PennState
Behrend

Penn State Behrend
Sigma Xi- 2019

Twenty-Eighth Annual
Undergraduate Student Research and
Creative Accomplishment Conference

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ORAL PRESENTATIONS ABSTRACTS

BIOLOGY

1. Identifying Potential Brook Trout (*Salvelinus fontinalis*) Populations Based on Summer Temperature and Watershed Characteristics

Megan Hazlett (Scott Wissinger, Chris Shaffer), Allegheny College - Ecology

Brook trout (*Salvelinus fontinalis*) populations in NW Pennsylvania declined dramatically and remnant populations continue to be threatened by agricultural land use, climate change, and stocking of nonnative brown trout (*Salmo trutta*). A state priority is to expand the existing range of brook trout into areas where they are thought to have been extirpated. The goal of my project is to locate new locations for brook trout range expansion based on land use characteristics and temperature/oxygen requirements. I placed 36 temperature data loggers in small, wadable streams in the French Creek Watershed (FCW) from May-October to monitor maximum summer temperatures (minimum oxygen levels). I compared temperatures among streams with brook trout, with brown trout, and candidate streams with good land use characteristics (high forest cover and riparian intactness). I found that temperature correlated tightly with oxygen with no variation among sites with varying gradients ($p<0.0001$). Surprisingly, I did not find any relationship between temperature and any land use variables ($p>0.10$). However, further analysis revealed interactive effects between forest cover and gradient; for gradient values of 15m/km or greater, forest cover predicted time spent in the optimal ($p=0.03$) and poor ($p=0.02$) temperature ranges. In low gradient streams, I predict that groundwater upwelling and the presence of upstream beaver dams are likely to skew the strong land cover-temperature relationship observed in high gradient streams by causing cooler than expected (i.e. groundwater upwelling) or warmer than expected (i.e. upstream beaver dams) water temperatures. Lastly, I used GIS to predict all locations within the FCW that should have suitable temperatures for brook trout. Locations that are predicted to support brook trout will either become the targets of future surveys if unassessed, or if assessed and without brook or brown trout, potential sites for reintroduction.

2. Effects of seasonal temporal variability of salt disturbance on *Chironomus dilutus* survival, emergence, and fecundity

Emily Dobry, Grace Schoeniger (Samuel Nutile, Pamela Silver), Penn State Behrend - Ecology

Year-round presence of road deicing salt in streams is a disturbance that interferes with aquatic ecosystem functioning. Salt runoff during winter melting events spikes salinity in streams before returning to a background level, which slowly increases as salt accumulates in the streams. During summer rain events, streams experience periodic freshwater flushing, dropping the salinity and gradually lowering the background level. Aquatic organisms use osmoregulatory processes to counteract these changes, leading to increased energetic costs, potentially influencing fecundity. The current study sought to assess the impact of road salt run-off on the survival, emergence and reproduction of *Chironomus dilutus* exposed to environmentally relevant flush treatments based on known exposure levels observed in Penn State Erie streams. A delay in pupation and emergence, as well as reduced fecundity, were expected to be observed in the high treatment when compared to the low and control treatments. Second instar *C. dilutus* larvae were added to randomized chambers containing one of three treatments. The chambers were flushed twice weekly with fresh water and returned to a decreasing background salinity throughout the experiment. The larvae were left to emerge into adults, which were segregated by treatment and allowed to breed. The resultant egg sacs were collected and eggs were counted. Preliminary results suggest the high treatment is leading to a negative effect on emergence, which would diminish overall population sizes. While the experiment is still ongoing, this work is important because it demonstrates the long-term impact of road salt runoff on freshwater organism populations.

3. Examining interactions between mutations in collagen and the immune system in *Drosophila melanogaster*

Katharine Hubert, (Dr.Bradley Hersh), Allegheny College - Genetics

Collagen is a structural protein present in connective tissues and the extracellular matrix, which provides structural support to surrounding cells. Individuals with collagen disorders, such as Ehlers-Danlos Syndrome (EDS), have multisystemic symptomology as a result of defective collagen. *Drosophila melanogaster* with mutations in collagen 4A1 exhibit muscle degradation, intestinal instability, and increased immune system activity. Though similar defects are observed in both *D.melanogaster* and human COL4A1 mutants, their developmental and physiological pathogenesis remains unknown. Linking multisystemic defects together could aid in the understanding and diagnoses of collagen syndromes, such as EDS. We hypothesized that the increased immune response is a result of the presence of faulty collagen, and that this increased response contributes to the defects in musculoskeletal and digestive systems. We have examined intestinal integrity and actin organization in body wall and oviduct muscles in wild-type flies, collagen mutant flies, immune mutant flies, and double-mutant flies. If mutant collagen and the immune system interact, reduced immune activity in the double mutants may rescue musculature and intestinal integrity. Preliminary results indicate a negative interaction between collagen and the immune system, which is evidenced by larval death in double mutant flies. This project may establish a connection between the integrative effects of collagen mutations on immune, digestive, and musculoskeletal systems.

4. Assessing the Need for a Forensic Database of Feline Mitotypes in Budapest, Hungary

Annika Erdely, (Kristen Amick), Westminster College - Genetics

Biological material from pets can be collected from a crime scene as evidence. If an animal was directly involved, the material could be blood or saliva. Hair that an animal has shed could also be found at a crime scene, even if the animal itself was never present, via secondary transfer on a human. From this shed hair, mitochondrial DNA can be extracted and used to link a specific animal the scene. Mitochondrial DNA (mtDNA) is used over nuclear DNA, because of its circular structure. The linear structure of nuclear DNA makes it more susceptible to degradation, while mtDNA's structure protects the genomic integrity. Unlike nuclear DNA, mtDNA is not unique to an individual. Mitochondrial DNA is passed from mother to offspring with no recombination, and unrelated cats can have identical mitochondrial DNA sequences, or mitotypes. Previous studies sampling 100s of cats has identified just 30+ unique mitotypes. The frequencies of the mitotypes can vary by geographic region. Previous surveys of the genetic diversity of cats in Italy and Germany have shown that frequencies of mitotypes vary by region too greatly for a global database to be truly representative. Through mtDNA amplification and sequencing of 20 cats from Budapest, Hungary, the mitotype frequencies for that region were analyzed and compared to those of neighboring countries to determine if a regional database is needed for forensic use. This research will contribute to the development of an accurate and representative forensic database of feline mitotypes in eastern Europe.

5. DNA Extractions

Saina Haideri, Mashota Mohamad, (Dr. Matthew E. Gruwell), Penn State Behrend - Genetics

The purpose of the research is to spread the awareness of the biodiversity on Behrend campus. To acknowledge the biodiversity, scientists must unroll the DNA sequences of an organism which is called DNA extraction. DNA extraction provides information about organisms' evolutionary history and their genome. To identify the evolutionary history and extend the phylogenetic tree of insects, past students have collected samples from many ecosystems on the diverse campus environment. Formerly, students collected invertebrates (insects) and made an introductory identification on samples. The DNA extractions was performed on the leg muscles of insects for better PCR readings. PCR (polymerase chain reaction) was ran on a portion of the genomic DNA using Cytochrome Oxidase 1 (CO1) DNA bar-coding primers for insects and made a DNA Bar-coding library of the insect identification using CO1. All the information and data were systematized and uploaded on the NCBI Gen Bank Database and the Bar-code of life Database (BOLD) for future comparison metabolic pathways of different insects. The cataloging of insects on campus is making Erie more Bio-aware and improving the acknowledgement efforts by knowing the existence of each diversity on campus that are conversation importance. This is a good source of extending the phylogenetic tree of insects as well as learning valuable skills in molecular techniques.

6. Molecular level of Alzheimer's disease: Aß42 and its inhibition of the hSlo

Kalena Grimes, (Lauren French, Rodney Clark), Allegheny College - Neuroscience

Alzheimer's disease (AD) is a progressive neurodegenerative disorder encompassing extensive memory loss in individuals. The disease and its symptoms have been long linked to insoluble amyloid-beta (Aβ) plaques found in the post-mortem brain throughout the cortex. However, the development of the symptoms does not match that of the plaques. As of now, these plaques and Aβ aggregation are the most plausible explanations of synaptic dysfunction and neuronal loss, but many questions remain. This research focuses on the peptide before it forms extracellular plaques. For example, the big conductance potassium (BK) channel is involved in action potential repolarization and calcium-induced apoptosis. This channel is inhibited by $A\beta_{42}$. Recent research has implicated that there is interference with synaptic transmission due to the toxicity of intraneuronal Aβ, particularly soluble oligomers and immature fibrils that have become sequestered in the cell. I investigated the effects of different conformations of intracellular and extracellular Aβ and TEA on a variation of the BK channel, hSlo1.1, using *a Xenopus laevis* oocyte model. Oocytes that expressed hSlo1.1 were exposed to intracellular Aβ and TEA via dissolution of the peptide in the solution that fills the current-electrode. Extracellularly, Aβ and TEA were applied through bath application into the recording solution. Intracellular and extracellular recordings were measured using a two-electrode voltage clamp (TEVC). Analyzing these recordings gives better insight as to how BK channels function in the presence of Aβ and TEA. Experiments similar to this one are necessary to explain the molecular mechanisms underlying Alzheimer's disease pathology.

7. Using sectioned otoliths to estimate growth rates of bluegills *Lepomis macrochirus* and pumpkinseeds *Lepomis gibbosus* from Presque Isle Bay, Lake Erie

Mikkela Cabanillas, (Greg Andraso), Gannon University - Organismal Biology

The objective of this study was to estimate growth rates of bluegills *Lepomis macrochirus* and pumpkinseeds *Lepomis gibbosus* from Presque Isle Bay, Lake Erie (PIB) using a cost-effective method of analyzing otoliths. Sagittal otoliths were embedded and sectioned using readily-available equipment. Sectioned otoliths were photographed under transmitted light, annuli were counted, and distances from the nucleus to each annulus were measured to the nearest 0.001mm. Total length (TL) at age was estimated for each fish using the relationship between TL and otolith size. To date, otoliths have been analyzed from 42 bluegills and 34 pumpkinseeds ranging in TL from 31 to 213mm (31-213mm for bluegills, 48-200mm for pumpkinseeds). Age of fish ranged from young-of-year (0+) to 8+ years for bluegills, and 0+ to 7+ for pumpkinseeds. Rapid growth was observed in both species through the first four growing seasons before slowing in subsequent years. There are currently no harvestable size limits for either species in PIB. However, TL of 178mm (the minimum harvestable size in Pennsylvania's Panfish Enhancement Regulations) was reached by bluegills and pumpkinseeds by approximately age 5. Our estimates of growth rates are similar to those published by the PA Fish and Boat Commission for populations throughout the state, and do not suggest impaired growth due to high population density or limited food resources.

8. Census of the Bat Population of Gannon University, Erie, PA

Alex Stauff, Priya Shrees (Steven Ropski), Gannon University - Zoology

For the past nine summers, a census of the bat population has occurred on the Gannon University campus in Erie, PA. The numbers for the first three years held relatively steady, but the data for the past six years indicates a dramatic decline. White Nose Syndrome was first reported in 2006 in a cave in New York. The disease has killed an estimated 6 million bats in the eastern United States since then and has spread throughout Pennsylvania and into northeastern Ohio. This fungal infection has killed 95% of bats in some caves and may result in the listing of three bat species as endangered in Pennsylvania, including the Little Brown Bat (*Myotis lucifugus*), the predominant bat on the Gannon campus. This study will compare yearly data by building, time of year, building side and species composition to determine how White Nose Syndrome has affected the Gannon campus bats. A decrease in numbers may be partially responsible for an increase in West Nile Virus in the area. The results will also be used to place bat houses at appropriate locations to encourage bat presence on campus.

CHEMISTRY, ENVIRONMENTAL SCIENCE, & PHYSICS

9. Theoretical Study of Disordered Graphene

Victor Barone, (Blair Tuttle), Penn State Behrend - Physics

Amorphous graphene is a two-dimensional sheet of carbon atoms with three fold coordination. The atoms in pure graphene form hexagons. Defects can form under growth conditions. Vacancies involve missing atoms in the network. The Stone-Waals defect involves two of the atoms being turned 90 degrees, which creates regions of bond distortion. In disordered graphene, there are regions of interconnected 5, 6, 7 and 8 sided objects with carbon atoms at the vertices. Here we use density functional calculations to explore the mechanical and electronic properties of graphene; from pure to disordered.

*Research supported by Dr. Tuttle's NSF RUI-DMR 1506403. This research was conducted using Advanced Cyber Infrastructure computational resources provided by The Institute for Cyber Science at The Pennsylvania State University.

10. Characterization of the Hydroxyl Radical-Water Complex using Matrix Isolation Infrared Spectroscopy

Tracy Jones, (Jay Amicangelo), Penn State Behrend - Chemistry

A complex of water (H_2O) and the hydroxyl radical (OH) in an argon matrix was characterized using matrix isolation infrared spectroscopy. The OH radical was produced using vacuum ultraviolet (VUV) photolysis of H_2O and deposited with excess H_2O in an argon matrix at 15 K. The OH stretching peaks for the OH-H_2O complex were observed at 3452 cm^{-1} and 3428 cm^{-1}. Several experiments and comparisons were made by varying the concentration of H_2O:Ar, comparing the VUV photolysis spectra to the spectra without VUV photolysis, and using matrix annealing experiments (30 - 35 K). Additional experiments were performed using D_2O:Ar and the OD-D_2O complex peaks were observed at 2543.2 cm^{-1} and 2525.6 cm^{-1}. Quantum chemical calculations were performed for the OH- H_2O complex using the Gaussian09W computational chemistry program at the MP2 and DFT levels of theory to obtain the complex structure and simulated IR spectra. Based on the calculations, two optimized structures were obtained; one in which hydrogen bonding occurs between the O atom in H_2O and the H atom of the hydroxyl radical (I) and the other, which is a slightly higher energy structure, with hydrogen bonding occurring between one of the hydrogens on H_2O and the O atom in the hydroxyl radical (II). After comparing the predicted and experimental spectra for the OH- H_2O complex, the observed infrared peaks for the complex have been assigned to structure I.

11. Determination of bonding in complex materials

Zihao Zhang, (Blair Tuttle), Penn State Behrend - Physics

Here we consider complex materials such as liquid silicon, nano-porous silicon carbide, aluminosilicates, and others. The goal is to create a computer code to detect bond and bonding defects in complex materials. We begin by examines structures from publicly available repositories. Then, we plot bond distribution histograms. By examining, the histograms, we develop an algorithm to identify bonding versus non-bonding atoms. We apply this code to identify defects in complex materials.

12. Microplastic Pollution in the Great Lakes in Sediment versus Water Column

Florence LaPlaca, (Sherri Mason), SUNY Fredonia - Environmental Science

Microplastic pollution in the Great Lakes region is something open to many different avenues of research and has the potential for many different discoveries. One of particular interest is what exactly are the types of plastics being found in the Lakes and at what percentages. The focus here is on how the sediment samples compare to the water samples. Particles looked at include foams, lines, fragments, films, and pellets. The FTIR analysis used to determine this found that in the Great Lakes, the most commonly found types of plastic in the water column are polystyrene at 19.22% and polypropylene at 31.74%. The most common plastic found that isn't considered to be one of the most commonly used plastics is some terpolymers at 10.45%. For the sediment samples, there is only 1.92% polystyrene and 7.69% polypropylene. The most abundant plastic in the sediment is found to be polyethylene at 43.59% which is only at 5.42% in the water samples. There also appears to be a greater deviation from the plastics deemed to be most commonly used in the sediment samples than the water samples. About a quarter of the sediment samples are "outside the normal" whereas only about a tenth of the water samples are outside this normal. Density most likely plays a role in this as polystyrene and polypropylene have lower densities than polyethylene. There is still more analysis going on as to why these plastics exist at the levels that they do. The three plastics mentioned are commonly found in products used for human consumption such as bottles, straws, bags, trays, etc. As such, possible explanations include urban runoff and imperfections of recycling processes.

