Razor's Edge Research Scholars Program: Reflective Portfolio

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Abstract

The purpose for this portfolio is to create a document that contains experiences that have furthered my personal understanding of research. These experiences can be from any aspect of the college experience, not limited to in class opportunities. The reason for creating this comprehensive document is to provide a way to reflect upon each semester as my understanding of research grows. As I continue to expand my knowledge of research, my portfolio will expand along with me and, by the time of graduation, I will be able to see my personal growth and reflection upon my journey.

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Statement of Goals

Fall 2016 Goals

1) Further my understanding on the process of how research is conducted.
2) Get no lower than an 85% on any of my biology tests.
3) Push my myself to challenge my viewpoints and pre-conceived notions in my psychology history and theories class.

Winter 2017 Goals

1) Successfully complete the university based research project and understand how to implement in class learning to the research project.
2) Integrate the learning from chemistry class with the laboratory experiments to gain a complete understanding of the labs being conducted.

Fall 2017 Goals

1) Maintain an open and positive mindset when challenged with new information in Invertebrate Zoology class.
2) Uplift and encourage teammates during practices and games no matter the score.
3) Challenge myself to get no lower than an eighty percent on any physics one exam.

Winter 2018 Goals

1) Learn at least two new skills in my mentors' lab and be able to replicate that skill on my own.

2) Begin volunteering with the South Florida Wildlife Center and create an opportunity for an internship over the summer.
3) Master one new skill in oceanography research through observation and application during oceanography class lab.

Highlighted Experiences

Fall 2016 Experiences

- **Razor 1000R**

- One experience that impacted my view of research was the presentation on "What is Science?" in the Razor 1000R class. The presentation focused on what qualifies something as "science" and how that can impact research. During the experience I was confused as to what Dr. Mills and Dr. Hecht meant. Everyone knew what science was, we've been conditioned about the scientific process ever since grade school. The further into the presentation, the more apprehensive I became about my viewpoint of science. I probably felt this way because they were challenging something that I had never questioned before, I believed that I knew what science was yet they pushed me further to analyze my perception of science. This in-class experience greatly challenged my view on research. Prior to considering "what qualifies science", I never truly questioned previously conducted research or the paradigms of what is truly researchable. Before this experience I thought that if something could fit into the scientific method and could yield data than it was researchable. However, this experience taught me that science is more refined than my previous generalization. Science is conducting experiments for a purpose that can yield useful data and create a meaningful conclusion. My viewpoint of science is now more like that of the philosopher Popper. Popper (2003) states that science needs to be falsifiable (has to be able to be proven wrong) and within the realm of the physical world. I will incorporate my new view of science as I progress into

research. It will affect the way I question previously conducted research as well as research areas that my peers as well as myself propose.

- **On-Campus Event**
- One on-campus event that changed my perception of research was completing a personality assessment conducted by the Office of Career Development. A representative from the Office of Career Development came into my university seminar and performed a personality assessment for each student. The assessment asked about certain ways we make decisions, how we spend our time, and which aspects of our lives make us happiest. I was not anticipating gaining a new perspective on research but taking the personality assessment and receiving my results piqued my interest. I began to question the validity of the tests and possible sources of error as well as if these results were scientifically based. After the experience, I reflected on my inquiries. I began to question other aspects of research that are considered more of a "social science" and not "hard science". I also began to think of other ways to derive the same information the personality assessments were measuring but in a more scientific manner. This experience made me realize that there are more areas to research than my previous perception of research. I had been focused on the areas of science that is geared towards medical research while areas such as psychology had never crossed my mind. This experience is something that I greatly cherish from this semester. It opened my eyes to the world of research beyond that of the specific scope that I had previously focused on. I will

carry this open mindedness and consideration of different areas and aspects of research as I continue on my journey as a researcher.

- **Experience of My Choosing**
- An experience that has greatly impacted my view of research is the term paper that I was required to write for my class of History and Theory of Psychology. The term paper was required to be written on a psychologist that we had studied in the class. It was meant to include the background of the psychologist, his theories, and the influence of the theories that the psychologist produced in the field of psychology. The term paper was, in essence, a research paper on one of the psychologists that we had studied. I chose to write my paper on William James, who is known as the father of American psychology. Prior to writing this paper, I did not believe it would affect my views on research. I have written many research papers in high school, some being very extensive, but I had never written one using only peer reviewed articles. Through the use of strictly peer reviewed articles, it opened my eyes to how few documents are peer reviewed that I would have liked to use as a source. In essence, it changed my perception about the sources I have been using to write papers. I had been using any source that I deemed useful and generally unbiased for research papers as well as general assignments. This experience made me realize that using credible sources is necessary when researching topics because it creates a better more accurate paper and knowledge of the subject being discussed. I will carry this apprehension towards non-credited sources forward as I begin to conduct my own research. I now understand that when I would like to gain information in

the area of intended research; I should be very careful on the sources I read and allow to influence my research.

Winter 2017 Experiences

- **Razor 2000R**
- An event that impacted my view on research was our undergraduate research projects. The research project was an idea that my groupmates and I created as a means to explore and aid the undergraduate population at Nova Southeastern University as well as other universities. The research projects changed my view on research because the project was my first research experience. The process of creating a research hypothesis, designing a project, and submitting the idea to the International Review Board (IRB) was challenging but a new and exciting experience. The information that I gained from this process will be essential when conducting future research. The ability to find a problem and propose a researchable solution as well as a solution that can be done easily with limited resources and little prior knowledge will be crucial when conducting various research at the undergraduate level. The process of turning the idea of the project into an actual research question was a series of creating parameters , defining a population and thinking of possible harmful effects to the stated population. The ability to think in this manor will translate directly to future research. However, the main skill I gained in this entire process was the ability to turn the idea into the forms required by the IRB. This process was a challenge and required a lot of new skills that involve a research

related mindset. This new mindset will be implemented when conducting future research and submitting the proper forms to the IRB>

- **On-Campus Event**
- An event that impacted my view on research was the Undergraduate Student Symposium. This event was mandatory for the class as well as for the Razors Edge Scholars Program. The event contained undergraduate students that had been conducting research at the university either independently or under the guidance of a professor. The event opened my eyes to the importance of research and the presentation of research. The students presenting the research did not take into account their audience and the posters that described their research did not adequately describe the research. The posters were the most eye-opening aspect at the symposium. Once I have conducted research and am presenting my findings, I will take into account where I am and who I communicating with. The presentation will display the research in a way that someone with no prior knowledge of the subject area will be able to comprehend the results. The Undergraduate Student Symposium posters often contained wonderful charts but provided no explanation or detail to explain what the charts meaning. When I present future research I will be more mindful of this aspect and ensure that it is easily understood by anyone reading the poster or listening to my presentation. I will also ensure that chart descriptions are included and are thorough in their explanation of the chart. Another factor in research that I learned to consider was the vast array of researchable topics. I was impressed and intrigued by the diversity of the projects

presented. In the future, I will consider topics outside of my immediate interest as well as topics that are considered "out of the box".

- **Experience of My Choosing**
- Another event that has impacted my view of research has been my chemistry one laboratory section. This laboratory section contained many experiments that involved concepts from the material that was being learned in the classroom component of the class. This aided in my view and concept of research because it was my first laboratory section that involved true data collection and analysis. During the laboratory section I gained experience in proper setup and cleanup of glassware and volatile liquids/ chemicals. This skill can translate in a possible future research laboratory component. Another skill that I have gained from this experience has the ability to take the data collected and interpret the numbers into something meaning and then describe/ translate that meaning for future implications. The ability to interrupt data and numbers is crucial in the field of research and can greatly aid me in my research future. The ability to take the meaning of the numbers and translate them into possible solutions for issues is another key aspect of research. Research would lack the validity it has if researchers weren't able to take what they conducted and turn it into useful applications for the public. While I gained a lot of new knowledge and experiences, the most valued would be the skill of carefully transporting and pipetting small amounts of liquid. I intend to conduct research in Stem Cells and this research field requires the ability to handle minute substances. As I progress in my research experience, the ability to

use instruments such as the micropipette that was utilized during this laboratory section will be vital and I am excited about integrating this new technique in my future endeavors.

Fall 2017 Experiences

- **Quantitative Research Design/Statistical Analysis**
- One event that has impacted my view of research was the presentation on the comparisons of statistical analysis for varying data collection methods. I was apprehensive about this class because I had prior knowledge of statistics and didn't understand how viewing it from a research perspective would change anything. However, I have gained more knowledge about analysis of research than I ever knew was possible. Not only is the analysis of the research conducted a vital step in the research process but I learned that it can also change the data collection process itself. We learned the multitude of collection processes in Razors 1000R and 2000R but this class changed my perception and knowledge base built from those classes. While the collection method needs to be analyzed critically to prevent errors or standard deviations, they also need to be considered from a mathematical viewpoint. The collection method should be chosen to reduce outside variations but it should also be chosen based on possible analytical standings. This class has expanded my mindset for the research process. The step by step process needs to be considered meticulously but the endpoint needs to be kept in mind and changes must be made to previous steps based on the type of results we wish to find. In essence, this class has taught me that research is not a linear process that is decided

one step at a time, instead, it is a free-flowing chain of information that builds off of each decision and is influenced by every aspect of the project under question.

