs	163.2lbs
50m Dash Time (Seconds)	9.07 sec	10.24 sec	10.17 sec	10.04 sec

Table 5: Test scores, test times, weight gain, 50m dash times for Subject 2 during each diet phase

Subject 1 Test Scores, Test Times, Weight Gain, 50m Dash Times during Pre-Diet, Simple Carb Diet, Recovery Phase, and Complex Carb Diets (Table 4)				
Tests	Pre-Diet	Simple Carb Diet	Post Recovery	Complex Carb Diet
Test Score	21/30	22/30	23/30	25/30
Test Time (Minutes)	6:12	5:15	4:34	4:13
Weight Gain (lbs.)	128lbs	128.9lbs	128.3lbs	128.6lbs
50m Dash Time (Seconds)	9.32 sec	10.24 sec	9.42 sec	9.35 sec

Table 4: Test scores, test times, weight gain, 50m dash times for Subject 1 during each diet phase.

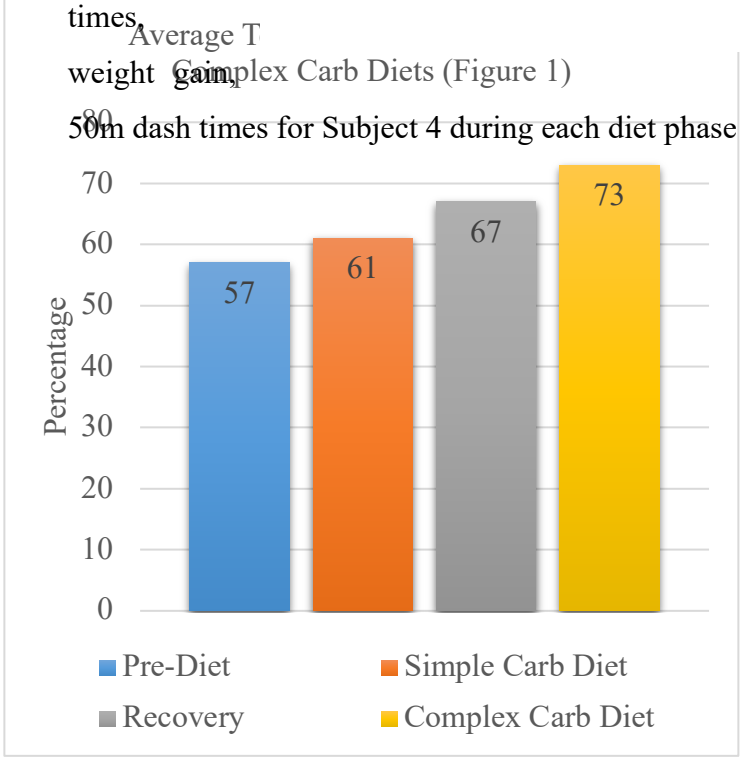
Subject 3 Test Scores, Test Times, Weight Gain, 50m Dash Times during Pre-Diet, Simple Carb Diet, Recovery Phase, and Complex Carb Diets (Table 6)				
Tests	Pre-Diet	Simple Carb Diet	Post Recovery	Complex Carb Diet
Test Score	13/30	14/30	17/30	19/30
Test Time (Minutes)	8:22 min	5:54 min	5:02 min	5:07 min
Weight Gain (lbs.)	97lbs	97.6lbs	95.2lbs	95.4lbs
50m Dash Time (Seconds)	11.03 sec	13.07 sec	11.01 sec	11.03 sec

Table 6: Test scores, test times, weight gain, 50m dash times for Subject 3 during each diet phase.

Subject 4 Test Scores, Test Times, Weight Gain, 50m Dash Times during Pre-Diet, Simple Carb Diet, Recovery Phase, and Complex Carb Diets (Table 7)				
Tests	Pre-Diet	Simple Carb Diet	Post Recovery	Complex Carb Diet
Test Score	18/30	19/30	19/30	20/30
Test Time	7:21	5:20	4:28	4:11
Weight	132lbs	132.8lbs	130.1lbs	130.4lbs
50m Dash Time (Seconds)	10.12 sec	11.56 sec	11.2 sec	10.10 sec

Table 7: Test scores, test times, weight gain, 50m dash times for Subject 4 during each diet phase

Figure 2: Average test times during each diet phase.



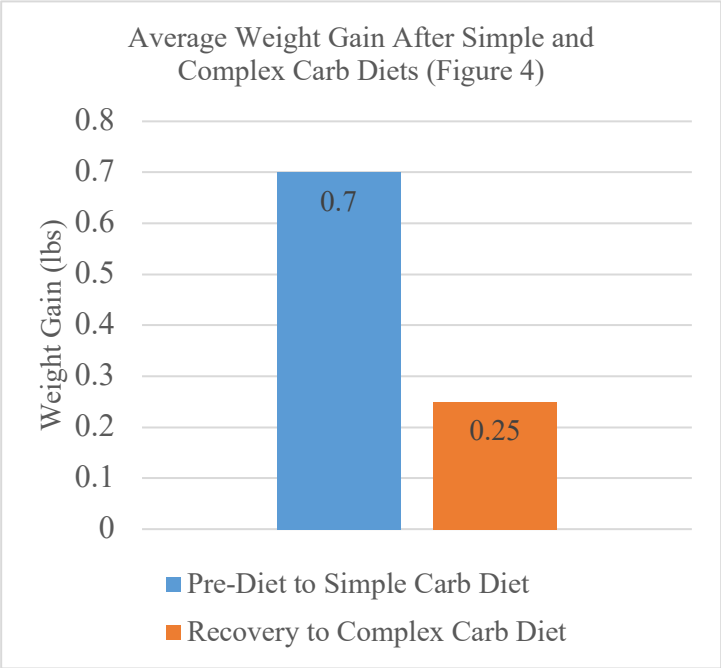


Figure 4: Average weight gain after simple and complex carb diets

IV. DISCUSSION & CONCLUSION

The hypothesis was correct. In this experiment, when simple carbs and complex carbs were compared, complex carbs made the body feel better, made the brain work better/faster, increased athletic performance, and added on less weight. When subjects were questioned after each diet and after the experiment, all subjects stated that the complex carb diet made the body feel better and that subjects preferred eating the complex carb foods than the simple carb foods. When testing subjects with the knowledge test at the end of each diet, results show that the score each subject received from the pre-diet to the simple carbs diet was lower than the score from the post-recovery to the complex carbs diet. On average, subjects scored a 59% in the first phase (pre-diet to simple carb) of the experiment and then scored an average of 70% in the second phase (recovery to complex carb). When subjects ran the 50m dash during the experiment, each subject ran faster in the second phase than in the first phase. On average, subjects ran slower or added on 1.24 seconds when going from pre-diet to simple carbs and ran faster or lowered the time by 0.32 seconds when going from recovery to complex carbs. When weighing the subjects in each stage of the experiment, subjects gained an average of 0.7 pounds when going from pre-diet to simple carbs diet. When subjects went from the post-recovery stage to the complex carbs diet, subjects gained a lower average of 0.25 pounds.

Figure 1: Average test scores during each diet phase.

Figure 3: Average 50m dash time increase/decrease after simple and complex carb diets.

Regarding the test scores and test times of each subject, because subjects take the same test multiple times, when they take the test the second, third, and fourth time, they have prior knowledge of the questions and can expect which questions they will have to answer. This can skew the time it takes each person to write the test and the score because they have already previously written it. (Kimble 2016) states that learning theorists have concluded that repetition can enhance the process of learning. This means that doing the same task for a repeated number of times will help with learning and doing the task more effectively and efficiently. In this experiment, subjects will have a lower test time after the first instance because of the repeated action. Subjects will learn the test and become accustomed to it, meaning subjects won't be surprised by any of the questions and will pre-emptively know which answer to write down, which will lower the time regardless of brain activity caused by the food. This also affects the test score of each subject. Because each subject knows which questions are already on the test, subjects are able to correct any mistakes that could have been previously made in the first attempt.

V. APPLICATION

This information can be used for the general public. Most people have the knowledge that foods such as whole wheat items are generally healthier, yet they do not know as to why this is the case. If people knew as to why these foods are healthier, then they would take more advantage of these benefits and purchase them more often. In making this change, it will allow more people to have healthier choices not only to benefit appearance (weight loss), but also productivity (brain performance, athletic performance, energy levels). The general public could use this information to improve the quality of life in all aspects.

This information can also be applied to sport fields of study. Because of the research and experimental answers that foods with complex carbohydrates improve athletic performance, sport fields and people who work with athletes can use this information to maximize athletes' athletic performance and energy levels to increase performance.

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Methods of Overcoming a Fear in Gymnastics

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Abstract

The question investigated was "What is the most effective method to overcome a fear in gymnastics?" The importance of the experiment was to help gymnasts find a beneficial method to overcome fears effectively. Three methods were compared: visualizing, verbally choreographing, and goal-setting. The subjects tried each method for a week and recorded a number of repetitions. This number was compared to the original number of repetitions completed without a method to determine a percent increase/decrease in performance. The most effective method was found to be verbally choreographing with an average increase in repetitions of 31.5%. It worked the best since participant is forced to think about the fear when the process is spoken out loud. This data was relevant for gymnasts hoping to overcome a fear since the method that will be the most helpful in overcoming the specific fear can easily be determined.

I. INTRODUCTION

This is relevant since 70% of high-level gymnasts have experienced a psychological blocking/ fear (USA Gymnastics, 2009). Many gymnasts say that mental blocks are the worst part of gymnastics (Van Deusen, 2019) and it can be difficult for athletes and coaches when the athlete can't perform a skill that should be easy due to fear. The more a gymnast can gain insight into internal obstacles, the greater the ability to contain and manage anxieties (Breazeal, 2014). There are many ways that a gymnast can try to decrease fear and overcome it, such as visualizing oneself doing it perfectly, verbally talking through it, or setting a goal that must be met for every practice.

What is the most effective method to overcome a fear in women's artistic gymnastics?

If the methods of overcoming a fear: visualizing, verbally choreographing, and goal-setting are compared, then visualizing will be most effective because when visualizing, the brain sends a message to the muscles telling the body what to do (Bellinger, 2017), which will minimize sense of fear.

II. METHODS

First, subjects were told to identify the skill that is causing the fear. The skill was completed as many times as possible in 30 minutes without aide from a coach and the number of completed repetitions was tallied and recorded in the Results Table. This was repeated 2 days later. The following week, participants attempted to do the skill again, but visualized doing it first. To visualize, one was to see the skill being done step by step in the mind's eye. The number of completed repetitions was tallied and recorded in the Results Table. This was repeated 2 days later. The third week, participants were to talk through the steps of doing the skill out loud before attempting to do it. The completed repetitions were tallied and recorded. The final week, participants were to set a reasonable and attainable goal for the number of repetitions that were to be achieved. Participants were told to remember that this goal had to be reached in the 30 minute period. The number of completed repetitions was tallied and recorded.

The independent variable was the method of overcoming the fear. The dependent variable was the percent change in repetitions. The controlled variables were the level of gymnasts, definition of successfully completing a skill, and additional aide offered by coaches. The level of the gymnasts participating was restricted to Provincial Optional Women's Artistic levels 6-8 to maintain a difficulty in the skills. The definition of successfully completing a skill was standardized to landing on feet before falling on floor and vault. A Fast Track could have also been used for skills on floor. On

beam, the gymnast had to finish the skill without falling off the beam and the beam had to be standard width of 4 inches and at least beam height off the ground. On bars, the skill had to be fully completed and dismounts had to be landed on feet before falling. The definition was controlled to maintain the quality of repetitions recorded as completed and to ensure consistency between athletes. Additional aide offered by coaches was restricted to none to maintain balance between athletes with different coaches since different methods are used by different coaches to assist athletes.

III. RESULTS

Table 1- Data gathered from participants. Shows number of repetitions done over two days, the average, and percent change.

Methods of Overcoming a Fear in Gymnastics

	None			Visualizing				Verbally Choreographing				Goal-Setting			
Participant	Day 1	Day 2	Average	Day 1	Day 2	Average	% Change	Day 1	Day 2	Average	% Change	Day 1	Day 2	Average	% Change
1	5	3	4	3	3	3	-33%	2	5	3.5	-14%	2	3	2.5	-60%
2	0	1	0.5	3	2	2.5	80%	0	1	0.5	0%	1	1	1	50%
3	5	4	4.5	3	2	2.5	-80%	6	5	5.5	18%	4	5	4.5	0%
4	0	1	0.5	0	1	0.5	0%	2	3	2.5	80%	3	3	3	83%
5	2	0	1	4	4	4	75%	4	9	6.5	85%	8	4	6	83%
6	3	5	4	4	4	4	0%	5	5	5	20%	5	5	5	20%
						Average	7%			Average	31.5%			Average	29.3%

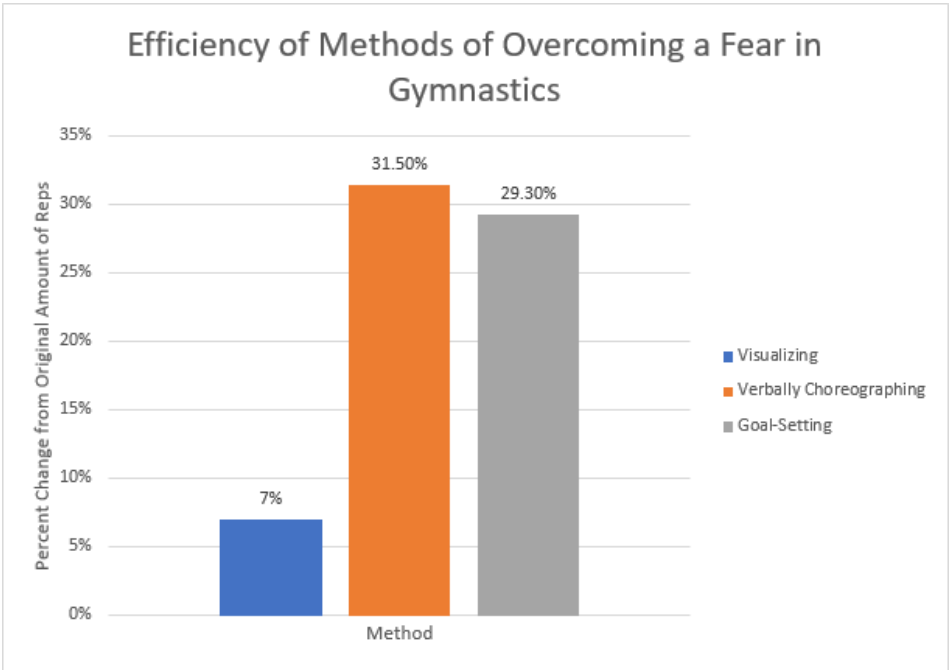

Figure 1- Shows the average percent change from the original of each method.

IV. DISCUSSION & CONCLUSION

The hypothesis was incorrect. The most effective method to overcome a fear in gymnastics was verbal choreographing. This was proven by the average percentage change of the different methods. When compared, visualizing had an average of 7%, verbally choreographing had an average of 31.5%, and goal-setting had an average of 29.3%. Verbally choreographing had the highest average change with 31.5%. The percentages for goal-setting and verbally choreographing were very close in range with only a 2% difference between them. Many participants had very similar results for all three methods. Three out of the six participants had one method not produce any change. All three methods were less efficient than facing the fear without a method for Participant 1.

Verbally choreographing is most effective since it was able to give the gymnast insight into internal obstacles. It works the best since it forces participants to think about the fear before facing it since it must be said loud so avoiding it is not possible whereas methods such as visualizing can be done quickly without much thought. As the hypothesis states, the connection made between the brain and muscles is an important factor, but in a verbal way instead of the predicted visual method. There are outliers in the data where the methods produced worse results than practicing with a method. The data is helpful to a gymnast to be able to predict which method may produce the best results. If the experiment were to be done again, ages of gymnasts and the most effective method would be compared to see if age plays a role in the most effective method.

V. APPLICATION

In order to further investigate the results of the experiment, experimentation could be done into whether the apparatus of the skill has an effect on the most effective method since questions were raised about whether the skill is done on a beam or bar makes a difference. Further experimentation could also be done to see whether age of participants affects the results since the range of participants was 9-16. This information can be helpful to the general public for overcoming any type of fear, it is not limited to gymnastics. These methods can be applied to virtually any fear as a way to face that fear.

