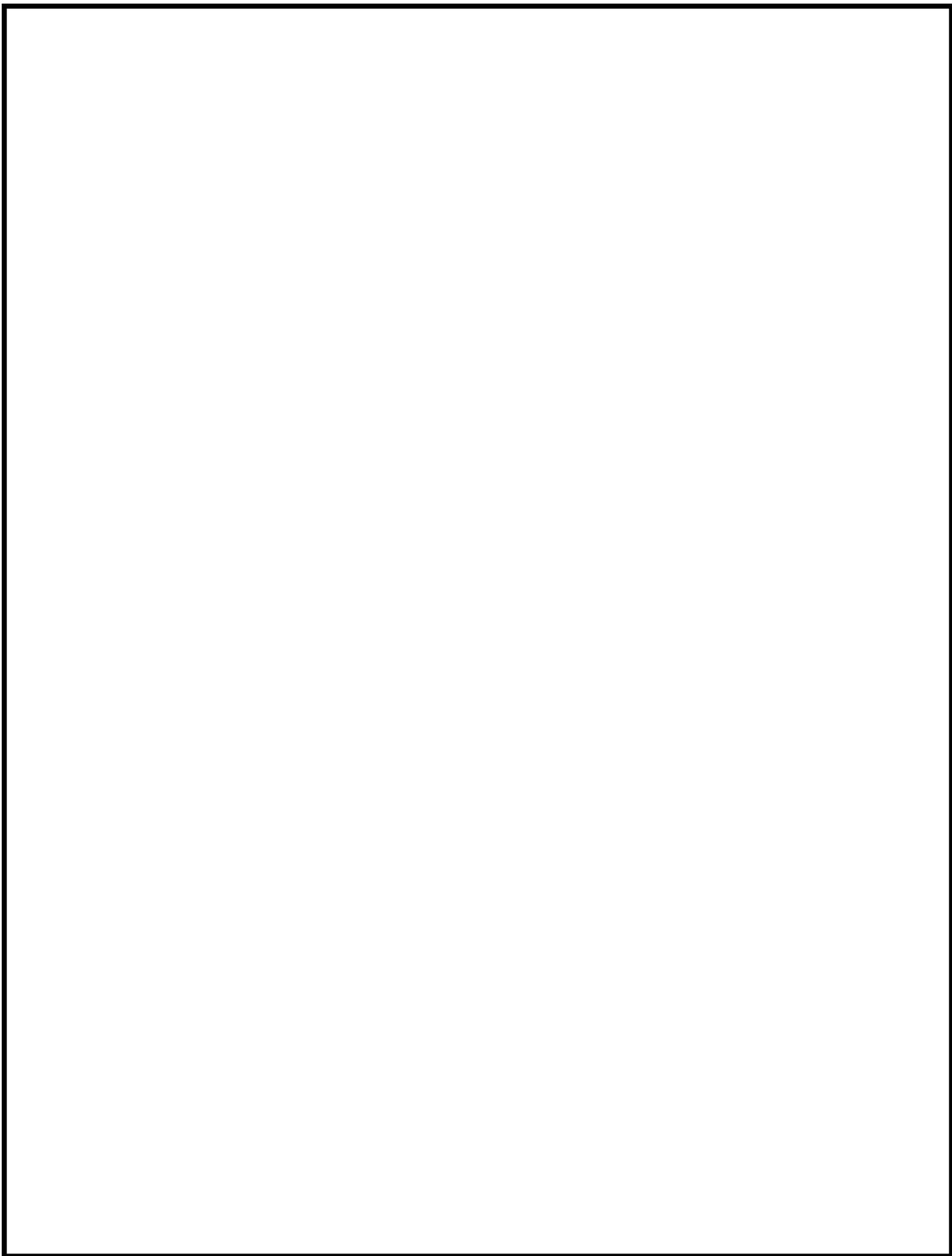


# 5th Annual Susquehanna Valley Undergraduate Research Symposium

Abstract Book



## WELCOME

Welcome to the fifth annual Susquehanna Undergraduate Research Symposium. This symposium is sponsored jointly by Bloomsburg University, Bucknell Institute for Public Policy, Geisinger Health System, and Susquehanna University. It is a valuable opportunity for students in central Pennsylvania to showcase their research activities, to learn about other methods and disciplines and to gain the experience of presenting at a professional conference.

Each year, the number of submissions has grown. In the first year of the symposium, 2011, the number of posters was 20 posters; this year we had a record 99 submissions. Each year, we have been impressed with the quality of work. We congratulate the participants and their professional/faculty mentors on their presentations.