- **On-Campus Event**
- The university based research projects that we have been conducting this semester has greatly influenced my viewpoint on research. Prior to this experience I was aware of the difficulty of persuading the general populous to participate in research when there were no direct benefits to them, but not the extent. My groups project simply required ten to fifteen minutes at a date in which the participants could choose. Unfortunately with no direct benefits to the participants, people were surprisingly unwilling to help. Obviously, my interest in research has skewed my willingness to participate in research trials. My group and I even struggled to get the Bernoulli research class members to show up for their assigned time slots in which they created themselves to fit their schedules. The rest of the participants were simply people we each knew personally and could persuade to participate. The general student population was not responsive to emails or even pleas in the middle of the university spine. This entire process has taught me that to get students to participate we need to either pursue projects of their interest or provide sufficient incentive. Moving forward, I will attempt to integrate my personal interests with the interests of the students, faculty members, or the target audience. I have also learned that students are far more willing to fill out surveys than to take twenty minutes of their time to participate in a study. In my future projects I will attempt to

design the project around the concept that surveys are far more receptive by students and possibly the general populous as well.

- **Experience of My Choosing**
- An experience that has altered my perception of research that was unexpected was the laboratory section of my physics class. Research to me has always connoted a laboratory with pipettes and chemicals. However, I have discovered an immense joy of hands on work with simple every day objects. It seems silly but it never occurred to me that great discoveries can be made outside of strict laboratory procedures. Research can be conducted anytime, anywhere with a creative mind and an idea. The physics laboratory section included things like balancing weights on rulers and finding their equilibrium position by balancing an unknown mass on the other side of the ruler. It may seem trivial but it can provide great information for the unknown objects mass as well as its density. While projects like this are not revolutionary the concepts behind them can be taken applied in different ways that could possibly create a very interesting project. Moving forward in the research field I will keep an open mind to the possibilities of research. Instead of being trapped by my preconceived notion of what is scientific research, I will try and be more open-minded to the fact that research opportunities can be found anywhere we search hard enough. The physics laboratory has also taught me that research doesn't necessarily have to connote something never thought of before. Research can mean testing old hypothesis and pushing them further or taking old ideas and changing them into something new and possibly more modern. For example, many concepts

in physics have been around for a very long time but they can now be retested due to the advances in technology. I will incorporate this idea as I progress in the research field by reminding myself that research isn't necessarily testing new ideas but it's also taking old ideas and progressing them forward.

Artifact Collection

Fall 2016 Artifacts

- **Razor 1000R – Midterm Question 1**

Question 1 – Science versus Non-Science

People tend to blindly trust science because as a society we confuse science as the absolute truth. For example, I can make any statement but if I preceded it with "in a scientific study" or "according to researchers", the majority of the population will take that statement as the truth without questioning the validity of the statement that was made. Science is a field that curtails a preconceived notion that has been engrained in the population since the earliest years of schooling - science is the way we prove things to be true. Which is true, but to an extent. However, what exactly is science? What qualifies something as scientific versus non-scientific? My opinion on this fine distinction between the two follows the Popperian viewpoint that is outlined in the novel "Theory and Reality".

In my opinion, science is how we explain the world around us through the collection of physical evidence or data that supports the explanation that was made. Now this evidence or data can either be empirical and collected through a series of replicable experiments or collected through astute observations that can also be verified through replication. I also believe that science is not the absolute truth and at best is a theory with ongoing revisions. My viewpoint on what qualifies science overlaps with the perspective of Popper as outlined by the novel "Theory and Reality". Poppers theory on science is best known as Falsificationism. Falsificationism is defined as: "a hypothesis is scientific if and only if it has the potential to be refuted by some possible observation." (Godfrey-Smith, 2003, pg.

508). He also believed that if a theory was not risky and agreed with every observation made then it was not truly scientific. I agree with Popper because, in my opinion, in order for something to qualify as science it has to be replicable and testable, and if a scientific theory cannot be disproven then it has to violate one of the two. If a theory conforms to every observation then it is most likely too broad which can lead to extrapolation of the findings. My opinion on what qualifies true-science is nearly identical to the viewpoint of Popper.

Due to the strict definition of true science, non-science is a very broad area. To me, non-science is anything that cannot be supported by evidence or data or attempts to explain something other than the natural word. For example, non-science includes religion, technology, or anything that is not testable. While I am a religious person I do not view my religion as a source of scientific information because none of the statements about our history or explanations of the world around us are testable or have the ability to be disproven. Technology is not science because science only makes theories about the world, it does not create truth or matter. Technology may be based on science but any form of technology itself is not science. While Popper did not have a theory or viewpoint on technology as a non-science as it did not exist in his time, he did have opinions on "pseudo-science" (Godfrey-Smith, 2003). For Popper it was simple, "pseudo-science" (Godfrey-Smith, 2003) was anything that was not falsifiable. If the "scientific" claim did have the ability to be disproven, then it simply was not science. I agree with this view because science attempts to explain the empirical world, but the key word is attempts.

Science is not the absolute truth because no amount of testing or experimentation can prove that it is the undeniable truth. Therefore, if something can't be proven false then it doesn't have the ability to be tested and in turn comes across as the absolute truth.

The distinction between science and non-science is something that as a society we tend to overlook. In the schooling system, science versus non-science is never a debate that is discussed and encouraged, instead it's thrown out the window and ignored because in order to have a standardized teaching across school systems of what science and non-science is there needs to be a clear distinction of two. Therefore school systems ignore the fact that something may not be science and in turn preaches that anything can be science as long as it is phrased in a "scientific manor", better known as the scientific method. No wonder people are confused as to what science and non-science is, they were never taught to analyze and challenge science is general. However, not the entire population is blind-sided by the fact science has a non-science aspect. The problem is, even with those who challenge if something is truly scientific or not, they do not have a general consensus on what qualifies science. In the end, it comes down to their opinion and what they believe, it's too subjective. Therefore, the distinction between science and non-science can become hairy and confusing even to those who do try and draw a line between the two. While many people have a clear understanding of what science is to them it can often become mixed with emotional factors and preconceived notions. For example,

if a scientific theory contradicts an individual's personal religious beliefs then they tend to disagree and consider it non-scientific or untrue.

Science and non-science has an aspect of subjectivity which can lead people to be confused when they try to distinguish between them. To me, science is simply anything in the natural world that can be proven false through the collection of evidence through replicable experiments or observations. Non-science is the antithesis, anything that cannot be proven false through data collection or attempts to explain the supernatural. My viewpoint directly correlates with Popper and his theory of Falsificationism. However, my viewpoint is exactly that, it is my opinion and like science it is not the absolute truth. No matter how hard we try, the confusion between science and non-science will always exist because people will always have opinions. However, science is like concrete, it may break and get removed but something new will always replace it because science is the infrastructure and future of our society.

Resources

Godfrey-Smith, P. (2003). *Theory and Reality: An Introduction to the philosophy of science*. Chicago: University of Chicago Press.

- **On Campus Event – Personality Paper**

Personality Paper

Personality assessments can help people on their road to self-discovery and guidance in their life decisions. Personality tests normally identify what characteristics a person possess' and how those personality traits can effect relationships as well as possible optimal job opportunities. The Tieger Assessment and the Big Five Personality Test are both personality tests that have personally yielded eye opening information on my characteristics and traits.

The Tieger Assessment identified me as extroverted, intuitive, someone who makes decisions based on emotions, with a judging approach to life. Each of these findings attributes certain characteristics to my personality. As an extrovert, I like being in social situations and interacting with those around me, suggesting that I have a career and field of study that lets me interact with others and allows me to surround myself with those who share similar interests. The test also stated that by being intuitive I rely on my "sixth sense", the unseen connections in life, which indicates that I would thrive at a job that would allow me to make personal connections with others that have meaning to them. As someone who makes decisions based on feelings, personal values and beliefs, I think about others and how my decisions would impact them. This means that in my job I would thrive in an atmosphere that promotes personal connections as well as gives me a sense of accomplishment and allows me to make my own decisions. However, due to approaching life in a judging manner, I also like some structure and recognition of work. In all, a job that would best suite me is one that allows me to interact with

others and make personal connections that mean something, while my work environment recognizes hard work. I mostly agree with the results the assessment yielded. I do make decisions based on my own moral code and I do crave the feeling of creating an impact on people but I don't make all decisions based on the bigger picture, I do also consider the specifics of a situation.