COMPUTER SCIENCE, ECONOMICS, & MATHEMATICS

13. An Application for the Matching and Ranking of Things in the Internet of Things

Morgan Atterholt, Shrey Arora (Naseem Ibrahim), Penn State Behrend - Computer Science/Software Engineering

The world is becoming more connected every day and with such an exponential growth, there will be growing pains. The Internet of Things is a vast and seemingly limitless tool to allow everyday objects, such as watches, parking meters, and buildings to become connected to their users, each other, and the world around them. This research aimed to find a way to give access to the information provided by these devices on a public level as the next step in improving connectivity. The ability to see this information allows insight into conditions such as weather, availability, or status of the area that a Thing monitors. This research began by evaluating the best way for this information to be discovered by users who hope to obtain the services of a Thing without owning it. We also evaluated if any services such as this currently existed. Upon assessing a lack of this in the market, we decided on an application format. This application will behave as a Registry, which is responsible for publication, discovery, and provision of data and services of IoT. It then needed to be researched how to rank and match Things when searching takes place. The ranking algorithm in place takes into account similarity between Things in addition to varying priority levels for different aspects of each Thing. In order to match and rank services, a way to determine semantic similarities between string also required research. At the completion of this application, it can be used as a fundamental framework to create a system which can manage large amounts of information on public IoT services

14. Evaluating Computer Vision Algorithms for Tracking Ants

Nathaniel Sprecher, Miriam Tan, Logan Stahl, Theodore Stangebye, Elizabeth Schwab, Luke Meier, Drew Hayward, (Britton Wolfe, Tim Mohr), Grove City College - Computer Science/Software Engineering

Ants provide a unique insight into complex social behaviors, both in their inter-colony and intra-colony interactions. Unfortunately, tracking the movements of many ants across any meaningful timespan devolves into a laborious process. Our project's long-term goal is to mitigate this impediment by building a mobile robot that uses computer vision to automatically track ants in the field by recording their movements for biology researchers. This task proves to be quite challenging, due, in no small part, to the small size of the ant, frequent occlusions (primarily caused by leaves and blades of grass), and background motion from wind. In this project, we implement various tracking algorithms, comparing their performance and evaluating them for their ability to track the ant as it moves across the field of view.

15. Emotion Detection for IoT Applications

Kyle Jonas, Morayo Ogunsina, Karina Cuadrado (Abdallah Abdallah), Penn State Behrend - Computer Science/Software Engineering

The ability to apply human learning and decision-making to computer modeling and embedded devices will be at the forefront of technological advancement. Although emotion detection is a skill humans apply in order to make better decisions; by using machine learning, we are able to translate this skill to computer systems in order to support commercial and industrial applications. The goal of this project is to develop a system to detect the emotions of users interacting with a camera attached to a lightweight embedded system. To implement our system, we proposed testing two different machine learning designs. The first, implementing classical machine learning hosted locally on the embedded system, while the second design utilizes deep learning and cloud computing. Both designs are developed in parallel, in order to evaluate performance between the two machine learning techniques. For classical machine learning, we utilized the MATLAB Neural Network Toolbox to in order to train a pattern recognition algorithm using the FER2013 dataset. Preliminary experimental results conducted using a MATLAB shallow neural network indicated that classical machine learning was insufficient in providing proper emotion classification. For the second design, we will utilize deep learning and the additional hardware resources of cloud computing; using the embedded system to pass images to the cloud service in order to be classified by the deep learning algorithm. To implement deep learning, we utilize the NVIDIA DIGITS training system to develop an algorithm to perform emotion detection using pattern recognition. This algorithm will then be deployed on a cloud service, using the embedded device to pass images to the cloud for classification. In short, by researching both machine learning designs, we are able to develop a system to detect the emotions of users interacting with a camera, as well as evaluate and compare the performance between the two machine learning techniques.

16. Human-Inspired Model for Emotion Detection

Nastassja Lahoff, Daniel Donley, (Abdallah Abdallah, Lisa Elliott), Penn State Behrend - Computer Science/Software Engineering

With the growing uses of artificial intelligence in self-driving cars and robotics, there will soon come a time where interaction between intelligence and ourselves will come face to face. One of the most difficult challenges that artificial intelligence researchers face today is detecting emotions, due to the complexity of emotion recognition, in spite of the intense research that has been done. Current detections systems are ineffective and need improvement due to inaccuracies, especially those in identifying negative emotions. Additionally, they are ill-equipped to deal with discrepancies such as the imperfect human differences in processing speed (i.e., social anxiety, anorexia nervosa, etc.) and obscured faces. Furthermore, previous investigations have struggled with isolating responses, as previous emotions shown may influence the participants' next response subliminally. Our investigation aims at transferring the human model to detect emotions to computer systems. We seek to use eye-tracking technology to transfer the knowledge of the human process to a new set of emotion detection algorithms. The benefits of such algorithms can be extended to understand the processing of human emotions in individuals who suffer from various disabilities. We will present the first phase of our investigation, focusing on the design and implementation of an interactive PC application to capture the unknown human model for reading and interpreting other human emotions. In addition to design and implementation details, a preliminary demonstration of the application will be presented.

17. Effects of Financial Literacy on Wealth

Kendrick Patterson, (Stephanie Martin), Allegheny College - Economics

An individual's net worth or wealth is the net value associated with assets and debts obtained by the individual. This measurement is an indication of financial standing. Assets include, car value, checking and savings account balances, portion of mortgage paid off, etc. While debts include, student loans, remaining mortgage balance, credit card debt and other outstanding loans. Financial literacy, the ability to manage personal finance matters in an efficient manner, has a strong theoretical connection to the net worth of individuals. Using economic theoretical model, I will provide context for the correlation shared between wealth and financial literacy. In this study I will analyze the effects of financial literacy on the net worth of individuals through the influence of activities such as investing, saving, and debt paying. Financial literacy having a positive impact on net worth implies that education about managing financial matter will increase the overall financial wellbeing of individuals. Applications for this information include school curriculum reform and employee education, allowing students and employees to obtain a better financial standing.

18. Increasing Efficiency with Northwestern, PA Trade Partners by Identifying Comparative Advantage

Hannah Carlino, (Travis Yates), Penn State Behrend - Economics

The economy is constantly fluctuating and new data is always being released. This means that the databases must be regularly updated with new information in order to see changes in the economy, or specifically in trade for this research initiative. With the previous research initiative, "Comparative Advantage and Economic policy Tools based on a Local Economy's Imports and Exports," the methodologies on how to quantify county level exports, and determine their relative comparative advantages are determined and discussed. This initiative will be using the methodologies from the prior to analyze trade between Erie County and its' northwestern trade partners in the state of Pennsylvania. This research will allow Erie County and its trade partners to better understand their comparative advantages in each NAICS industry sectors. Industry earnings and employment data from the Bureau of Economic Analysis act as the primary source of data for this initiative to properly analyze comparative advantage. Suggestions for economic development and adjustments to trade will be made through the use of policy recommendations.

19. Expressing the Gamma Function of Fractions with Series

Trevor Johnson, Patricia Brotherson, (Jennifer Ulrich), Penn State Behrend - Mathematics

The gamma function was the first generalized representation of the factorial and was introduced by Euler as a function to find the factorial of fractions, negative, and complex numbers. However, as far as fractions, it has only been used for those with a denominator of two. In this talk we will expand upon this idea by analyzing how one half is evaluated using the definition of the function. We will use our analysis to discover other possible fractional base cases that can also be evaluated. It is our goal to approximate the value of the function by redefining these cases as infinite sums.

ENGINEERING

20. Data Analytics Models for Medicare Spend Optimization

Aaron Slavin, (Faisal Aqlan), Penn State Behrend - Data Analytics

Medicare Spending per Beneficiary (MSPB) measures a hospital's efficiency, based on the Medicare payments made during a specific episode or stay. An episode is comprised of the three days before, during, and 30 days following the patient's stay in the hospital. The MSPB index is the ratio of the hospital's payment-standardized risk-adjusted MSPB amount to the episode-weighted median across all hospitals. A MSPB ratio greater than one means that a hospital is spending more money than expected. This research uses data collected from a local hospital and a national Medicare database to develop analytics models that can be used to analyze and improve the current MSPB for the hospital. Results show that the hospital's high MSPB ratio was due to excessive readmission rates. The models are used to identify the variables that effect readmissions and solutions are proposed to reduce the MSPB ratio and improve hospital's performance.

21. Building a Frequency Spectrum Observatory using Software Defined Radios

Nicholas Smith, Nadira Badrul, Keith Powell, (Abdallah Abdallah), Penn State Behrend - Electrical Engineering/Technology

This presentation explores the study of frequency spectrum observatories around North America and proposes a design to build a frequency spectrum observatory using software defined radios (SDR) for future implementation. The purpose of this observatory is to measure power spectral density (PSD) around Penn State Behrend and store data for further analysis. Several existing spectrum observatories were studied to compare and contrast antennas, filters, software defined radio boards, storage, and computation unit in order to come up with a design that can meet the requirements of this project. Two design alternatives were presented and one final design was chosen after careful considerations. Spectrum observatories can be implemented in both environments, indoor and outdoor. The design for this project is proposed for outdoor use to cover a range of frequencies from 25 MHz to 6 GHz. We plan on covering the cellular, Wi-Fi, Paging, and FM radio frequencies. We will observe the PSD of all the signals that surround Behrend and record this data for later use or analysis. The project is to be implemented for a senior design project.

22. Image Capture Performance for Computer Vision in Edge Compute Environments

Theodore Stangebye, Joeseph Lovin, (Timothy Mohr), Grove City College - Electrical Engineering/Technology

The Grove City College Electrical Engineering and Computer Science Departments are developing a mobile robot to track insects in their natural environments. The long term goal of this project is to learn about ants' behaviors, especially those which are related to navigation, exploration, and cross-colony interactions. Our goal is to find an image-pipeline solution which is able to process 2 megapixel images at frame-rates greater than 15 frames-per-second. The final system should be capable of capturing image frames and either performing online inference or saving data for offline training and evaluation. In a search for the ideal embedded capture system, our team experimented with several image acquisition pipelines. We explored multiple hardware platforms, including the National Instruments myRIO, RaspberryPi, and Odroid Xu4. We used CSI and USB camera interfaces with OpenCV, LabVIEW, and OS-specific image capture programs. We aim to evaluate and compare the effectiveness of these different image-processing solutions, showing what systems performed well and which ones failed to meet our goals.

23. Biaxial Test Device – Multiaxial Stress State

Tyler Altmire, (Chetan Nikhare), Penn State Behrend - Engineering

Using traditional methods of strength testing gives a good representation of a materials capabilities in one direction, but with our knowledge of forming materials, unwanted and often unaccounted stresses in the material can occur. In the automobile industry a new fuel efficient requirement is being set in place to have all vehicles to have an average fuel economy of 55.8 miles per gallon by 2025. With the need for strong and lightweight materials comes new ways to form the materials used in manufacturing. There are many parts used that have complex geometries which will have residual stresses introduced when formed which requires further knowledge on the amount of stress a material can withstand in not just one but multiples axes. Analyzing multiaxial stress states many research publications have recommended the use of limiting dome height tests as well as bulge tests, however these limit multiaxial loading conditions. In light of the issues that have been faced using this method a new test machine called a biaxial test was device which would provide the ability to test material specimens in multiaxial stress states yielding more accurate results. The biaxial test uses two processes, limiting dome tests and biaxial tests, which varies to loading and displacement on two axes rather than one. Previous testing using this method resulted in higher limit strains in the dome testing rather than the biaxial testing due to the contact pressure on the punch press. Although this may seem like it has an unwanted error in the analysis combining the two methods result in a more pure material behavior due to the pressure being removed in the biaxial test. This being said, if a process where a rigid press is present calibration is necessary to account for the press being used. Results were recorded using forming limit diagrams to more accurately represent the stress occurring due to minor and major strain when being pulled in multiple directions. This would best be suitable for a verbal presentation.

24. Integrating Lean Six Sigma and Data Analytics to Improve Student Retention

Joel Patterson, Esther Dagne, (Faisal Aqlan, Carol Putman), Penn State Behrend - Industrial Engineering/Technology

Higher education institutions are constantly expected to deliver a high-quality education while meeting the growing demand from students. Every institution has specific factors that attract students to apply but also share the same challenge of retaining the students after enrollment. This problem does not seem to have an ideal solution in most higher education institutions. This project integrates the use of Lean Six Sigma techniques and data analytics to establish a standardized process for improving student retention rates, with a focus on Penn State Behrend as a case study. Data sets pertaining to admission, enrollment, transfer and dropout were collected and analyzed to identify opportunities for improving the retention rate. Descriptive and predictive analytics models were developed to find trends in the data and predict future retention outcomes. Based on the research outcomes, recommendations are made to help higher education institutions to better understand and improve student retention.

25. 360 Videos and Virtual Reality-Based Teaching Modules to Teach Industrial Engineering Concepts

Bradley Nulsen, Andrew Gerber, (Dr. Omar Ashour), Penn State University - Erie, The Behrend College - Industrial Engineering/Technology

Modern engineering curriculums are a combination of both scientific theory and practical skills. While book learning and laboratory work can never be replaced, they absolutely can be supplemented in order to help with the practical side of things, especially when this experience can either be impossible or expensive to achieve using traditional techniques. This research project aims to use 360o videos and Virtual Reality (VR) technology to provide an additional, more engaging teaching modules to help engineering students to experience more realistic work scenarios as well as give professors a context in which to challenge students on their abilities and knowledge with the course material. The scope of all disciplines engineering disciplines is vast so this project is focused on just Industrial Engineering (IE) concepts. In the scope of the IE curriculum, concepts of queueing theory and the practice of time studies will be used to demonstrate the use of this teaching module. In order to provide VR learning tools for these elements, a virtual factory environment will be implemented in which a fully functional electric-drill production line can be interacted with. A 360 video for a powder metallurgy manufacturing environment will be created as well. The students will be able to walk around these environments, interact and alter the machinery to change the parameters of the system, as well as try to investigate any problems or scenarios. Tools will be provided for the student such as a calculator, stopwatch, and note-taking tool in order to allow the most realistic experience possible compared to the way a real engineer would go about their work in that environment. The implementation hardware will be an array of Oculus brand VR devices. The software used to develop the environment is Unity.

26. Process Improvement to Reduce Time-to-Intervention for Acute Stroke Patients

Safinaz Elhadary, (Omar Ashour), Penn State Behrend - Industrial Engineering/Technology

Stroke is the fifth leading cause of death in the U.S. Timely treatment is one of the most vital factors for the survival of an ischemic stroke patient. A treatment that has proven to increase “disability-free” survival for ischemic patients with large vessel occlusion (LVO) is endovascular thrombectomy. The purpose of this research is to decrease door to groin time (DTG) which is the time from when the patent arrives until the start of the endovascular treatment. The first step was to revise the existing pathway to improve patient flow. This helped identify non-value add activities that caused delays. For analysis, the time of the day a patient arrives was compared, as well as, the patient’s arrival method. Time of the day consisted of before or after work hours. Patient’s arrival method consisted of In-house, emergency department (ED), regional, and pre-hospital. The two categories were statistically analyzed and the result was presented to all stakeholders for feedback. Several solutions were developed. A short term approach would be to offer stroke identification education and training sessions to hospital staff, while a more long term and an expensive solution would be to invest in a Stroke Suite that includes all the required treatment protocols for a stroke patient in one room. After implementing the selected solutions, we expect to see a significant reduction in the DTG time. This improvement will be achieved without compromising the safety of patients.

27. Achieving Climate Control using Renewable Energy

Drew Bower, Mike Bielski, Evan Mangan, Daniel Schell, Kasra Ghahremani, (David Gee), Gannon University - Mechanical Engineering/Technology

The objective of this study was to determine the feasibility of powering a climate control system solely from a renewable energy source. The climate control system components were adapted from a standard residential-type refrigerator. In order to initiate the project, the refrigerator housing was carefully deconstructed around the heat exchangers, expansion valve, compressor, and associated coolant lines. The components were then reattached onto a box-type enclosure which was constructed to serve as the compartment whose temperature was to be controlled. The enclosure design was purposefully simple; a rectangular shaped box constructed out of 0.5 in plywood and mounted on castor wheels. A Plexiglas door was substituted for the front face of the enclosure. The overall design provided for enhanced enclosure mobility while also allowing easy observation of the interior temperature via a thermostat mounted within the compartment. The heat source which triggers the refrigeration system is no longer food or drink, but rather is incident solar radiation. Hence, instead of a relatively cool 4 ^{o}C interior temperature, the enclosure was maintained at 15.6 ^{o}C (60 ^{o}F). This was affected by replacing the refrigerator's original thermostat with a digital commercial residential model. Compressor power was derived solely from renewable energy. Specifically, a pair of crystal silicon solar panels was used to generate electricity which was then stored in a deep-cycle battery. In between the battery and compressor, a pure sine-wave power inverter was used to convert direct current to alternating current. Finally, inside the laboratory and on cloudy days a small portable space heater was installed inside the enclosure to produce heat, and the solar panels were activated with light from a bank of light emitting diodes.