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Running Effecting Math Exams

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1. Abstract

The purpose of this experiment was to see if running helped the final marks on the exam and the process of studying before one. This is an important topic to talk about because exams are stressful and put a lot of pressure on teenagers near the end of the years. The experimenting was conducted by taking in how much the subjects had improves as each day went on. This experiment was done by making the subjects run for 30 minutes and then writing a math exam for 4 days straight. Throughout the data, it is understandable that as they continued to run each day, the amount of questions the subjects got correct increased and the time the subjects had taken decreased. Each day, the questions that were corrected increased with an average of 3 question, with the exception of outliers caused by external factors. When on the actual exam, because the focus level is much stronger, this implies that the test can be finished earlier and would give time to check over their work without rushing last minute

II. Introduction

This is an important topic because it could help benefit with school and at home. This specific experiment will help show that a little bit of running can help improve the marks and clear your brain before the exam. One source, called The Guardian had explained that running, leads to the many growth of new brain cells, which helps the brain to remember certain information without mixing them up, specifically when studying or doing a certain task. Another source called The New York Times has said running is the best way to get fit, relaxed and it is a great way to have friendships with other runners. A source called the Business Insider has mentioned that running in the morning before school will help students excel by functioning and focusing better. This suggests that running will overall improve the processing of information in the brain for everyday activity. If running is done the day before exams and as well as before studying, then it will excel the

thinking process when doing the exam and help have positive outlook on things.

III. Method

For four consecutive days, the runners ran for 30 minutes, with the exception of breaks. The subjects took a 5 minute break to catch their breath and to calm down. The math exam was presented to them and as the subjects continued to write the exam, they were timed to see if there is a decrease in time taken. The test consisted of math questions learned in grade 10. Each day had a different question, however, they had the same topic for each mathematical sub-topic (i.e. quadratics, matrices, etc.). This was to ensure that everyone had a fair chance in answering the questions. The independent variable is the test because the tests change every day to keep it fair and new. The dependent variable is how many questions the subjects had got correct and as well as the time taken to write the exam. The controlled variable was the time they were given to run, the field, the type of runner (non-runners), and indoor and outdoor environment. For this type of experiment, it required that all the subjects get the same time to run, so the data is easier to observe. The same field has to be the same to ensure that the level of running is the same difficulty. The experiment required non-runner to see the improvement of their focus level. The outdoor and indoor must stay same as no distraction are allowed.

IV. Results

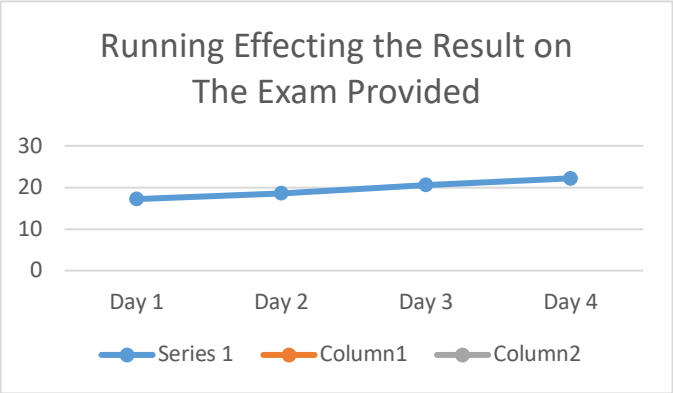

Figure 1. Average time of runner per day

Subject	Time given to run before the exam	Time taken to finish the test	Marks on Exam
A	30 minutes	15.26	19/25
B	30 minutes	19.52	15/25
C	30 minutes	21.45	19/25

D	30 minutes	16	16/25
E	30 minutes	15.18	17/25

Figure 2. Data chart for Day 1

Subject	Time given to run before the exam	Time taken to finish the test	Marks on Exam
A	30 minutes	15	21/25
B	30 minutes	18.56	17/25
C	30 minutes	20.32	18/25
D	30 minutes	16.45	20/25
E	30 minutes	15	17/25

Figure 3. Data chart for Day 2

Subject	Time given to run before the exam	Time taken to finish the test	Marks on Exam
A	30 minutes	15.23	25/25
B	30 minutes	15	20/25
C	30 minutes	19.7	21/25
D	30 minutes	15.39	20/25
E	30 minutes	15.36	19/25

Figure 4. Data chart for Day 3

Subject	Time given to run before the exam	Time taken to finish the test	Marks on Exam
A	30	16.24	25/25
B	30	22.21	23/25
C	30	20.15	22/25
D	30	18.33	22/25
E	30	16.35	19/25

Figure 5. Data Chart for Day 4

V. Discussion and Conclusion

The hypothesis stated was correct as it had said that running does help improve your marks on an exam. As shown on the graph, as each day went on, the

average exam marks for the 5 people went up gradually. Comparing the first two days, the average went up by 1.4%. Furthermore, the subjects appeared more relaxed and calm when writing the exam with no fidgeting, leg shaking, or any form of nervous movement. This comes to show that because the brain is relaxed, it is able to focus on processing information, instead of relying on the emotion of feeling distressed during a difficult time. On day three the subjects had started to get used to this process and had started to receive a better mark. Subject B went form 17/25 to 23/25, which indicates that they were able to work on the exam with one goal in mind. Outliers may be evident when subjects did not improve and stayed on the same mark due to some external factors (i.e. sickness). Running can help relax the brain and help focus on exams.

VI. Application

This experiment could be used in many different scientific research. Due to the fact that when the brain is under stress, it is not able to process information as fast and as accurately. It could be used in physiology studies because it all related back to the brain and how it functions. Furthermore, it will inspire and let others know that running has a great benefit for your body which also includes the brain. This will allow everyone to not only to get a breath of fresh air, but also help them relax during stressful times.

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The Effects of Video Games on the Body

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Abstract

The question investigated was; how does playing video games affect the body's blood pressure, reaction time, heart rate, breathing rate, and pain tolerance? Most adults complained that their children are too focused on playing video games rather than doing something "useful" in their spare time (Joanne, 2017). According to Newzoo's 2018 report, there were over 2.3 billion gamers in the world. For these reasons, finding out how playing video games affect the body was important. The experiment was conducted by measuring the test subjects' blood pressure, heart rate, breathing rate, pain tolerance, and reaction time before and after the test subjects played a fast-paced action video game (Spiderman). The test subjects were very concentrated in playing the video game, did not respond to their surroundings and remained in one position throughout the game. The blood pressure, heart rate and breathing rate all increased, while a higher pain tolerance and a faster reaction time occurred. As the players experienced intense situations in the video game, the players did not focus on anything except the stressful situation in front of them. The test subjects reacted quickly, the stress raised the blood pressure, heart rate and breathing rate, and the test subjects were too concentrated to focus on pain.

I. INTRODUCTION

Most adults are usually complaining that their children are too focused on playing video games rather than doing something "useful" in their spare time (Joanne, 2017). According to Newzoo's 2018 report, there are over 2.3 billion gamers in the world. There is concern among the public that the violence or brutality portrayed on television, as well as within video games, encourages aggressive behavior within its spectators and the youth.

A high blood pressure places tension on the blood vessels and heart which increases risks of a heart attack or stroke (Bloodpressureuk, 2008). If the heart beats too fast, the heart does not pump properly, and the blood does not flow efficiently to the rest of the body, which can lead to a heart attack (Nordqvist, 2017). A high breathing rate decreases the level of carbon dioxide in your blood, which can lead to hyperventilation (Vorvick, 2018). A higher level of pain tolerance makes a person stronger and less receptive to minor pain (Cafasso, 2018). A faster reaction time means quicker reflexes, which is especially important when playing sports, or when in a dangerous situation (Seana, 2017). For these reasons, finding out how playing video games affect the body is important. This leads to the question; how does playing video games affect the body's blood pressure, reaction time, heart rate, breathing rate, and pain tolerance?

If comparing, playing, verses not playing video games, then playing video games will increase the test subjects' blood pressure, heart rate, breathing rate, and pain tolerance, and it will improve the reaction time. The blood pressure, heart rate, and breathing rate will increase due to the stress the

player undergoes as the player tries to reach the highest possible score (Heartmath, 2012). The perception of pain will decrease due to the complete concentration and focus on the video game (CBS News, 2007). The reaction time will improve due to the quick decisions being made during the video game and by decreasing the impact of conflicts between stimulus and response locations (Pace, 2016).

II. METHODS

The test subject's blood pressure and heart rate were taken using a blood pressure monitor. The test subject's breathing rate was calculated by counting the number of breaths taken per minute. The pain tolerance was taken by poking the test subject with a toothpick 17 times and asking the test subject to guess how many times the test subject felt poked. The reaction time was calculated using an online test (Allen, 2002). These tests were conducted before and after the test subject played the video game (Spiderman) for 12 minutes. These steps were repeated with two non-gamers and two gamers. The results of the tests from before playing, and after playing the video game were compared.

The independent variable was the test subjects; based on experiences with video games; Gamers VS Non-Gamers. The dependent variables were the blood pressure, reaction time, heart rate, breathing rate, pain tolerance. The controlled variables were the methods of how each test was taken. The blood pressure monitor was controlled to ensure that the blood test results were accurate, and no bias occurred, to see if there were any increases or decreases in blood pressure. The reaction time test was controlled to guarantee that no test subject had a greater advantage, to know accurately if there was any increase or decrease in the reaction times. The stopwatch and time of playing video game was controlled to make sure that each test subject played for the same amount of time, with no unfairness, leading to accurate results. The type of toothpick and amount of times poked (17) were controlled to guarantee that the same amount of pain was experienced before and after playing video games, so the results would not be affected. The video game and console were controlled to ensure that each test subject had an equal chance and the results would be accurate. The position/ surrounding environment was controlled so that each test subject had the same position and comfort level, making sure it wouldn't influence the results.

III. RESULTS

Non-Gamers learned how to play the game in very little time. Test subjects were very concentrated in playing the video game and did not respond to their surroundings. Test subjects remained in one position throughout the game and did not turn or respond even when pictures were taken of the test subjects. Altering the volume of the TV or turning the lights on and off did not disturb or result in a reaction from

Test Subject	Diastolic Blood Pressure Before Playing Video Game (mmHg)	Diastolic Blood Pressure After playing Video Game (mmHg)
A	61	66
B	70	74
C	66	71
D	63	69

the test subjects. Even though the test subjects did not interact with the people around them, the test subjects would speak aloud when the test subjects felt excited and completed mission, or when the test subjects felt annoyed when the mission was not easy.

Test subjects A and B are not gamers while test subjects C and D are gamers.

Table 1: Systolic blood pressure readings of test subjects before and after playing the video game for 12 minutes.

Blood Pressure of Test Subject's at Its Highest

Test Subject	Systolic Blood Pressure Before Playing Video Game (mmHg)	Systolic Blood Pressure After Playing Video Game (mmHg)
A	95	101
B	105	116
C	98	105
D	100	123

Table 2: Diastolic blood pressure readings of test subjects before and after playing the video game for 12 minutes.

Blood Pressure of Test Subject's at Its Lowest

Table 3: Reaction time online-test results of test subjects before and after playing the video game for 12 minutes.

Reaction Time of Test Subject's in Seconds

Test Subject	Reaction Time Before Playing Video Game	Reaction Time After Playing Video Game
A	0.56	0.54
B	0.85	0.42
C	0.51	0.39
D	0.33	0.19

Table 4: Heart rate readings of test subjects before and after playing the video game for 12 minutes.

Heart Rate of Test Subject's Per Minute

Test Subject	Heart Rate Before Playing Video Game	Heart Rate After Playing Video Game
A	63	69
B	75	81
C	72	75
D	71	73

Table 5: Breathing rate calculated per minute, of test subjects before and after playing the video game for 12 minutes.

Breathing Rate of Text Subject's Per minute

Test Subject	Breathing Rate Before Playing Video Game	Breathing Rate After Playing Video Game
A	18	27
B	22	25
C	17	23
D	20	27

Table 6: Level of pain tolerance of test subjects calculated before and after playing the video game for 12 minutes.

Pain Tolerance Guesses of Volunteers (The Amount of Times The Test Subjects Felt Poked)

Test Subject	Pain Tolerance Guess Before Playing Video Game (Out of 17)	Pain Tolerance Guess While Playing Video Game (out of 17)
A	22	15
B	20	18
C	21	16
D	19	15

Figure 1: Comparison between blood pressure readings of test subjects before and after playing video game for 12 minutes. Blue represents the blood pressure before playing video game, while orange represents the blood pressure after playing video game.

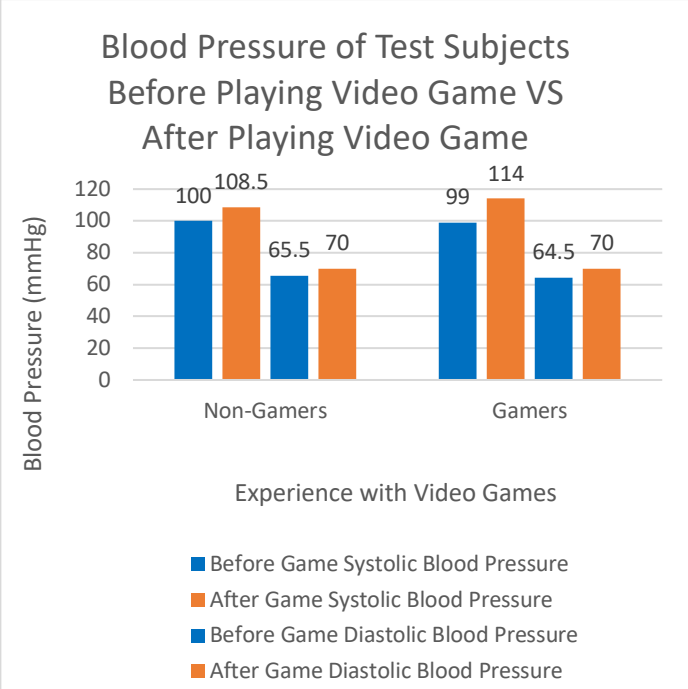


Figure 2: Comparison between heart rate per minute of test subjects before and after playing video game for 12 minutes. Blue represents the heart rate before playing the video game, while grey represents the heart rate after playing video games.

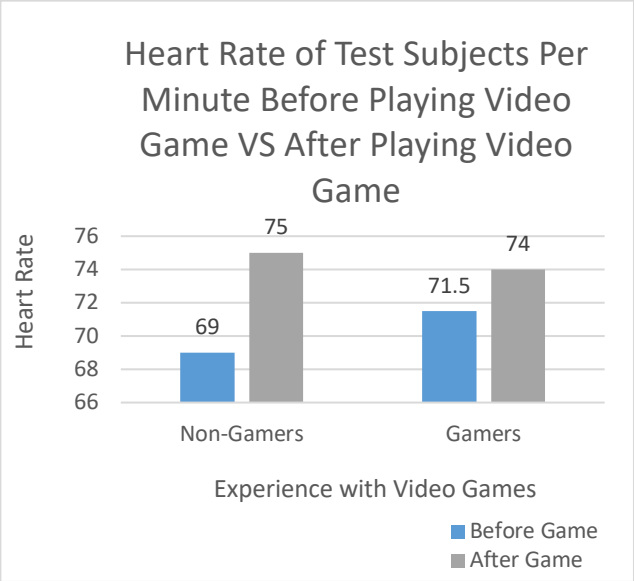


Figure 3: Comparison between online reaction time test results of test subjects before and after playing video game for 12 minutes. The green represents the reaction time test results before playing video game, while blue represents the reaction time test results after playing video game.