The Big Five Personality Test stated similar results as the Tieger Assessment. It found that I am moderately open to experiences, highly conscientious, highly extraverted, highly agreeable, and low in neuroticism. Basically it states that I think in somewhat abstract ways (open to experience), I am very cautious but orderly and dependable (conscientious), I derive my energy from interacting with people (extraverted), I am kind and sensitive as well as cooperative (agreeableness), and I am also carefree and optimistic and self-confident (low neuroticism). These results suggest that I should have a career and job that allows me interact with people in a way that allows me some personal freedom. However, I do crave structure and verification but I will also voice my opinion when I feel it is necessary. A potential job might be a TV personality or criminal judge. This assessment suggests that I crave relationships that allow me to be more dominant but also allow for a very personal connection. This tells me that I should be careful in how I interact with others, that I don't overpower situations and allow others to voice their opinions. I mostly agree with these results as well. I do tend to be very extraverted and orderly but I am not as agreeable as the test indicates. On most issues, I will cooperate and work well in a team but I also voice my opinion which sometimes does not work well in groups.

Personality assessments can create perspective for people. Perspective on themselves and how they interact in the world around them as well as how others perceive them. Both the Tieger Assessment and the Big Five Personality Test say that I derive my energy from others, I am generally easy going but I will also voice my opinion and stick to who I believe I am. This assignment has helped me gain a better sense of self and a better understand what I need from relationships as well as a job.

- **Experience of My Choosing – Term Paper**

Abstract

This paper discusses William James, including his philosophy, theory, outlook on psychology, as well as biographical details. William James was a pragmatist that lived during the US functionalism period, a time in which psychology in the United States was now a combination of the sciences with a focus on practicality. James thought that all aspects of human nature should be studied with no limitations by scientific studies. His viewpoint and subsequent theories became so revolutionary that he is credited with having a large influence on the field of functionalistic psychology as a whole. His theories included topics such as habits and instincts, the self and self-esteem, free will, and the James- Lange theory of emotion, a theory that is still relevant today. While not all of James' theories were influential, his outlook and approach to psychology is how he created a lasting impact on the field and earned the title of father of American psychology.

William James led an interesting life that guided him to the field of psychology almost accidently. However, once he arrived in the field he proved very influential and successful. James offered the first class in psychology in America and is credited with bringing and popularizing psychology in the United States. As a psychologist, James created many theories that greatly influenced the field of functionalistic psychology, as well as other psychologists. Through evaluating the life and theories of William James and how they impacted the field of psychology, we can understand why he is revered as the Father of American Psychology.

William James was born to Henry James Senior in January of 1842 in the Astor House Hotel in New York City (Ivie, 2006) and died on August 26, 1910 in Chocorua, New Hampshire. James had one sibling, a brother named Henry that was born fourteen months after his birth (Ivie,2006). The James family must have had a wealthy background because their father was able to send the two brothers to very wealthy and esteemed private schools in the United States as well as Europe (Ivie, 2006). The James family also frequently traveled in England, France, Switzerland, and Germany having tutors that furthered their education when traveling (Ivie,2006). With such a diverse background in travel and world experience, James was exposed to various cultures and educational experiences growing up, giving him a different type of education that many people aren't exposed to at such a young age. When James was younger and deciding on what to pursue in his life, he decided to become an artist. After studying with artists in Rhode Island, James realized he would never be able to make it as an artist. Therefore, at the age of 19 James enrolled in Harvard University and studied Chemistry for a short period before he shifted his focus to the school of medicine where he studied physiology and anatomy. In 1865, James attended an expedition to the Amazon River where he collected biology specimens, however after returning he decided that collecting specimens wasn't for him. In 1869 James received his medical degree even though he had very little interest in medicine; this is the only degree James every received. After graduation, James felt lost and still didn't know where he was going to make his living. At this point in James' life he was really struggling on trying to earn a living. However, soon Charles Eliot, the newly appointed Harvard President, extended a position of professor of physiology to

James. As a professor James was able to develop many theories that become quite innovative. In 1875 James taught the very first course in psychology that was offered at an American College (Ivie,2006). His course became the turning point for his career and his life. His class on psychology became so popular a publisher, Henry Holt, extended a contract to him to create a textbook on psychology (Ivie,2006). The textbooks were published twelve years later and were an instant success, shooting James into a reputation of an esteemed scholar on a subject that he never received a degree in. His volumes on the subject were later created and published as textbooks, ones that were used in psychology classes for many years. James' theories were seen as so influential partially due to the time period in which he lived. The US renaissance period, the period before James' life, was known for its focus on "hard" empirical science that had little focus on topics that couldn't be studied through experiments or were incapable of yielding data. James' theories extended past these limitations. He believed that all aspects of human nature should be studied, not just those that can yield data. His pragmatic viewpoint reflects the US functionalism period in which he lived. This time period combined the hard science aspect with a focus on the practicality aspect of psychology as well.

The theories that William James proposed generally reflected the practicality aspect of the US functionalism period. His approach to psychology was very apparent in the theories he produced. His theories are focused on habits and instincts, the self- and self-esteem, free will and the James-Lange theory of emotion. Through analysis and understanding of each his theories you can see how they were impactful on the field of psychology. His theory on habits and instincts states that instincts rely on

behavior and are blind while habits are learned behaviors (Suplizio, 2007). James believed that you could shape and change habits because they were learned in nature. He believed habits were changeable by removing one's self from a situation that encouraged the bad behavior, that one shouldn't contradict the good behavior, and that a change in bad habit should occur immediately and not gradually over time (Suplizio,2007). James also believed that instincts were the starting point for our education and could become motivation (Ivie,2006). This reflects the practicality aspect of psychology at the time by suggesting a theory he created could change human behavior. He also theorized that instincts were generally innate while habits were changeable and flexible, introducing the practical use of psychology in its ability to shape these habits (Suplizio,2007).

James' theory on self and self-esteem also reflects his viewpoint of practicality. He viewed that our "self" is every aspect of us and can be divided into different "self's (Sargent, Crocker, & Luhtanen, 2001). The material self-consisted of everything that one owned such as clothing or books while the social self is the perception of others on the individual. The social self is also dependent on who is perceiving the individual. For example, the social self that one's friends know can be different than the social self that one's parents or teachers know. Finally, the spiritual self consists of one's conscious and emotions as well as the idea that they are accepted and loved by God or other spiritual beliefs (Sargent, Crocker, & Luhtanen, 2001). Each of these "self's can change and are not fixed, just like one's self-esteem. James theorized that one's self-esteem is dependent on a ratio of feeling good about one's self compared to feeling bad about one's self. It can basically be interpreted as

the amount of things the individual attempts over the amount of things the individual attempts and in turn succeeds. James stated that in order to increase self-esteem, someone could either simply succeed more often or attempt fewer things (Ivie,2006). Another way that James approached the differences from person to person was their personality type. James believed that there are two distinct types and styles of thinking, tender-minded and tough-minded (Mitroff, 2004). The tender-minded individual, according to James, tends to think in a more optimistic, religious, and rational way while the tough-minded individual tends to think more in a manner that is fact-oriented, pessimistic, and materialistic way (Mitroff, 2004). The idea that individuals think in different manners was radically new and previously unconsidered before his time. While personality typing was fairly new, the question of the interaction between the mind and the body is a century old problem. According to James there are only three was that the brain and mind can interact as outlined in his transmission theory of mind/brain interaction (Hall, 1996). The first possibility of interaction is that there was no interaction, without the brain there is no mind. The second and third possibilities are variations of the brain transmitting creations of the mind. The second possibility hypothesizes that the brain funnels mind creations and focuses them into a particular point in time and space (Hall, 1996). The third process of interaction is the brain "focusing a section of the mind in time and space" (Hall, 1996). James thought that evaluating the observations of the relationship between the mind and brain could only happen two ways. He believed that a change in mind was linked to a change in the brain and we could create a change in the brain through something like surgery and then observe a change in the mind (Hall, 1996).

While each theory discussed so far has had an impact on psychology, the one with the most influence is the James-Lange Theory of Emotion. The James-Lange theory states that "bodily changes follow directly the perception of an exciting fact…then our feeling of the same changes as they occur is the emotion" (Palenick,2007). The first half of the statement describes the conditions that cause the emotion(s) to occur while the second half of the statement describes the nature of the emotion (Palencik,2007). Basically, the theory states that we perceive (take in outside stimuli), act (the physical response), and then feel (the emotional response). This idea was so revolutionary because it was previously believed that we perceive, feel, and then act. James was suggesting that we do not have control of our emotions but instead they are dependent on our behavior. This meant that someone could control their emotions through changing their behavior. This was also revolutionary because it suggested that we don't have as much control of our actions as we previously thought. Instead, our actions are based more upon on what we perceive, thus discrediting the amount of free will people have over their emotions. James shared credit for this theory because the Danish psychologist Carl Lange independently developed this theory as well (Palencik, 2007). Together, their theory of emotion sparked a new perception of emotion throughout psychology. However, while James' theory of emotion was influential, it was not his only theory to cause a change in perception.