For the third year we have selected projects for oral presentation and will be awarding prizes for outstanding work. There are four categories for prize awards:

- Four \$100.00 awards for those selected to give oral presentations of their research.
- Four \$50.00 awards selected the day of the symposium from each of four disciplines:
  1. Social Sciences/Arts & Humanities
  2. Natural Sciences & Engineering
  3. Biological Sciences
  4. Clinical Research

Special thanks to Meg Martin for assistance in organization and logistics.

We would appreciate any feedback you have to give us about the symposium this year. We will incorporate your suggestions in planning for next year's event. Please send it to any of the following 2015 conference organizers (below).

Thank you for participating in this year's symposium!

The Organizers:

**Heather Feldhaus, PhD**, [hfeldhau@bloomu.edu](mailto:hfeldhau@bloomu.edu)

Bloomsburg University

**Toshiro Kubota, PhD**, [kubota@susqu.edu](mailto:kubota@susqu.edu)

Susquehanna University

**Janet Robishaw, PhD**, [jrobishaw@geisinger.edu](mailto:jrobishaw@geisinger.edu)

Weis Center for Research, Geisinger Health System

**Amy Wolaver, PhD**, [awolaver@bucknell.edu](mailto:awolaver@bucknell.edu)

Bucknell Institute for Public Policy

## **Keynote Speaker:**

Erin Keen-Rhinehart, Assistant Professor of Biology, Susquehanna University

Erin Keen-Rhinehart has been a member of the Biology faculty at Susquehanna University since 2009. She received her Bachelor's degree in Neuroscience from Lehigh University in 1998, and Her PhD in Neuroscience from the University of Florida, College of Medicine in 2003. Her area of specialization is Neuroendocrinology, with a focus on the role of gestational environment on offspring neuroendocrine and behavior. She and her students study how environmental perturbations such as stress or nutritional deficits can alter offspring development in ways that have long-lasting impacts on neuroendocrine regulation of ingestive behavior and reproductive function. Recent projects have investigated the effects of low protein diet during gestation on offspring hypothalamic neuropeptide expression in rats and the effects of reduced nutrient availability on offspring ingestive behaviors in Syrian hamsters. Keen-Rhinehart maintains ongoing collaborations with colleagues in the Biological Sciences Department at Lehigh University in Bethlehem, PA. She was instrumental in establishing the new Neuroscience major curriculum at Susquehanna University, and she teaches the Introduction to Neuroscience course as well as upper-level courses including Functional Neuroanatomy and Behavioral Neuroendocrinology.

## **Support for Undergraduate Research**

### **Bloomsburg University**

Bloomsburg University has a long tradition of active learning through research, scholarship, and creative activities by our undergraduate students. Early students achieved these goals through course-embedded projects and capstone experiences. More recently, we developed a university-wide program to further integrate longstanding and new areas of undergraduate research, scholarship, and creative activities into a vibrant scholarly community. Across all disciplines, we support faculty as Teacher-Scholars to mentor our undergraduate students by providing a wide range of on-campus seed grants, support for external funding, and professional development opportunities. New centers for research, such as the Center for Community Research and Consulting, the McDowell Institute, and the Center for Undergraduate Research directly support research, scholarship, and creative works by our students and faculty. The Undergraduate Research, Scholarship, and Creative Activities (URSCA) Program, held in the summer, supports students with financial support to conduct a project with a faculty mentor. Students receive basic undergraduate research training and engage in the scholarly community during the program. The Susquehanna Valley Undergraduate Research Symposium is an important culminating event for these students, giving them valuable experience presenting research at an interdisciplinary event involving multiple institutions. Our undergraduate research initiative would be ineffective without the broad and enthusiastic support of BU faculty, both as mentors and as members of the URSCA Advisory Group, and our administrators' innovative approaches to engaging students in the scholarly community. In Academic Affairs, the Provost (Dr. Ira Blake), Associate Vice President of Research (Dr. Robert Gates), and President (Dr. David Soltz) provide remarkable administrative support for undergraduate research, scholarship, and creative activities.

### **Bucknell Institute for Public Policy**

The Bucknell Institute for Public Policy aims to educate the global citizen in three ways—general education of the student and community, curricular support through a minor in Public Policy, and fostering qualitative and quantitative research skills in the social sciences in and out of the classroom. We aim to enhance undergraduate research opportunities in the social sciences through supporting student development and encouraging more faculty members to mentor undergraduates in their own scholarship. The Institute, formally constituted in 2012, sponsors a competitive summer research program which provides students with summer stipends to work as research assistants for faculty on policy-related projects, provides additional faculty research grants which include support for students. With the Bucknell Environmental Center, we developed an Emerging Scholars program, now in its second year, which provides seed money for student-directed projects which are at an early stage of development. We organize weekly professional skills development workshops for students

participating in the Institute sponsored research projects and are open to all students working on policy-relevant research, regardless of their funding source. In co-sponsoring the Susquehanna Valley Undergraduate Research Symposium, we are happy to celebrate undergraduate research accomplishments in all disciplines.