HISTORY & CULTURAL STUDIES

28. The Bedouin Tent: Shading the Line Between 'Progress' and Cultural Continuity

Rex Barner, (Leigh-Ann Bedal), Penn State Behrend - Anthropology

The people of the Bedoul tribe are the indigenous inhabitants of the Petra valley in southern Jordan. They proudly claim their identity as one of the region's Bedouin tribes. In recent decades, the Bedoul transitioned from a semi-nomadic existence to a government-enforced sedentary lifestyle with the provision of permanent housing in a village complex on the outskirts of Petra. Although the Bedoul have readily adopted many modern amenities, and despite the availability of more contemporary alternatives, some aspects of Bedouin culture that are ingrained in their identity persist. One prominent example is the traditional tent which is implemented in a variety of contexts related to work, ceremony, and leisurely activities of daily life. In addition, the Bedouin tent is a popular draw for tourists seeking an authentic cultural experience. In summer 2018, while participating in an archaeological excavation in the ancient site of Petra, I had the opportunity to work alongside members of the Bedoul community and to carry out ethnographic fieldwork. Using participant-observation, I gained first-hand experience with the construction and multiple functions of the tent in daily activities, and came to understand the significant role it plays in their desire to stay connected to their ancestral Bedouin roots.

29. Interpretations of the Confederate Flag Among College Students

Elizabeth Wright, (Patricia Brougham), University of Pittsburgh at Bradford - History

The Confederate Flag is a symbol for popular debate in American society today. Often, the dispute stems from the question of whether or not the flag is a symbol of racism. Scholars and researchers alike have looked exhaustively at this debate and found multiple answers for negative attitudes surrounding the symbol. Since the Flag's adoption by popular white supremacist groups, many feel the flag is oppressive and racist by nature. On the other side of the debate, it is argued that the flag merely represents the grim history of the United States, a certain sense of patriotism, and states' rights. Therefore, it can be argued that the flag is not a symbol of racism. This study examines the attitudes of college students within the Eastern United States as they relate to the Confederate Flag. From this study, conclusions will be drawn about the views of that targeted population.

30. Behrend Chessmen: A Collection of Early Reproduction Chess Artifacts

Aurora Paterson, (Leigh-Ann Bedal), Penn State Behrend - History

As Penn State Behrend celebrates seventy years of being a college campus, the history of the campus and Behrend family is being celebrated. The land of the Penn State Behrend campus belonged to Mr. and Mrs. Ernst Behrend, and the Glenhill Farmhouse was their home. The Behrends were wealthy and had an appreciation for art and craftsmanship, which led to their avid collecting of antiques. In the Glenhill Farmhouse, a small collection of chess pieces are on display. Most of them resemble Lewis chessmen, the largest antique chess collection in the world that was discovered in 1831 on the Isle of Lewis in Scotland. The Lewis chessmen are perhaps the most famous and recognizable antique chess collection and have fascinated scholars and tourists since their discovery. The chessmen were carved from walrus ivory and whales' teeth in the Scandinavian world during the 13th century. After examining and photographing each of the chess pieces in the Glenhill Farmhouse collection, I took on research to explain why those chess pieces were collected, where they may have come from, and what they reveal about the Behrends. Using the Behrend archives, museum databases and publications, the photographs and analysis of the Behrend chess pieces, and chess publications, I have attempted to answer these questions. While doing so, I found a wealth of information about the Behrends and the place of these chess pieces in the history of artifact reproductions.

31. Pornography and HIV Status: Correlation or Causation

Austin Johnson, (Mark Owens), Penn State Behrend - Econometrics, Statistics, and Cultural Anthropology

While pornography is not a professional or well-respected industry; it does play a vital role in everyone's life either directly or indirectly, so we must respect the industry's great impact and understand it. We are all aware of the stigma between homosexuals and HIV, so I was wondering what porn's relation was in the situation. What is the correlation between the amount of porn someone watches and someone's HIV status? How does this associate with other variables related to these topics such as drugs and alcohol? Although pornography is widely available and frequently used among many adults in the U.S., little is known about the relationship between pornography and risk factors for HIV transmission among men who have sex with men. As a member of the LGBTQIIA+ I would like to compare my findings with other research out there and compare our results to prove there either is or is not a correlation.

32. Supporting Student Survivors: The Analysis and Creation of a Trauma-Informed Resource for Sexual Violence Survivors at Allegheny College

Jordann Kline, (Heather Moore Roberson), Allegheny College - Community and Justice Studies

College students are the most at risk population to experience sexual violence. An act of sexual violence is extremely traumatic and is often accompanied by numerous side effects. It is imperative for the mental, emotional, and physical health of the victim that they are able to access resources that can provide them with the support they need. There is currently a gap on Allegheny College's campus, in that there are not any readily accessible resources that exist solely to support and educate student survivors of sexual violence. By analyzing the existing policy that addresses sexual violence on college and university campuses, Title IX, and feminist political thought, it is clear that patriarchal influence has normalized sexual violence and silenced the victims. Through the philosophy of trauma-informed care, recommendations on improving community education and support is provided. In order to fill the previously identified gap, the creation of a trauma-informed, survivor focused resource will operate with the primary goal of putting knowledge, and thus personal autonomy, back into the hands of the survivor. The finalization and distribution of the resource will occur during the spring semester of 2019. This resource helps to educate survivors, but also the Allegheny community on sexual violence and Title IX. If student survivors do not have access to survivor focused resources, and support from a trauma-informed community, it is unlikely they will be able to heal in the same place they encountered trauma.

PSYCHOLOGY

33. Transcending Death Anxiety through Death Education

Dawnyiel Smith, Tessa Sidelinger (Heather Lum), Penn State Behrend - Psychology

Discussion of death is often avoided within American society which promotes anxiety. It is generally not until elder years that death anxiety decreases and acceptance begins. This research hypothesizes that through death education and discussing death in a positive light, death perspective can be positively impacted at an earlier age. In this study, the participants will briefly learn about death through an approximately 12-minute long educational video. It is suggested that those who are exposed to this information will score lower in death anxiety than participants who are not exposed to the information. The 36 question Collett-Lester Fear of Death scale will be used to score anxiety. Scores will be compared in SPSS to look for significant differences. Demographics will also be compared including gender, age, religion, ethnicity, and college standing. Participants will receive comprehension questions after watching the video. Only participants' scores who engaged thoughtfully in the video will be used for comparison. Immature concepts of death can cause fear and unanswerable questions to arise, so education is suggested. If education impacts death perspective, then death education should become an integral part of school curriculum to promote increased well-being.

34. Delinquency: Past, Present, Future

Eleni Vlachos, Grant Maier, Jackson Walker, (Luke Rosielle), Gannon University - Psychology

The purpose of this study is to explore the effect that family status and living arrangements have on sentencing and recidivism rates of juveniles in Erie County, Pennsylvania. Data were obtained from the Juvenile Courts Judges Commission. The sentencing data for first-time offenders were collected from 2012-2017, and the recidivism data refers to cases closed between 2007-2012 with the new offenses occurring in subsequent years. This study seeks to understand what is associated with juvenile delinquency and recidivism rates, as well as explore the services that could decrease the likelihood of offending and reoffending.

35. Improving cognitive mapping and spatial abilities through augmented reality game Pokémon Go

John Campbell, Heather Vommoro, Benjamin Lorigan, Steven Brown, Mason Mcguire (Heather Lum, Dawn Blasko), Penn State Behrend - Psychology

In the past decade, many innovations have been made in personal computing, smartphones, and computing software. Given the high demand for various computing devices and billions of dollars in sales, the price for these technologies has significantly decreased - making devices like smartphones readily accessible to a large majority of the population. Given the developments in GPS and smartphone software, we can now navigate with our handheld devices with ease. It has been unclear in recent years whether our phones and their powerful applications are a detriment to our spatial and cognitive mapping skills, or improving our ability to successfully navigate and comprehend our surrounding environment. Spatial skills involve our ability to navigate our environment and the cognitive techniques we use to do so. Spatial skills can help us accomplish simple tasks like finding a car in a crowded parking lot. The basic skills of navigating around a college campus involve using retained spatial information of our environment known as mental maps. Given that everyone is different, research suggests spatial abilities between individuals also varies. Like any other skills, spatial skills and ability can be improved through training. Our research aims to test how augmented reality and smartphone technology impact spatial ability. We have run a study on an augmented reality smartphone game called Pokémon Go. The intent of our Pokémon Go study was to investigate whether the game and the augmented reality navigation helps individuals develop mental maps and improves spatial skills. We hypothesized that the aspects of playing with a partner would facilitate motivation and increase attention on the spatial task Pokémon Go. We collected data of participants mental maps of Penn State Behrend Campus through a three-minute map task. Through surveys, we have gathered data on player preferences and performance with individual and group play.

36. Issues in Community-based Research

Jack Parker, Bethany Pimental-Bowman, (Monali Chowdhury), Allegheny College - Psychology

Evidence suggests that in academia a majority of educators and students are trained in traditional methods and approaches most useful in lab-based and clinic-based research (Aiken et al, 2003; Kazdin, 2005). However, these laboratory standards and values might not be exactly applicable to the real world demands of research performed within the community in collaboration with human service agencies.

With this overview in mind, we delineate issues surrounding community research implementation and evaluation in the context of an ongoing projects in our research program. Specific examples from different projects are used in a critical analysis of the unique methodological considerations of community-based research such as: (1) working effectively with field collaborators, (2) choice and use of criteria to assess program effectiveness, (3) producing a battery that is manageable and feasible to implement while maintaining scientific merit, (4) training indigenous personnel to administer this battery, (5) introducing the research and obtaining consent from potential participants which in this case includes minors from a vulnerable population. In conclusion, recommendations are made for integrating community-based research in the context of undergraduate research and civic engagement.

37. Impact of Evidence-Based Mentoring on Outcomes Related to Positive Youth Development

Cheyenne Huellen, Adrienne Pauline, Lydia Ogunjeminiyi, Marquis McBride, (Charisse Nixon, James Hodge), Penn State Behrend - Psychology

The influence of positive relationships with a formal figure outside of the home, including community helpers and mentors, is protective for various aspects of gaining social relationships as well as promoting mental health and psychological well-being (Capp, Berkowitz, Sullivan, Astor, Pedro, Gilreath, Benbenishty, & Rice, 2016). The impact of mentors on at risk-youth may mitigate these experiences of poor mental health and psychological well-being and promote constructive ways to deal with these problems. Studies involving the influence of mentoring have demonstrated that mentoring promotes the psychological well-being of mentees (Chen, Greenberger, Farruggia, Bush, & Dong, 2003; DuBois & Silverthorn, 2005). The current study explored the impact of evidence-based mentoring on outcomes related to positive youth development. Specifically, researchers measured adolescent well-being, positive developmental assets, coping strategies, and other theoretically relevant outcomes. Impact of mentoring was explored with a pre-post design using treatment and control groups. Of the total 140 participants, 34 middle school mentees were exposed to a socio-emotional curriculum during the 2017-18 academic semester. Trained college mentors met with mentees weekly for a total of one hour. During this time, lessons and topics of discussion surrounded myriad aspects of positive developmental outcomes. Researchers hypothesize that the development of empathy will mitigate the effects of relational and physical victimization on its perception of severity and overall emotional functioning. Further, it is hypothesized that mentoring will increase developmental assets, emotional functioning, and other important protective factors.

38. Effects of Victimization and Social Media Use

Leanne Confer, Marna Owens-Bailey, Samantha Conway, (Charisse Nixon, James Hodge), Penn State Behrend - Psychology

Previous research has shown that social media use is heavily correlated with negative outcomes, particularly when usage time exceeds two hours daily (Twenge et al., 2017). Supplementary negative outcomes are linked to increased rates of adolescents' mental illness, such as depression and anxiety, and increased suicidal behavior. Relational victimization peaks during middle school which is during the same time that adolescents are increasing their social media intake. Due to the changes in the prefrontal cortex functioning to the limbic system adolescents struggle to make rational decisions, particularly during emotionally salient situations (Casey et al., 2011). Recent research has focused on resilience (Hinduja & Patchin, 2017) and purpose (Damon, 2008) as potential protective factors among youth to minimize negative outcomes and optimize positive outcomes. Executing an effective mentoring program concentrated on teaching socio-emotional skills, coping, purpose and resilience may be one approach to minimize negative effects associated with bullying during adolescence. The work at hand sought to investigate if various forms of bullying (i.e, relational victimization, negative social media) predicted lower levels of purpose. Further, we assessed the effects of mentoring on the relationship between bullying and adjustment outcomes. Gender differences were also examined throughout. Our sample was composed of 53 sixth graders, 10 of whom were mentored by college students in the 2016-2017 academic year. Using multiple regression analyses, we found that victimization is negatively correlated with reported sense of purpose. More specifically, this effect was only significant for those kids who did not take part in the mentoring program ($p = .016$), and not among those who were mentees ($p = .142$). Social media use did not significantly impact sense of purpose but, rather, face-to-face relational aggression was far more damaging. There were no significant gender differences.

POSTER PRESENTATIONS

BIOLOGY I

1. Role of trans-Golgi Network and Endosomal Adaptors in Nitrogen-Regulated Growth of *Saccharomyces cerevisiae*

Allyson Owens, Rachel Stubler, (Quyen Aoh), Gannon University - Cell & Molecular Biology

Cell membrane trafficking is the transportation of vital cellular materials, such as nutrients, waste products, and proteins between the plasma membrane and organelles. Membrane trafficking is facilitated by a host of proteins that concentrate cargo and mediate vesicle formation. The ability to correctly regulate membrane trafficking under different environment conditions is essential for cell growth. In this proposal, the role of trafficking in regulating cell growth under different nitrogen conditions is examined using the yeast *Saccharomyces cerevisiae*. Specifically, we determined how clathrin adaptors that function at the trans-Golgi Network (TGN) and endosomes regulate cell growth in preferred and non-preferred nitrogen sources. We used spectrophotometry to measure the growth of mutant yeast with various deletions of clathrin adapters. The movement of molecules between organelles is an essential function in eukaryotic cells and is required for cell growth. The trans-Golgi Network (TGN) and endosomes are central hubs of membrane trafficking and are known to regulate the localization of proteins, such as nitrogen permeases. Vesicular transport at the TGN and endosomes is regulated by the clathrin adaptors Gga2, AP-1, Ent3, and Ent 5. These adaptors concentrate cargo molecules and recruit the coat protein clathrin to form vesicles. Clathrin adaptors at the TGN and endosomes appear to have distinct but overlapping functions. Specifically, Gga2 seems to primarily function with Ent3 and separately from AP-1. Ent5 appears to function primarily with AP-1 but also redundantly with Ent3. In cells grown in non-defined rich media, deletions of combinations of adaptors that both inhibit Gga2 dependent and AP-1 dependent trafficking reduces cell growth. The results of this study will add to a growing body of knowledge of how clathrin adaptors affect the overall fitness of the cell and may reveal how membrane traffic is differentially regulated depending on the environment

2. Role of SCAMP3 in β-Amyloid Production and Secretion

Maura Mobilia, Mariam Alkhafaji, (Quyen Aoh), Gannon University - Cell & Molecular Biology

Alzheimer's disease is a neurodegenerative disease associated with loss of memory and cognitive function. The aggregation of extracellular plaques containing β-amyloid is related to the processing of the amyloid precursor protein (APP). The degradation of APP is regulated by the endosomal sorting complexes required for transport (ESCRTs) and disruption of ESCRT function leads to accumulation of β-amyloid. Previous studies have shown that secretory carrier membrane protein 3 (SCAMP3) interacts with ESCRTs that function in APP processing. We hypothesize then that SCAMP3 functions in trafficking of APP. In this study we use a well-established ELISA assay to determine if RNAi-induced knockdown of SCAMP3 promotes or inhibits β-amyloid production.

3. Cytotoxicity of Anthracyclines, DNA Topoisomerase 2 Inhibitors, in Prokaryotic and Eukaryotic Cells

Desiree Thompson, Demitrios Lampros, Kelsey Warner, (William Mackay, David Fulford, Craig Steele), Edinboro University of Pennsylvania - Cell & Molecular Biology

For more than forty years, Anthracyclines (Daunomycin, Adriamycin, Idarubicin and Epirubicin) have represented one of the most commonly used classes of anticancer drugs. It is known that Anthracyclines interact with DNA in a very complex manner. The major anthracycline anti-tumor function is thought to be accomplished by an inhibition of DNA Topoisomerase 2 activity. Studies in our lab have shown that Anthracyclines are mutagenic and cytotoxic in bacteria (*Salmonella typhimurium* and *Escherichia coli*), and can induce intrachromosomal recombination events in the yeast /*Saccharomyces cerevisiae*/. The objective of this study is to accurately access the vital role of DNA type 2 Topoisomerases in the presence of anthracycline compounds. Normal as well as *gyrA* and *gyrB* mutant *E. coli* cells were exposed to Adriamycin and cell viabilities were determined for all strains. Experiments indicate that anthracyclines have no effect on cell viability in mutant cells, and these results will be discussed regarding the role of bacterial topoisomereases in the presence of these anticancer drugs.