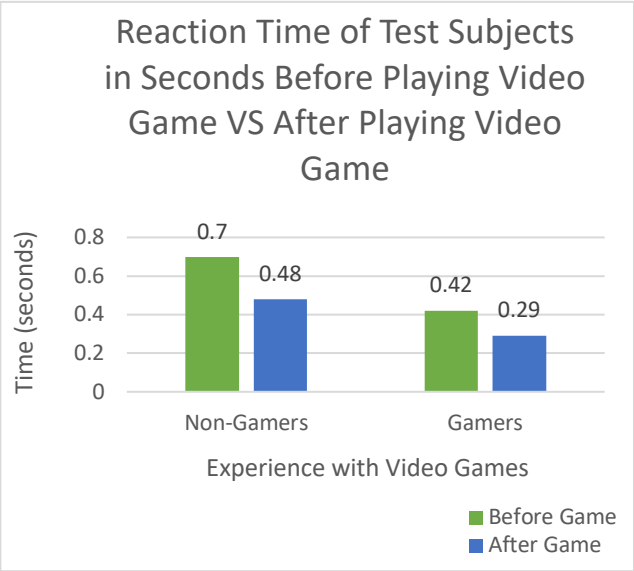


Figure 4: Comparison between breathing rate per minute of test subjects before and after playing video game for 12 minutes. The yellow represent the breathing rate before playing video game, while the orange represents the breathing rate after playing video game.

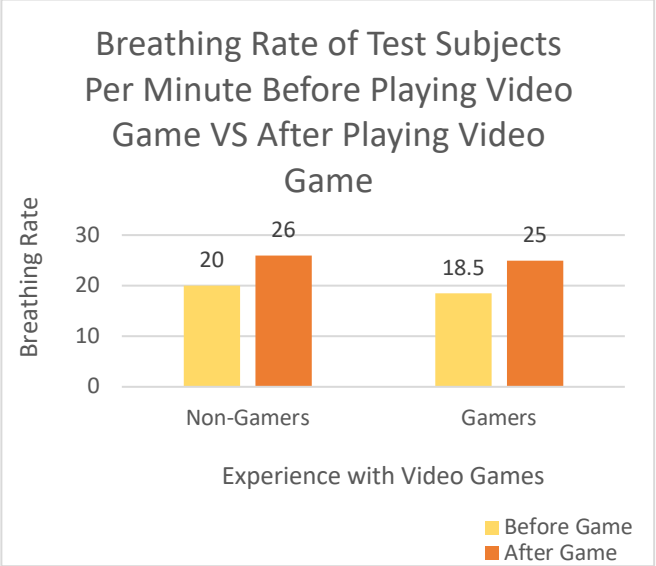
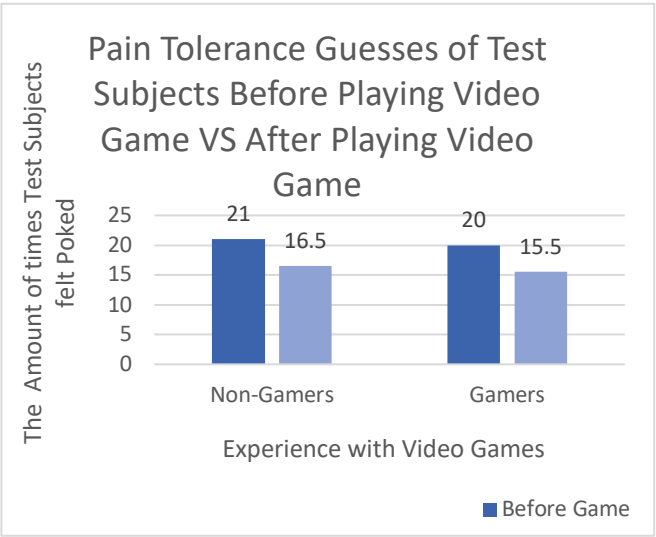


Figure 5: Comparison between the level of pain tolerance of test subjects before and after playing video game for 12 minutes. The dark blue represents the pain tolerance level before playing video game, while the light blue represents the pain tolerance level after playing video game.



IV. DISCUSSION AND CONCLUSION

In conclusion, the hypothesis was correct for both the gamers and non-gamers. The results represented that video games do in fact have multiple effects on the human body. Two of the test subjects were beginners and two of the test subjects were veterans, the results were close for both players. The gamers' systolic blood pressure increased from 99mmHg to 114mmHg; about 15%. The non-gamers' diastolic blood pressure increased from 65.5mmHg to 70mmHg; about 7%. The gamers' heart rate increased from 71.5 to 74; about 4%. The non-gamers' breathing rate increased from 20 to 26; 30%. The pain tolerance (guesses of how many times the test subjects were poked) of gamers decreased from 20 to 15.5; about 22%. The reaction time of non-gamers improved from 0.7 to 0.48; about 46%.

The blood pressure, heart rate, and breathing rate of the test subjects increases after playing the video game. This increase occurs due to the stress the player experiences as the player tries to reach the highest possible score (Heartmath, 2012). The perception of pain decreases due to the player's complete concentration and focus on the video game (CBS News, 2007). The reaction time improves due to the quick decisions the player makes during the game and by decreasing the influence of clashes among stimulus and reaction areas (Pace, 2016). These effects on the body that video games cause, are expected, because as players experience intense situations in the video games, the same way people respond in real life, players do not focus on anything except the stressful situation in front of them. The players react quickly, the stress raises the blood pressure, heart rate and breathing rate as mentioned above, and the player's concentration is on the video game, not on the pain. An error that may occur is the timing which may vary slightly, in-between taking the tests after the test subjects play the video game. This might alter the results slightly.

V. APPLICATION

The procedure can be performed on a larger quantity of test subjects than four, to prove that the results found are in fact, accurate. Also, other things, such as, does violence portrayed in video games influence aggressive behavior on players, can be tested. People that are interested in increasing their pain tolerance level, and attaining a faster reaction time can try playing video games. The general public or scientific community can use this information by paying attention to the amount of time spent on playing video games. There are pros like a faster reaction time and a high pain tolerance, however there are also cons such as a high blood pressure, heart rate, breathing rate. The general public should enjoy playing video games for a short amount of time but not play for too long at once.

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Effects of Individual Biomotor Abilities on Running

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Abstract

Many athletes worldwide strive, in search of easier ways of improving at what they do. Efficiency, though, is a huge factor to take into consideration for training, because what will really benefit you the most? For the most part, people fall back to a simple but sometimes unreliable Google search, or question an experienced friend, or a coaching figure. However, what/which biomotor abilities (speed, strength, endurance, flexibility, coordination) should be focused on in order to train for running more efficiently? What even is a biomotor ability? The purpose of this investigation was to answer these exact questions. Fueled by personal curiosity and a hunger to improve at running, brainstorming of a rather accurate method to experiment how each ability affected running performance would be a priority. A few subjects were each assigned to an individual skill and train that skill in the span of 5 consecutive days, preceded and succeeded by a mile run to compare performance. In short, the results were mostly as expected (endurance coming up top as most effective), but also highlighting the expected flaws of this experimentation.

I. INTRODUCTION

This experiment is intended to find and compare how subjects respond to varied training based on their designated 'skill'. By examining the results and how they performed, we distinguish and identify which skill provided the most effective training, which could help athletes enhance their own training.

According to Sarah Atkinson, a kinesiology professor at the University of Windsor, people tend to better respond to training when using periodization, to focus on an individual aspect by assigning chunks of time for just that while attempting to normally mesh other aspects in your training. This has to be accompanied by adequate rest, and a generally healthy lifestyle on top to see reasonable progression.

With this in mind, how exactly do the 5 biomotor abilities (speed, strength, endurance, coordination, flexibility) individually influence running performance? In every sport, biomotor abilities come into play, but of varying emphasis. In a simple comparison, a volleyball players requires emphasis on speed and coordination, to keep the ball in the air and in control, whereas a heavy-lifter relies on strength training the most. If an athlete excels at all 5 of the biomotor abilities, then they would be undoubtedly fit all-round, theoretically being a fantastic runner due to the critical importance of optimal physical fitness in running. However. if the mile run is being used to find the most crucial skill, then it is hypothesized that endurance-related training will have the most benefit on the subject's performance, because of the mile run being a longer distance to run, thus requiring this skill

more. It is already widely recognized as being a crucial skill for running.

II. METHODS

Testing which skill would have the greatest impact would require an immense amount of potentially strenuous physical activity. 5 subjects, each assigned to one of the five skills, were to run a mile before and after a continuous 5 days of training to compare each individual person's performances to see which skill-based training provided the greatest benefit.

Each of the 5 days, the endurance subject had gone on a 30 minute run at a steady pace, recording heartbeat in the middle and at the end of a run, and note the percent increase. If this is more than 5%, the subject can be said to not be fit. The strength subject had performed 5 proper deadlifts using the deadlift barbell, and if successful or comfortable, proceeded to slowly add weights and lift until the inability to perform a proper or safe deadlift. The subject noted the max deadlift weight. For speed, the subject sprinted a 100m as fast as possible twice, and recorded the fastest time. For flexibility, the subject performed 16 high kicks as high as possible, and had someone measure & record the max height of the kick. Also, they were to attempt the splits, and recorded the length from the waist to the ground if it was not a complete one. For coordination, subjects performed 30 lunge jumps, stood on the bottom side of a bosu ball with one leg, maintaining balance, while was thrown medicine balls to catch. Also, the subject performed 20 one arm Romanian deadlifts (10 per arm) using their preferred weight. The number of faults was to be recorded.

To ensure proper experimentation, the independent variable was solely the different subjects used to perform tests, due to the different skill each subject was assigned to, which meant varying result. The dependent variable were the results for the mile run before and after the training period to compare results. Each athlete had to perform their designated exercises the same way everyday. Starting and ending position on the track used for speed training needed to be controlled (due to the slight reduction of speed when running the curves)

III. RESULTS

Table 1: Each subject, their before & after mile run time, and their measurements for each day of exercise.

Subject	Mile Run Time (mins) (before)	Day 1	Day 2	Day 3	Day 4	Day 5	Mile Run Time (mins) (after)	Mile Run Time Increase (%)
1(Strength)	7.05	185 lbs	185 lbs	185 lbs	200 lbs	200 lbs	6:54	8%
2(Speed)	5:04	13.02 secs	13.78 secs	13.22 secs	14.16 secs	13.00 secs	5:06	-1%
3(Coordination)	4:50	6 faults	2 faults	0 faults	1 fault	1 fault	4:41	2%
4(Flexibility)	6:19	168cm high kick, 45cm split	135cm high kick, 45cm split	144cm high kick, 45cm split	149cm high kick, 42cm split	143cm high kick, 39cm split	5.57	11%
5(Endurance)	6:02	4%	4%	6%	3%	4%	5.43	11%

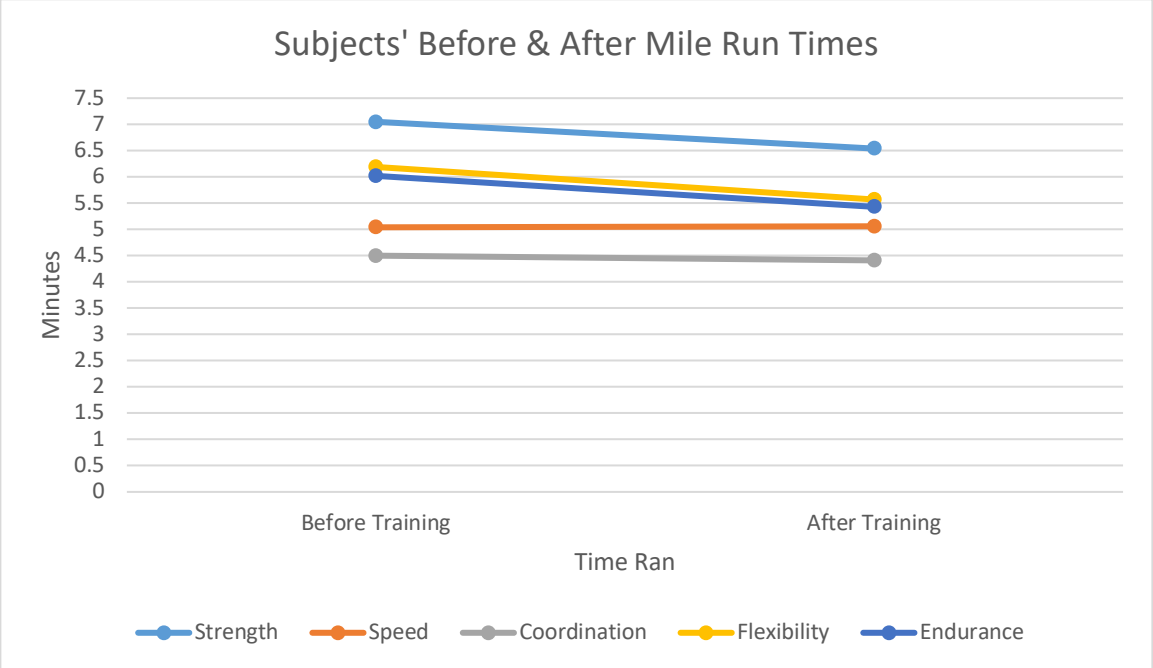

Figure 1: Subject's mile run times shown before and after the 5 consecutive days of their designated training.

IV. DISCUSSION & CONCLUSION

It was originally hypothesized that endurance training would benefit the results of the mile time the most. According to the results from 5 different subjects, both flexibility & endurance subjects wielded the best time decrease percentage (each with wounding up with an 11% time decrease, according to table 1) following 5 consecutive days of training. This theoretically meant that both flexibility & endurance influence running performance the greatest, thus still proving my hypothesis partially correct, originally hypothesized that only endurance would matter the most.

The testing did highlight some imperfections, however, which may have resulted in the -1% time decrease in the mile run for the 'speed' subject. In performing their designated exercises, subjects were potentially subject to muscular fatigue due to the 5 days straight of training, with the mile run before and after. This may have had an impact on the speed subject, who also did not receive training that would have amassed a great result, due to the long distance nature of the mile run. Fluctuating results for exercise-related experiments is very likely due to the many uncontrollable internal circumstances varying from subject to subject (e.g. things eaten that day, fatigue/soreness from person-to-person). This can also be attributed to the rushed nature of this experimentation, as the search and organization of subjects, time restraints, and the difficulty cohering to each subjects' personal schedules potentially made testing slightly less accurate. Generally, endurance would be the most beneficial skill, as the results from the flexibility subject may have been a slight outlier/overperformance by the subject, due to the individualistic aspect of testing. Also, the selection of utilizing the mile run to compare before & after results may have favoured the 'endurance' category to come out on top, where as 800m is more of a middle-ground which may have been a better balance between the 5 skills.

V. APPLICATION

Due to the obvious athletic background of this experiment, this information would undoubtedly be more attractive and/or interesting to athletes, particularly runners. Since this experimentation is rather amateur, more educated input from qualified professionals would also enhance personal knowledge for future benefit and therefore training. But as mentioned in the 'abstract' portion, efficiency and ease of training is what many athletes strive for to improve at what they do. Casual/amateur athletes of any age could learn and interpret the implications of this very experiment, and take away meaningful information regarding biomotor abilities on its own, even if they do not run, as biomotor abilities play a major role in every single sport, of varying emphasis.

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Proper front crawl techniques lead to faster swim time

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Abstract:

This experiment tested what hand/arm/leg technique was most effective for swimmers to gain speed fast and easily. The results have helped subjects perform better in other lifeguard related classes because they can now gain speed quickly. For this experiment subjects swam 100m front crawl using techniques they had become comfortable with then they swam 100m front crawl with a modified technique. The average increase in speed was 6 seconds, proving my hypothesis correct. These results can help swimmers go faster when competing and lifesaving and scientists can use the experiment to research the similarities between humans and animals and the potential of human power.

I. INTRODUCTION

After finding the results, proving technique does effect speed, swimmers were able to use this knowledge to gain speed easily to pass lifeguarding classes. Myswimpro (2015) stated any minor flaw can be a major factor in one's swimming speed because water is 800 times denser than air and this makes it harder for swimmers to travel in water due to the change in density and proper technique will make the whole process easier and more efficient. Getting used to the new technique was not easy for subjects but it soon became a habit because of consistent practice. Swimminglessonsonline 2013) Explains how proper technique will become easier and more of a routine if swimmers focus on it when training and regularly practice the correct stroke, this is also supported by (Christophe Keller 2018) and its mentioned mental motivation is also a big factor to gaining speed. This experiment was based off of the question: What hand, arm, and leg techniques will help a swimmer swim 100 Meters front crawl the most efficiently and effectively? This lead to the final hypothesis that if a swimmer swims with cupped hands and has the fingers enter the water before the elbow continuing into an "s" pull, while also kicking with slightly bent legs, then the swimmer will gain speed easier and faster because they will be more streamlined and will flow through the water rather than fighting through the water.