Due to the revolutionary nature of William James' theories they created an impact on the field of psychology. However, the greatest influences of William James' theories and outlook can be seen in the field of functionalistic psychology (Ryan,

2008). James was a pragmatist and thought that all aspects of human nature should be studied, as stated before. This concept is apparent in the field of functionalistic psychology (Ivie, 2006). Functionalistic psychologists believe that psychology is a practical science that should use various methods to study psychology as well as study mental process and behavior even though it can be difficult to yield data. His theories of habits and instincts, emotion, and the self can all be seen in the unified themes of functionalistic psychology. James' theory of habits and instincts correlates to the theme of motivation and process because the theory attempts to explain aspects of human nature and how some are innate while others are seemingly learned. The functionalistic psychologists attempted to explain the mind and what might occur in the mind that would produce behavior. James' theory of emotion shed light on how perception and action might impact the mind and emotions produced. The theory of self can be found in the theme of the study of motivation, mental process, as well as the emphasis on individual differences over similarities. Even his theory of tender-minded versus tough-minded personalities is found in the theme of motivation behind behavior (Mitroff,2004). His theory stated that there are two personality types; tender minded personalities are more rational and optimistic while tough-minded people are more materialistic and pessimistic. His attempts to explain personalities can be seen as an attempt to explain why people tend to act in the manner they do. Functionalistic psychologists are opposed to the breakdown of the consciousness into small pieces. James also frowned upon the attempt to break down the consciousness. He believed that we cannot fully explain the consciousness through scrutiny of tiny aspects but instead by focusing on the conscious as a whole,

for example he thought that breaking down the conscious into tiny parts was "like focusing on only a small spectrum of visible light, it gives you an idea but doesn't allow you to see the full picture" (Ryan,2008).

While James' theories are very apparent in the field of functionalistic psychology, his impact can also be seen in other psychologists (Ivie, 2006). For example, Robert Sessions Woodworth who was a student of James, is credited with influencing eclectic psychology and dynamic psychology. Eclectic psychology is open to all ideas regardless of their source, which is an idea of James' that was taken to the next level. James believed everything should be studied regardless if it can be proven scientifically or not, and Woodworth took this idea and extended it to say that any idea should be considered in spite of source not limiting it to the area of study. Woodsworth also is credited with dynamic psychology, where the attempt is to explain why people do what they do. Many of James' theories attempt to explain some aspects of behavior, such as the theory of emotion as well as habits and instincts. Woodsworth took James' perspective on psychology and extended the openness of study even further.

Another psychologist that William James had impacted was Edward Thorndike. Thorndike was also a student of James and was the first to use non-human animals as test subjects. While James obviously never used animals, he did promote unconventional thought and various methods to research topics.

The outlook James created also impacted the psychologist James Dewey. Dewey theorized that behavior occurred in a stream and cannot be divided for study because it worked as a whole. This is reflective of James' view of conscious and the

overarching perspective that not all things can be studied through harsh examination of individual parts. While James' theories themselves were only slightly influential individually, his lasting impact came from his new and different perspective on psychological topics. He pushed the boundaries and addressed different topics that had been previously ignored or had been thought of in a specific way for many centuries. The only theory that is still considered relevant today is the James-Lange theory of emotion. It is not generally accepted to be true, but it still has a lasting impact on how we view behavior.

William James was a man that stemmed from a very unconventional background. Raised as someone with great access to education and vast travel experience, he was able to acquire a sense of various cultures and interactions of humans. I believe his childhood experiences and medical training greatly impacted his theories and outlook. His theories on free will, habits, instincts, and the self and self-esteem never created a larger impact than on the field of functionalistic psychology, and most of them eventually fell by the way side. Although, the James-Lange theory of emotion survived and became the basis of many theories to come. William James extended his impact on psychology by introducing the idea that every aspect of human nature can be and should be studied, not only the aspects that can be empirically proven. However, his lasting legacy on the field of psychology is how he introduced psychology to the United States, earning him the title of father of American psychology.

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Winter 2017 Artifacts

- **Razor 2000R**

Effects of Non-Lyrical and Lyrical Music on Memory Retention and Concentration

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Abstract

This study will address the optimal noise environment conducive for memory retention as well as concentration for college students. The study will address this through playing lyrical or non-lyrical music while students read a passage and afterward will be tested on the passage. The proposed participants are undergraduate students 18 to 23 years old. The participants must be literate and capable of sight to read and understand the passage given, as well as be able to hear for the music to possibly affect their concentration. The research design is experimental in nature and includes two separate treatments, each participant receiving the control and one treatment. The expected results are that non-lyrical music will be best suited for memory retention and concentration while lyrical music is less effective. The implications of these findings are that students will better understand the correct noise environment they should implement while studying to maximize their outcomes.

Introduction

purpose of this experiment is to find the best noise environment for successful studying in college students and to determine the best audio stimulus that promotes memory retention and focus. The questions we aim to answer are: How is the ability to concentrate on a reading affected by lyrical and non-lyrical music as well as how is memory retention of details for a given story affected by lyrical and non-lyrical music?

A study was conducted by Crawford and Strapp titled: "Effects of vocal and instrumental music on visuospatial and verbal performance as moderated by studying preference and personality." The purpose of this study was to try and determine cognitive performance of university students while listening to vocal vs. instrumental music taking into account the subjects' extroversion level. The research question was: While simultaneously monitoring the properties of the sound, the characteristics of the person, and the information type of the task, does noise level effect performance? Both quantitative and qualitative data was collected. The quantitative data was collected through the three cognitive tests that were scored during the experiment, while the qualitative data was collected from the questionnaires given.

The participants included 61 university students (29 men and 32 women), ranging in age from 18 to 21, who volunteered for a study entitled "Personality and Cognitive Factors."

The hypotheses for this experiment were as follows:

- Null Hypothesis 1: University students who reported typically studying while music is playing will be no more or less debilitated by the music conditions than those who did not study with music.

- Alternative Hypothesis 1: University students who reported typically studying while music is playing will be more or less debilitated by the music conditions than those who did not study with music.
- Null Hypothesis 2: Performance on subjects' verbal tests will be no more affected by the vocal music compared to no music or instrumental music.
- Alternative Hypothesis 2: Performance on subjects' verbal tests will be more affected by the vocal music compared to no music or instrumental music.
- Null Hypothesis 3: Those who studied with music would be no more extroverted, report no greater attentional focusing skills, and report no less sensitivity to environmental noise than those who studied without music.
- Alternative Hypothesis 3: Those who studied with music would be more or less extroverted, report greater or lesser attentional focusing skills, and report greater or lesser sensitivity to environmental noise than those who studied without music.

The procedure for this experiment began with subjects being randomly assigned to a room with either no music, vocal music, or instrumental music, equally splitting up the people between each room that typically listened to music while studying and those who did not. In the two rooms with music, the music was played through a cassette player at 75 decibels constantly throughout the session. Each room tested 5 people at a time with no mention that the test was relating to music. Instructions of the three tests were read and practice items were done. Informed consent forms were signed. Following the cognitive tests, each student was given 3 questionnaires including a personality questionnaire, a noise sensitivity scale, and a questionnaire based on the subjects' ease of focusing in a variety of conditions. Next, subjects were asked if they typically studied with music. Finally, a questionnaire asked subjects for their age, gender, grade point

average, and (if they were in a room with music) their familiarity with the music selection. Subjects were debriefed at the conclusion of the experiment. A multivariate analysis of covariance was performed using the three cognitive tests as dependent variables, condition (no music, instrumental music, and vocal music), and studying preference (with or without music) as the independent variables, and EPQR Extroversion as the covariate. The findings for this study were of the three different tests, only one test showed a difference in scoring between the people who normally listen to music while studying and those who do not. In this specific test, the people who preferred to listen to music outscored those who did not while listening to vocal music. In addition, vocal and sometimes instrumental music had negative effects on cognitive performance, while extroversion did not have a significant correlation (Crawford & Strapp, 1994). This study relates to our project because it also tried to discover a correlation between cognitive performance of university students and the music that they may or may not have listened to.

Another Article, written by Salame and Baddeley, also focuses on the effects of different background noises on a participant's ability to concentrate. The study is entitled "Effects of background music on phonological short-term memory". The purpose of this study was to establish how quiet instrumental, vocal, and non-lyrical music effected the ability of participants short term memory. Another goal of the research was to establish how music with lyrics was more distracting than instrumental music or no music. The study was broken up into three separate experiments, each studying a different aspect of the research question. The first experiment looks at the effect of instrumental and vocal music on the immediate serial recall of sequences of nine visually presented digits. The music was kept at a constant sound level of 75db

for both instrumental and lyrical. This part of the study concluded that both Instrumental and Lyrical music hindered the recall of the numbers, but instrumental was less of a distraction.

- Null Hypothesis: Lyrical and instrumental music will have no effect on a participant's ability to recall nine numerical digits.
- Alternative Hypothesis: Lyrical and instrumental music will have an effect on a participant's ability to recall nine numerical digits.

Experiment two was the same protocol as Experiment one, but used participants with a higher experience level. The participants were allowed to practice the recall of numbers prior to the actual experiment. These results had a clearer outcome on the effects of the different typed of background music on the retention of numerical data.

- Null Hypothesis: Lyrical and instrumental will have no effect on an experienced participant's ability to recall nine numerical digits.
- Alternative Hypothesis: Lyrical and instrumental music will have an effect on experienced participant's ability to recall nine numerical digits.