## **GEISINGER'S SUPPORT OF UNDERGRADUATE RESEARCH**

Geisinger Health System has been offering undergraduate research experiences for almost 28 years. As part of that experience, interns receive outstanding guidance, mentoring and support from researchers who are conducting state of the art research or from physicians, engineers, and staff from across the institution dedicated to changing the ways in which health care is managed and delivered.

In 2006, Geisinger formalized its internship program to help coordinate undergraduate and graduate placements for students in non-clinical areas throughout Geisinger Health System. Students have had placements in such diverse areas as Supply Chain, Human Resources, Finance, Geisinger Health Plan, Dietary Services, and Innovation. Laboratory opportunities are provided at the Weis Center for Research in the areas of genetics, cell biology, and systems physiology, and also at the Center for Health Research in the areas of public health, biostatistics, medicine, environmental studies, health care administration and social sciences. The recent opening of the Geisinger-Bucknell Autism & Developmental Medicine Center in Lewisburg, Pennsylvania has provided new opportunities for research in genetics and developmental issues for many local students.

The students who have internships at Geisinger are often from local universities including Bloomsburg, Bucknell and Susquehanna. Other interns go to schools outside of the area but have a family connection in the local area or have a very particular research interest that can be met during their time at Geisinger. A large proportion of the interns make career decisions based on their experience at Geisinger and some return to be employed at Geisinger or by other local employers. The interns, through the research and projects they conduct, also help to create important linkages between Geisinger researchers and clinicians and faculty at Bucknell, Bloomsburg and elsewhere, leading to collaborations and joint projects.

## **Susquehanna University**

Susquehanna University makes collaborative research between undergraduate students and faculty members a priority. In fact, the university has been recognized as a leader in the field by the National Conference for Undergraduate Research (NCUR). Nearly 80 percent of our students get professional experience before they graduate, either in the form of undergraduate research or an internship. Students can choose from a variety of research opportunities in a number of disciplines. The Research Partners Program, begun in 1996, is one such option. Since its beginnings, Research Partners has enabled students to work with faculty on a full-time basis during the summer. Last year, Susquehanna received \$3.1 million in grants from the

National Science Foundation, the National Institutes of Health and the Richard King Mellon Foundation to provide continued funding for faculty-student research. Research topics include: how advertising affects the demand for cigarettes and potential substitutes; the effects of a mother's nutrition during pregnancy on brain and endocrine system development; and the ecology and health of the Susquehanna River and Chesapeake Bay watersheds. In addition to encouraging independent research and experience through internships, the university supports opportunities for students to present their findings at national conferences. This year, NCUR included Susquehanna on a list of 57 schools in recognition of its high level of student participation in NCUR's annual conference.

## **Acknowledgments**

The organizers thank the following volunteer judges for evaluating the posters for prizes.

### **Biological Sciences**

Dr. Gerda Breitwieser, Senior Scientist, Weis Center for Research, Geisinger Health System  
Dr. Elizabeth Capaldi, Associate Professor of Biology, Bucknell University  
Dr. David Fazzino, Anthropology, Assistant Professor of Anthropology, Bloomsburg University  
Dr. Margaret T. Peeler, Professor of Biology, Susquehanna University

### **Clinical Research**

Dr. Erin Keen-Rhinehart, Assistant Professor of Biology, Susquehanna University  
Dr. Erin Jablonski, Associate Professor of Chemical Engineering, Bucknell University  
Dr. Janet Robishaw, Senior Scientist, Weis Center for Research, Geisinger Health System  
Dr. William Schwindinger, Assistant Professor, Biological and Health Sciences, Bloomsburg University

### **Natural Sciences & Engineering**

Dr. Samya Bano Zain, Associate Professor of Physics, Susquehanna University  
Dr. John Hrantiz, Professor, Department of Biological and Allied Health Sciences, Bloomsburg University  
Dr. Ned Ladd, Professor of Physics and Astronomy, Bucknell University  
Dr. Raghu Metpally, Bioinformatics Scientist, Weis Center for Research, Geisinger Health System

### **Social Sciences, Arts & Humanities**

Dr. Sharon Larson, Senior Investigator, Director Behavior Research, Geisinger Health System  
Dr. David S. McLaughlin, Assistant Professor of Education, Susquehanna University  
Dr. Loreen Powell, Assistant Professor of Business Education and Information and Technology Management, Bloomsburg University  
Dr. Vanessa Massaro, Visiting Assistant Professor of Geography, Bucknell University