4. Growth of Cultures of *Alternaria alternata* from Leaves of *Actinidia arguta* are Inhibited by 1,4-Dimethylnaphthalene

Jessica Till, (Michael Campbell), Penn State Behrend - Cell & Molecular Biology

Alternaria alternata is a pathogenic fungus known to cause leaf spot in many plant species such as apples, purple coneflower, onions and many others. *Actinidia arguta* (hardy kiwifruit) is an alternative crop which has commercial potential in the United States. Field trials of *A. arguta*, located at Lake Erie Regional Grape Research and Extension Center, presented leaf lesions which suggested the presence of a pathogen. Leaf samples were taken from multiple symptomatic vines and allowed to incubate in empty sterile petri dishes. Symptomatic sections, approximately 1 cm^2, were cut from the leaves and placed onto fresh potato dextrose agar (PDA) plates and incubated at 25°C for three days. Several fungal species were present on the plates with one fungal species common among all leaf samples plated. All visibly different species were isolated onto separate PDA plates, incubated, and re-plated until purified cultures were obtained. PCR amplification of the 18 ITS region was accomplished using degenerate primers and DNA products were identified using Sanger sequencing. Resultant sequences were analyzed with BLASTn against the NCBI database. Cultures of *A. alternata* were identified as present on multiple leaf lesions. Established cultures were treated with 1,4-dimethylnaphthalene (DMN) in a 9.5 Liter BBL GasPak chambers for two days. Mycelial growth was inhibited by DMN relative to control cultures. This is the first report of *A. alternata* isolated from the leaves of *A. arguta* and a demonstration that DMN can inhibit the growth of this fungal species.

5. Regulation of dihydrofolate reductase (DHFR) gene expression in human breast tissue cell lines

Parmvir Deo, Meghan Robick, (Prasad Dalvi, Gary Vanderlaan), Gannon University - Cell & Molecular Biology

The dihydrofolate reductase gene (*Dhfr*) is an E2F1-regulated proto-oncogene. *Dhfr* is critically important in the anabolism of both sulfur-containing amino acids and certain nitrogenous bases. Perhaps its most notable role however is for the synthesis of deoxyribose thymidine triphosphate (dTTP), a requisite building material to sustain elevated DNA replication rates in cancer cells. Previous work has established that expression at the *Dhfr* locus is under the combined control of at least five distinct mechanisms. At the transcriptional-level, E2F1 binding sites located in the promoter of the *Dhfr* gene place it under direct control via the E2F family of specific transcription factors that regulate the cell cycle. Further, a non-coding RNA (*ncRNA-Dhfr*) expressed from a nearby minor promoter destabilizes assembly of general transcription factors, TBP and TFIIB, during transcriptional initiation at the *Dhfr* major promoter. Lastly, the DHFR enzyme itself has been shown to interfere with translational machinery, and two different microRNAs (miR-24 & miR-192) appear to regulate *Dhfr* mRNA stability putatively in a RISC-mediated mechanism. Each means of regulation has been documented in an equally disparate array of cancer cell lines, ranging from leukemia, osteosarcoma, fibrosarcoma, and colonosarcoma. Here we seek to investigate human *Dhfr* regulation in both non-tumorigenic breast epithelial cells (MCF10A) and a breast cancer cell line (MCF-7) by analyzing the levels of 1) *Dhfr*, 2) *E2f1*, and 3) *ncRNA-Dhfr* transcription via RT-PCR assays of isolated total RNA derived from cell-culture lysates. Future experiments may investigate the RISC-mediated mRNA degradation in these two human breast cell lines.

BIOLOGY II

6. Evaluation of current technologies for in situ behavioral monitoring of small amphibians

Dana Arnold, (Lynne Beaty), Penn State Behrend – Ecology

Over the last 20 years, researchers have identified a consistent decline in the populations of amphibians worldwide due to a variety of stressors including Chytridiomycosis, a prominent disease, and increased temperatures resulting from climate change. Due to this decrease in amphibian populations, it is crucial to monitor and observe their behavior and life history patterns so that we may identify strategies to understand and evade additional population losses. Unfortunately, the devices that are currently available to monitor behavior of animals in the wild have a number of limitations that make them unsuitable for use on amphibians. Using *Ambystoma maculatum* as a model organism, I identified currently available monitoring devices and summarized their specifications in order to quantify their limitations. In pursuit of a solution, my data will be compiled into a concise summary which will be used to guide developers in the creation of a new device that will fit the qualifications to safely and efficiently record behavior patterns of small amphibians like the *A. maculatum*. The largest limitations that can be seen in the industry of tracking devices for small amphibians, like *A. maculatum*, are weight capacity, mechanism of implantation, weight of the device, and price. In order to improve these limitations and increase the safety of these devices for the use on small organisms, different mechanisms of attachment, smaller dimensions, and lower device weights must be produced. Current needs include: external attachment mechanisms to prevent internal damage to the organism as well as device weights below 0.5-1.0 grams in order to avert the possibility of excess tag burden. This synthesis of the limitations and extensions of current tracking devices will allow for the development of a device which fits the specific requirements of small organisms in fossorial and subterranean habitats.

7. How Lake Erie Alters Climate Change in the Lake Erie Grape Belt

Kara Dobson, (Michael Campbell, Lynne Beaty, Bryan Hed), Penn State Behrend - Ecology

The second largest grape growing region in the United States lies along the Southeastern shore of Lake Erie and is known as the Lake Erie Grape Belt. The unique microclimate in this area, due to its proximity to the lake, allows for the production of grapes. Climate data dating back to 1948 was found at the Lake Erie Regional Grape Research and Extension Center, which resides in North East, PA. This data contains daily maximum and minimum temperatures, and was analyzed to determine how the climate has changed in this region over the last 70 years. Climate data from other coastal and inland cities within Pennsylvania, New York, and Ohio was collected from NOAA and analyzed to see how climate change affects regions closer and further from Lake Erie. Our results show that winter is becoming shorter, with the first frost date starting later and the last frost date ending earlier each year. While this is true for both coastal and inland cities, the degree to which it is changing differs between the two. Yearly high and low temperatures were also compared between the coastal and inland cities, with inland cities having much lower low temperatures than coastal cities. Other factors from the North East station including growing degree days, bloom dates, precipitation levels, and Brix levels have been analyzed to determine how the grape growing industry may be affected by the changing climate. Further research is being conducted to compare coastal and inland regions, which should allow us to further determine how Lake Erie is altering the effects of climate change in the Lake Erie Grape Belt.

8. Assessing the stream health of PA tributaries to Lake Erie using macroinvertebrates

Cytalia Crosby, Maggie Dolak, Christopher Ross, Kaylee Luchansky, (Chris Dempsey), Gannon University – Ecology

The importance of water quality cannot be understated in aquatic ecosystems. Within the Pennsylvania (PA) portion of the Lake Erie watershed there are about 22 tributaries that drain into the lake. The most recent water quality assessment of those streams was in 2005. The health of stream ecosystems can be assessed using biological indicators. In this study we selected 10 streams (16 study sites) in the Erie, PA area and conducted a water quality and macroinvertebrate assessment. Sampling occurred from August to November 2018. Macroinvertebrate samples were collected using a kick net and then keyed out to family level classification in the laboratory. Water quality measurements (pH, dissolved oxygen, water and air temperature, and conductivity) were taken with a YSI ProDSS sonde. For each study site we calculated a Hilsenoff Biotic Index score, a Simpson diversity index value, and tabulated water quality data. We used that information to provide an assessment of each stream that we studied.

9. Assessing nutrient limitation to dissolved organic carbon degradation in Elk and Walnut Creek

Alexandra Paullet, Margaret Dolak, (Chris Dempsey), Gannon University – Ecology

Nutrient limitation in aquatic ecosystems is well debated in the literature. Some systems are limited by a single nutrient, others may be co-limited. In the Great Lakes, much of the literature suggests that phosphorus is the nutrient that limits biological activity. In this study, we designed an experiment to test nutrient limitation in two Pennsylvania streams that drain into Lake Erie. Seasonal water samples from Elk Creek and Walnut Creek were supplemented with either phosphorus, nitrogen, or nitrogen and phosphorus to assess whether microbial activity might be nutrient limited. We analyzed changes in the concentration and quality of dissolved organic carbon over 21 day experiments to determine whether our study sites were limited by one the scenarios above. Heterotrophic microbes are capable of utilizing dissolved organic carbon as an energy source and serve an important link at the base of the aquatic food chain. Two study sites within each creek were selected. Initial results from the fall showed that both Elk and Walnut Creek's may not be nutrient limited. We conducted seasonal experiments (fall, winter, and spring) to determine whether conditions might change throughout the year.

10. Context Dependency of the Hydrolysis of Urea to Ammonium for Urea-based De-icing Alternatives

Megan Solan, Elizabeth Klos, (Samuel Nutile), Penn State Behrend – Ecology

Freshwater salinization caused by chloride de-icing salts is a problem of growing environmental concern in the United States. With this, products marketed as "eco-friendly" have been introduced to the de-icing market. One "eco-friendly" alternative utilizes urea to de-ice without the need for any chloride, theoretically lowering environmental impact on freshwater ecosystems. Prior research with one urea-based alternative, concluded, using standard 10 d toxicity testing conditions with *Chironomus dilutus*, that this product was more toxic than traditional road salt. However, toxicity of the urea-based de-icing blend was likely correlated with the hydrolysis of the nontoxic urea to toxic ammonium. The factors influencing this hydrolysis process are dependent on environmental context. Understanding the lethality of this compound in real world systems is far more complicated since these toxicity tests are not predictive of real-world exposure. The objective of this study was to determine the lethal concentration 50 (LC_50) for an urea-based de-icer under different environmental conditions. Ten day toxicity tests were conducted using 2nd instar *C. dilutus* in fine silica sand and lake sediment. The LC_{50} for the sand medium was 0.306 g/L (0.156-0.489 g/L, 95% CI) and the lake sediment was 0.108 g/L (0.082-0.137 g/L). While these values are numerically similar, they are likely not biologically different. The hydrolysis rate of the urea to ammonium was different in the two media, however, the peak ammonium concentration was similar for each medium, driving the similarity in toxicity. The time component of the test is likely normalizing the toxicity data, demonstrating a fault in traditional time dependent toxicity tests. Thus, we have determined the toxicity of this compound would be better represented as a threshold value, rather than a time dependent concentration, simultaneously expanding understanding and risk management of de-icing formulations.

11. Investigating the Mechanism Used by the Bacterium *Pseudomonas nitroreducens* to Block Induction in the Fern *Ceratopteris richardii*

Callie Steele, (Michael Ganger), Gannon University - Ecology

The gametophytes of the fern *Ceratopteris richardii* (C-Fern) may be either hermaphrodite or male. Hermaphrodites secrete a hormone called antertheridiogen (A_C_E) that causes undifferentiated individuals to develop into males through a process called induction. The bacterium *Pseudomonas nitroreducens* has been shown to increase the percentage of hermaphrodites in culture by somehow blocking induction. The bacterium could potentially alter sexual development by removing A_C_E or producing plant hormones that counteract the effects of A_C_E. An experiment was designed to test whether the bacterium removes A_C_E from culture and whether the bacterium needs to be present with C-Fern. Twenty Petri dishes were established with C-Fern and twenty without. After two weeks, sterilized fluid from each of these treatments was then split and used to establish Petri dishes with or without the bacterium. After one week, sterilized fluid was then used to establish four treatments consisting of ten Petri dishes: 1) no C-Fern followed by bacteria, 2) no C-Fern followed by no bacteria, 3) C-Fern followed by bacteria, and 4) C-Fern followed by no bacteria. The Petri dishes were then sowed with different densities of C-Fern. After two weeks gametophytes were counted and identified as either male or hermaphrodite. An analysis of covariance determined that the percentage of hermaphrodites was significantly lower in the two treatments starting with C-Fern regardless of the presence of absence of the bacterium. This leads us to conclude that the bacterium probably does not consume A_C_E and that it likely produces a hormone that blocks induction. Furthermore, the bacterium probably does not produce this molecule unless it is grown in the presence of C-Fern.

12. Effects of Fluoxetine and Predation Risk Span Generation in a freshwater snail

Noah Colvin, (Lynne Beaty, Adam Simpson), Penn State Behrend - Ecology

The awareness of predational risk is an extremely important trait for organisms to have in their natural habitat. Having a heightened awareness for predator cue can mean life or death for organisms in aquatic and land-based environments. Physid, for example, exhibit strong and rapid responses to olfactory cues released by the aquatic predators such as the rock crayfish (*Cambarus carinirostris*). The ability of animals to respond to predation risk is governed, in part, by the actions of serotonin. There are compounds commonly found in wastewater, however, that can influence the action of serotonin. For example, fluoxetine, the active ingredient of Prozac®, is a selective serotonin reuptake inhibitor, which may influence serotonergic signaling in freshwater animals and thus their responses to predation. The objective of this study was to determine how predation risk and fluoxetine interacts to influence the behavior and morphologic responses of Pysid snails in two generations. We applied six different treatments consisting of all combinations of three levels of fluoxetine (FLX; 0 µg/L, 0.1 µg/L, and 1.0 µg/L) and two levels of predation risk (presence and absence of the olfactory cues of crayfish) to the F1 generation of nails. Water changes and treatment applications were preformed biweekly for 5 weeks until the F1 generation began to reproduce. The F2 generation was then reared for four weeks in the absence of predation risk and FLX treatments. At the end of the four weeks, we quantified antipredator behavior, shell shape, shell size, and crush resistance of the F2 generation. We found that both the FLX and predation risk experience by the F1 generation influenced the behavioral respaces of the F2 generation to perceived predation risk. The influence of FLX and predation risk on shape, size, behavior, and crush resistance of the second generation will be presented at the Sigma Xi Student Research Symposium in April 2019. The goal of our findings is to be able

13. Zooplankton Assemblages in Lake Erie

Allison Perston, (Michelle Kuns), Gannon University - Ecology

Zooplankton serve as an important food sources for young fish and are sensitive to changes in water conditions. We monitored zooplankton assemblages in Presque Isle Bay as part of a larger program to monitor the health of the Presque Isle Bay aquatic ecosystem. Zooplankton samples were collected each month throughout the ice-free season (May-November) in 2018. Samples were collected using a 20-cm vertical net lowered to near the bottom of the bay (5m) and pulled to the surface. Zooplankton samples were immediately preserved in 70% ETOH. In the lab, the zooplankton are being identified under a light microscope, counted, and measured for size. Species composition and abundance will be compared to water clarity, light penetration, and nutrient data collected at the same time as the zooplankton.

14. The impact of tadpole predation risk on frog morphology throughout development

Zhuoyan Si, (Lynne Beaty), Penn State Behrend - Ecology

Predators are capable of changing prey behavior and morphology, resulting in induced, plastic, antipredator defenses in the prey. Many prey organisms, like frogs, have different morphologies that are best suited to combat different types of predation, but tadpole susceptibility to different types of predators changes throughout development. To understand how the risk from different types of predators influences frog morphology throughout development, we collected naïve Blanchard's cricket frogs (*Acris blanchardi*) tadpoles from ponds with and without a history of fish predation, and exposed them to cues from fish or dragonfly predators throughout development. All of the tadpoles from this study had their pictures taken once a week starting one week after hatching until metamorphosis. Tadpole shape (morphology) was then quantified from the photos and analyzed using geometric morphometrics. Given that previous studies have shown that tadpole growth and shape can be affected by habitat and predation, we expect to see differences in tadpole morphology over time in our treatments.

15. Does experience improve the phototactic performance of Nerite snails

Kaylee Brown, (David Merwine), University of Pittsburgh at Bradford - Organismal Biology

In a pilot study, we tested the effects of rotenone, a piscicide and pesticide, on Nerite snail locomotor and phototactic behavior. During that study, we noted that the animals' phototactic responses seemed to improve with experience. Control snail behavior was tested under both red and white light, and both tests were repeated a week later. Under both lighting conditions, the number of snails that spent more time in the light than the dark, and the ratio of time spent in the light compared to the dark for the population, increased on the second test. We performed the same tests on a different group of snails after exposing them to a very low dose of rotenone. Rotenone is a chemical that induces Parkinsons-like symptoms in a number of model species, and impairs locomotor behavior in snails. Again we noted an improved phototactic performance during the second round of testing, despite an overall reduction in locomotion. In our pilot study, we used a very small number of snails (n = 14) and tested each lighting condition twice. In order to investigate the possibility that snails were "learning" to move toward the light, we will repeatedly test 20 snails with the red light stimulus and measure their phototactic and locomotor behaviors. We will then compare group and individual performances to look for improved phototactic responses with experience. This data will then be used to inform the design of our rotenone study. Further, this study may demonstrate a "learned" component to phototactic behavior in the gastropod snail, *Neritina natalensis*.