Experiment three compared instrumental music with unattended speech and with noise modulated in amplitude. The four condition tested in this section include quiet, speech (Arabic), normal instrumental, and pink noise (similar to white noise but constant). The results showed that the noise condition did not differ from silence; both of these proved less disruptive than instrumental music, which was in turn less disruptive than the unattended speech condition.

- Null Hypothesis: Different noise conditions will have no effect on a participant's ability to recall nine numerical digits.
- Alternative Hypothesis: Different noise conditions will have an effect on a participant's ability to recall nine numerical digits.

This particular study related to our research project, because it uses many of the same experimental techniques we will use. A control of no noise will be used in all of our trials, as well as a standard set decibel for each of the music conditions. Lastly, they tested the short term memory recall of numbers, while we are testing the short term memory recall on a short descriptive story.

One last article that shares similarities with our research study is entitled: "The perceived impact of playing music while studying: age and cultural differences" by Kotsopoulou and Hallam. The purpose of this study was to establish how popular music, that is easily obtained in today's world, effects the studying patterns of students between the ages of 12-21. The study used questionnaires to establish what sorts of tasks are being done while listening to music, what type of music is being listened to, and asked about perceived success in studying with music. Each of the questionnaire responses used a five-point rating scale questionnaire which was developed to explore the listening habits of the students from the different cultures. Surprisingly the article states that a majority of students that answered the questionnaire did not play music during extensive studying or testing, because they knew it was a distraction. A large number of participants also listen to various types of music while writing or doing idle work. This article relates to our study, because we will also be doing a questionnaire that utilizes a scale with each of the responses. We also share the same goal of knowing what is the most popular musical method while doing academic work.

For our study, the null hypothesis for the concentration component is: listening to lyrical or non-lyrical music will have no effect on the subject's ability to concentrate. The alternative hypothesis for the concentration component of this study is: Listening to lyrical or non-lyrical music will have an effect on the subject's ability to concentrate. The null hypothesis for the

memory component of this study is: Listening to lyrical or non-lyrical music will have no effect on the subject's ability to retain information. The alternative hypothesis for the memory component of this study is: Listening to lyrical or non-lyrical music will have an effect on the subject's ability to retain information.

Methods

The proposed subjects of this study are undergraduate students aged 18-23 years old. In order to qualify for the study the participants must be within the aforementioned age range as well as have full visual and auditory faculties and basic literacy skills.

The materials that will be used to gather data are mainly post-reading tests as well as a stopwatch. The stopwatch will be used to time the participants as they read the initial passage with no music. They will be timed again when they read the second passage as either lyrical or non-lyrical music is playing. The purpose of the stopwatch is to test the participants' ability to concentrate on the passage during the various noise environments. The second testing instrument being used is a post-reading test. The test will be administered after the participants have read the passage. The tests consist of 10 open response questions and aim to measure the participants' memory retention.

The independent variable is the type of (or lack thereof) music played: for the control, it is no music; for the experimental, it is lyrical or non-lyrical music. The dependent variables include the concentration measured as the rate/speed of reading (in seconds), and memory retention measured through the free response tests.

The procedure of this experiment is fairly trivial. After the participant has signed and understands the consent form, they complete a survey that asks questions about their normal studying environment and demographics. After the survey is completed, the participant will be

placed in a room. Each subject will be tested in both control and experimental conditions. Each subject being evaluated will be randomly assigned to an experimental condition with either lyrical music or non-lyrical music. This study uses a within-subjects approach by comparing the results of the control conditions with the results of the experimental conditions and this will expectantly show the true effects of the music. The part one construct is the ability to concentrate, based on the rate/speed of reading (in seconds). Subject will read an essay with no background music, and will be asked to tell the observer when they are done reading. This time will be recorded. Later, subject will read another essay of equal length with either lyrical or non-lyrical music playing in the background and will be asked to tell the observer when they are done reading. This time is recorded. Subjects will be assigned to the lyrical or non-lyrical groups randomly. Half of the subjects will be tested with the constant first while the other half will be tested with the experimental situation first. The part two construct is the retention of information learned from reading a given passage using a free response test (which tests recall-not recognition). After reading the previously mentioned essays from part one of the test the subject will be given a free response test asking them to recall specific details from the story.

Results

The control test score is compared to the experimental test score. For the first construct, concentration, a marginal increase or decrease in time in the experimental situation when compared to the control situation is assumed to be caused from the background music.

For the second construct, memory retention, a marginal increase or decrease in correct answers is assumed to be caused by the experimental condition of either lyrical or non-lyrical music. The data that will be yielded will be qualitative and quantitative. The qualitative research does not address either research question. The qualitative data will be used as a way to better

understand the group of participants being tested as well as give a background for the reported auditory environment for the "average" college student. This data will be analyzed through the use of pie charts and graphs. The qualitative data will be the time taken to complete the passages as well as the percent correct on the post-reading test.

The first research question (concentration) will be addressed by examining the control or baseline time and comparing it to the treatment/experimental time. This will be done through comparing the difference between the initial time and the experimental time. The results will be separated by their experimental treatment, either lyrical or non-lyrical music. Each treatment's timed result differences will be graphed on a line chart. The average difference time can be found and in turn yield a base for comparison for each experimental group.

The second research question (memory retention) will be addressed by examining the control or baseline test results and comparing it to the treatment/ experimental test results. The tests will be out of 10 possible points with participants either receiving a full point for fully correct answers or no points for incorrect or incomplete answers. The results for the baseline will be graphed through the use of a dot plot that will be numbered from 0 to 10, with each number reflecting the participants number of correct answers. The results of the experimental groups will be separated by treatment, either lyrical or non-lyrical music. Each treatment will be graphed through a dot plot. The dot plot was chosen because it allows for easy visual analysis for the spread of the data. The average for the control and each experiment will also be calculated to provide a way to compare and analyze the results across treatment groups.

Discussion Section

We expect to find that non-lyrical music is the most effective for concentration and memory retention as compared with lyrical music and no music.

The research being conducted can help move the field forward because the previously conducted research is frankly outdated. The previous research in this field was performed with the use of a cassette player. The technology now has clearer and more crisp quality to the music being played. The quality of the music has improved so much that this research will fill in the generational gaps. The previously conducted research was also in a time when music was not as readily available. In this day and age, music surrounds students and their environments. With this research on the style of music most conducive for students, it could aid restaurants, universities, and students on what style of music to listen to or play to maximize the effect of studying.

The limitations for this study include the genre of music. This experiment only addresses lyrical or non-lyrical music and not specifically the genre of music being played. The lyrical music is going to be "pop" music, however that is only one genre of lyrical music out of many.

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- **On Campus Event**

Undergraduate Student Symposium Reaction Paper

The undergraduate student symposium was a unique experience that provided an insight into the research process for a student researcher. While the event was taking place, I analyzed and attempted to understand the projects the student researchers had been invested in during the past year, some extending two years or more. Each poster or oral presentation contained strengths and weakness, as any presentation does, however some proved easier to receive than others.

The poster critiques intrigued me immensely due to the array of responses that I received. The fist poster critique that I conducted was on the "A Compression of Digital Data Using Linear Algebraic Methods" research project. The research question for this project was: Is distortion reduction of JPG imaging possible? The student presenting this poster became engaged in research through the professor asking students for research assistance while the project itself was the professors research. The poster conveyed the significance of the project as well as the results of the research. However, the implications of their findings were not clearly stated and required probing by the reader. I believe the poster could have been improved through using side-by-side images to display their findings, making the language used on the poster more colloquial and through using a better format.

The second poster critique I conducted was on the project "The Effect of Sucralose on the Inhibition of Three Bacteria Species that Inhabit the Human Gut". The research question explored was: Does sucralose effect gut bacteria in humans? The student presenting this poster became involved in the project through asking

their professor. The project was the students independent research study, therefore they became active in the project through seeking their professors guidance. The poster was incredibly well done and very well explained by the student. During the students explanation of the study, they clearly stated the results, implications, and further research that could be conducted. I believe the poster could have been improved through better usage of charts and graphs, clearer explanations of the study as well as an implication of the findings section on the board.

The final poster that I critiqued was "Isolation and Characterization of Antibiotic Producing bacteria from Storm Water". The question investigated was: Can certain bacteria in storm water be isolated and treated? The student presenting the poster asked their professor to aid in the project due to her interest in the subject. The student was required to interview for the position due to the fact that it was the professors research. The poster was generally very well received due to clearly reported results, clear implications of the study, and very convincing impacts of the study. However, I believe the poser could have been enhanced with more graphics that depicted their process, better diction use, and a results section that described what the graphs represented.

The oral critique was much more challenging to evaluate but more pleasant to receive than the poster evaluations. The oral presentation was "Don't hug Me I'm Scared". The question explored was: Is there deeper meaning in media that is passively consumed? The significance of the study was not clearly stated and the results were not described clearly. The implications of the study was not laid out by

the presenter but was fairly easy to discern as an audience member. I wanted to ask the presenter if he thought his research process would be valid across other areas of media/ other television shows. With this oral presentation being the only oral presentation I was able to attend, I preferred the oral presentation over the poster presentations. The oral presentation provided a more natural flow of information to me than a poster that was filled with facts and figures that I did not necessarily understand. The oral presentation was much more audience friendly however it was hard to understand his results and his implications.