II. METHODS:

First have subject swim front crawl. Note what arm/hand/leg techniques are used and record this in a chart. Let subject swim 100m front crawl without a modified technique. Record time. Repeat for each individual subject. Teach subjects "s" pull/the fingers should enter water before the elbow, slightly bent knees and consistent pointed toes. Give subjects ten minutes to practice this modified technique. Once subjects are comfortable with this technique, have them swim 100m front crawl and record time. The independent variable in this experiment is the different techniques swimmers have

used because different techniques combinations will lead to different speed results. This means the time at which each swimmer would complete 100m would be dependent on the technique. The arm/hand and leg techniques were also observed deeming them dependent in this experiment. The subject's distance traveled, and modified technique was controlled. The swim attire was also controlled to insure there was no outside contributions of drag such as pockets that fill with water to slow down a swimmer.

III. RESULTS:

The results found prove that one's swimming speed is determined by the different techniques used.

Table 1: this table shows different techniques each subject used and their performance time while using different techniques

	Subject 1	Subject 2	Subject 3
Natural swimming techniques	Can swim 100m on an average of 1:52min Using cupped hands/ no "s" pull/ slightly bent knees	Can swim 100m on an average of 1:49min Using cupped hands/ "s" pull/ straight legs	Can swim 100m on an average of 2:03min Using opened fingers/ "s" pull/ straight legs
Modified swimming technique ("s" pull/ cupped hands/fingers enter water before elbow/ slightly bent knees/pointed toes /streamlined)	Can swim 100m on an average of 1:45min using modified technique	Can swim 100m on an average of 1:44min using modified technique	Can swim 100m on an average of 1:50min using modified technique

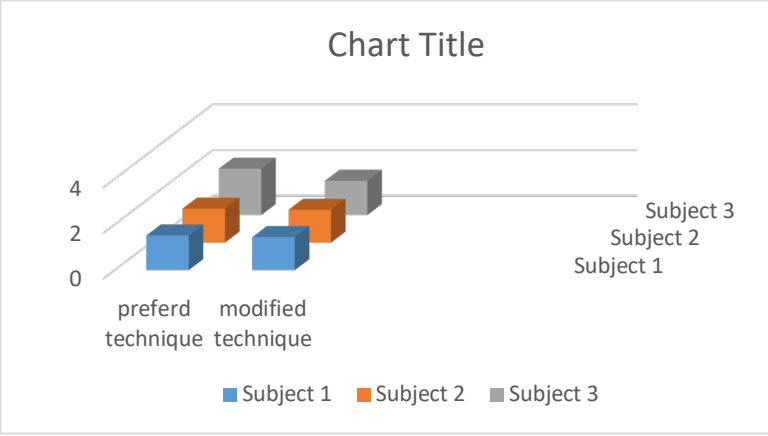

Figure 1: This figure displays the average speed of three subjects from the same age group (16- 19). It shows the difference in speed using two different techniques.

IV. DISCUSSION & CONCLUSION:

Yes, my hypothesis was correct. When swimmers swam using the modified technique, they reduced their overall speed for front crawl by an average of 6 seconds, this does not include outliers. These results have been similar to what couches and scientist have predicted or tested for similar experiments. The results were not unexpected because subjects had time to get used to the new technique, but I can predict that if the subjects didn't get time to practice, they would most likely have the opposite results because the new technique would be uncomfortable and hard at first. Starting and stopping the timer was one problem this experiment had through it. This effected the time recorded. Another problem with this experiment was the pace the subjects swam at, this experiment would be more accurate when measuring the number of strokes rather than distance, this is because subjects can give it their all or go slow on purpose but having them do only 5 strokes perfectly or each technique would show which technique is more effective because it would have subjects end father with the same number of strokes.

V. APPLICATIONS:

The results can help lifeguards and lifesavers pass time swims much faster and easily now. This information can be helpful to competitive swimmers also to help win races. This information can be used to design the most efficient boats and other water inventions that are intended to go fast. The general public and scientists can use this information to do further studies on the capabilities of the human body and relations of animals and human when it comes to transportation. The community can use this information to swim faster.

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How Do Different Types of Foods Affect Running Speeds

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Abstract

The experiment, how do different types of food affect your running speeds was conducted to see what the effects of healthy foods (such as fruits and vegetables) and unhealthy foods (such as cookies and chips) would have on the subjects' bodies after they ran, see how they felt and which food category was better (healthy or unhealthy). The subjects ate a fruit bowl, scrambled eggs and a cup of water during the first week of the experiment every morning as the healthy breakfast and then went on a 3km run. During this process they would also record how they were feeling during, before and after they ran and how long it took them to complete the run. The subjects then proceeded to repeat this process, but this time they had a bag of skittles, two waffles, 1 granola bar, a chocolate chip cookie and a high in sugar drink like a sports drink for breakfast for a full week. The subjects results were looked at and they were quite similar. Almost all had more content results during the healthy week and more un-content results during the unhealthy week. After the results were compared, it was clear that the healthy breakfast had a positive effect on the subjects after their run compared to the unhealthy breakfast where the subjects felt tired and out of breath after their run.

I. INTRODUCTION

To start the project, knowing the importance of it is very important. The question that will be answered is relevant and important because according to Christine Luff (2018) 'not eating the proper foods before running can lead to an upset stomach.' An upset stomach could cause cramps as well as having less stamina and speed but knowing what proper foods to fill the stomach with before a run can help anyone so that the speed time of the run can be improved. But Christopher Mohr (2017) says that 'eating right before running makes the body want to focus on digesting food rather than getting the body ready for a run. Fueling the body with the proper nutrients before a run gives the body more stamina and strength but eating junk food before a run could cause dehydration and people should know what to fuel the body with before a run.'

The question that will be answered and experimented in this project is, How Do Different Types of Food Affect Running Speed?

If healthy food (such as fruits and vegetables) is eaten before a run than there will be an increase of speed throughout the run because Pamela (2016) said that 'going on a run empty or not nutritionally full could lead to feeling fatigue much sooner as well as harder to finish the run. Eating foods low in carbs and calories tend to give you the best results and boost your energy with not as much food'. The bigger the meal the more time it

will take to digest especially if high in carbs and sugar. Eating a healthy bowl of fruit not only provides healthy choices but improves the overall blood sugar stable and keeps the heart healthy before and after a run.

II. METHODS

During this experiment, four subjects were chosen to complete the experiment. For one full week, every morning for breakfast the subjects ate a healthy breakfast which consisted of a fruit bowl, scrambled eggs and a glass of water then went on a three-kilometer run. For another full week of breakfast, the subjects ate an unhealthy breakfast which had a bag of skittles, a waffle, a chocolate chip cookie, and a high in sugar beverage such as a sports drink. Again, the subjects went on a three-kilometre run after the breakfast. The subjects also daily recorded how they felt before, during and after the run as well as how long it took to complete the run.

While doing this experiment the unhealthy foods (such as cookies and skittles) and the healthy foods (such as fruit and eggs) was the one thing that was being compared and changed without messing up the results in the experiment which is also known as the independent variable. As for the dependent variables, the running speeds and emotions of the subjects before, during and after the run were measured and observed to see how they changed over the days. But while undertaking the experiment the subjects had to ensure that they were always getting at least seven hours of sleep each night during the two weeks and that a total of 3.5km was ran each day. Also, the subjects made sure that the weather was checked every morning so that they could run in sunny weather each day. These protocols had to be followed or else if not the results would be un-accurate and then the question would not have been able to be answered and data would be all different and hard to translate.

III. RESULTS

Table 1: This table was filled out by the subjects everyday while conducting the experiment.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
What Did You eat?							
How do you feel before running?							
Time Started Running							
Time finished Running							
How do you feel after?							

Did you stop and walk while running or slow down?							

How did you feel during running?							

The subjects recorded all their data in this chart everyday during the experiment so that when it was time to look at the results, the data was clear.

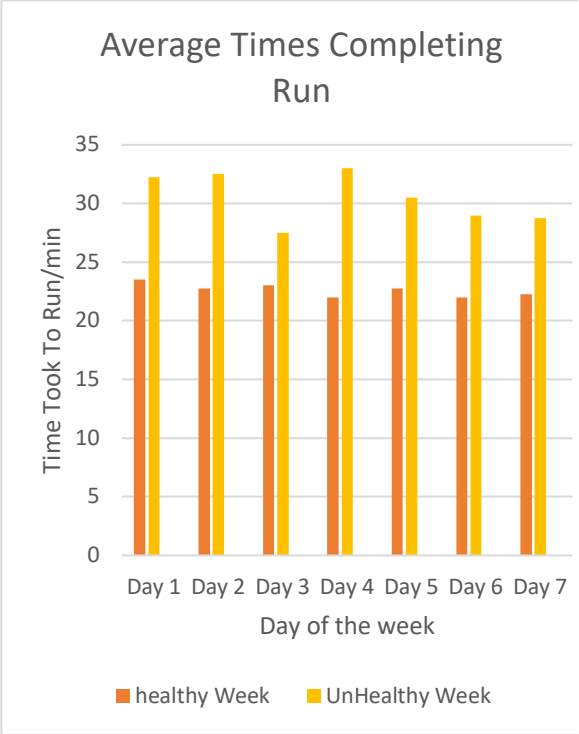

Figure 1: This chart shows the average times it took the subjects to complete the run.

IV. DISCUSSION & CONCLUSION

The hypothesis that was made was if healthy food (such as fruits) is eaten before a run than faster running speeds and more positive emotions will occur. According to the data collected the hypothesis made was correct. The initial problem/experiment was how do certain types of food affect running speeds.

When all the data was collected the results showed that the subject's emotions and how they felt, as well as their run time was much better on the day's a more balanced and healthy breakfast was eaten. For example, subject 2 felt energetic and hardly out of breath after one of the runs on the day of a healthy breakfast, but when subject 2 ate a less healthy breakfast and more sugary snacks they felt much more tired and exhausted after the run and it took a longer time to complete the run.

So by looking back at all the data it is clear that unhealthy foods such has sweets, affected the running speed by slowing the subjects down because the subjects were more tired and healthy foods such as fruit affect your running speed in a positive way making the subjects feel more energetic and happier and less tired while running.

When referring to scientific background retrieved for experiment, it was not as surprising because the results were somewhat expected to be what they were.

One of the scientists emailed, David J.A Jenkins, replied to me stating that he 'would not recommend junk food as the way to get your nutrition before a run'. Which makes sense according to the data because the subjects felt more tired and exhausted after the run on the days an un-healthy breakfast was eaten.

Professor Jenkins also said that 'Canadas Food Guide would be a great guide to look at before a run or just all the time and that its best you don't eat as much food right before a run. By eating a lot of sweets high in calories (like the subjects did during the un-healthy week) before a run fills you up quicker making you feel more tired during a run'.

Some errors would have to be that the number of calories eaten were not counted and this could have affected the results because different amounts of food was eaten.

V. APPLICATION

Some further research that could have been done is getting actual pro-athletes to try the experiment and see how it would affect them since they are more active. Also, it could have been experimented on multiple age groups and see how the results differ in that perspective. Other fields of study that could use this information are sports areas such as pro-runners and even any form of physical activity profession because food plays a big role throughout all of them. Areas such as dietitians could also use this study when giving diets to specific clients who are physically active. The general public could use this info for everyday tips on how to live a healthier lifestyle and what they should be eating for breakfast in the morning in general.

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How proper Running Technique Effects 100m Performance Times

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Abstract

Getting faster or becoming stronger is constantly being studied. So how does proper running technique effect performance times in a 100-meter sprint? In this experiment, 10 subjects all from the same soccer team with similar physical abilities ran two 100-meter sprints. One at the start of the 3-week training regimen and another at the end. The results showed that 7 out of the ten subjects had improved times, on the second tests. The total average times from the first test was 12.27 while the second was 12.16 seconds. There were two subjects who were outliers both subjects slowed down significantly after the training regimen, these subjects could have possibly felt awkward and unnatural to run with their altered forms, therefore slowing down significantly. In conclusion, proper running technique enhances and improves performance times. However, everyone has a different running techniques that has to be taken into consideration while altering technique.

I. INTRODUCTION

Whether, it's to get faster, to jump higher, or to become stronger, all athletes aim to improve.

The biggest aspect of sports or working out is growth and self development. The hunger to improve is evident in every athlete that exists. Therefore, if proper technique may affect their performance levels, it becomes vital to further research and investigate new methods that may help improve performance levels within these athletes. Regardless of how small or little it may seem.

The question relating to this topic is, how proper running technique effects 100m performance times.

Proper technique is the actions that allow us to run at maximum efficiency; these techniques include arm motions, hip movement, as well as body positioning (Moore.2016).

If people were to develop proper technique performance times will drastically improve. This is because running technique allows athletes to utilize their whole body, to fulfill an action. Also, when proper techniques are being implemented, it allows runners to prevent extra energy usage. For example, during the propulsion phase it is possible that the energy from the push is being used laterally instead directly forwards. (Ifpa-fitness, n.d.)

II. METHODS

This experiment was conducted on 10 grade 10 participants, with similar physical abilities. At the beginning of the three week training regime, subjects were asked to run a 100 meter sprint, one at a time. These sprints were timed and recorded. Following the run athletes were tasked to perform the following exercises and warm-ups religiously; Hamstring stretch, quadriceps stretch, groin stretch, dynamic hamstring stretch, dynamic gluteus stretch, A skips, B skips, high knees, butt kicks, and lastly, progressions. These exercises and stretches were performed on three days every week, on Tuesdays, Thursdays, and Sundays at 6:30 p.m. At the end of the three week regiment, subjects were once again asked to run the 100 meter sprint again, following the same rules as before. Times were recorded for future analysis.

The independent variable was the drills and stretches, because these did not differ or change throughout the experiment. The dependent variable was the subject's performance times. The controlled variables were the track, weather, time, and subject health. These were chosen as the controlled variables because all 4 variables could drastically stray final outcomes. Someone who is sick would not be able to perform at their peak performance. The track in which subjects ran on could change their outcomes, due to change of material or quality of the track. Weather, subjects who run in rain may be cautious of slipping and falling, or if the weather is too cold, athletes may not be able to warm up correctly. Furthermore, the time in the day in which athletes were tested could possibly impact the results because, the earlier in the day the subjects run, subjects will be able to minimize physical activates prior to testing. These could all produce inaccurate results.

Stretches and Exercises

Hamstring stretch: Subjects sat on the ground and extend their right leg out in front of their body. Then subjects took their left foot and placed their sole on to their right inner thigh afterwards, subjects reached for their toes. After 20 seconds subjects would release, and repeat the above steps with their other leg.

Quadricep Stretch: Subjects stood straight up. And brought their right heel to their butt then subjects grabbed their heel with their right hand. Subjects then began to pull their right leg back with their hand, and held for 30 seconds and released. Subjects then switched to their left foot as well as their left hand.

Gluteus stretches: Subjects laid on their back, feet flat on the floor. They pulled their right knee up to their chest, subjects held for 10 seconds. While their knee was up at their chest subjects pulled their knee towards their left shoulder, and held for 30 seconds and then released.

Groin stretches: Subjects stood with their feet far apart horizontally. Subjects then leaned to the left careful not to move their left foot, and bent their left knee. Subjects held for 20 seconds then released. Subjects then repeated the previous step but on their right foot.

Dynamic Hamstring Stretch: Subjects stood parallel to a wall and placed their left hand on the wall. With their right leg swing subjects swung their leg vertically upwards and downwards. Subjects swung for 10 reps and then switched sides and began the process again.

Dynamic Gluteus stretch: Subjects sto od up, with their right foot subjects lunged forward, and paused in position for 2-5 seconds then subjects brought their left leg up to right leg, afterwards with their left foot subjects lunged forward and continued on like before. This was repeated 5 times on each leg.

A Skips- Subjects brought their right knee up to their chest while taking small skips and right back down once their right knee created contact with the ground subjects drove their left knee upwards and repeated for 30 meters. Two reps.