16. Effects of acute exposure to a low dose of rotenone on locomotion and phototaxis in *Neritina natalensis*

Caitlin Nolan, Kaylee Brown, (David Merwine), University of Pittsburgh at Bradford - Organismal Biology

Rotenone, a neurotoxin known to affect aquatic invertebrates, is used as both a piscicide and pesticide. Though some studies suggest that rotenone does little harm to organisms other than fish, a few studies suggest otherwise. Here, we expose the aquatic invertebrate, *Neritina natalensis*, to a brief, low dose of rotenone to examine its effects on *N. natalensis* locomotion and phototaxis. In our control study, snail phototactic responses were studied under both red and white lighting conditions. In both conditions, snails displayed positive phototaxis, or movement toward the light, indicating typical behavior. A separate group of snails was then exposed to rotenone, and the same tests were conducted. Our pilot results suggest a change in the preference for light in the rotenone-exposed snails. During the first round of post-rotenone testing, many snails showed no preference for either red or white light. Additionally, there was a significant increase in the time spent in the center of the testing environment, indicating decreased locomotion. This result is consistent with other reports that show Parkinsons-like effects, including reduced locomotor activity, in several model species after exposure to high doses of rotenone. Interestingly, in a second round of testing a few days later, the snails' phototactic response reappeared, despite overall locomotor activity remaining reduced. After an extended recovery period, the snails' overall locomotor activity also recovered. In conclusion, we show that sub-lethal doses of rotenone are capable of affecting the locomotor and phototactic behaviors of aquatic invertebrates, though over time these consequences appear to decrease.

17. Differences in Infections of Pennsylvania Ruffed Grouse (*Bonasa umbellus*) With Ascarida and Heterakis Nematodes, by Year, Age, and Sex

Michal Szelwach, Nicole Simonetti, (Edward Phillips), Gannon University - Zoology

Ruffed grouse (*Bonasa umbellus*) were collected from 21 counties in Pennsylvania during the last four hunting seasons. Necropsies were performed on the intestines and ceca of the grouse to remove parasitic nematodes. Two species of nematodes were identified (not all specimens were identified to species), Ascarida bonasae from the intestines and Heterakis isolonche from the cecum. The % of birds infected and the mean infection per infected bird of both species of nematode were analyzed in all birds combined, by year, and by age and sex of the bird. Overall infection rates with Ascarida dropped during each of the first three seasons from 64.7% to 53.7% to 30.9%, then increased to 54.8% during the 2017 season. Individual mean infections with Ascarida also dropped each season from 4.6 to 3.1 to 0.8 during the first three seasons, then increased to 2.6 worms per bird during the 2017 season. The drop to 0.8 during the 2016-17 season was significantly different from the two previous seasons and from the 2017 season. The infection rates and mean individual infection of Heterakis remained relatively constant through-out all four seasons. During 2017, and for all four seasons combined, juvenile grouse had significantly greater mean infections of both Ascarida and Heterakis than did adult grouse. There were no significant differences between the sexes.

18. Paleoecological and Paleobiogeographical Examination of a Late Eocene Elasmobranch Assemblage from Georgia, USA

Morgan Shields, Bradley Van Ess, (Todd Cook), Penn State Behrend - Paleontology

Recently, a large vertebrate assemblage was recovered from a Late Eocene (38-34 Ma) deposit from Georgia, USA. Preliminary examination of the fossil dentition has revealed numerous elasmobranch (sharks and rays) species from six orders, 11 families, and 16 genera. Also recovered were numerous teleost (bony fishes), reptilian and mammalian fossils. Elasmobranch teeth are among the most common vertebrate fossil remains. This is due to the durable nature of the outer enameloid covering and the continual production and shedding of teeth throughout the life of the organism. Recovered dentition can provide important insights into regional paleoecology and paleobiogeographical distributions of extinct taxa. Teeth may also be used as a biostratigraphic tool to assign relative ages of geographically separated rock strata. As such, detailed imaging of the fossil specimens has been employed. Larger specimens were digitally imaged using ammonium coating, whereas scanning electron microscopy was used for smaller fossils. Comparing this assemblage with previously described Late Eocene assemblages throughout globe has shown that many of the species appear to be endemic to the Atlantic and Gulf coastal plains of the USA. The assemblage also reveals a wide-ranging trophic structure that includes both small durophagous and large macrophagous species.

BIOLOGY III

19. Genetic Barcoding: A Survey of Invertebrate DNA and Analysis of Methods

Emily Eiss (Adam Simpson), Penn State Behrend - Genetics

The objective of this project was to analyze the methods of DNA extraction, DNA purification, PCR, sequencing, and database searches used and to identify the species of sixteen invertebrate samples collected in the field using DNA barcoding of the CO1 gene. Samples of tissue were ground to a small amount, and the DNA was extracted, purified, and exposed to primers that isolated the CO1 gene, which was then replicated in PCR. The processed sequences were searched in the identification engine of Barcode of Life Data Systems and through the National Center for Biotechnology Information's BLAST search. BOLD searches yielded expected results from the forward primer sequences but could not identify the species for any reverse primer sequence, except *Dicromorpha viridis*. NCBI's BLAST was consistently reliable in returning a species identification for both the forward and reverse primer sequences. Overall, the methods used were mostly successful, because nearly all (87.5%) of DNA samples sequenced were identified as the species intended, and nearly all (96.9%) of the sequences were identified by NCBI's BLAST as the CO1 gene of an invertebrate, whether it was the expected species or not.

20. Gametophytes of the Fern *Ceratopteris richardii* Express *CRKNOX1*, *CRKNOX2*, and *CRKNOX3*

Lyndsay Farrell, (Michael Ganger), Gannon University - Genetics

The KNOX (knotted-like homeobox) genes are members of a gene family that occur in plants and are involved with the regulation of transcription. The KNOX genes are divided into two classes based on nucleotide sequences: Class 1 (KNOX1) and Class 2 (KNOX2). The fern *Ceratopteris richardii* is a model system for the study of physiology and development and has gametophytes that develop as either males or hermaphrodites. Previous research has shown that *C. richardii* expresses at least three KNOX genes (*CRKNOX1*, *CRKNOX2*, and *CRKNOX3*) in the sporophyte, but not the gametophyte. With the sensitive technique of RT-qPCR we show that *CRKNOX1*, *CRKNOX2*, and *CRKNOX3* are differentially expressed in male and hermaphrodite gametophytes. Sequence analysis is currently being performed to confirm amplicon sequences.

21. ANI1 Expression Is Not Related to Rhizoid Growth and Development in Gametophytes of the Fern *Ceratopteris richardii*

Morgan Nyman, (Michael Ganger), Gannon University - Genetics

The fern *Ceratopteris richardii* (C-Fern) is a model system for understanding the physiology and development of plants. Sexual development in these ferns is environmentally determined. Individuals may be either male or hermaphrodite and the factor that has the largest effect on sex determination is a pheromone called antheridiogen (A_C_E) that is produced by hermaphrodites. The presence of A_C_E influences individuals to develop as males, while its absence results in hermaphrodite development. The gene *ANI1* (Antheridiogen-induced 1) is thought to be important in the development of males in response to A_C_E. However, research in our lab has shown that *ANI1* is expressed in large amounts in hermaphrodites, in particular, the basal, medial portion that includes the rhizoids and many antheridia. One hypothesis for the expression of *ANI1* in hermaphrodites is that the gene is associated with rhizoids. In order to test this, C-Fern were grown in the presence and absence of the soil bacterium *Pseudomonas nitroreducens*. The bacterium causes individuals to increase their rhizoid growth by 250%. RNA was extracted from hermaphrodites and the expression of *ANI1*, determined using RT-qPCR, was not affected by the bacterium leading us to conclude that *ANI1* expression is likely not associated with rhizoids.

22. Analysis of Bacterial DNA found in the New York African Burial Ground: Insight for Community Substructure

Ugonna Nwannunu, (Carter Clinton), Howard University - Neuroscience

The New York African Burial Ground (NYABG), a cemetery located in lower Manhattan, encompasses the remains of thousands of free and enslaved Africans who lived during the 17th and 18th centuries. Depictions of the lives, conditions, and mortality of these individuals may be accurately recollected only with research interpreted through the intricate scope that is the sociocultural climate of the time. Initial archaeological reports on the burial site provide insight into the estimated ages, sex, physical afflictions, nutritional deficiencies, and burial tokens of each individual. We at the W. Montague Cobb Research Laboratory aim to flesh out the initial observational discoveries utilizing bacterial DNA extraction of soil samples. Thus far, isolation and verification of bacterial DNA from 74 burials, including sites 10, 197, 217, 287, 307, 310, and 321, have been completed. DNA extraction reveals the prevalence of bacterial species specific to each individual such as his or her unique microbiome signature and exposure to virulent bacterial infections of the time. The existence of tokens, rings, and shell artifacts in our burials, as explicated in the initial reports, represent an individual's status in the cultural community among enslaved Africans as defined by West African culture. The conglomerate of African and Western practices that influenced the social experiences of the free and enslaved peoples buried in the NYABG may also have had significant correlation with susceptibility to infectious and stress related ailments. It is hypothesized that individuals of higher social status may reflect less severe cases of physical afflictions and fewer infections' to be derived from microbiome analysis' compared to those who were regarded with lower status. We suspect that our results will be supported by the existence of tokens, rings and shell artifacts in our burials, as explicated in the initial reports.

23. Investigation of bacterial DNA from New York African Burial Ground Soil Samples to explore evidence of cardiovascular disease

Jade Dickenson, (Carter Clinton), Howard University - Neuroscience

Advancements in genomics research, along with the understanding of the genetic history of African Americans have been hindered due to 400 years of slavery in America. Significant representation of genomic data of African descended peoples has yet to be acquired and deciphered as a result of the Transatlantic slave trade, yet we are working to combat this issue at Howard University. In 1991, the W. Montague Cobb Research Laboratory analyzed skeletal remains of The New York African Burial Ground (NYABG), over 400 samples of 17th century enslaved and rebel African Americans that were discovered in an unmarked cemetery in New Amsterdam (present day Manhattan). This post-colonial African burial ground was hidden under the developments of one of America's largest modern-day cities. Research is currently conducted on 74-cadaver associated soil samples (as a result of the reburial of skeletal remains) in an effort to extract, analyze, and sequence via next generation sequencing bacterial DNA exploring bacterial diversity of 16S rRNA gene in the samples. Currently, bacterial DNA found in these samples has been successfully extracted, isolated, and analyzed through the use of the Qiagen DNeasy Powersoil Kit and the Mothur software. The aim of this study is to investigate sequenced bacterial DNA showing evidence of cardiovascular disease in 17th century African Americans. The identification of bacteria, *Facklamia hominis*, *Enterobacteriaceae*, and *Bacteroidetes* related to cardiovascular disease research will further help us gain knowledge of the genetic variation of these individuals and will ultimately increase the number of African American microbiome profiles for inclusion into reference databases. The data obtained from this study could potentially provide valuable insight into the evolution of heart health disparities among African Americans over the course of time.

24. Effects of Conus textile Crude Venom on the Kv4.2 Ion Channel Expressed in a *Xenopus laevis* Model

Andrea Pence, (Lauren French), Allegheny College – Neuroscience

Kv4.2 is a voltage-dependent potassium channel whose change in function and expression have been linked to many neurological disorders such as epilepsy, autism, and Alzheimer's disease. Currently, there are no existing pharmacotherapeutic agents that act specifically on Kv4.2 channels to treat the aforementioned disorders. There exists great potential to discover a naturally occurring toxin in an organism that could alter the function of this channel. A potential source is the genus Conus, predatory marine snails which produce crude venom containing smaller peptides called conotoxins used to immobilize their prey by targeting specific ion channels. The number and diversity of different conotoxins increases the likelihood that there is a conotoxin that acts specifically on every kind of ion channel, including Kv4.2. One such species of Conus that has yet to be studied in regards to pharmacotherapeutic application, especially pertaining to Kv4.2, is Conus textile. This study aimed to investigate the effects of Conus textile crude venom on Kv4.2 channel current. Kv4.2 RNA was expressed in *Xenopus laevis* oocytes. Upon confirmation of expression, oocytes were exposed to C. textile crude venom while Kv4.2 current was electrophysiologically monitored. Investigating pharmacotherapeutic agents which specifically target Kv4.2 channels helps to pave the way to designing drug treatments which act only on their targets and produce less negative side effects.

25. Effects of *Conus striatus* Venom on the T-type Calcium Ion Channel Cav3.2

Madeleine Stauffer, (Lauren French), Allegheny College - Neuroscience

The T-type calcium ion channel Cav3.2 has been connected in multiple studies to the symptoms expressed in Idiopathic Generalized Epilepsies (IGEs). IGEs encompass a variety of epilepsies that are infrequently diagnosed and have a strong genetic component. Mutations in the gene encoding Cav3.2 have been linked to IGEs, specifically that of childhood absence epilepsy and juvenile absence epilepsy. Conotoxin from the cone snail species *Conus striatus* has been found in previous studies to inhibit the activity of the Cav3.2 channel. Conotoxins target nervous system proteins, such as ion channels, with unmatched specificity. The discovery of a conotoxin in *Conus striatus* that inhibits Cav3.2 could be developed into a treatment for IGEs. Cav3.2 RNA was expressed in *Xenopu*s oocytes and the channel's behavior was analyzed using the two-electrode voltage clamp technique. Fractions of conotoxins from *Conus striatus* were applied to these Cav3.2 channels in order to narrow down the pharmacological component inhibiting the channel. Building on previous studies testing different fractions of conotoxins, a fraction was found to inhibit Cav3.2 by approximately thirty percent after two trials. Continued experiments like this will help to narrow down the single peptide responsible for inhibition of Cav3.2.

BIOLOGY IV

26. Genetic Dissection of the Heme Resistance Locus in the Bacterial Pathogen *Bacillus anthracis*

Anne Harshbarger, Marin Howie, Ashley Winters, (Devin Stauff), Grove City College - Microbiology

Nearly all bacteria require trace amounts of iron as a nutrient. When presented with the iron-restricted environment of host tissues, bacterial pathogens that infect mammals often acquire iron from hemoglobin and its iron-containing cofactor, heme. Heme acquisition presents pathogenic bacteria with a problem: heme is toxic. The Gram-positive pathogen *Bacillus anthracis* overcomes heme toxicity by detecting heme through the heme-sensing two-component system HssR-HssS. Heme-activated HssR-HssS induces expression of HrtA-HrtB, a transporter required for resistance to heme toxicity. Although the strategies of heme sensing and heme detoxification have been delineated in *Bacillus anthracis*, the role of each individual component of the HrtA-HrtB transporter in heme detoxification has not been assessed experimentally. Furthermore, in Bacillus *anthracis* the two genes *BAS3024* and *BAS3025* are located between *hssRS* and *hrtAB*, suggesting that these genes have a role in heme detoxification. Here, we apply reverse genetics techniques to the heme resistance locus in *Bacillus anthracis* by generating markerless, in-frame deletions of *hrtAB*, *hrtB*, *hrtA*, *BAS3024*, and *BAS3025*. We then assess the heme resistance of each strain by tracking plate-based and liquid media-based growth in the presence of heme. Our results provide a more complete understanding of the role that each gene within the *hss-hrt* locus plays in resistance to heme toxicity.

27. Strain Dependent Vancomycin Sensitivity and the Influence of Culture Media on Antibiotic Inhibition in *Haemophilus ducreyi*

Delaney Lacey, (Tricia Humphreys), Allegheny College – Microbiology

The fastidious growth requirements of the gram-negative bacteria *Haemophilus ducreyi* complicate the use of culture as a diagnostic method. Two different media types with vancomycin (3mg/ml) are typically employed to ensure recovery. Clinical and research labs have recently observed differences in vancomycin sensitivity between classes of *H. ducreyi*. Variable vancomycin susceptibility jeopardizes the accurate diagnosis of chancroid and cutaneous ulcers. A disk diffusion assay was performed for three antibiotics across two different media to assess if media type influences antibiotic inhibition.Two concentrations of vancomycin (5 mg/ml and 10 mg/ml) were utilized to determine whether there is a difference in vancomycin susceptibility between class I, II, and cutaneous ulcer strains of *H. ducreyi*. Media type significantly contributed to the observed variances in zone size for ampicillin ($p=0.00094$; $p<0.001$) and vancomycin 5µl ($p=0.00095$; $p<0.001$) but the growth of two ulcer strains (SB5757/NZS3 and SB5755/NZS1) was media dependent. Significant differences in vancomycin susceptibility between class were found ($p=0.0000$; $p<0.001$), but significant differences in vancomycin susceptibility between strains within each class were also observed ($p=0.0000$; $p<0.001$). Since antibiotic inhibition cannot be appreciably controlled for by media selection, employing two types of media can only enhance the accuracy of culture as a diagnostic tool. Differences in vancomycin sensitivity between strains indicate the necessity of incocculating additional non-selective plates to ensure the recovery of *H. ducreyi*.