# SUSQUEHANNA VALLEY UNDERGRADUATE RESEARCH SYMPOSIUM Schedule

10:00 - 11:00 a.m. Registration/Open for Poster Hanging

11:00 - 11:30 a.m. Welcome - Amy Wolaver, PhD, Bucknell Institute for Public Policy

Keynote Speaker - Erin Keen-Rhinehart, PhD, Assistant Professor of Biology Susquehanna University

11:30 - 12:30 p.m. First Poster Session

12:30 - 1:15 p.m. Lunch

1:15 - 2:15 p.m. Second Poster Session

2:15 - 3:30 p.m. Oral Presentations

Kelly Bridgham, Clinical Research “Utility of Prophylactic Antibiotics for Non-Operative Facial Fractures”

Katherine Dent, Biological Science  
“Using pupillometry to understand the physiological basis of focusing spatial attention”

Xiaoying Pu & Elliot Radsliff, Natural Science & Engineering,  
“Improving Decision-making via Wearable Biosensors”

Yujie Yang, Social Science, Arts & Humanities, “Severance Tax in the United States”

3:30 - 4:00 p.m. Conference Closing & Announcement of Best Poster Presentation Winners

**Author:** Abdullahi, Khadija

**Mentors:** Feldhaus, Heather

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Exam Preparation Techniques and Habits

**Abstract:**

This project examines the study habits of college students through interviews with students regarding how they prepare for examinations. Participants included students from Bloomsburg University, who each completed a 10 min. interview that was audio recorded and then transcribed. Data will be analyzed using a grounded theory approach. The type of techniques students use, the amount of time spent studying, and from whom student's learned their current study methods are a few of the questions included in the interview. The analysis of the interviews looks at the trends across the four classes: freshmen, sophomore, junior, senior. Two common reasons why students said that they change their techniques have to do with the type of course they are taking, and the perceived level of difficulty of the course and material being learned. Participants reported mixed results about professors giving guidance on how to study and whether they found assistance helpful. Participants also report studying differently for courses in their major compared to general education courses. Some interesting findings from the book "Make it Stick: The Science of Successful Learning" by Brown, Roediger III, and McDaniel include that retrieval methods that require more effort are more effective for long-term retention, and repetition help to quicken recall of information one has retained. Also that delaying practice after initial learning is helpful, because a little forgetting causes more effort during practice. Preliminary findings from the current study suggest that more than 75% of participants indicated that they use notecards at some point during the semester. Participants reported that they mostly use notecards to help with memorization of facts, terms, and definitions. Some student also reported that they have learned, through trial-and-error, that this method is not effective when preparing for an essay formatted exam.

**Author:** Altenbach, Sierra

**Mentors:** Roggenbuck, Ted

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Writing Fellow Programs: Bridging the Gaps between WAC/WID and Developmental Writing

**Abstract:**

In fall 2013 the Bloomsburg University's Writing Center extended its services by adding a writing fellow program specializing in developmental writing. A writing fellow is a course-based tutor that works with faculty, attends a chosen developmental class, and conducts weekly mandatory sessions for students. Originally, the writing fellow program was adopted from another school in the Pennsylvania State School System of Higher Education (PASSHE); Bloomsburg's writing fellows would attend an annual training session at this school. While this training has helped Bloomsburg University's writing fellows adapt to the writing fellow program, this state school and Bloomsburg have important differences within our own writing centers. Therefore I have worked with Dr. Ted Roggenbuck, the director of the Bloomsburg University Writing Center (BUWC), to create a semester-long training course for its writing fellow program.

In order to create this training, we conducted literary research focusing on Writing in the Disciplines (WID)/ Writing across the Curriculum (WAC) and developmental writing. We then combined the pedagogies of WID/WAC and developmental writing to form our own training program. After this literary research, I collaborated with Dr. Ted Roggenbuck. I then crafted a course outline and determined specific reading material for the upcoming fall semester.