B skips- Subjects brought their right knee up to their chest while taking small skips then, kicked their right leg outwards and pulled downwards, once their right foot made contact with the ground subjects drove their left knee to their chest and kicked out. Repeated for 30 meters, twice.

High Knees- Subjects began to run slowly and then progressively raised their knees higher, (remember for quick transitions). Repeated for 30 meters, twice.

Progression- Subjects started with a slow run and progressively increased in speed until subjects reached 95% to maximum speed. Subjects maintained speed for 20 meters and began to come to a standstill. This was repeated 8 times.

III. RESULTS

Subject	First 100m attempt (Time in seconds)	Second 100m Attempt (Time in seconds)
Subject 1	11.6	12.1
Subject 2	11.5	11.6
Subject 3	12.2	12.0
Subject 4	12.0	11.8
Subject 5	12.8	12.6
Subject 6	13.7	13.2
Subject 7	12.6	12.3
Subject 8	11.4	11.4
Subject 9	12.4	12.2
Subject 10	12.5	12.4

Figure 1: A data chart of individual subject times, comparing both the first attempt as well as the second attempt.

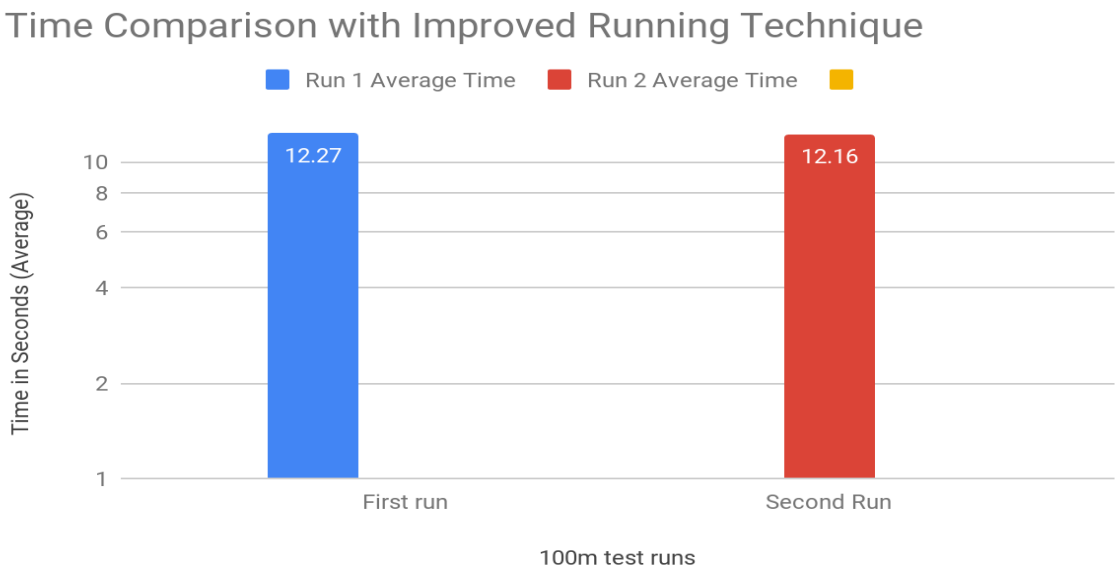

Figure 2: A graph showing the total average performance times of all 10 subjects, one before, and after training.

IV. DISCUSSION AND CONCLUSION

In conclusion, the experiment supported the original hypothesis. The effects of better running technique helped subjects in their 100-meter sprints by decreasing their total time by 0.1 seconds. This is exemplified by the total average time drop from the first attempt to the second attempt, shown in the graph. Furthermore, 70% of the total subjects had lower times in their second attempt. This shows that for the vast majority of subjects proper technique is beneficial for their performance. For example, subject 6 had a significant improvement time of 0.5 seconds. This improvement was an abnormality within the data. But, there are 2 subjects that faltered away from the expected hypothesis. Subjects 1, and subject 2 both had drastic changes in their times. After having their forms altered subject 1 slowed down by 0.5 seconds while subject 2 slowed down by 0.1 seconds; these are both major effects. Lastly, subject 8 stayed at the same performance rate in his second attempt as well as his first attempt. In conclusion, based off the data collected, proper running technique substantially improves subject's perform ance times in a 100 meter sprint.

These results occurred because of the use of the whole body. When running with proper technique it allows subjects and athletes to run more efficiently by utilizing all muscles and body parts that are needed to perform the action (running). Therefore, when actions become more efficient subjects are able to use less energy for more power. This also enhances endurance, so that subjects are able to maintain their maximum speed for as long as possible: cutting down on time. But, for others this may not work because the cookie cutter technique may cause awkwardness as well as discomfort within athletes. Therefore, instead of utilizing the techniques to cut down time, it can cause their times to rise. This is caused, because they when subjects are uncomfortable subjects will exert energ y incorrectly, therefore wasting energy for the wrong movement. This is exemplified by the propulsion phase, if the toes were to point outwards, energy will be used to push subjects laterally not directly forward.

V. APPLICATION

The ideas of enhancing the human race is still very prevalent in today's society, and will continue until the end of the human race. Thus, with this information the general public would be able to implement these running techniques within younger children, so that as these athletes grow older, they're able to perfect the ideal technique. So that the future generation can run faster, longer, and with less injuries. This information can be applied to all different occupations in the real world, for example, physiotherapists could use this information to prevent further injuries within patients. On the other hand. sport coaches and fitness trainers could use

this information to help clients and players run faster. This is caused by the foreign concept and awkwardness, from the change in technique for these subjects. If subjects are to feel awkward and uncomfortable, subjects will be applying energy in unimportant aspects of their running.

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Reaction Times in Response to Movement-Oriented vs. Open-World Video Games

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Abstract

In this experiment, a comparison between movement-oriented and open-world video games were used to analyze reaction times in subjects. Over a three-day period, after having performed the Human Benchmark test, subjects played a game for 10 minutes. This was followed up by asking the subjects questions regarding brain activity and difficulties of the game, after which they performed the Human Benchmark test again afterwards. In general, the reaction time improved for the subjects in terms of both speed and consistency, regardless of the video game. Based on the results, movement-oriented video games improved a person's reaction time more positively than open-world video games.

I. INTRODUCTION

Answering this question is important and relevant because video games and technology are currently a trend in the world. With how they're perceived as a distraction to students, it's hard to believe they could be used for any good. However, general skills such as dexterity are beneficial to have, and video games may help more than expected. It has already been tested that the stimuli given may assist those who have slower thought processes such as the elderly (Clark et al., 1987; Drew and Waters, 1986).

How do different types of video games affect reaction time?

If movement-oriented and open-world video games are compared in terms of the effect it has on your reaction time, then movement-oriented games will be more effective, because the constant strain it puts on the brain keeps it alert. Green (2008) had already found that action video games can train reaction timing, but it's argued that a limited amount of skill gets transferred, meaning a sizable amount of time is needed to improve performance (Pashler & Baylis, 1991).

II. METHODS

This experiment was conducted over a three-day period. Each day, subjects performed the Human Benchmark test. They would then be introduced to one of three games: Soul Knight, Minecraft, and League of Legends for Day 1, 2, and 3 respectively. After having played the game for ten minutes, subjects would be asked the following questions:

1. Did you feel pressure to actively think?
2. Was there something about the game that made moving around difficult?
3. Does your brain feel more alert after playing?

(Refer to Table 2, Table 4, and Table 6 for responses)

Subjects would then perform the Human Benchmark test once more after playing.

The independent variable was the type of game played (ex. Soul Knight), the dependent variable was reaction time, and the controlled variables were environment, alertness and time played. The environment was selected because distractions often take away someone's focus, severely affecting reaction time. Alertness was selected because a

person's awareness allows them to either react to situations faster or slower. The time played was chosen because the longer a person plays, the more used they are to a game, and the more their brain warms up.

III. RESULTS

Table 1

Records reaction time in milliseconds for each subject on Day 1, both before and after playing the game Soul Knight. The term (No) refers to the average human, while (Ga) refers to the typical gamer.

Subject	Before	After
1(No)	389 ms	330 ms
2 (Ga)	251 ms	247 ms
3 (Ga)	259 ms	234 ms
4 (Ga)	272 ms	243 ms
5 (No)	502 ms	416 ms

Table 2

Records summarized responses of answers to questions asked after playing Soul Knight.

Subject	Q1	Q2	Q3
1(No)	Yes	Character's controls	Yes
2 (Ga)	No	Many things to dodge	Yes
3 (Ga)	Yes	Multiple objects on screen	Yes
4 (Ga)	Not often	Screen scrolling is quick, bad frame rate	Just a casual game.
5 (No)	Yes	Mobile platform makes controls difficult.	Yes, brain felt more active. Felt "warmed."

Table 3

Records reaction time in milliseconds for each subject on Day 2, both before and after playing the game Minecraft.

Subject	Before	After
1(No)	294 ms	324 ms
2 (Ga)	258 ms	267 ms
3 (Ga)	269 ms	277 ms
4 (Ga)	264 ms	270 ms
5 (No)	370 ms	300 ms

Table 4

Records summarized responses of answers to questions asked after playing Minecraft.

Subject	Q1	Q2	Q3
1(No)	No	Nothing difficult	No, feels relaxed
2 (Ga)	No	Nothing	No, feels relaxed
3 (Ga)	No	Nothing too difficult	No
4 (Ga)	Yes	First person POV, every block moves	Mostly relaxed
5 (No)	Yes	Kept getting stuck, layout is weird	Yes

Table 5

Records reaction time in milliseconds for each subject on Day 3, both before and after playing the game League of Legends.

Subject	Before	After
1(No)	306 ms	314 ms
2 (Ga)	248 ms	239 ms
3 (Ga)	247 ms	241 ms
4 (Ga)	270 ms	262 ms
5 (No)	310 ms	298 ms

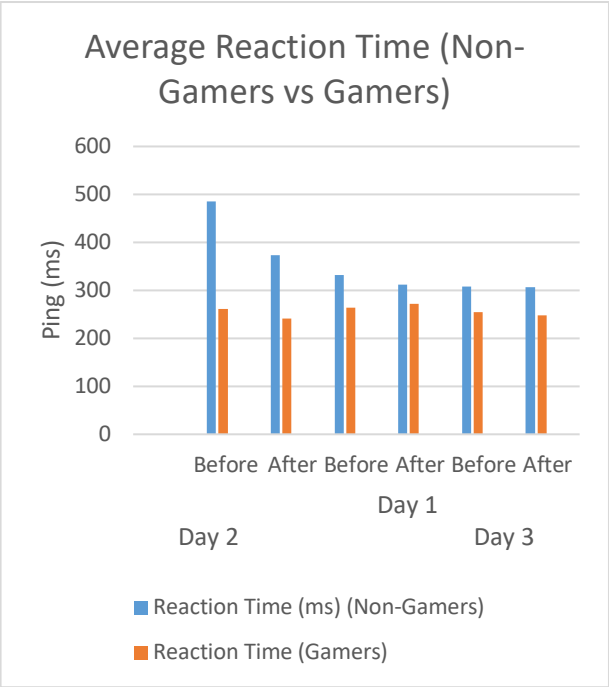
Table 6

Records summarized responses of answers to questions asked after playing League of Legends.

Subject	Q1	Q2	Q3
1(No)	Yes	Constant clicking	Yes
2 (Ga)	Yes	Familiar with game	Yes, had to multitask
3 (Ga)	Yes	Blocked by minions	Yes
4 (Ga)	Yes	Character's abilities difficult to control	Yes
5 (No)	Yes	Constant clicking	Yes

Graph 1

Displays average reaction time of Gamers and Non-Gamers for all three days.



The tables and charts above proved to have very definitive and clear results. In terms of speed, a very obvious decrease wass apparent in Non-Gamers from day to day, while Gamers seemed to fluctuate back and forth between being faster or slower. In terms of consistency, after having reached Day 3 with Non-Gamers, the reaction time remained mostly stable with no changes, meaning subjects were able to retain that skill of reaction time over a period of time. Gamers had already been shown to be consistent, justifying this theory. While playing movement-oriented games in Day 1 and Day 3, subjects almost always responded to questions regarding their brain activity as somewhat high due to factors like fast-paced decision making. While playing open-world, four out of five subjects responded to those same questions with their answers all revolving around a relaxed brain, with no need to use it due to the general peacefulness of the game itself.

IV. DISCUSSION & CONCLUSION

In terms of which game was more effective in terms of improving one's reaction time, games oriented more around movement like Soul Knight and League of Legends proved to be the more effective option, meaning the hypothesis was correct. What determined this outcome wasn't just the big jump in improvement before and after Day 1, but the fact that Gamers showed a decrease in performance after Day 2 as compared to before showed that Minecraft, as an open-world game, has less stimuli than any of the others.

The most significant results were the massive drop before and after Day 1 for Non-Gamers, along with the decrease in performance for Gamers before and after Day 2. These results prove all video games seem to have an effect on reaction time, but it becomes much more drastic of a change when Non-Gamers play for the first time. It also shows that in terms of how different games affect reaction time, open-world games like Minecraft can actually be detrimental, but only if the person playing is a Gamer used to more stimulating games. Comparing these results with other scientists, they return consistent in terms of video games improving reaction time, although studies comparing two different types of games were not found. While the results were expected in terms of the general idea, a drastic change in improvement was not expected for Non-Gamers picking up a game for the first time/in a while. It was also not expected that the Non-Gamers came so close to the results of the Gamers as well, the range well within around 50 milliseconds on average. Some issues and sources of error done throughout this experiment had to do with the control variables. Every subject had a different schedule, so it was hard to meet up and get them to play a game for three days straight at a common location, which was originally planned. Although the subjects had tried to get their environment while playing to be as isolated and quiet as possible, that may have slightly affected their results while testing, as the Human Benchmark Test required only five attempts, which could have been altered with distractions.

V. APPLICATION

Where this information is useful can be in driving, which requires a lot of focus because you have to keep track of many things. This means you need a fast reaction time if things go wrong fast, which gaming is great for improving. The legal age to drive is sixteen, so at least gamers in high school will have a lower chance of crashes and other accidents, which can be very common due to a factor of inexperience. Human kinetics or neurology would be a great field of study to use this knowledge as well, to conduct studies of their own dealing with how the body and brain both react to stimuli, depending on how quick someone's reaction time is. The general public, mainly families, would see video games in somewhat of a more positive light, and may not be as harsh on it because there are benefits through long-term gameplay.

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How does Natural vs Generic Skincare Impact the Skin Of Teenagers?

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Abstract

How does Natural vs Generic skincare affect teenagers skin differently? That was the purpose of this experiment. This is relevant because we need to be cautious about what we put on our skin because it is also what we are putting into the skin. There were four participants in this experiment. Each individual was asked to use two types of different skincare products in the course of two weeks. At the end of these two weeks the participants with dry skin had better results with the natural products and the participants that had combination skin had better results with generic products. Experimenting and trying to find what works best for your own skin might be the only way to work what truly has the greatest benefits accustomed to you.

Introduction

The purpose of this experiment is to compare the different results of using natural and generic skincare products on the skin. Natural skincare has been proven to be better for the skin in the long run. It also tends to be more costly but within the same range as generic skincare products. Generic skincare products are known to be more efficient in preventing acne knowing that majority contain salicylic acid and alcohol based ingredients which are shown to dry out the skin. This being said they also tend to cause the most irritations on the skin such as redness or swelling. So which products helped the skin the most, natural or generic?

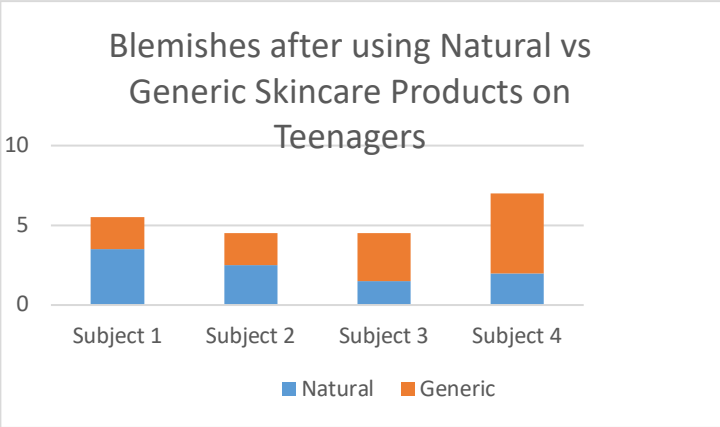
If a group teenagers were to use all natural products on their skin for one week then generic products the upcoming week, natural products would work better because of the use of less chemically based ingredients and shown irritation level decrease.