28. Antibacterial Effects of Manuka honey and *Mahonia aquifolium* on Inhibiting the Growth of *Staphylococcus aureus*

Michaela Schlichtkrull, (Tricia Humphreys), Allegheny College - Microbiology

Staphylococcus aureus causes severe skin diseases in humans, resulting in slow or non-healing wounds. This increases the risk of sepsis and invasive inflammatory diseases, which are associated with high morbidity and mortality. Menstrual toxic shock syndrome (mTSS) is a rare but severe disease typically associated with tampon usage by previously healthy women. mTSS affects 1 to 3 in 100,000 women every year, with *S. aureus* being the main causative agent. Only 10% of *S. aureus* infections today can be treated with drugs in the penicillin class; the other 90% are completely resistant to this class of antibiotics, causing the insurgence of re-evaluation of therapeutic use of plant and plant-based products, such as Manuka honey and *Mahonia aquifolium*. I hypothesized that *S. aureus* would be sensitive to Manuka honey and *M. aquifolium*. Radial diffusion assays were conducted to determine the sensitivity of *S. aureus* to different concentrations of Manuka honey and *M. aquifolium*, in addition to the combination of Manuka honey and *M. aquifolium* to test if there was an additive or synergistic effect. However, while there was no evidence if an additive or synergistic effect was taking place, *S. aureus* was sensitive to both Manuka honey and *M. aquifolium*. *S. aureus* was most sensitive when both natural remedies were in full concentrations and *S. aureus* was more sensitive to Manuka honey. The results from this study suggest that Manuka honey and *Mahonia aquifolium* would be viable treatment options for all *Staphylococcus aureus* infections, offering a natural remedy for penicillin-resistant infections.

29. Understanding hygiene habits and the prevalence of MRSA in a college weight room facility

Blake Bachner, Madison Conti, Carson Hauser, (Beth Potter), Penn State Behrend - Microbiology

Gymnasiums are notorious for being breeding grounds for harmful diseases/infections, such as MRSA, staphylococcus, ringworm, and many more. The goal of this study was to determine the prevalence of methicillin-resistant Staphylococcus aureus (MRSA) in the Junker Center gymnasium, and test the effectiveness of signage and current sterilization procedures. To determine current hygiene habits a survey was administered to those who regularly visit the Junker Center weight room. The survey gathered general information regarding the participant (age and academic level), when they use the gym and why, current hygiene practices during and after the use of the weight room, and diagnosis of a MRSA infection while a student at Behrend. Hygiene habits were also tracked over the course of five days through an observational study. For the microbiological part of the study, the Junker Center gym was separated into 15 groups of equipment and bacterial samples will be collected daily for one week. Each day, bacterial samples were collected during three randomly distributed treatment periods. One treatment period would correlated with normal weight room usage and there would be no change to the normal behavior of the weight room. The second treatment period involved an increase in signage encouraging the wiping down of equipment and use of hand sanitizer. The third treatment involved a thorough cleaning performed by the researchers every hour. All samples were plated on MRSA chromogenic agar for analysis.

30. Effect of silver ions on the bacterial composition within local streams

Tyler Hostetler, Elijah Dangrow, (Beth Potter), Penn State Behrend - Microbiology

Our society has become more aware of the abundance of bacteria which is evident by the increase in antimicrobial products over the past two decades. A commonly used agent in many antimicrobial products is silver ions due to its multifactorial approach to killing a wide range of microorganisms. Most of the research concerning silver ions has focused on its antimicrobial effectiveness and considerably less research has been done on any effect of the over-usage of silver in the environment. Thus, the goal of our study was to determine whether silver is affecting bacterial ecosystems within our local waterways. For the study, collections from surrounding streams will be exposed to coupons either coated with silver zeolite or a non-silver coating. After 48 hours of exposure, the samples were transferred to a filter through vacuum filtration and the filters were placed on: tryptic soy agar (TSA), modified mTec agar (MTec), mannitol salt agar (MSA), and Carbapenem-resistant Enterobacteriaceae agar (CRE). Preliminary results suggest that some resistance may be occurring within the microbial populations, specifically within the Gram-positive populations.

31. Evaluation of Lysine Anabolic Blockade as a Bacteriostatic in the Possible Rescue of Human Thp1 Monocytes from *Mycobacterium smegmatis*-Induced Apoptosis

Lydia Lukomski, Meghan Robick, Alex Stauff, (Christine Saber, Prasad Dalvi, Gary Vanderlaan), Gannon University - Microbiology

Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, is a major health issue with an estimated 1.3 million deaths globally in 2017. About 23% of the world population harbor latent TB and are at risk for reactivation in their lifetime. Routine antibiotic treatment for TB includes rifampin (RNAP blocker) and isoniazid (inhibitor of mycolic acid anabolism). However, multi-drug resistant strains of TB (MDR-TB) exhibit resistance to at least rifampin or isoniazid, and extremely-drug resistant strains of TB (XDR-TB) are resistant to both antibiotics plus two additional drugs. In countries with high TB burden, mortality rates involving XDR-TB can surpass 70%. In the course of TB disease progression, human alveolar macrophages (Thp1 cells) are targeted by all *Mycobacterium* spp. While *Mycobacterium tuberculosis* infection of Thp1 cells inhibits apoptosis of Thp1 cells, infection of Thp1 cells by the non-tubercle *Mycobacterium smegmatis* is unable to block macrophage apoptosis. Thus, Thp1 cells execute elevated apoptoses when infected by *M. smegmatis*. In humans, lysine is essential. Mycobacterium spp. however harbor a *lys* operon encoding the enzymes involved in lysine anabolism. The terminal enzyme in the pathway is diaminopimelate decarboxylase (DAPDC), encoded by the *lysA* gene. Previous work has characterized two different DAPDC blockers, lanthionine sulfoxide (LS) and L,L-DAP (a stereoisomer of the natural DAPDC substrate: D,L-DAP). Here we propose to synthesize lanthionine sulfoxide *de novo* beginning with L-cysteine and L-(Beta)-chloroalanine. We then wish to evaluate the effectiveness of LS-mediated DAPDC blockade in two different biological assays: 1) in perturbing the growth of *Mycobacterium smegmatis* in growth media deficient in lysine amino acid, and 2) in rescuing Thp1 cells of apoptotic induction by *M. smegmatis* infection. This research might reveal a novel treatment option involving DAPDC blockade for XDR-TB.

32. Comparison of the Evolutionary Rates of Streptomycin Resistance in Three Common Agents of Urinary Tract Infection

Michael Stewart, Parmvir Deo, Matthew Dilts, Ishveen Saini, (Prasad Dalvi, Gary Vanderlaan), Gannon University - Microbiology

Urinary tract infections (UTIs) are one of the most commonly diagnosed afflictions in the United States. Three of the most common agents include, in descending order of diagnosis frequency, the Gram-negative Escherichia coli, the Gram-negative *Klebsiella pneumoniae*, and the Gram-positive *Staphylococcus saprophyticus*. Of these three, only *E. coli* is motile. Previous work has investigated the evolution of trimethoprim resistance in *E. coli* using an assay known as MEGA (Microbial Evolution and Growth Arena). In this assay, rectangular slabs containing concentrations of increasing orders of magnitude of a selected antibiotic are arrayed next to one another, and a motile antibiotic-sensitive species is inoculated initially at an agar slab position containing no antibiotic. Time-lapse imaging then tracks the evolution of antibiotic resistance through the increasingly concentrated antibiotic zones. Notably, evolution of trimethoprim resistance to 1000-times the normal killing concentration can be observed in /E. coli/ in just eleven days. A key feature of the MEGA assay is a large surface area (120 cm by 60 cm) for the selection and growth of antibiotic resistant strains of a selected motile microbe. Here we propose several modifications to the established MEGA assay, such as 1) a reduction in the overall surface area, 2) replacement of trimethoprim as a selective pressure with that of streptomycin, and 3) assessment of streptomycin-resistance monitoring in non-motile microbes including *K. pneumonia* and *S. saprophyticus*. Furthermore, we propose a fluorescent approach to imaging the acquisition of streptomycin resistance utilizing pGLO transformation into each of the three common UTI agents. In the case of *E. coli*, the *aadA* and *strA-strB* gene cassettes provide resistance to streptomycin at low and high concentrations, respectively. Glycerol stocks at each slab junction will be kept for future sequencing to assess changes at resistance loci.

CHEMISTRY, ENVIRONMENTAL SCIENCE, & PHYSICS

33. Multi-Site Directed Mutagenesis of Serine Residues to Glutamate in the C-Terminal Domain of *Saccharomyces cerevisiae* to Mimic Phosphorylation

Dustin Williams, (Java Villemain), Indiana University of Pennsylvania - Biochemistry

Homologous recombination (HR) is a fundamental DNA repair pathway for the repair of double-strand DNA breaks, and most of our knowledge of HR comes from studies conducted in the yeast Saccharomyces cerevisiae. In yeast, the Srs2 helicase plays an important regulatory function in HR mediated by its C-terminal tail. It acts as an anti-recombinase in the absence of DNA damage through C-terminal domain protein-protein interactions with the Rad51 recombinase and is recruited to stalled replication forks by the sumoylated sliding clamp protein, PCNA, to promote resumed replication following repair. It is also known to interact with other proteins involved in DNA damage response. Srs2 helicase contains seven serine amino acid consensus sites targeted by cyclin dependent kinase-1 (CDK-1), phosphorylation of which have been shown to modulate Srs2 function(1). Out of these seven serine sites, five are present in the C-terminal region of Srs2, while the other two sites are located in the helicase domain. Using multiple site-directed mutagenesis, we mutate serine to negatively charged glutamate in order to mimic phosphorylation at combinations of the C-terminal domain sites that overlap the Rad51 binding site and appear to alter the secondary structure of the C-terminal domain. We propose that the Srs2 C-terminal domain is intrinsically disordered and that its conformation is dependent on both protein interactions and phosphorylation to mediate its activity. The resulting phosphorylation mutants will allow us to investigate how the phosphorylation at consensus sites in the C-terminal domain affects its conformation and interactions with the known interaction partner, Rad 51 recombinase.

34. Synthesis and Spectroscopic Characterization of Manganese Tetraphenylporphyrin Halide Complexes

Emily Brocious, (Mary Grace Galinato), Penn State Behrend - Chemistry

Manganese porphyrin complexes are used as models to help understand more complex structures of heme enzymes because they mimic the geometric and electronic structural components of these larger molecules. Therefore, it is important to study their electronic structures in order to properly elucidate their function. In a previous experiment, four manganese tetraphenylporphyrin (TPP) halogenated compounds, [Mn(III)(TPP)F], [Mn(III)(TPP)Cl], [Mn(III)(TPP)Br], and [Mn(III)(TPP)I] where synthesized and spectroscopically characterized in order to understand the unique absorption spectra of Mn(III) porphyrins. Since the initial synthesis of these compounds, several steps have already been achieved, including synthesizing the above-mentioned Mn(III) halide complexes, and analyzing each compound using UV-vis, NMR, and MS spectroscopies, and elemental analyses. More recently, continued research has been done in order to obtain pure bromo and iodo analogues in order to generate magnetic circular dichroism (MCD) spectra. Results from this analysis will then be compared with our current MCD data on [Mn(III)(TPP)Cl]. Importantly, the [Mn(III)(TPP)] analogues of the heavier halides demonstrate drastically different absorption features that are not typically found in Fe porphyrins. This study aims to resolve the electronic structure of Mn(III)-porphyrins by honing in on the spectral analyses and density functional theory calculations of the chloro, bromo, and iodo complexes.

35. Effect of an Anti-caking agent on Release of Palladium from Catalytic Converters

Jacob Ferko, Rose Kerr, (Deborah Aruguete), Penn State Behrend - Chemistry

Every winter, large accumulations of de-icing salts are deposited on roadways. In addition to sodium chloride (NaCl), many contain the anti-caking agent sodium ferrocyanide ($Na_4Fe(CN)_6$, a.k.a yellow Prussiate of soda or YPS). The cyanide (CN^-) from this additive has the potential to create soluble complex ions with various metals, especially metals such as gold and platinum, due to high stability of these complexes. Emissions from vehicle catalytic converters (VCCs) contain platinum group elements, the most common of which is palladium (Pd), along with minute amounts of other metals. The aim of this study was to determine the relative amounts of palladium and other trace metals released into solution as a function of both Cl^- concentration and $Fe(CN)_6^{4-}$ at a common environmental pH value of 8. Studies were conducted by mixing together ground VCC material and a solution of simulated runoff for 48 hours. Levels of NaCl and YPS tested were based upon prior studies of real road runoff and manufacturer specifications. The NaCl concentrations tested were 0 ppm, 1000 ppm and 10000 ppm; the YPS concentrations studied were 0.5 ppm, 1 ppm, 5 ppm, and 6.6 ppm. In the 10000 ppm Cl^- solutions, a synergistic increase on [Pd] was observed at 1 ppm and 6.6 ppm $Fe(CN)_6^{4-}$. The highest [Pd] was 512.0 ppb (±67.3) at 6.6 ppm YPS. Exposing VCC material to the same concentrations of YPS without Cl^- resulted in no significant Pd release above background.

36. Hydrology of a Former Irrigation Reservoir and Watershed at Gospel Hill Golf Course (Penn State Behrend)

Mark Tlumach, (Anthony Foyle), Penn State Behrend - Environmental Science

A physical limnologic project began September 1st, 2018, on Penn State Erie's Gospel Hill Golf Course which lies within a 672.76 sq. km watershed that drains to Lake Erie. The research goals are to (I) define the physical hydrological characteristics of the 4m deep, 6,027 sq. m pond that lies on the property and its watershed; (II) observe density trends across three seasons of research, and (III) quantify groundwater-surface water interactions. The project includes developing a water budget and determining the pond stratification, mixing, and turnover occurrence, timing, and duration. Two monitoring stations were installed in the pond that monitor abiotic factors such as temperature, conductivity, and pressure with sensor-loggers at multiple depths (1.3m, 2.2m, 3.5m) at 90 minute intervals. A piezometer was installed up gradient of the pond to monitor groundwater both with a sensor-logger and manually through field samples. Field samples that are collected weekly with handheld equipment include, water temperature, dissolved oxygen, conductivity, salinity, pH, and pond water level. Samples of water table elevation, conductivity and temperature from the 1.68m piezometer are also collected weekly. A bathymetric survey was completed and merged with topographic LIDAR data in ArcGIS. Time-series and spatial-series plots of all recorded data are being developed as new data are periodically retrieved from the pond. On the basis of trends in dissolved oxygen, conductivity, density, and temperature, this pond is stratified into three layers (epilimnion, hypolimnion, and monimolimnion) in the late summer/fall. In the winter however, pond overturn or slow vertical mixing that is driven primarily by thermal density changes reduces stratification to two layers (epilimnion, hypolimnion). This research is important because it is the first attempt to characterize this man made pond that may be physically and ecologically evolving towards a natural system on Penn State property.

37. Evaluation of Acceleration Due to Gravity Using Standard Preliminary Physics Laboratory Equipment

Ethan Fontana, (Chuck Yeung, Thomas Flanagan), Penn State Behrend - Physics

Measuring the acceleration due to gravity is a standard part of any introductory physics class. At Penn State Behrend, this experiment is performed by measuring the displacement between dots placed on a strip of paper at a regular interval of time. This is a standard method utilized at many high schools and universities. These dots are marked by a tape-timer as the strip of paper falls through the tape-timer. However, students usually obtain a value of gravity that is much lower than the expected 9.81 m/s^2, which the students usually blame on (1) "human error" or (2) some nebulous form of "friction". However, the actual cause of this deviation from the accepted value has never been studied systemically. This experiment determined that the source of large error that students obtain is due to a frictional force at the point of contact between the strip of paper and tape timer. By determining the acceleration of the tape with different masses attached, I was able to determine the size of frictional force and a very accurate value for the acceleration due to gravity. I additionally found that the frictional force was approximately constant and independent of the mass attached to the system. The results of these measurements are compared to other standard introductory physics laboratory methods for determining the acceleration due to gravity. Furthermore, the advantages and disadvantages of the different methods are also discussed.