The poster evaluations were very superficial. I found it hard to grade each poster solely on the quality of the presentation instead of the quality of the research. My scoring rubric consisted of three sections: ability to understand the project, design/layout, and graphics. I deemed low quality as a score of one to four, a medium quality as a score from five to seven and a high quality as an eight to ten. The table with my scores is below:

Title of Poster	**Ability To Understand the Project**	**Design/Layout**	**Graphics**	**Total**
Improving Functional Movement Patterns Reduces Pathomechanics in Competitive Distance Runners	9	8	7	24

Biomechanics differ between Highest and Lowest race finishing places of collegiate distance runners	9	9	8	26
Galaxy Morphology Classification System	7	8	5	20
Quantitative Measurement of learning in *Caenorhabditis elegans* in response to an engineered nematicidal bacterium	4	8	9	21
A Compression of Digital Data Suing Linear Algebraic Methods	6	7	7	20
Academic and Emotional Intelligence in First Year College Students: A research proposal	5	4	3	12
Differences in Jump Height and Reactive Strength Index-Modified in dancers and Non-dancers performing the vertical jump from two positions	8	5	3	16
Examining the stress-gut microbiome interface in a human population	7	7	9	23
Frozen Brain Atlas: Individualized Brain Mapping for	6	2	1	9

Research and Education				
Behavioral Response of small everglades fish to hydrological variation, Predator Cues and Parasites	10	10	10	30
Catfish Get Caught and Punished: Dating Profile "Cheaters" and Mate Value Ratings	9	10	8	27
Comparison of *Porifera* Bacterial Symbiont Community Profiles Based on Species and Source Template	8	9	4	21
Continuous Dependence on differentiation solutions of a second order boundary value problem with an average value condition	4	6	3	13
Cytotoxic effect of Iphinoe: A marine natural product of LNCaP prostate cancer	7	5	8	20
Does stress hurt everyone? Individual differences in susceptibility to psychosocial stressors	10	8	7	25
Evaluation of FAK and MDR1 crosstalk in platinum	6	6	7	19

Resistant Ovarian Cancer Cells				
Fluorinated porphyrin interactions in cancer cells	10	7	9	26
heavy metal contamination at unregulated target shooting sites in the everglades	10	10	9	29
Investigation of fecal Contamination of Urban tidal Flood Water in Southeast Florida	9	7	6	22
Isolation and characterization of antibiotic producing bacteria from storm water treatment areas	7	5	4	16
Longevity of Visual Improvements following Electro-Stimulation Therapies and Efficacy of Retreatment in Retinitis Pigmentosa Subjects	7	8	9	24
Low Vision Patients' and Providers' satisfaction with telerehabilitation	6	10	8	24
Mathematical Approach to Understanding Consumer Behavior	7	10	8	25
Mineralogical Analysis of Aeolian Dune Deposits, White River	6	8	7	21

Badlands, South Dakota				
Rationalizing the Irrational Consumer: How Behavior Economics Impacts Marketing	7	5	6	18
Sargassum-associated fish communities are stable over time and feature low levels of parasitism	7	3	2	12
Screening for Type III Secretion System Inhibitors	8	7	7	22
Stress, cognitive functioning, mind wandering, and mindfulness: A latent variable examination	7	6	7	20
The Effects of Video Gaming with Brain-Computer Interface on Mood and Stress	7	6	7	20
The Psychological and Physiological Implications of Sleep restriction: A Comparison of Voluntary and Experimental Sleep Restrictions Groups	5	4	8	17
Whey versus Casein protein supplementation on body composition and resting metabolic rate	8	4	2	14

-

- The first place winner "Behavioral Response of small everglades fish to hydrological variation, Predator Cues and Parasites" was the only poster that received a full thirty points on my scoring rubric. However, the second place winner "Evaluation of FAK and MDR1 crosstalk in platinum Resistant Ovarian Cancer Cells" only received a score nineteen points and in my opinion was a poster that I found had very little explanation of their results and had a very poor poster. The third place winner "fluorinated porphyrin interactions in cancer cells" received a score of twenty six on my rubric and I found it to be a very good poster and presentation. It only received the score that it did because I had a harder time fully understanding their research. In all, the top winners were good posters and scored highly on my rubric however I disagree with the second place winner as my scoring suggests.

- **Experience of My Choosing**
  Experiment: Determining the Mass of Water in a Hydrated Salt

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Course: Chemistry 1300 EV3
Instructor Name: Dr. Obiajulu Nwanze
Laboratory Assistant Name: Neal Patel
Date Experiment was Performed: January 30, 2017

Abstract:

The purpose of this experiment was to determine the percent by mass of water in a hydrated salt through the use of gravimetric analysis. The theory explored was that water is lost when heated. The mass of H_2O in the hydrated salt was determined through the weight of the watermelon salt, the salt heated in a crucible, and then measured again to determine the mass lost. The average percent of H_2O in the hydrated salt was found to be 55.49%. The hypothesis was accepted.

The purpose of this experiment was to determine the percent by mass of water in a hydrated salt [1]. The device used to determine the weight of the watermelon salt before and after it was heated was an automatic weigh scale. The theory behind this experiment is that a hydrated salt is a salt that contains water molecules that are chemically bound to the ions of salt in its crystalline structure [1]. The water molecules that are bound to the crystalline structure are referred to as waters of crystallization [1]. Some waters of crystallization are loosely bound to the ions allowing heat to remove them. Once the water molecules are removed, the salt forms into an anhydrous salt [1]. Other forms of salts include efflorescent salt that spontaneously loses water to the atmosphere and deliquescent salt that absorbs water [3].

To obtain the anhydrous salt, heating of the salt must occur. The hydrated watermelon salt was heated over a flame to drive off the water molecules that were bound to the ion. The formula to determine the mass of H_2O in the hydrated salt is (mass of hydrated salt – mass of anhydrous salt)[2]. This only determines the mass of water that was lost through heating the hydrated salt. The formula (mass of hydrated salt – mass of anhydrous salt / mass of hydrated salt) will yield the desired number of percent of mass of water in the hydrated salt [1].

Throughout the experiment the hydrated salt was kept in a crucible. The crucible was heated prior to the experiment to remove any remnants that could cause contamination. The watermelon salt was maintained in the crucible throughout the experiment to keep the salt from possible contamination.

The hypothesis of this experiment is that the percent water in a hydrated salt will be determined through gravimetric analysis, heating of the hydrated salt and measurement of the initial and final weight of watermelon salt.

Materials and Methods:

Refer to Experiment 5 on pages 86-90 of Laboratory Manuel for Principles of General Chemistry by J.A. Beran. One deviation from the procedure was that 1.00-1.50 grams of a hydrated salt was used instead of less than 3 grams. Another deviation from the procedure was that only two trials were conducted instead of the instructed three trials. There were no other deviations from the procedure in the experiment.

Results:

Data:

Table 1: Determination of Percent Water in Watermelon Salt		
	Trial 1	Trail 2
Mass of fired crucible and lid (g)	31.8778	31.9816
Mass of fired crucible, lid and hydrated salt (g)	32.8778	32.9817
Mass of crucible, lid, and anhydrous salt 1st measurement (g)	32.4	32.4898
Mass of crucible, lid, and anhydrous salt 2nd measurement (g)	32.35	32.4
Mass of hydrated salt (g)	1	1.001
Mass of anhydrous salt (g)	0.4722	0.4184
Mass of water lost (g)	0.5278	0.5816
Percent by mass of volatile water in hydrated salt (%)	52.78	58.20

Table 1 shows the various measured and calculated values needed in determining the percent by mass of water in watermelon salt.

Table 2: Determination of Percent Water in Watermelon Salt (Formulas)		
	Trial 1	Trial 2
Mass of fired crucible and lid (g)	31.8778	31.9816
Mass of fired crucible, lid and hydrated salt (g)	32.8778	32.9817
Mass of crucible, lid, and anhydrous salt 1st measurement (g)	32.4	32.4898
Mass of crucible, lid, and anhydrous salt 2nd measurement (g)	32.35	32.4
Mass of hydrated salt (g)	=B2 - B1	=C2-C1
Mass of anhydrous salt (g)	=B4-B1	=C4-C1
Mass of water lost (g)	=B5-B6	=C5-C6
Percent by mass of volatile water in hydrated salt (%)	=B5-B6/B5	=C5-C6/C5

Table 2 shows the calculations used to find the percent by mass of volatile water in hydrated salt

Table 3: Determination of average percent H2O, Standard Deviation, and Relative Standard Deviation of H2O in Watermelon Salt			
	Trial 1	Trial 2	
Percent by mass of volatile water in hydrated salt (%)	52.78	58.20%	
Average percent H2O in hydrated salt (% H2O)			55.49%
Standard deviation of %H2O			3.833
Relative standard deviation of %H2O in hydrated salt (%RSD)			6.91%

Table 3 shows the values calculated for average percent H_2O, standard deviation, and relative standard deviation of H_2O in watermelon salt.