Methods

This experiment would consist of 4 teenagers ranging from ages 14-19, three of which are female and one male. The four products needed for this experiment where all gathered. A moisturizer and facial wash from the brand Burts Bees and a facial wash and moisturizer from the brand Clean and Clear, both which fall into the same price range of 15 -25 dollars. Each product was divided into 5 smaller, clean containers that were then split amongst all participants.

First week would consist of each participant using the two products providing daily. If they had any other products they used they were asked to discontinue them for the next two weeks for it to not

interrupt with any of the results. Participants were all told to drink around 6-8, 8 ounce glasses of water each day. Along with getting minimum of six hours of sleep per day to make sure none of these factor affect the skin. The amount of time their skin came into contact with their hand throughout the day should have been minimum to none. Each individual would have to wash their face once in the morning and once before going to bed, no more no less. The amount they used was a pea size for both the face washes and the moisturizers. While applying the products they were to make sure that their hand were thoroughly washed and clean so they wouldn't have any unwanted bacteria coming into contact with their skin. The products should be applied in a circular manner to insure the skin is thoroughly cleansed. The water temperature when washing the face should be look warm to start with then cold to wash off products. The skin should have been delicately patted dry with a towel. After ward the moisturizer should be taken onto the fingers and pated into the skin instead of rubbed in. This was to be repeated with the generic skincare as well.



The independent variables were the skin care product that was being used. The dependent variable would be how irritated the skin was after the use of each product. The controlled variables were how many times a day the face would be washed because if not washed enough the results may not be significant and if over washed the skin can become irritated fairly quickly. How much of the products would be used per wash, which was a pea size and how much moisturizer to apply because this would affect the day to day comfort of the product. Another controlled variable is the temperature of the water being used since warm water opens pores and cold closes pores this would affect how well the skin absorbs the products. The water intake of each individual was another controlled variable because of how much water affects our skins hydration along with clarity.

Results

The first chart shows the amount of blemishes that occurred with each of the products in a week span. The two charts are the minimum comments that the participants were asked to record as there first impression of each of the products.

Week 1	**Amount of new breakouts**	**Skin texture**	**Hydration of skin**	Comments and Observations
Subject 1 (combination skin)	2-5	smoother	hydrated	• Less fragrance was found in the moisturizer and was light in texture • The face wash left skin hydrated even after washing and a little went a long way
Subject 2 (combination skin)	2-3	Smoother with slight redness around cheeks	hydrated	• Moisturizer had an odder smell but wasn't greasy and easy to work with • The face wash stayed in liquid form and had a good scent
Subject 3 **(combination skin)**	1-2	Softer , less bumps on skin	Slightly dryer	• Moisturizer didn't have any scent and was more light on skin. It left a more oily residue on skin • The face wash wasn't foamy • Skin felt moisturized even after washing it compared to my normal clean and that leaves my skin feeling dry afterwards
Subject 4 (Dry skin)	2	Smoother and more clear	hydrated	• Products seemed to have no have no scent

Week 2	Amount of new breakouts	Skin texture	Hydration of skin	Comments and Observations
Subject 1 (combination skin)	1	Remained the same a little smoother	hydrated	• Products all smelled better • Moisturizer was more oily
Subject 29 (Combination skin)	4	Less redness but more breakout	hydrated	• Products all felt pretty similar to the natural ones
Subject 3 (combination skin)	1-2	Skin remained the same as before Skin also felt more tight and dryer	Slightly dryer	• Moisturizer was more heavy and had a stronger scent • Face wash foamed up easily
Subject 4 (dry skin)	1-2	Skin was clearer than before and there was no irritations	dryer	• Moisturizer was more sold in texture

Discussion and Conclusions

From the data collected my hypothesis turned out to be incorrect. Overall each individual had a different experience with each product. Focusing only on week 1 consisting of the natural products, 60% of the participants found an increase in the amount of blemishes that appeared on their skin during that week. The subjects with dry skin had a decrease in the amount of breakouts and the subjects with combination skin found that they were more prone to breaking out. As for the moisturizer everyone had said the skin felt hydrated but not greasy and that the moisturizer had little to none fragrance along with a light texture. Out of the four participants the one that experience irritations with this product had combination skin and was also the only male in this experiment.

In the second week of the experiment there was a 20% decrease in the amount of blemishes the participants experienced. The amount of irritation also remained minimum since the most major issue was slight redness around the cheeks. The subjects with combination skin said their skin felt hydrated and softer than before. The subjects with dry skin said their skin felt slightly dryer than before.

Even though there isn't much coloration in the data it is shown that the subject with dry skin had a much better experience with the natural products rather than the generic products. Other then that the data doesn't have any similarities. Some subjects with combination skin experience irritations while others didn't. Some experienced more blemishes while others didn't.

Some variables that may have affected this experiment may have been the different gender since we have different hormones which causes our skin to act differently. If I was to redo this experiment and try to get more accurate results I would focus more on one gender and one skin type. For example I would've don't this experiment only on girls with combination skin within the age range 13-19. This would've helped me see more patterns in the data.

Application

The results of this experiment can be used to further encourage someone to understand what is in their skincare products and motivate them to find the best products that work for them. This has helped me to understand that certain skin types will benefit more from certain ingredients being in their products even if its said to be damaging in the long run. This can also help people understand that knowing what your skin type is and finding a routine that works for based on your skin type can be effective.

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The Most Effective Method to Teach A Conure to Mimic Sounds

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Abstract

The species of parrots are most known for its ability to mimic speech. This species of bird has become increasingly popular as a household pet, due to its vocal ability. The ideal method to teach a parrot had been discovered through various amounts of tests using different methods. There were three different methods used; repeating a word, conversation and teaching through a video. The methods were tested every day for three weeks, during three different time periods each day with breaks in between. In result of using the repetitive method, the bird has shown gradual improvement, squawking more and more throughout the time period. The conversational method resulted in the bird decreasing its amount of squawking throughout the experiment. The video method resulted in an inconsistent outcome, with no improvement or diminishment of squawking shown. The most effective method was the repetitive method, due to the positive correlation of increase speech. The results of the best method may vary and be different for each bird. The type of bird, age of bird, word chosen for the repetitive method, and environment would change the outcome of the experiment.

I. INTRODUCTION

It is important to use one central method to teach a bird how to speak because utilizing a variety of methods will overwhelm the bird. By using the same method every day and engraving it into the bird's daily routine, the bird will be able to adapt to the new routine. Using a new method on the bird every day will increase confusion in the bird. Making a routine is very important in keeping the Conure learning environment healthy. Conures learn new sounds from close observations, building a strong relationship with the bird from day one is the best approach. Tell the pet about day-to-day events the trainer may experience in simple conversational words, as if teaching a child, but never in a child-like tone. Make the Conure listen to everything needed to be said about anything and everything (feathered family, March 2004). The ideal way to encourage a bird to speak is by speaking in a positive, happy tone and to make sure the bird is interested in the tone, word, or conversation. If the bird is not interested, then it will not listen to the trainer and never learn to speak. Also choosing simple words, like words with two syllables, gives a higher chance of the bird replying back with the word. Watch how the bird reacts and behaves to each word. The more positive interest the bird shows in a specific word, the more likely it will respond back with repetition. Leading to, what is the best method to teach a Conure how to talk? If a phrase is repeated daily to the Green-Cheek Conure, then it will grasp onto the word and start to speak because repeating this same word, in the same inflection will allow the bird to study the sound that is wanted to be mimicked (Pippa Elliot MRCVS, March 29, 2019). Since the bird does not have a vocabulary of its own, the bird will learn to talk only by imitating what it hears. To help the bird practice certain sounds, the trainer will have to repeat phrases and words, repetitively.

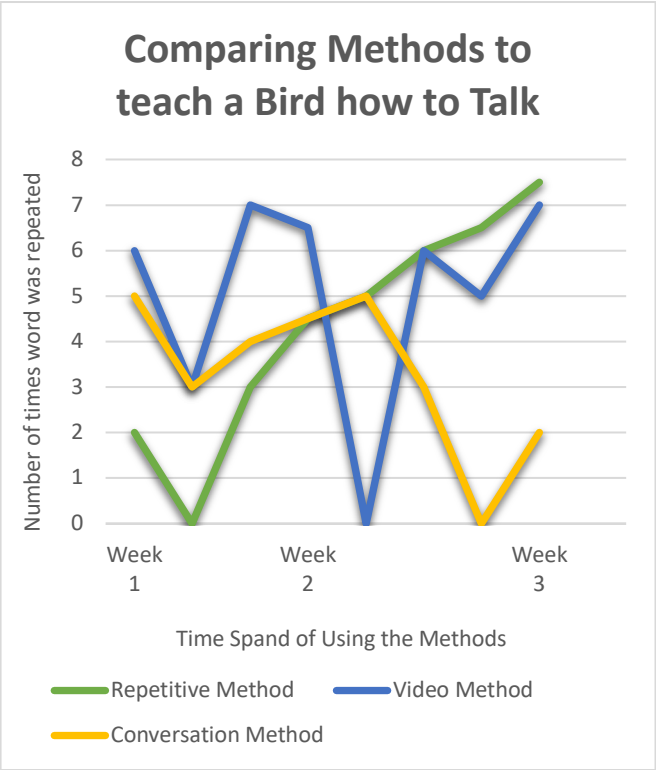
II. METHODS

There were three different methods used, along with a detailed schedule as to when to use each method. Each method was completed every day for three weeks. The repetitive method, where the trainer had chosen a word and repeated it to the bird multiple times a day at 8:00am for three weeks. During the repetitive method different words were tested to see how the bird reacts to each word. The reaction of the bird would determine what word is to be chosen. The word with the most positive reaction out of the bird was chose, as in the bird's name. Since the more positivity the bird shows towards the word, the more the bird would want to reply back by saying the word. The conversational method had the trainer converse with the bird for at least fifteen minutes every day at 4:00pm for three weeks. Conversations consisted of day-to-day activities in a simple conversation using uncomplex words, making it easier for the bird to understand. During the video method (https://www.youtube.com/watch?v=2aRbsRuhVog), a video was shown to the bird every day at 6:00pm for three weeks. In the video it consisted of a person giving tips and techniques on ways to teach a Conure how to speak. Along with a parrot in the background of the video speaking. The bird was surrounded by a calm and quiet environment with very little distractions. Between each method the bird was given a break sleeping, eating, flying and playing. Observations were recorded through a camera each time a method was used. The bird must be comfortable around the camera when recording the observations or keep the camera hidden, if not, the bird may get camera shy or distracted. The experiment was dependent on the bird. The independent variable was the type of method used. Variables that could be controlled were the following: how long you used the method each day, what tricks the bird already knew, type of bird, time of day, what did the subject do during breaks, age of bird and environmental conditions. These variables could alter the results of the experiment even if the procedures where done correctly. For example, if the bird was too old, it will be harder to pick up the sounds and has a higher chance of not mimicking the words. In contrasts to a younger bird who has a greater potential of learning how to speak. Also, over using a specific method could result in bias to the other methods. The tricks the bird may already know could affect how quick the bird learns how to speak. Not all types of birds have the ability to mimic speech, the experiment won't work on birds who don't have this ability. Depending on the time of day, the bird may be more active during the day time rather than the middle of the night. The effects of the breaks can carry out to the experiment and alter the results. A stressful environment would affect the bird's behavior and how it reacts to each method. The environment of the bird would also affect its learning ability. The controlled variable could determine the result of the experiment based on the various factors.

III. RESULTS

After conducting the experiment for three weeks and analyzing the observations. The following observations were discovered: The repetitive method showed ongoing improvement throughout the three weeks. During the first week of the repetitive method the bird would listen to the trainer repeat the word, occasionally replying

back. More improvement was made in the second week, where the bird would reply more often. In results to the third week the bird would reply almost once a day, especially when the bird was happy or was shown attention. *Refer to Graph 1 Green line.* The conversational method displayed a decline of the amount of speaking during the three weeks. In result of the first and second week, the bird would listen to the trainer and frequently reply back. Throughout the final week the Conure would regularly ignore the trainer's conversation and often flew away. *Refer to Graph 1 Yellow line.* The video method presented an unpredictable amount of progress through the three weeks. The duration of the weeks consisted of loudly squawking at the video screen, staring silently and flying away when the video was played. Each day there was a different outcome. *Refer to Graph 1 Blue line.*



Graph 1 shows the average amount of speaking on a weekly basis on a scale form 0-8 when using each method.

Graph 1

Table 1

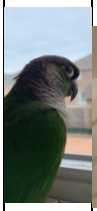
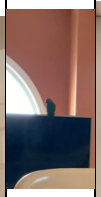
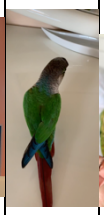
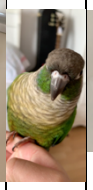
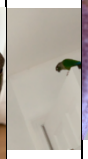
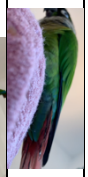
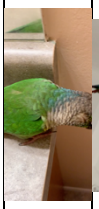
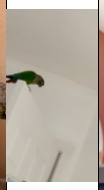
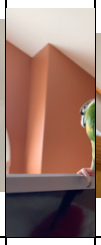
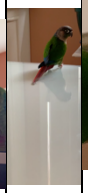
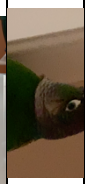
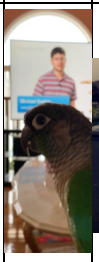
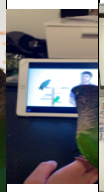
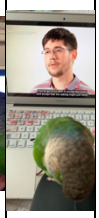
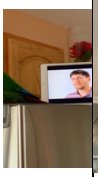
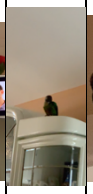
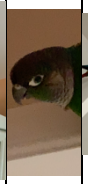
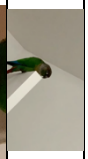
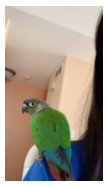
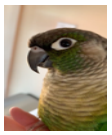
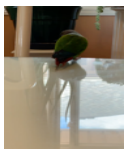
Schedule	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Repetitive Method							
Conversational method							
Video method							

Table 2

Schedule	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Repetition Method							

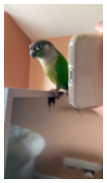
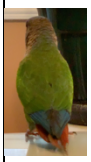
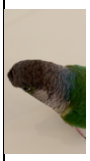
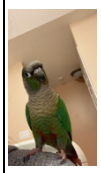
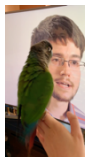
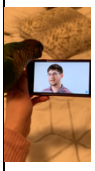
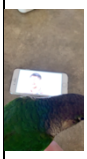
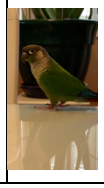
Conversational Method				
Video Method				

Table 3

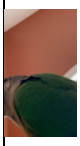
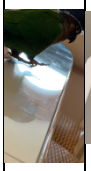
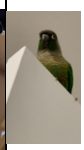
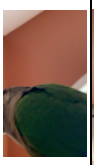
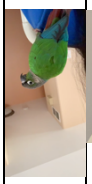
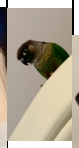
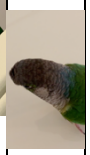
Schedule	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Repetitive method							
Conversational Method							
Video Method							

Table 1, table 2 and table 3 display the observations that were captured in its scheduled dates throughout the experiment.

IV. DISCUSSION & CONCLUSION

The hypothesis was correct. If a phrase is repeated daily to the Green-Cheeked Conure, then it will eventually grasp onto the words and start repeating the sounds it hears. Since repeating the word in the same variation daily, allows the bird to study what is needed to be mimicked. This proves that repeating a word to the Conure daily is the best method out of the three; repeating a word method, conversation method or video method.