38. Potential Origin and Longevity of Mars in Venus's Orbit

Jonas Smucker, (Darren Williams), Penn State Behrend - Physics

There is evidence that liquid water once flowed on the surface of Mars in the distant past. At that time, however, the luminosity of the Sun was not large enough in magnitude to allow for this presence suggesting Mars might not have been in its current orbit. One reasonable idea is that Mars was once closer to the Sun and then migrated to its present distance. Furthermore, there are points in the solar system where Mars might have been stable for a long time. We have used an orbital software package placing Mars in Venus's orbit at a relatively stable orbital location called a Lagrangian point so that the stability and longevity can be investigated. Lagrangian points are locations in an object's orbit that allow a smaller mass to remain a certain period of time without change. For this project, an orbital integrator called REBOUND is used to acquire data. Additionally, a python script has been created that generates initial conditions, analyzes data in Venus's reference frame as it orbits the Sun, and probes the fourth Lagrangian (L4) point to assess stability. Preliminary data reveals that Mars is stable at the L4 point for a 10 million years and possible longer.

COMPUTER SCIENCE, ECONOMICS, & MATHEMATICS

39. LionTrack Attendance System

Patricia Brotherson, Morgan Taylor, (Thomas Rossi), Penn State Behrend - Computer Science/Software Engineering

The research will deal with improving the way attendance is documented in the classroom at the university level. There is an evident problem in the level of efficiency that pre- existing programs such as Canvas offer for a roll call module. The intended research will make up for the deficiencies such as inadaptability to large classroom sizes. Solving this will include creating a way to transfer the process of taking roll call from the instructor's hands to the students. Our research will achieve the ease of taking attendance efficiently independent of the classroom size, making students more proactive in their academic dealings, and it will uncover students who are potentially at risk of not doing well in a course. The research will involve writing backend and frontend code to create a web application that will be easily accessed by students. Our research will address the common link between attendance and the degree of success in a course by effectively monitoring the presence of students in a classroom.

40. Investigation of Multimodality Methods for Facial Expression Recognition

Karina Cuadrado, (Abdallah Abdallah), Penn State Behrend - Computer Science/Software Engineering

Face expression recognition (FER) has various applications in transportation, security, health care, etc. However, proper classification is still a challenge to this day. This study aims to provide a new dataset of human face images in three modalities (color, depth, and infrared) with diverse facial expressions for the use of developing better emotion classification algorithms. These images include variations in facial expression, pose, 2D orientation, occlusion and spontaneity. To achieve this diversity in data, the tool used for recording is the Kinect Sensor v2.0 which provides depth and infrared information as well as a more accurate reading from that of typical cameras. It has been proven in previous studies that depth data may improve the accuracy of these algorithms as opposed to color in certain areas of the human face. Likewise, infrared data has its advantages as well. Therefore, by creating this dataset, researchers and developers can use it to make their emotion classification models more robust by combining the best aspects of each modality. The first phase of this study is to research historically successful datasets and evaluate the effectiveness of the variations explored in their images collection. The second phase consists of prototyping the data acquisition setup which includes developing an application using C#, MATLAB and the Kinect v2.0 SDK for the fusing of infrared, RGB and depth matrices, and the design of a database for all image records. The data collection using the developed C# application takes approximately 40 minutes per participant; 22 minutes for the spontaneous portion, 16 minutes for the scripted portion, and 2 minutes in acquiring the participant's statistical data. All the data is conveniently stored for post-processing using a simple MATLAB script. The third phase of the study is the collection of data at the Behrend campus.

41. Factors Influencing Access to Antiretroviral Therapy in Sub-Saharan Africa

Maria DiDonato, (Stephanie Martin, Chris Finaret), Allegheny College - Economics

The lack of access to antiretroviral therapy (ART) continues to be a major impediment for the treatment of HIV/AIDS in Sub-Saharan Africa. Approximately 26.6 out of the 40 million people living with HIV/AIDS globally live in the Sub-Saharan African region. This paper analyzes the influence that pricing, infrastructure, income distribution, generic ART, and the supply of health professionals, health facilities, and ART have on access to ART in Sub-Saharan Africa. Panel data was taken from 1998 to 2017 for each country in the region in order to analyze access to ART over time. It can be suggested from the findings that lack of sufficient infrastructure, particularly transport infrastructure, is the most influential barrier to accessing ART in Sub-Saharan Africa. With insufficient transport infrastructure, it may take individuals multiple days of traveling to receive treatment at a health facility. In order to increase access to ART in the Sub-Saharan African region, there must be a decentralization of health facilities and more public-private partnerships. Decentralizing health facilities will provide rural populations with greater opportunity to receive treatment; the establishment of more public-private partnerships can increase the efficiency by which companies distribute ART within a country. This increased efficiency is achieved through shared knowledge and infrastructure, resulting in more available storage for ART and greater product innovation.

42. Sex Sells: Evaluating the Economic, Social, and Legal Implications of Government Intervening on the Rights of Sex Workers

Catrina Steckler, (Stephanie Martin), Allegheny College - Economics

Ever since sex work began, there has been numerous stigmas, stereotypes, and unreliable political backings. Due to the lack of legalization, prostitution is not considered legitimate work. According to Workers rights, only legitimate work is covered under federal mandate, thus excluding sex workers. I will be evaluating the economic, social, and political implication of government intervention on the rights of sex workers. There will be an evaluation on the mental and physical well-being of sex workers both on and off the black market. Moreover, there will be first hand narratives of sugar babies, as well as creators of the sugar baby online platforms. These will all serve to understand the benefits as well as costs and risks of being a sex worker. There will be an evaluation of the Trump Administration specifically focusing on the *Stop Enabling Sex Traffickers Act and Fight Online Sex Trafficking Act (FOSTA-SESTA)* package which became law on April 2018. This law will take into consideration the size of the black market for prostitution and what economic implication this has on both the buyers, and sellers of sex workers. The economics of prostitution will include evaluation such as supply, demand, government interventions, elasticity, as well as concepts such as thinking on the margin, and the substitution effect. There will be a conclusion of a policy change which will include legalizing prostitution, and put in place barriers which allow for the safety of this profession as well as decrease the amount of potentially sex trafficking.

43. Are Tariffs Good or Bad for Business? - A Study on Recent Tariffs on Steel and Aluminum and its Effects on Businesses

Samantha Bengel, (Varun Gupta), Penn State Behrend – Project and Supply Chain Management

There is a stark divide between the businesses and scholars who have welcomed President Donald J. Trump's tariffs on steel and aluminum and the ones who have denounced Trump's tariffs. In this research study, I will look in detail the impact of the current tariffs on steel and aluminum and how they are affecting domestic supply chains. Specifically, I will try to understand how these policies are affecting companies based in the Erie region who rely on global sourcing. I conducted an online survey on how the global sourcing operations and supply chain contracts specific to these products impacted by these tariffs. Subsequently, I conducted an in-depth analysis of the tariff impacts on the supply chain measures for local companies who source their products from overseas suppliers and will be impacted by the president's decisions. This research is important as I first substantiate the impact of the policies on supply chains, additionally, this study aims to fill the gap between the stark divide among businesses and scholar on the impacts of Trump's policies with an in-depth analysis.

44. Analyzing Maximum and Minimum Scores of the Game 2048

Zachary Aszalos, (David Prier), Gannon University - Mathematics

The game 2048 has become a popular smartphone game in recent years. In this presentation, the maximum and minimum scores on rectangular two-dimensional boards of different sizes are examined. Then, similar questions are examined on boards in higher-dimensional space, as well as on boards that are triangular in shape.

45. Location and Scale Parameter Estimation of Burr Type III Distribution by Monte Carlo Markov Chain (MCMC) Procedure

Kyle Maraffi, Adam Majewski, Luke Pilarski, Mariah Kacey, (Woosuk Kim), Slippery Rock University - Mathematics

In 1942, Burr type III distribution was first introduced by I. W. Burr for modelling lifetime data or survival data. In 1996, S. R. Lindsay introduced Burr type III distribution with location and scale parameters. In this project, we want to estimate location and scale parameters of Burr type III distribution by Monte Carlo Markov Chain (MCMC) Procedure.

46. Maximum Likelihood Estimation for Location and Scale Parameters of Burr Type III Distribution

Michaela R. Piper, Emily S. Foley, Madeline B. Baillie, (Woosuk Kim), Slippery Rock University - Mathematics

In 1942, Burr type III distribution was first introduced by I. W. Burr for modelling lifetime data or survival data. In 1996, S. R. Lindsay introduced Burr type III distribution with location and scale parameters. In this project, we want to estimate location and scale parameters of Burr type III distribution by maximum likelihood estimation.

ENGINEERING

47. Transmission of Video over WiFi bands using Raspberry Pi and Software-Defined Radio

Keith Powell, Gavin Fawcett, (Abdallah Abdallah, Sudarshan Nelatury), Penn State Behrend - Electrical Engineering/Technology

This poster/demonstration focuses on software-defined radio (SDR) and its ability to wirelessly transmit and receive video. The goal of this project was to research what an SDR is, how they function, and provide an implementation to show a proficiency on the topic. This project takes 2 computing devices, one laptop and one Raspberry Pi, and attaches a USRP B200 SDR to each device. One side of the system would be in charge of transmitting a saved video that is stored on the computing device. The second side of the system would be in charge of streaming the video as it is received by the SDR. This system was implemented through the use of the GNURadio software. In order to reach the final goal of a video transceiver, the project was broken down into a series of less abstract projects. Initially, the boards were made to simply receive a signal at various frequencies. The project progressed into building an FM receiver that was capable of playing audio similar to the radio one finds in a vehicle. Eventually, the project had reached a point where the boards were capable of sending and receiving data from one another with a low visual quality. By the end of the research project, video was able to be transmitted and received using the SDRs at a fair level of visual quality. The system was tested over the 2.4 and 5 GHz WiFi bands using two different hardware setups. The first hardware setup used the laptop and a Raspberry Pi. When the video was streamed over the 2.4 GHz band, the video was able to be streamed at 480p with many interruptions causing the video to cut off temporarily. When streamed over the 5GHz band, the video was also able to be streamed at 480p, but with less interruptions compared to the 2.4GHz band. The second hardware setup used just a laptop with both SDRs attached to it. This setup received very similar results to the previous setup, in terms of interruptions over certain bands, but was capable of streaming up to 1080p.

48. The Development of Processing Parameters for Industry Integration of Advanced High Strength Steels (AHSS)

Jackson Craig, Austin Hankey, (Paul Lynch), Penn State Behrend - Mechanical Engineering/Technology

The Penn State Behrend Materials and Manufacturing Group has been working on the development of lower cost, high strength steel alloys (advanced materials) since fall 2015. This work specifically addresses the need for the development of process parameters for machining, welding, and heat treatment of advanced high strength steels (AHSS). The results of this work will move these advanced high strength steels (AHSS) closer to complete integration into the steel industry supply chain.

49. Properties and Processing of Advanced Wear Resistant Alloys

Sean Flanagan, Jacklyn Niebauer, (Paul Lynch, John Roth), Penn State Behrend - Mechanical Engineering/Technology

The need for the development of lightweight alloys with mid temperature range wear resistant properties has led to this current body of work on aluminum metal matrix composites (MMCs). The blend of both ductile and brittle materials combined to produce new materials (MMCs) with strategic combinations of these properties, is particularly attractive to both the automotive and aerospace industries. The effect of overaging on the mechanical properties of an aluminum matrix composite with silicon carbide particles (2009 Al/SiC/15p MMC) was studied and the microstructure and mechanical property results are presented. In addition, a study was undertaken to study the properties and processing of a martensitic stainless steel for similar applications.

50. Integrating 3D Sand-Printing into the Pennsylvania Metalcasting Industry

Jackson Craig, Austin Hankey, Elizabeth Gaughan, (Paul Lynch), Penn State Behrend - Mechanical Engineering/Technology

Metalcasting is one of the most important sectors of the Pennsylvania manufacturing economy. Pennsylvania ranks second only to Ohio for the largest number of metalcasting facilities per state. Initial data collected has shown that PA foundry owners and managers recognize the new opportunities presented by 3D Sand-Printing. However, few of the Pennsylvania foundry companies have thoroughly explored these emerging manufacturing technologies for integration into their existing businesses. Two of the most commonly cited barriers to 3D sand printing technology adoption are capital equipment cost and the lack of trained engineers/ technicians to operate the equipment. This research displays the design freedom and design tools available as a result of 3D printing sand molds and cores for metalcasting. It also displays data on the current landscape of 3D sand printing and the future of the technology. Research on the cost advantages of 3D sand printing are also reported.

51. Cylindrical lithium-ion battery integration in an X-wing quadcopter arm configuration

Paul Lutz, (Adam Hollinger), Penn State Behrend - Mechanical Engineering/Technology

Batteries are most widely used to act as a power source for any given system, but they also have the ability to improve the strength of the system. In this particular research, a quadcopter arm with batteries incorporated inside of the arm was chosen to demonstrate the additional structure that can be provided. The concept of battery integration could be is one that can be applied to larger scale commercial and industrial projects. This is due to the general benefit of having lower material costs, less mass, and the same amount of power generation. Currently, there are no exact mechanical properties of the jellyroll section of an 18650 battery nor is there any finite element analysis (FEA) modeling of an 18650 battery as a cantilever beam. This study used ANSYS' topological optimization to optimize the quadcopter arm and remove as much mass as possible. After, more extensive FEA modeling was conducted on the arm with and without the inclusion of batteries and the arm was subjected to a cantilever mechanical test. The expected results are that the 18650 batteries will provide a significant amount of structure and strength to the current quadcopter arms. In the future, others may find this concept on projects to be of great benefit as it allows for a consistent power source along with higher strength and less weight.

PSYCHOLOGY I

52. Staying in the Social Class Closet: Examining the Consequences of Social Class Concealment

Arissa Spitalny, (Ryan Pickering), Allegheny College - Psychology

In my study, I aimed to examine the consequences of concealing socioeconomic status (SES). SES, a measure of one's combined economic and social status in relation to others, as well as an individual's access to material and social resources, is an identity that can be hidden from others and is often devalued and negatively stereotyped. In fact, there are negative stereotypes associated with individuals with both lower and higher SES. Individuals lower in SES are stereotyped as lazy, criminal, stupid, immoral, and violent (Cozzarelli, Wilkenson, & Tagler, 2001). Whereas individuals higher in SES are stereotyped as arrogant, superficial, and entitled (Cashman & Twaite, 2009). Therefore, we are often motivated to conceal our social class identity. However, previous research has shown the negative consequences of concealing a stigmatized social identity, including worse psychological and physical health outcomes (Chaudoir & Fisher, 2010). The current study aimed at understanding the relationship between motivation to conceal social class and psychological health. Participants (N = 126; 50% female; Mage = 37.34) completed a series of questionnaires for monetary compensation through Amazon's Mechanical Turk. We investigated the relationship between a self-designed income disclosure questionnaire (14 items; e.g., I don't think I should discuss the topic of socioeconomic status with others a = .85) and negative affect (e.g., 3I feel that I have nothing to look forward to stress (e.g., I cannot cope with all of the things that I need to do and anxiety (e.g., I find it difficult to relax. As predicted, results indicated that there were significant positive relationships between social status concealment and depression (r=.46, p<.001), stress (r=.54, p<.001) and anxiety (r=.58, p<.001). Important implications for psychological and physical health are discussed.

53. Recognizing Warning Signs of Intimate Partner Violence

Anna Downey, Kailey Lewis, Emma Culbertson, Lauren Plummer, (Heather Lum), Penn State Behrend - Psychology

Intimate partner violence (IPV) is a phenomenon that silently affects many of our loved ones. The purpose of this study is to determine if college students are able to recognize known warning signs of IPV. The hypothesis states that traditional college students do not recognize the warning signs of IPV. A traditional college student is defined as one who is between the ages of 18 and 24. If the findings support the hypothesis, the study may demonstrate the need for education on campuses nationwide about IPV, which is a vital first step in reducing IPV experienced by college students. Regardless of its form, IPV can render severe mental consequences on the victim, such as post-traumatic stress disorder and depression. Not only can the victims of IPV experience negative symptoms, but their family members or loved ones can too, as they may witness the victim go through their abuse. This topic is important to research as it can have detrimental consequences on mentality and relationships.
(Mechanic, Weaver, & Resick, 2008)

54. Tempo of Classical Music and its influence on Visual Memory Performance and Heart Rate

Brianna Geppert, Sarah Hornick, Zachary Dutton, (Heather Lum), Penn State Behrend - Psychology

How the brain stores information is one of many growing topics that is researched in the medical and psychological community. This poster presentation further explores the idea of how the tempo of music one listens to affects how well an individual's memory stores information. Research by Van Dyck, Six, Soyer, Denys, Bardijn, & Leman (2017), suggests that tempo is one of the most significant determinants of music-related arousal and relaxation effects that cause a significant increase in heart rate. In the current study, the type of beats, and time taken to complete a memory task were chosen based on how the body and mind react, both physiologically and psychologically when listening to classical music. This poster examines Van Dyck, et al. (2017) past research, in addition to several credible research sources, in relation to determining if the tempo of music individuals listen to increases heart rate, and affects how well one memorizes and stores that information when completing a given task. Researchers predict that when an individual is exposed to slower tempos of classical music, their memory will be improved, compared to those who listen to faster beats of classical music, or no music when completing a memory focused task. As a result, our study will aim to help students use classical music as a better study tool to memorize information more efficiently.