Table 4: Determination of average percent H_2O, Standard Deviation, and Relative Standard Deviation of H_2O in Watermelon Salt (Formulas)			
Percent by mass of volatile water in hydrated salt (%)	B5-B6/B5	C5-C6/C5	=((B5-B6/B5)+(C5-C6/C5))/2
Average percent H_2O in hydrated salt (% H_2O)			=(B5+B6/2 - (B5-B6/B5) + (C5+C6/2)-(C5-C6/C5))/2
Standard deviation of %H_2O			=(B5+B6/2 - (B5-B6/B5) + (C5+C6/2)-(C5-C6/C5))/2
Relative standard deviation of %H_2O in hydrated salt (%RSD)			=((B5+B6/2 - (B5-B6/B5) + (C5+C6/2)-(C5-C6/C5))/2)/ ((B5-B6/B5)+(C5-C6/C5))/2

Table 4 shows the values calculations used to find the values of average percent H_2O, standard deviation, and relative standard deviation of H_2O in Watermelon Salt.

Calculations:

1. **Mass of hydrated salt= 32.8778-31.8778 =**1.000 g
2. **Mass of anhydrous salt = 32.35-31.8778 =** 0.47g
3. **Mass of water lost = 1.000 – 0.47=** 0.53 g
4. **Percent by mass of volatile water in hydrated salt = 0.53 / 1.000 =** 52.78%

5. **Average percent H_2O in hydrated salt = 52.78 +58.20 / 2 =** 55.49%
6. **Standard deviation of H_2O= 55.49-52.78 + (55.49-58.20)/2 = 3.833**
7. **Relative standard deviation of H_2O in hydrated salt = 3.833/55.39 = 6.91%**

Discussion:

The purpose of the experiment was to determine the amount of H_2O in a hydrated salt. The experiment required a Bunsen burner to heat the hydrated watermelon salt and a weigh scale to determine the mass of the salt before and after being heated.

After the hydrated salt was weighed, it was placed above the Bunsen burner with the lid hallway covering the crucible. This was a key aspect in the procedure because the lid not covering the crucible entirely allowed the heated water molecules to escape the apparatus. If the water molecules were not allowed to escape they would simply stay inside the crucible not allowing any change in weight. After the burning was complete the crucible lid was placed fully on to prevent any water in the atmosphere from adding water molecules to the anhydrous salt.

After the crucible was cooled, the weight of the crucible was determined. However the crucible was then heated again to ensure that all water molecules had separated from the ion. This is crucial because it further enhances the validity of the results. This is why when doing the calculations, the weight of the second measurement of the crucible after heating was used.

In order to calculate the percent of water in the watermelon salt, it was assumed that no water from the atmosphere was reintroduced to the anhydrous salt after being heated. The results found that the watermelon salt contained an average of 55.59% water with a relative standard deviation of 6.91%. This means that the watermelon salt contained around 55.59%

water with a few percentage points in either direction. This means that the watermelon salt had a significant amount of water molecules attached to the ion. This therefore supports the theory that the water molecules were loosely attached to the ion because they were removed through heat.

Conclusion:

The purpose of this experiment was to determine the percent water in a hydrated salt. The results found that there was an average of 55.95% H_2O in the watermelon salt with a relative standard deviation of 6.91%. The hypothesis was accepted.

There are a few possible sources of error in this experiment. One could be that water from the atmosphere was introduced to the anhydrous salt after it was burned. Another could be that not all of the water molecules were detached from the ion. A third possible source of error could be that the watermelon salt was overheated causing the salt to lose mass.

An improvement to this lab could be having a second Bunsen burner with two different crucibles with the same hydrated salt with one Bunsen burner flame being relatively low while the other is much closer to the crucible. Another improvement might be to heat the salt a third time but with a flame that is further away as to not disintegrate the salt. A third improvement of the lab might be to use the same crucible on the first and second trial. This may eliminate any weighing discontinuities.

Post Lab Questions:

2. Part A.1. The fired crucible is handled with (oily) fingers before its mass measurement. Subsequently, in Part B.1., the oil from the fingers is burned off. Will

the percent water in the hydrated salt be reported as being too high, too low, or unaffected? Explain.

- The percent water in the hydrated salt will be reported too high. It will be too high because the oil from the fingers was measured when the crucible was weighed, since the oil was burned off, the weight of the oil is no longer there. Hence the weight after the heating processes will reflect the water burned off as well as the oil that was burned off. This in turn will cause the numbers to reflect a higher water content in the hydrated salt than is truly there.

6. Part B.1. The hydrated salt is overheated and the anhydrous salt thermally decomposes, one product being a gas. Will the reported percent water in the hydrated salt be reported too high, too low, or be unaffected? Explain.

- The reported percent water in the hydrated salt will be too high. The final mass will be reflect the water molecules that were burned off as well as the salt that was decomposed. This will cause the final mass reading to be too low, therefore when the calculations are done the percent water will be higher than it should be because the weight was lower due to the decomposed salt as well.

7. Part B.1. Some of the hydrated salt splatters out of the crucible because of a too rapid heating process. Will the reported percent water in the hydrated salt be reported too high, too low, or unaffected? Explain.

- The percent water reported will be too high. The final weight measurement will be lower than it should be due to the salt spilling out of the crucible. The calculations

will then report the amount of water lost as a higher number because the loss of mass will also be due to the loss of salt instead of purely the loss of water.

Works Cited

[1] Beran, J.A., (2008). Page 86-90 Laboratory Manuel for Principles of General Chemistry

[2] Formula of a Hydrate Lab. (n.d.). Retrieved February 06,2017, from http://chem.lapeer.org/Chem1Docs/Hydrate Lab2.html

[3] Efflorescence, Hygroscopy, and Deliquescence. (n.d.). Retrieved February 06, 2017, from **http://www.freechemistryonline.com/effloresccnce-hygroscopoy-deliquescnence.html**

Fall 2017 Artifacts

- **Quantitative Research Design/Statistical Analysis**

Midterm Exam

1) Chapter 2, Question 4

X	X^2+5
1	6
3	14
4	21
5	30
6	41
Sum	**112**

2) Chapter 5, Question 2

- Average: 1+4+8+18/4 = 7.75
- Square root of ((1-7.75)^2+(4-7.75)^2+(8-7.75)^2+(18-7.75)^2)/ (4-1)
- = Square root of (45.5625)+(14.0625)+(0.0625)+(105.0625)/(3)
- = Square root of (164.75)/3
- = Square root of (54.91666667)
- **= 7.411**

3) Chapter 8, Question 10

- Average: (10+8+2+4+12+14+9)/7 = 8.42856
- t = 3.7074
- 99% confidence = 2.576
- Standard deviation = 4.237/(square root of 7)= 1.601
- 8.42856+or- (3.7074) X (4.237/Square root of 7)
- = 8.42856 + or 5.937
- **We can say with 99% confidence that the true actual size of Black Crappe fish in the Florida Everglades near sugar production farms lie between 2.491 inches to 14.3655 inches.**

4) Chapter 10, Question 2

a) The research topic is coral growth in environments that contain no algae. The researcher is collecting data on the amount of coral colonies that appear in environments with no algae present. The researcher is testing to see if the algae absent environment grows more coral than the average amount of corals found in an aquatic environment with regular algae production.

b) H_O: U= 25

H_A: U>25

(25 is the average amount of coral colonies found in a 5 foot by 5 foot radius in the normal algae producing environment)

c)

Report

noalgae

Mean	N	Std. Deviation
32.0000	10	6.49786

d)

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
noalgae	10	32.0000	6.49786	2.05480

One-Sample Test

Test Value = 0

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
noalgae	15.573	9	.000	32.00000	27.3517	36.6483

e) The t-test was significant because the p-value is 1.833 while the alpha level is 0.05. When the P-value is greater than 0.05 we fail to reject the null hypothesis. This means that we do not have sufficient evidence to say that null hypothesis is not correct at the 95% confidence interval.

f) Raw effect size = (predicted mean/ calculated mean)/ Standard Deviation

Raw effect size= (25-32)/ 6.49

Raw effect size =-1.079

g) The results of the one –sample t-test is that, statistically speaking, we do not have sufficient evidence to reject the null hypothesis at the 95% confidence interval. The practical significance is that we don't have enough data to say that a non-algae environment is more conducive to coral growth than a normal algae producing environment.