The best method is discovered by how the bird reacts to each technique. For example, when the bird watched the video, during the video method. Its foremost reaction is panic. This shown by the sound of the bird's squawking and the ruffle of its feathers trying to blow off steam. Mostly due to the anxiety of the sound of the other bird in the video. Other times the bird didn't pay attention to the video and walked or flew away. While using the conversation method seems to work when the bird is paying attention, but most of the time the bird was distracted. Rarely the bird would have a conversation back in its own bird language. The discovery in the repetitive word method allows the bird to hear a word it's familiar with and understand the word rather than hearing a bunch of unknown words when having a conversation. Similar to most humans, humans won't remember the word if they are not familiar with it or understand the meaning of the word (Paul Turner M. ED TSL, BA July 2008).

During the cases of repeating the word, the bird would occasionally ignore the word if it gets boring or tries to repeat the word. Usually resulting in the syllables of the word is said by the bird. In the end, the bird said the word that was being repeated, not a word from the conversation or from the chosen video. This supports my hypothesis, with the idea of the bird grasping onto the repetitive word and repeating it. Since the increasing amount of improvement shown throughout the process of the repetitive method, in contrasts with the other methods that did not show progress, allows the bird to be learning a new sound. The result is consistent with other investigators reports. Most reports state that the best method to teach a parrot how to speak is by repeating a word to the bird in optimistic tone, multiple times a day, and provide training sessions (Amazon Service LLC Associates Program April 8, 2019). The following are sources of errors during the experiment: The conversation method took the longest in time compared to the other methods, all methods were not always done at its schedule time, different types of screens were watched on for the video method and each method was done at a different location.

V. APPLICATION

The information discovered in this experiment is useful towards Conures/parrot owners, who have the trouble of teaching the bird to speak. Other areas are circuses, zoos, and bird show. Places where teaching a bird how to speak and mimic sounds is necessary. Further research that could have been done is to examine the bird's biology, how specific types of birds have different levels of ability to mimic speech, bird's vocal capabilities and how it differs from human vocals. This research can improve the experiment and help understand how the bird is learning to speak. Information that has been discovered could apply to avian research in which the behavior of the bird and its surrounding environment affects what it learns to mimic.

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An Investigation into How Music Affects Emotions and Human Complexity

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Abstract

The hypothesis is that if artists made the song to make the listener feel a specific emotion then music will make you feel specific emotions every time because studies show that adolescents listen to music especially when distressed. The purpose is to discover how it affects people and why, so people can further understand feelings. The subjects in the experiment recorded feelings throughout the day in a survey, listened to songs of various emotions and recorded feelings after listening. The results consisted of happiness being reciprocated with happy songs, but more vague emotions were shown with other emotions expressed in music. This evolved into finding that human brains are more complex then this experiment could have shown, but the hypothesis still reigns true. The results are important because they allowed for more questions to be asked.

I. INTRODUCTION

This question is important to answer because it can help people understand themselves better and how they feel. According to Dominic Utton (2018), the type of instrumentation, rhythm and recording technique are manipulated to make you feel certain emotions. If people to listen to certain songs, they are feeling certain emotions that those songs are made or written to convey.

How does Music Affect Emotions?

If artists made the song to make the listener feel a specific emotion, then music will make you feel specific emotions every time because studies show that adolescents listen to music especially when distressed.

II. METHODS

Three subjects sat down in a quiet room in their homes at 6pm and recorded how the day went in the survey provided. Three songs were written at the top of the page before the experiment. Subjects listened to the songs in the order that they appeared with headphones or earbuds at three quarter volume and recorded in the spaces below the survey if the songs changed the mood and thoughts of the song. See Figure 1 for survey outline.

The independent variable was different songs. The dependent variables were mood, feelings and reactions. The controlled variables were environment, noise level and time of day. A specific environment such as the quiet room was controlled to ensure that there were no distractions that may alter the results of the experiment. Having the music go through headphones or ear buds at the same volume each time kept the experiment consistent. Lastly, the time of day stayed the same each time to ensure that the boxes in the survey (Figure 1) could be filled in accurately.

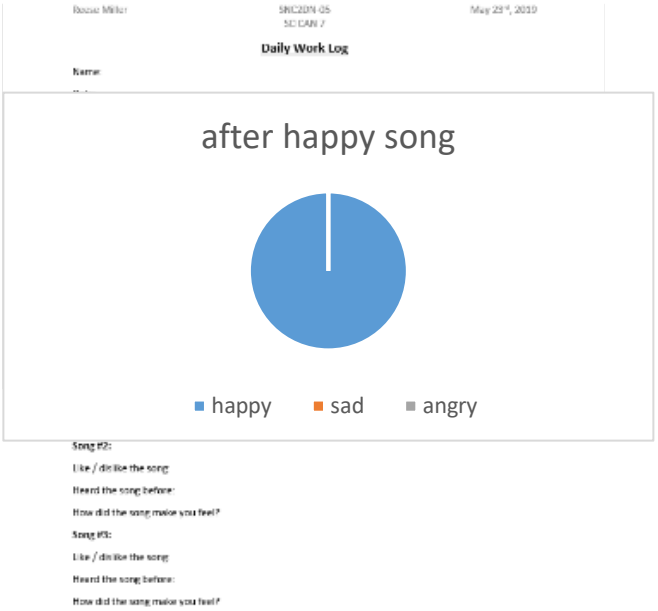


Figure 1

III. RESULTS

Table 1: results of emotions at 6pm, before listening to music

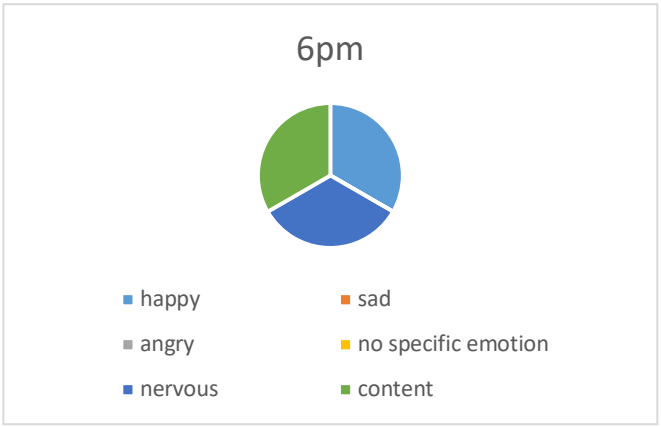


Table 2: results of emotions after listening to happy song

Table 3: results of emotions after listening to sad song

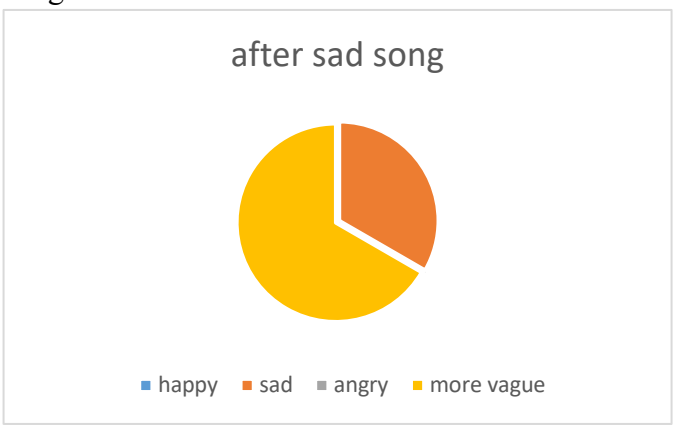
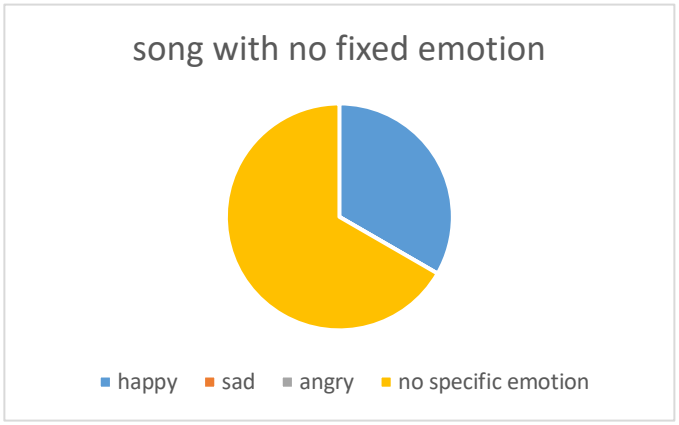


Table 4: results of emotions after listening to a song with no fixed or specific emotion



IV. DISSCUSSION AND CONCLUSION

The hypothesis was correct because it stated that teens listen to music and feel certain emotions that the songs are made to convey, and the subjects responded in ways very similar to the hypothesis. It also stated that music will make people feel certain ways on purpose, and the more upbeat songs made the subjects more excited. Music affects emotions by making people feel certain ways with certain lyrics, melodies and beats. Subject A felt nostalgic with a song, which brings happy memories and therefore made the subject happier. All three subjects

responded to the song with no fixed emotion with the expected result of no fixed emotion or a vaguer emotion. Though some results correlated with the hypothesis, others didn't. Some results went against what the hypothesis stated. For example, Subject C was the only one who responded with sad as their emotion after the sad song. Subjects A and B responded with emotions that were vaguer, such as relaxing and sleepy. These results sprung a new idea regarding human complexity. Humans experience more emotions other then sad and happy and were not really accounted for with the survey outline.

According to Dominic Utton (2018), the type of instrumentation, rhythm and recording technique are manipulated to make you feel certain emotions. Sara Loy (2018) explains that we listen to sad music purposefully to feel better or worse. The results from this experiment are consistent with what these other investigators have found because all three subjects responded to the happy song with a happy emotion. The results were unexpected with the sad song because only one subject responded with sad as their response. The reason for this might be a bad choice of a survey outline. The survey allowed the subjects to be as vague as possible, which is difficult to measure, especially when the subject is not numerical to begin with. The results might have been affected because they weren't entirely what was planned.

V. APPLICATION

The results from this experiment can be very useful to everyday life, no matter if the person using the results is a scientist or an average person. To an average person, it allows the person to be more aware of what they listen to, and how it affects and reflects them as a person. Most things in life have deeper meanings as to who the person is. Scientists could use these results to further examine the human brain and psychology in ways that high school students can't. Psychologists could use this information and further research the topic to find the specific reasons that this happen, and musicians could use this information to further help them target their preferred audience, by seeing which age group or other audiences like to listen to and how they want to feel.

VI. REFERENCES

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Loy, S. (2018, June 25) Why Do We Listen To Sad Music? From www.indianapublicmedia.org

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The Ideal Combination of Common Instruments

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This experiment was conducted to find the ideal combination of common instruments in a group of 4 consisting of a soprano, alto, tenor and bass voice to use for the creation of a relaxing melody. This experiment was felt to be relevant because it was a way to give a definitive answer to what instruments should be used for this purpose when the limit of four instruments is given. In order to conduct the experiment, several test subjects were told to listen to every combination of the common instruments used playing one melody in order to find a clearly better group. The piano played each melody as well after the group played in order to leave no impressions of the earlier group. After the test had been concluded, it was found that the combination of violin, trumpet, trombone, and tuba was the most pleasing and the combination of flute, alto sax, trombone, and baritone sax was found to be the least enjoyable. Once the experiment was finished, it was decided that the data was relevant and useful, but a conclusion was reached that the winning group was still subject to opinion and therefore could be used when making music but could not be cemented as a fact. The experiment also recognizes the short-falls of being unable to use live musicians as well as the small size of the test group and its effect in the test and the results it bore.

I. INTRODUCTION

Music is still a multimillion-dollar industry in Canada, with a total 76 million in revenue in 2017 (Statista 2018) and there is always a need for new music, and the better music sounds to people, the more likely it is to be successful. Ontario Creates (2018), also says that the music industry is still growing, therefore there will be demand for new music. Music Entrepreneur HQ (2017) also states that live music is also still a growing part of the industry and at live performances there will usually be actual instruments, not recordings on computers, so knowledge about actual instruments is still relevant.

What group* of instruments is the most pleasing to listen to while relaxing?

*for this test a group of instruments will be comprised of a soprano, alto, tenor and bass.

If the ideal combinations of instruments for a pleasing harmony can be found which will most likely be the violin contrasting with brass, then the knowledge can be used to play music in a more enjoyable and relaxing way because there is still room for new combinations (Music Entrepreneur HQ 2017) of instruments to be found that are successful together.

II. METHODS

Every instrument (violin, flute, alto sax, trumpet, clarinet, tenor sax, trombone, bass clarinet, baritone sax, tuba) was put into a group and in every possible combination. The groups then went on against the similar group with a different top and bottom voice. The winner in that group went into the category for winners, the bottom one went into a category for the losers and the middle two combinations were eliminated. This process was repeated with every subject. Their responses to the groups they liked and disliked were also recorded while they decided their top 3 favorite groups and bottom 3 least favorite groups. By the end of this elimination bracket, the top 3 and bottom 3 groups were decided, however if the test subjects wanted to, they could change their vote for a group if they felt it should not have been eliminated.

The independent variable for this experiment was the way the instruments played, it was chosen because the goal of the experiment was to find the ideal combination. The related independent variable was how subjects reacted to the instruments, and the experiment was designed to record these reactions and use them for a conclusion. The controlled variables included the place of testing and the time of testing to even it out for every subject, and the medium it was listened to through, headphones, were played at the same volume so that all the groups were heard at an equal level to remove any bias that could be accounted to the way the experiment was conducted. Another controlled variable was the quality of the instruments because they were played by an electronic device, so no mistakes could be made or random other sounds that could occur while a real person was playing the instrument, it was chosen so that every instrument was equal. The final controlled variable was what was listened to before and after each group, because a piano played the melody once in-between, to remove any preexisting notions, and so that it could be compared evenly, this was chosen to reset what the brain was hearing so that it was not relaxing more and more with each group, it returned to the same feeling after each test.

III. RESULTS

Group	Points For	Points Against	Recorded Comments
Violin, Trumpet, Trombone, Tuba	17	0	Verbal: • "I like the way the violin kind of stays in the front of the other warm brass background," • "I like how it's all kind of one tone from the brass, but it all comes in different ranges" • "I think it's because of the way the violin

			sounds kind of small, but the brass is like a big wall that engulfs it and makes it sound nice”
Violin Trumpet, Bass Clarinet, Tuba	12	0	• “I like how the violin is on top and not being overpowered, but it being supported by the bass clarinet” • “ I like how the violin and the trumpet go together and the bass clarinet and tuba hold texture
Violin, Clarinet, Tenor Sax, Tuba	9	0	• “The violin and the clarinet sound mellow while the tuba and sax make the background feel deep and rich”
Flute, Trumpet, Tenor Sax, Tuba	2	11	• “I think the flute feels too punchy to make me relax” • “I don’t think the flutes sharpness and the tenor sax’s coarseness mix nicely”
Flute, Alto Sax, Trombone, Tuba	0	14	• “The alto sax and the flute are too high and feel too high strung to make me relax” • “I feel tension between the flute and the alto and it's not very nice to listen to”
Flute, Alto Sax, Trombone, Baritone Sax	0	16	• “I [strongly dislike] the way the flute and alto sound, they sound tinny” • “The flute is too punchy to relax to and the alto sax overpowers it too and makes it sound weird”

IV. DISSCUSSION AND CONCLUSION

The hypothesis was correct because once the highest rated group was found, all subjects listened to it playing a short melody, and compared it to the lowest rated group and all agreed on which one sounded better and which they would rather listen to. This means that by finding the group most highly rated, a clear difference was established in how much people could relax to the music based on the instruments. The group that was the most pleasing to listen to is the violin, trumpet, trombone and tuba, which was inferred.

In the research, it was learned that the trumpet sounded best in unison with strings and this was proven true when the violin played with the trumpet and is rated in the two highest groups. This knowledge can also be extended to the other brass instruments which are also in the top groups, namely the tuba and the trombone. It is also known in the research that the clarinet was a good blend for all groups, and it was proven because there was a clarinet and bass clarinet in the 2nd and 3rd best groups. While the problems that existed did not affect the conclusion reached on the hypothesis but the problem of not having live musicians may have affected the data.