55. Coping Mechanisms and Resilience in College Students for Finer Life Satisfaction

Lydia Ogunjeminiy, Marquis McBride, Tre Dejournett, (Heather Lum), Penn State Behrend - Psychology

College is not for everyone. There are certain attributes and qualities one must possess to make it through the school work and the overall experience. The purpose of this study is to look into how and if the coping mechanisms and resiliency skills in college students can lead to a better perceived life satisfaction. It is important to understand this because higher levels of life satisfaction brings about greater happiness in life and positively impacts our health and well-being which can lead to academic success in college students. This study will be conducted with at least 60 randomly selected college students varying through age and gender. We will measure coping mechanisms, resilience and life satisfaction in the self-reported survey conducted of 3 validated research questionnaires. The participants will be divided into two groups, a control group and an experimental group. Participants in the control group will view a recorded 2-minute social simulation video clip of the rated-E video game Animal Crossing that teaches young players the importance of saving their game progress. Participants in the experimental group will view the story about a boy and his mother who connected through playing the video game Animal Crossing. The predicted results is that the students with higher levels of coping mechanisms and resilience will have a higher level of life satisfaction than students with lower levels of coping mechanisms and resilience.

56. Anxiety and Eating Behaviors in Commuters and Non-Commuters on a College Campus

Samantha Reedy, Jamie Herrmann, Lea Saunders, (Heather Lum), Penn State Behrend - Psychology

College is a time for changes and often the first time young adults are making their own decisions, which comes with a large responsibility. Once students start college there are many different stressors that begin occurring and can impact their eating behaviors or even be a stressor for them. The study is trying to determine if there is a relationship between eating behaviors and anxiety, specifically looking at commuters and non-commuters. The researchers will be using a healthy and unhealthy vignette to see if the participant can identify the different eating behaviors. The researchers hypothesize that commuters will have worse eating behaviors than non-commuters, and that those with worse eating behaviors would have higher rates of anxiety. The physical well-being which consists of eating behaviors; and commuters typically will eat less than non-commuters since they do not have meal plans. Potential implications could be that commuters pack their own lunches, or they do purchase a commuter meal plan so their eating behaviors are not as affected. Another implications would be that we can understand where some anxiety may stem from and they can create more programs on campus to help students.

57. Effects of Fear on Memory

Mitchell Weber, Benjamin Lorigan, Jessica Feketik, (Heather Lum), Penn State Behrend - Psychology

This study is looking at the effect of fear on memory. Memory is an important aspect of everyday life. Along with memory, individuals experience stress every day in some form or fashion. Participants will be introduced to either a horror game condition or a neutral game condition. They will be exposed to a memory task, the PANAS Scale, and the NASA-TLX before and after gameplay for comparison. The memory task consists of a picture of a room filled with objects that will be used to test the participants' recognition. Participants will fill out the questionnaires and then conduct the memory task before gameplay. They will then play the condition specific game for 30 minutes followed by the same set of questionnaires and a similar memory task with a different picture and demographics. The researchers expect to see a significantly lower performance on the memory task for the fear and stress group. They also expect to see a significantly higher gameplay performance for the participants in the neutral game condition. Some limitations of the study are the required order of questionnaires which may lessen the desired fear effect and therefore diminish the results as well as the neutral condition game contains minor glitches that may impact how the participant performs in game and on the memory task. This study is relevant because stress and fear are abundant in everyday life as is memory. By finding the connection between these variables and how they interact, the impact of a stressful or fearful situation on memory can be lessened when a sharp memory in these situations is imperative.

58. How Mood is Affected by Type of Dog Stimulus in College Students

Taylor Wood, Kayla Dick, (Shariffah Dawood), Penn State Behrend - Psychology

The purpose of this study was to examine if alternatives to live animal therapy would have an effect on positive mood scores. The overall prediction was that there would be a significant difference in positive mood scores between the three conditions. There were 75 participants randomly assigned to one of three conditions: control, videos, or virtual reality condition. A mood survey was administered before and after each condition in order to record the participant's current mood scores. The Big Five personality survey, along with a questionnaire containing demographics and previous animal experience, was also administered. Results showed a significant effect on mood between the conditions, specifically the difference in mood from pre to post-test within the control group and virtual reality group, but not in the video group. There was also a significant difference in mood between the control group and video group's post-positive scores, as well as between the control and virtual reality group post-positive score. There was not a significant difference in post positive scores between the video and virtual reality group. This would imply that there are alternative options to live animal therapy for college students that should be further explored.

59. Comparison of First-Generation and Non-First Generation Students on Stressors, Coping Mechanisms, and University Resources

Hannah Kitcey, Laura Carper, Zy'Anne Grady, Cassandra Hoida, (Luke Rosielle), Gannon University - Psychology

A first generation student is defined as an individual whose parents or older sibling(s) have never achieved an education higher than an associate's degree. First generation students often have a more difficult time adjusting to demands of college (Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012). The purpose of this study is to compare first generation and non-first generation students on a variety of stressors, as well as the coping mechanisms they utilize. In addition, the study looks to assess what university resources are used by students and how comfortable they feel accessing them.

PSYCHOLOGY II

60. Self-Confidence and Grit in Athletes, Non-Athletes, and Honors Students

Drew Barger, Elizabeth Raymond, Katitlyn Miller, (Luke Rosielle), Gannon University - Psychology

The purpose of this study was to measure self-confidence and grit among several subgroups of students. It could be the case that honors students and athletes require a higher level of self-confidence and grit compared to other students due to athletic or academic demands. However, we also have reason to believe that other students require self-confidence and grit as well. Athletes, honors students, and other students took the Twelve Point Grit Survey and the Academic Self-Confidence Scale. We are interested to see if differences in self-confidence and grit will emerge between the three groups.

61. Effects of Dress Style on Perceived Traits in Men

Kara Truesdale, Casey Hornyak, Tori Hubbart, Hannah Vogt, (Sharrifah Dawood), Penn State Behrend - Psychology

What an individual wears can influence how other people perceive them. People are likely to judge each other based on appearance, and the way a person dresses can be a large influence on how they appear to others in social and professional settings. The purpose of this study was to understand if dress style affected how men were perceived by others. We looked at how the concepts of attractiveness, sociability, and intelligence were rated based on the type of clothing worn. Specifically, if men would be seen as more attractive and intelligent when dressed formally, but more sociable when dressed casually. To measure this we randomly assigned participants into one of two separate conditions - formal or casual. Then, participants viewed a photograph of a male model wearing either a formal or casual outfit and filled out three questionnaires; the Interpersonal Attraction Scale: which measured physical attractiveness, reliability, and friendliness, the Rating Scale of Social Competence which measured how socially competent the model appeared to be and the People's Conceptions of Intelligence Questionnaire - Revised, which measured how intelligent the model appeared to be. The results suggested that men who dress formally appear more reliable and intelligent to both men and women. The next step would be to look at how these traits would be rated on a female model.

62. Using Functional Connectivity to Delineate Object Familiarity

Jennifer Mosley, (Christopher McNorgan, Erica Edwards), University at Buffalo - Psychology

Object categorization is the process of discerning features of an object that are relatively similar or dissimilar to other objects, and to group them accordingly. The ability to distinguish between objects is dependent upon object familiarity. The present study used functional neuroimaging (fMRI) data of ten subjects to examine differences in brain activity while visualizing familiar and unfamiliar objects. With our collected data, we analyzed brain activations for familiar object conditions (e.g. HAMMER, GUITAR, APPLE) and for unfamiliar object conditions (e.g. ADZE, DJEMBE, KOHLRABI). Our preliminary findings suggest that there are activation differences in the left visual pathway between familiar and unfamiliar conditions when visualizing respective objects. These differences imply that there is a notable distinction between the neural-cognitive processes that underlie object familiarity. These results can contribute information on the mechanisms that guide object representation in humans, and the implications of such findings can span research from neuropsychology to machine learning.

63. Do they all "look alike" to you? The relationship between implicit associations and own-race bias

Gabrielle Griffin-Maya, (Allison Connell Pensky), Allegheny College - Psychology

Research into implicit association and own-race bias could be crucial in helping deconstruct racial prejudices that are proving divisive in this country and around the world. Own-race bias, also called cross-race bias, or the cross-race effect, is the phenomenon where individuals are more accurate at recognizing the faces of people of their own race, and less accurate at recognizing faces of people of other races (Meissner & Brigham, 2001). While explicit attitudes are often more predictive of behavior than implicit attitudes, implicit attitudes are often used to measure attitudes in socially sensitive situations. Specifically, the Implicit Association Task (IAT) has been shown to be more valid than self-report in socially sensitive situations, and are often used in studies investigating interracial issues (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). In the present study, 50 undergraduate college students participated in an experiment to investigate the relationship between own-race bias and implicit associations. Participants completed a facial introduction task where they were exposed to a set of Caucasian and African American faces. After this, they completed an Implicit Association Task (IAT) (https://implicit.harvard.edu/implicit/). And finally, their recognition memory for the studied faces was tested in an old-new paradigm. I hypothesize that higher levels of preference for an own-race group as defined by IAT score will correlate with the presence of own-race bias in the facial recognition task.

64. Decision Making Biases in a Social World: Responding to Moral Dilemmas

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The current research centers on decision making biases in a moral dilemma task and aims to explore the extent to which semantic word priming plays an influential role in the process. This investigation will extend previous work that looks at moral sensibility and decision making by experimentally manipulating the situational context of the fictitious scenario as a function of the nature of the previously shown words. Subjects randomly assigned to one of four conditions will be exposed to orthographically presented words, in isolation, that vary on the basis of their semantic association with the concept of acting: 1) action (e.g., move, perform, use), 2) inaction (e.g., stay, idle, delay), 3) action (e.g., move) and inaction (e.g., stay), or 4) control (e.g., face, menu, kiss). During the initial word exposure phase, subjects will name each item aloud as it appears on the screen. Following the exposure phase, subjects will read a prompt containing an adaptation of the "trolley problem" (Thomson, 1985; Navarrete, McDonald, Mott, & Asher, 2012) and will be presented with a scenario in the form of a two-alternative forced choice: allow the trolley to continue on its path and hit five people - or - shift the course of the trolley to instead hit one person. After the subject enters their selection, a free recall task will be implemented to test memory for words from the initial phase of the experiment. Researchers hypothesize that responses to the fictitious dilemma will demonstrate an influence of recent exposure to word primes and that memory for words is enhanced when prior decisions align conceptually with the items being tested (i.e., subjects may be more likely to recall words that are semantically associated with action/inaction in the event that a corresponding selection had been made in response to the dilemma). The overall goal of this research is to more fully understand the cognitive processes and circumstances that underlie decision making biases.

65. Video Game Genres' Effects on Academic Performance

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Ventura et al. (2012) found that low, selective, and highly selective gaming styles were associated with various GPA's, with low and highly selective style gamers having lower GPA's. Gose (2015) found that video game genres were associated with learning constructs, which are skills and abilities that can help enhance specific cognitive learning skill sets. Moreover, Gose (2015) and Squire (2011) point out a need for research to focus on how video games can promote student's skills and attitudes toward school. This study investigated the relationship between work ethic, learning constructs, GPA, selective styles, and video game genres. Since Gose (2015) found that video game genres had different amounts of learning constructs associated with them, it's possible genres with more learning constructs may promote a student's work ethic. It was also speculated that selective style gamers who play genres with more learning constructs may have a better work ethic and overall GPA than low selective style gamers. Sixty-six participants took part in the study. Results from t-tests indicated significant differences between a gamer's selective style and learning constructs. This means low selective style gamers (M=36.39, SD=20.55, N=51), compared to selective style gamers (M=49.33, SD=21.12, N=15), played genres that had fewer learning constructs; t (64) = -2.131, p = .037. There were no significant differences found between video game genres and work ethic scores.

66. Does Self-Worth Moderate the Effect of Stressful Life Events in College Students

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A plethora of research has indicated that stressful life events can have negative effects on a person's life. This study aimed to assess how self-worth moderated the effects of stressful life events on college students' academic achievement. Participants were asked to complete a survey in order to assess this potential effect. College students (N=72) attending a university in northwestern Pennsylvania participated in this survey. Subjects completed the following assessments: Contingencies of Self-Worth Scale, Academic Success Inventory For College Students, Life Events Checklist for DSM-5, and Reactions to Research Participation Questionnaire-Revised. It was hypothesized that an individual who experiences a stressful life event that has high self-worth will report high academic achievement. Results from a multiple regression analysis did not support the hypothesis but did indicate that individuals who experienced a stressful life event had lower academic achievement when self-worth was low. Limitations of this study include a small sample size and inability to generalize to the overall population. Future researchers may be interested in investigating whether the age that the event was experienced, types of stressful life events experienced, and the perception of the event's severity influence academic achievement.

67. Expand your mind: An assessment the Effectiveness of Creative Aerobics as a Creativity Enhancement Technique

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Many authors support the influence of creativity-enhancing techniques. However, such claims lack substantial empirical evidence to endorse the assertions. This research analyzed the effectiveness of Creative Aerobics (Conway Correll George & Yagnik, 2017), a four-step technique of creativity enhancement. Participants completed three measures of creativity prior to training: a convergent measure (20 items from the Remote Association Test, RAT), and items from two divergent thinking measures (the Line Meaning Test and the Instances Test). They also completed a mood scale (PANAS), and measures of individual differences (Gough scale, a brief personality scale, and the Curiosity Scale). Participants were later shown one of five conditions: a TedX talk describing the Creative Aerobics technique, 2) a control TedX video, 3) the transcribed script of Creative Aerobics video, 4) the transcribed script of control video, or 5) the Creative Aerobics video and questions that required them to complete the practice exercises after viewing the video. Last, they completed the post-test creativity scales using different items from the same tests as the pretest. We predicted that participants who viewed the Creative Aerobics video and completed the exercises would perform better than those who did not. However, they did not show a larger increase in the post-test measures than other groups in the Creative Aerobics conditions. Contrary to our predictions, there were no differences found among the groups. Participants who read the script from the control video demonstrated the greatest enhancement in the total number of items generated on the Line Meaning Test. Previous research has shown reliable correlations among personality and creativity measures. However, these measures did not account for any change from pre- to post-test. The data suggest that brief exposure to a creativity training activity does not increase performance on classic measures of creativity.

68. Sarcasm in the Workplace: Individual Differences, Social Context, and Cultural Differences

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Sarcasm is ubiquitous in natural language, yet the interpretation of any sarcastic utterance vary depending on the social context (e.g. with friends, family, or coworkers) and individual characteristics of the listener. In the first study we investigated how individual, social, and cultural variables influence the usage of sarcasm in the workplace. We assessed U.S. college students' self-reports of personality, sarcasm usage, and cultural values. Participants also rated on how appropriate it would be to use sarcasm with different types of people (e.g. gender and age) and in different situations (e.g., at work, with friends, or with family). The survey was administered online to 140 students. The results showed most people see sarcasm as appropriate with friends but less so in the workplace. Both gender and power dynamics are powerful, especially in the workplace. Additional findings revealed that respondents most often used sarcasm with close friends and siblings, which may be considered safe places to let go and have fun, without repercussions. Males reported more sarcasm use than females. Specifically, men most often used sarcasm when face saving compared to women. In the second study, we investigated cultural differences in sarcasm use between countries. The same Qualtrics survey from Study 1 was administered to 42 students whose first language was not English. Results showed that native English speakers use sarcasm more often than non-native speakers. Specific differences were evident in cues to understanding sarcasm: English speakers rely more on tone of voice, facial expressions, and social context. Differences were also found between native English speakers and non-native speakers in the reasons they reported they use sarcasm. In conclusion, sarcasm is a complex form of nonliteral language where use and interpretation depend on social, individual, and cultural factors.