Chapter 11, Question 2

a) My research topic is coral growth. The researcher gathered data on the amount of corals found in a 5 by 5 foot radius in environments with an increased amount of algae.

b) H_O: U= 25

H_A: U(doesn't equals symbol) 25

c)

Group Statistics

	regular	N	Mean	Std. Deviation	Std. Error Mean
increased	.00	5	26.0000	3.08221	1.37840
	1.00	5	16.2000	3.83406	1.71464

d) t =(26.00-16.200)/ ((3.83+3.08)/square root of 10))
t= 9.8/(2.185)
t= 4.45

e)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
increased	Equal variances assumed	.376	.557	4.455	8	.002	9.80000	2.20000	4.72679	14.87321
	Equal variances not assumed			4.455	7.647	.002	9.80000	2.20000	4.68573	14.91427

f) The t-test was significant because the t-critical value is 2.306 while the t value is 4.445. This means that we reject the null hypothesis which is statistically significant.

g) Raw effect size = t (N_1+N_2) / (N_1N_2)
Raw effect size = 4.45 (4+4)/ (4 X4)
Raw effect size = 4.45 (8/16)
Raw effect size = 2.225

h) The ideal minimum sample in future research would be 4.

i) The statistical significance is that we reject the null hypothesis meaning that we have sufficient evidence to say that the increased algae environment has a statistically significant different mean than that of coral environments with regular algae growth. The practical significance is that environments with higher levels of algae will produce a different level of coral than environments with regular amounts of algae production.

- **On-Campus Event**

Adult/General Informed Consent (Rev. 04/08/2016)

Consent Form for Participation in the Research Study Entitled
Effects of Non-lyrical and Lyrical Music on Memory, Retention, and Concentration

Funding Source: None

IRB protocol #:

Principal investigator
Margaret Carnes
3301 College Avenue
Ft. Lauderdale, Fl 3314
Box Number: 1330
Contact phone number: (352) 213-3008

Co-investigator
Klein, Taylor
Staley, Nicole
3301 College Avenue
Ft. Lauderdale, FL 33314

For questions/concerns about your research rights, contact:
Human Research Oversight Board (Institutional Review Board or IRB)
Nova Southeastern University
(954) 262-5369/Toll Free: 866-499-0790
IRB@nsu.nova.edu

What is the study about?
You are invited to participate in a research study that has the goal of learning the optimal noise environment for studying. We are also looking to determine which audio stimulus will have a greater effect on memory retention and concentration.

Why are you asking me?
We are inviting you to participate because you are currently a college student that studies for exams. There will be between 100 and 120 participants in this research study.

What will I be doing if I agree to be in the study?
You will be tested and observed in one of two sound environments. These tests will be followed by a brief survey that takes into consideration your preferences in music, volume, and study techniques. The complete process should take you no more than 25 minutes to complete.

Is there any audio or video recording?
There is no audio or video recording involved.

What are the dangers to me?
Risks to you are minimal, meaning they are not thought to be greater than other risks you experience everyday. Being recorded means that confidentiality cannot be promised. Sharing your opinions about treatment may make you anxious or bring back

memories. If you have any questions about the research, your research rights, or have a research-related injury, please contact Margaret Carnes and Steven Hecht. You may also contact the IRB at the numbers indicated above with questions as to your research rights.

Are there any benefits for taking part in this research study?
There are no direct benefits.

Will I get paid for being in the study? Will it cost me anything?
There are no costs to you or payments made for participating in this study.

How will you keep my information private?
The questionnaire will not ask you for any information that could be linked to you. You have the right to leave this study at any time or refuse to participate. If you do decide to leave or you decide not to participate, you will not experience any penalty or loss of services you have a right to receive. If you choose to withdraw, any information collected about you before the date you leave the study will be kept in the research records for 36 months from the conclusion of the study and may be used as a part of the research. All information obtained in this study is strictly confidential unless disclosure is required by law. The IRB, regulatory agencies, and Taylor Klein and Nicole Staley may review research records.

What if I do not want to participate or I want to leave the study?
You have the right to leave this study at any time or refuse to participate. If you do decide to leave or you decide not to participate, you will not experience any penalty or loss of services you have a right to receive. If you choose to withdraw, any information collected about you **before** the date you leave the study will be kept in the research records for 36 months from the conclusion of the study and may be used as a part of the research.

Other Considerations:
If significant new information relating to the study becomes available, which may relate to your willingness to continue to participate, this information will be provided to you by the investigators.

Voluntary Consent by Participant:
By signing below, you indicate that

- this study has been explained to you
- you have read this document or it has been read to you
- your questions about this research study have been answered
- you have been told that you may ask the researchers any study related questions in the future or contact them in the event of a research-related injury
- you have been told that you may ask Institutional Review Board (IRB) personnel questions about your study rights
- you are entitled to a copy of this form after you have read and signed it

you voluntarily agree to participate in the study entitled "Effects of non-lyrical and lyrical Music on Memory, Retention, and Concentration

Participant's Signature: _____ Date: _____

Participant's Name: _____ Date: _____

Signature of Person Obtaining Consent: _____

Date: _____

- **Experience of My Choosing**

Essay Questions For Lab

1) The results of today's experiment wouldn't change. The balance reference wouldn't be affected because acceleration would apply equal force throughout the meter stick. Thus the final calculated mass wouldn't be affected. The force of acceleration is equally distributed along the apparatus.
2) If we use a lighter meter stick the location of balancing reference mass would not change. The weight of the meter stick doesn't matter. The meter stick weight is null because we balanced it so that the only contributing factor is the point of equilibrium on the stick. As long as the lighter stick can be balanced, and it should be able to, then the meter stick could be any weight. The final calculated mass would remain the same. The meter stick is simply the fulcrum and the apparatus allowing us to measure the weight of the unknown. The actual weight of the fulcrum is irrelevant.

Reflections

Fall 2016 Reflection

- The first semester of college began with an apprehension and worried me. I was engrossed in school work and homework worried that even the slightest misstep would cause a rift in my grades. However, looking back I realize how unnecessary my woes were. My final thoughts of the semester are that school is the reason that I am attending college but that is not the entirety of the college experience. I now realize that leaving my dorm room and having fun is a very necessary aspect of my new found life. I have learned this semester that setting priorities is crucial but incorporating every aspect of my life on the list of priorities is even more crucial to my happiness and success as a college student. I have also learned that college is not as challenging as I previously thought and I have more free time to do things that I enjoy. I have also come to the conclusion that the key to success in the classroom is becoming a good test taker. College relies on testing to create grades and weighs testing the most out of any other category when computing the final score of a class. While these are all things that I have grown to know as a college student, I have also grown to know and foster the inner researcher in me. This semester has caused me to grow greatly as a researcher. Prior to college, my research included high school labs and any personal inquires that I would find interesting. This semester has allowed me to hone the skills that I have learned throughout life and apply those skills in a manner conducive to research. I have gown to understand how research should be properly researched prior to any investigation on the topic. I now understand that an investigation into conducted and published research is necessary

because there is a vast amount of published research that is skewed. As a researcher, I have grown to understand that not all science should naturally be accepted as the truth. In all, this semester has transformed me from someone who has had a natural propensity and curiosity for research into someone who has the knowledge to become a proper researcher.

Winter 2017 Reflection

- The second semester of my college experience has given me a new mindset on schooling and the importance of keeping my life in perspective. This semester contained many new experiences for me in the aspect that last semester consisted solely of classes that I had already taken in high-school. However, the classes this semester were a variety of new and old material. The new mindset on schooling that I now possess is one that values my education and the realization that college is the last time I will be learning this type of material. As in, after college I will be attending a professional school that will only cover necessary and pertinent information. This means that the thirst for expansive knowledge needs to be quenched while attending college. This made me realize that I need to value even the strangest of classes that I might be taking because they are still important for my general educational well-being. The new perspective on life that I maintain is that college is fleeting. This past year was a blur of class, friends, and studying. I found that I need to take time to enjoy the experience and live more in the moment instead of over-analyzing every aspect of a situation. A perspective and mindset such as this will aid in my future research experiences. Research is misconstrued as simply the

acquisition of new information while in reality it is much more. The forgotten aspect of research is the implication of the findings made and following through on the discovery or new information. The research findings made should be thought of or analyzed in a perspective of time and society. Analyzing the results is essential but analyzing the use of information and findings is also key. This semester has really taught me to keep perspective in mind while traversing through any and all experiences in life.

Fall 2017 Reflection

- This semester has pushed me farther than I ever thought schooling could. My class schedule this semester was very intensive with courses that consisted of information of which I had no prior knowledge. I had to constantly remind myself that undergraduate schooling is just a small part of my life and that the information I am learning now is important, it does not affect the rest of my life. However, while the semester did push my mental and physical capabilities, it pushed me in a healthy manner. I now have a better understanding of how to manage my time, manage my stress and pursue things that make me happy. This semester didn't necessarily teach me many new skills about physical research but it pushed me mentally. I now have a better understanding of the vast array of topics and possibilities that I could pursue. With a more open-minded perspective on research I feel as if this semester is the first semester that I am adequately prepared to conduct research. Another achievement from this semester is the mentor-mentee matches. I have been matched in an area of research in which I have no prior knowledge and while many may view that as a negative, I view it in the opposite regard. The mentor-mentee match will push me to continue expanding my interests in the research field and hopefully let many new milestones come into fruition. This opportunity will also give me experience in a physical laboratory researching areas of pharmacology that could produce very interesting results. In its entirety, this semester was full of firsts academically as well as with regards to research. It has opened my eyes as a researcher to the multitude of avenues that I can explore and apply myself as I continue to gain experience in this field.