V. APPLICATION

This information could be useful for the music industry along with independent musicians when trying to play new or old compositions. This information could be used by a group of musicians who need to play for an event but only have a limited amount of space available, meaning they can have limited instruments. By knowing the ideal combination, they can play more enjoyable music, and the more that their music is enjoyed, the more opportunity they will have. This information could lead to a small group of musicians being able to get more gigs and more success. If further research was to be done, it could include less common and more niche instruments to see if they work even better which could lead to a rise in popularity for these instruments.

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The Effects of Caffeine on IQ

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Abstract

The effects of caffeine on the human brain's IQ was investigated due to the ubiquity of consumption of caffeinated beverages and the established link between IQ and problem-solving ability. The investigation was carried out by making several test subjects complete IQ tests after ingesting varying levels of caffeine and comparing the results afterward. The data obtained showed no significant trend in the subjects' IQs after ingesting caffeine. The conclusion was that caffeine had only a minor positive effect on the human brain. Beliefs that caffeine effected IQ in a concretely positive way were misconceptions, and it should not have been taken with the hopes of increasing IQ significantly.

I. INTRODUCTION

The purpose of this project will be to investigate the possible effects of caffeine on the human brain's IQ. This subject is important to look into since coffee is a commercially available and widely used beverage in Canada (Statistica, 2018). Proof of any positive, or negative, impacts would then have an impact in many peoples' lives. Scientists have also proven that coffee should theoretically release chemicals that will increase brain entropy (DiSalvo, 2018), which is linked to higher cognitive functions (Nichols, 2017). All that remains is to find actual, empirical evidence to either support or refute such theories.

With this data in mind, the purpose of this experiment will be: What is the effect of ingested coffee on the human brain's Intelligence Quotient?

It is hypothesized that if coffee is ingested, then the brain's Intelligence Quotient will increase, because it is proven to increase levels of dopamine and glutamate in the brain (John, Kodama, and Siegel, 2014).

II. METHODS

The experiment was conducted by making a subject first complete an IQ test with no caffeine being ingested, then recording the result of the test. Afterwards, the same subject was made to ingest 72 mg of caffeine, and 15 minutes later, was made to write another, equally difficult test. Then, 24 hours later, they were made to ingest another 144 mg of caffeine, writing another equally difficult IQ test 15 minutes later. Finally, the entire procedure was repeated with different people in order to obtain more data.

In the experiment, the independent variable was the caffeine dosage before each IQ test, the dependent variable was the performance on the IQ tests, and the control variables were the relative difficulty of the IQ tests, time each test was being taken, and the environment in which the test was held. Keeping the control variables the same throughout the experiment was important because it made obtained results more accurate. It ensured that the effects of a substance or

technique being tested was responsible for the changes in outcomes, and not random, arbitrary differences between experiments. This allowed effects to be accurately attributed to their causes, but also allowed tests to be reproduced so that findings could be found and proven by other experimenters, which would further promote scientific integrity and accuracy in results.

III. RESULTS

Table 1: Table of different subjects and their IQ scores with varying levels of ingested caffeine.

	IQ with no Caffeine	IQ with 72 mg of Caffeine	IQ with 144 mg of Caffeine
Subject A	128	141	142
Subject B	136	111	126
Subject C	133	125	129
Subject D	142	139	145

Half of the subjects had an overall IQ increase after all the caffeine had been ingested, while the other half had an overall decrease, though their final scores with 144 mg of ingested caffeine were still greater than their score with 72 mg of caffeine ingested. The average of all the scores showed an increase in IQ after consuming 144 mg of caffeine, though only of 2.2%, but also a slight decrease of 3.7% with only 72 mg ingested.

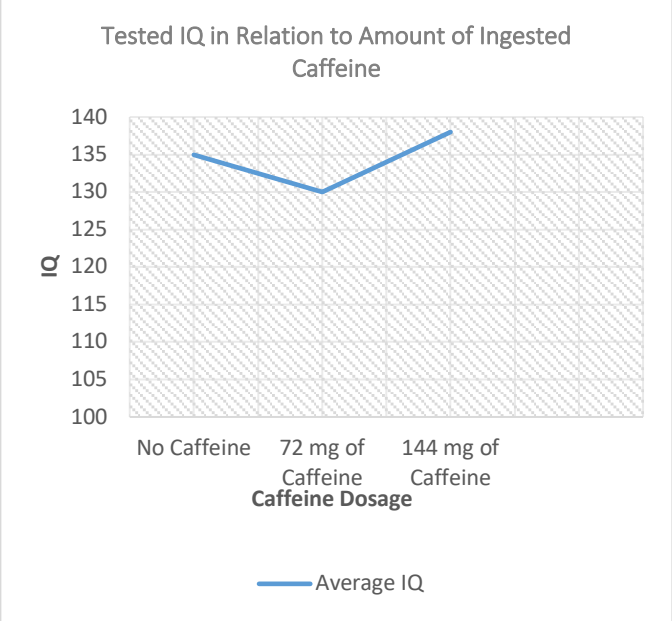

Figure 1: Graph of average IQ results with various amounts of ingested caffeine.

IV. DISCUSSION & CONCLUSION

The results of the experiment showed that the ingestion of coffee had a positive effect on the human brain's Intelligence Quotient, though that effect was limited. As such, the hypothesis had been proven to be correct. Each subject's IQ increased after going from ingesting 72 mg to 144 mg of caffeine, despite some subjects having a decrease from ingesting no caffeine to ingesting 72 mg of caffeine. Specifically, Subject A had an IQ spike from 128 to 141 after ingesting 72 mg, and that number further increased to 143 afterwards, with the ingestion of 143 mg of the substance.

Due to its ability to increase brain entropy and alertness, the caffeine in coffee has caused the test subjects' IQ scores to improve with increasing dosages of the substance. Its increase of the

glutamate levels in the brain (John, Kodama, and Siegel, 2014), which is a chemical that sends signals between neurons and helps with memorization and learning, allows the brain to answer the IQ tests by drawing on more past experiences and knowledge, solving more difficult questions in creative ways (DiSalvo, 2018). The increased dopamine caused by caffeine, which is a neurotransmitter known for producing feelings of well-being and motivation (Nichols, 2017), also allowed participants to answer questions quicker and more confidently, giving them a time bonus on the IQ test. However, this effect also caused some to not check over their answers for possible mistakes, which would explain the lowered IQ results for some after ingesting caffeine, at first. On the second run with caffeine, they learned from the prior test and exercised more caution. The outcome of the experiment was expected, and mirrored the results of the referenced researchers' conclusions because of the emphasis of caffeine having a positive effect on the brain's mental performance and increasing the chemicals that are responsible for it. The experiment conducted had margins of error in the difficulty of the IQ tests, which may have been inconsistent in specific questions, causing misleading increases or decreases in IQ, and the administering of the caffeine, which could have been inconsistent regarding amount and time allotted for caffeine's effects to take place, also skewing results and creating false trends in the data.

V. APPLICATION

From the results obtained from the experiment conducted, further tests could be conducted in the future. A test to check for possible placebo effects of drinking coffee will have to be conducted, since the current experiment had participants drinking coffee to ingest caffeine, all while knowing that they were ingesting caffeine. It is possible that subjects believed that drinking a beverage with caffeine would raise their IQ, and thus would answer questions with greater care, causing their IQ scores to rise independently of ingesting caffeine. A test where participants would not be told if they were ingesting caffeine in a beverage or not would remove the possibility of a placebo effect and yield more accurate results without any false trends. Currently, the conclusions drawn would have application in the field of cognitive science and human biology, where scientists would be able to see how the brain would be affected by the stimulants in caffeine, if at all. The experiment conducted would serve as a concrete bit of evidence that could be used to further solidify theories on how the brain functions, and how humans problem-solve. In general, the public would be able to apply the results of this experiment with how they drink coffee and other caffeinated beverages, and what they expect to occur from doing so. They would realize that ingesting caffeine will not be an effective alternative to studying or practicing, since IQ is raised very minimally, if at all, by caffeine, and all of this can be out-weighed by the negative consequences of over-confidence that an increase of dopamine in the brain can cause.

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Mentality of a Gamer

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Abstract

"How does Phantom Forces' player base respond to challenging situations in game?" Such a question is a small step, but could prove to be key in unravelling the influences a video game has on the player's mentality. Nevertheless, answering the question above takes priority, and so it was through the gameplay recording function of the Roblox engine that players' mental states as they played, along with their situation in the match, was recorded. It was found that those facing difficulties would often complain of their misery through the chat, while those who were not burdened as such would not speak of struggles. Thus, it is implied that those facing challenges in video games would be quite vocal about how much they're struggling, which could become vital in the deciphering of how one is influenced by video games.

I. INTRODUCTION

The study of the influence of games on minds young and old have been ongoing for years and whether the boons outweigh the drawbacks is still a subject of debate. Finding how they affect one's attitude during gameplay can be a crucial step in further understanding the upsides and downsides of gaming per genre as well as finding out why certain games are more popular. Studies posted to ScienceDaily found that faster-paced video gaming boosts the player's visual skills but reduced their ability to reign in their impulses (Society for Personality and Social Psychology, 2013) and it's also noted that this is not limited to only action-oriented games (Dunckley, 2016). Evidence also shows that playing action or FPS games, both of which are fast paced, boosts gray matter in one area of the brain while decreasing it in another (Columbus, 2017).

How does Phantom Forces' player base respond to challenging situations in game? If the game's situation is not in the player's favour, then they will rant about it in the chat feed because they need to vent their frustration on something.

II. METHODS

To record the gameplay of Phantom Forces, one must use their computer with the Roblox Game Engine installed. They must then enter the game itself, enter the menu, go to the recording section and begin recording the video, renewing the process as necessary should the recording shut off on its own for any reason. Then, to supply themselves with an ample amount of subjects, they must proceed to record five games from beginning to end, pressing tab at the beginning and end

of each round to bring up the in-game leaderboard. Then, as they review the recording of the session, they must select a player that stayed for three of the five sessions and note their stats for those games as well as their comments in the chat for the three games.

III. RESULTS

Table 1-Subject 1's data and analysis on psyche

	Kills	Deaths	Match Result	Sample Comments	Notes on Psyche
Match 1	30	33	Victory	*"only thing that matters is objective."* *"shotguns are cancer"*	-No outstanding moods. -Could be in good mood due to victory and leaderboard placement (2nd)
Match 2	11	6	Victory	*"i know that feel"* *"nailed it"*	-Seemed commiserating to a player -Could be in a decent mood from previous victory
Match 3	20	16	Victory	*"kdr doesn't mean anything to me"* *"my aim has deteriorated to nothing"*	-Disgruntled -Likely didn't feel like winning due to the large number of deaths

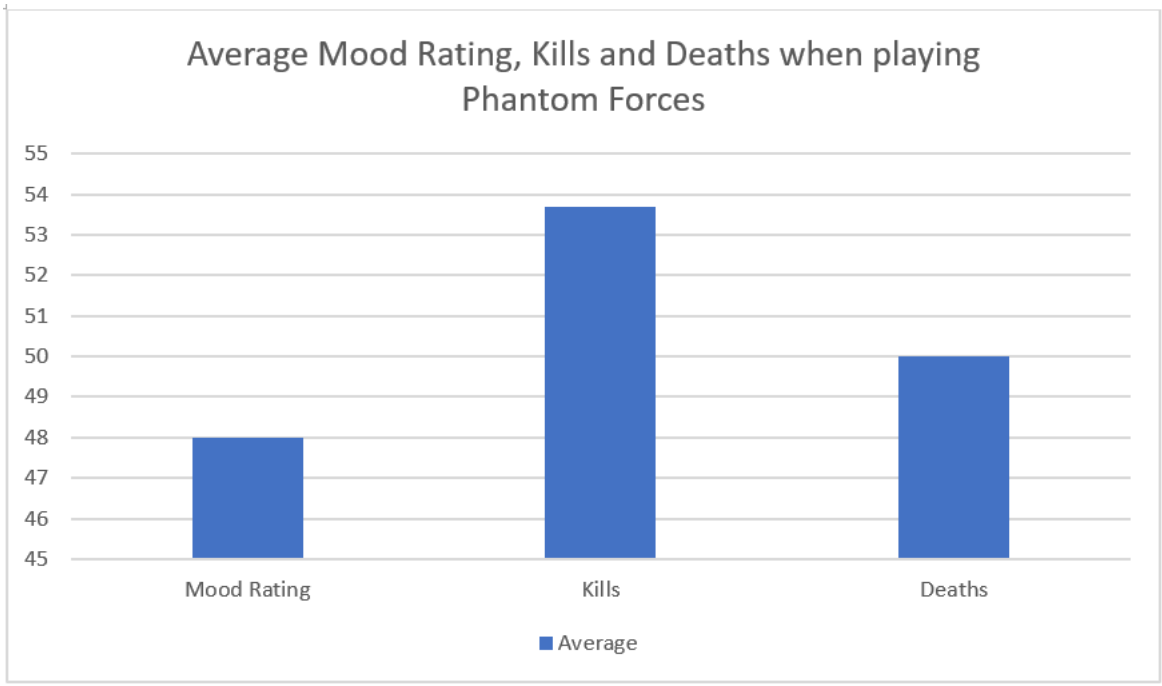
Table 2-Subject 2's Data and analysis on psyche.

	Kills	Deaths	Match Result	Sample Comments	Notes on Psyche
Match 1	22	22	Defeat	*"your team is"* *"IKR"*	-Possibly bitter. -Likely due to defeat, high amounts of death, and the "gae camping"
Match 2	23	27	Defeat	*"spammers"* *"i just want to lvl up"*	-Possible frustration -Perhaps due to wanting to level up (as stated) and two defeats in a row
Match 3	5	9	Defeat	*"get to the flag"* *"my team thinks it is TDM"*	-Dispirited -Uncooperative teammates and *third* loss in a row.

Table 3-Subject 3's Data and analysis on psyche

	Kills	Deaths	Match Result	Sample Comments	Notes on Psyche
Match 1	8	7	Victory	*"lol"* *"youre not even positive [REDACTED]"*	-Easygoing -Seemed completely unconcerned with events going on within match.
Match 2	23	11	Victory	*"everyone has an off day"* *"youre even so thats not too bad"*	-Unconcerned -Possibly due to death number not coming close to kill number
Match 3	19	19	Defeat	*N/A*	-No discernable mood -Likely focused on objective over chatting

Graph 1-Average of all Subjects' Data and Mood Ratings



IV. DISCUSSION & CONCLUSION

The hypothesis was largely correct. The players that faced challenging situations were talking about it in the chat either as a focus or a side topic, while those who didn't were almost completely unconcerned with what was happening in the game. This is exemplified through Subject 2, whose situation in the game was never truly ideal and was constantly babbling about his struggles in the game. A notable outlier, however, did not say a word as he tackled his challenges head on. While it can't be confirmed, it is suspected that this was done out of focus.

The data gathered relate to the question that spurred this project in a very straightforward manner: it answers it. The question of "How does Phantom Forces' player base respond to challenging situations in game?" is proven to match the hypothesis provided of "If the game's situation is not in the player's favour, then they will rant about it in the chat feed because they need to vent their frustration on something." These results are consistent with what the Society for Personality and Social Psychology's report on how action-oriented games, like Phantom Forces, tend to lower peoples' impulse control abilities. Of course, there is no way the results are 100% accurate: Some of the errors that could have been present are within the methods of analysis: the subjects were recorded through the game's chat rather than being recorded using a face cam, so it isn't set in stone that what was noted about their psyche is what they truly felt. Another point of error

lies in one's judgement and interpretation of what the subjects' commentary actually means: the ones conducting the experiment are but humans as well, and humans tend to make mistakes. These kind of errors does make the accuracy of the data a little more suspect.

V. APPLICATION

Many are already performing research on the influence of video games. Some in the same branch as I did–psychology–while others look at physical bonuses and demerits that video games bring. To answer questions that come up regarding this topic as well as questions resulting from the experiment, the tests have to increase in both quantity and diversity: quantity so that results can be confirmed beyond doubt and diversity to cover more bases on the influence of games. Many could benefit from knowing how and why people generally react to video games: it could help gamers keep their temper together once they know what to watch out for, and it could also potentially help scientists identify patterns in other fields of psychology.

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