**Author:** Bard, Sydney

**Co-Authors:** Doll, Victoria; Piro, Nicholas; Kassel, W. Scott

**Mentors:** Dougherty, William

**Institution:** Susquehanna University

**Category:** Natural Science & Engineering

**Title:** The Spectroscopic Investigation of the Monomer-Dimer Solution Equilibrium of Tris(3-isopropylpyrazol-1-yl)boratonic nickel(II) Thiocyanate

**Abstract:**

The solution monomer-dimer equilibrium of tris(3-isopropylpyrazol-1-yl)nickel(II) thiocyanate, TpiPrNiNCS, was investigated using various spectroscopic techniques. Reaction of excess sodium thiocyanate with TpiPrNiNO<sub>3</sub> in methanol resulted in the formation of the desired complex in a 68% yield. X-ray diffraction studies indicated that the complex is a symmetric, thiocyanate-bridged dimer in the solid state with a long Ni-S bond of 2.500(1) Å holding the dimer together. Dissolving the complex in non-coordinating solvent at room temperature resulted in partial dissociation of the dimer producing a dynamic equilibrium between the monomeric and dimeric states in solution. Solution-state IR spectroscopy supported this equilibrium by exhibiting two different thiocyanate resonances at 2135 and 2051 cm<sup>-1</sup> corresponding to the dimeric and monomeric states respectively. UV-vis spectroscopy in toluene showed an increase in monomer concentration coupled with a decrease in dimer concentration as the temperature was raised from 0 to 70 °C. The transition from mostly monomer to mostly dimer in solution was monitored by variable-temperature <sup>1</sup>H-NMR spectroscopy. These experiments indicated that the isopropyl hydrogen atom, the one closest to the nickel center, was most affected by the solution composition. The slowing of the dimerization process and the complicated magnetic properties of the two states resulted in the shifting and broadening of this NMR resonance initially located at 3.2 ppm at room temperature to 5.2 ppm at -30 °C before disappearing completely at -40 °C. Cyclic voltammetry experiments identified both forms of the complex at room temperature in CH<sub>2</sub>Cl<sub>2</sub> with one-electron Ni<sup>2+</sup>/1+ reduction processes at -1.63 and -2.29 V for the dimer and monomer respectively. Cooling the sample to approximately -40 °C resulted in loss of the monomer wave leaving only the dimer reduction process present. The combined results from the spectroscopic techniques indicated the solution equilibrium lies heavily towards the dimeric form at low temperatures and heavily towards the monomeric form above room temperature.

**Author:** Beck, Lauren

**Mentors:** Kubota, Toshiro

**Institution:** Susquehanna University

**Category:** Biological Science

**Title:** Judging the Effect of Grouping in Human Depth Perception

**Abstract:**

In this study, the inherent inaccuracies in visual perception of depth were examined. Subjects from the local community ( $n=29$ ) observed two layouts each composed of 8 surveyor's flags (4 white and 4 orange). The flags were placed along a  $45^\circ$  positively sloped line with its midpoint 150 feet away from the subjects. The white flags were placed to the left of the midpoint while the orange flags were placed to the right. In the first setup, each flag was separated by 5 feet. In the second setup, the white flags and orange flags were shifted slightly, introducing a 10 foot gap between the rightmost white and leftmost orange flags. After observing each, subjects chose the closest layout from a list of ten choices. These included curved, random, stepwise, and linear layouts. Finally, subjects estimated the metric distance to the flag's midpoint. It was hypothesized that the flags in the first layout would appear as one line parallel to the viewer, but that two distinct stepwise parallel lines would be perceived in the second layout due to the larger gap. This is supported by Gogel's adjacency principle and Weber's Law.

In the first setup, 36% of subjects chose the correct layout while another 36% saw a flat line. In the second setup, only 10% chose correctly. A majority (75%) chose either disjointed steps or curves. Between the two setups, the proportions of correct answers were moderately different ( $p<0.10$ ), and the distributions of multiple choice answers were different ( $p<0.01$ ). Thus, the larger gap was a more effective cue than color at inducing subjects to group the flags, confirming our hypotheses. On average, subject underestimated the metric distances ( $p<0.05$  and  $p=0.166$ , respectively), and the two setups did not affect these estimates ( $p>0.1$ ).

Judging depth is a fundamental way humans perceive the world, so uncovering the extent to which this may be manipulated is an important area of research--is what we see really what is there, or are our perceptual systems failing us? These experiments highlight that our everyday perception may not be as accurate as we like to believe.

**Author:** Bengier, Brian

**Mentors:** Feldhaus, Heather

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Best Practices for Serving Student Veterans

**Abstract:**

Programs that help veterans transition into academia and follow them along throughout their college career and on into the workforce. Through the use of two web-based surveys using open-ended questions I surveyed current/past student veterans and administrative personnel who oversee programs for veterans. Through the use of surveys, programs will be obtained to better serve the veteran population in a college setting for the future. The basic objective of this project is to find out what potential programs can be used to help student veterans in college. Some other research suggests a "veteran friendly" campus provides the best atmosphere for student veterans. This research also makes a statement that when student veterans have one central location for their needs, plus a space of their own increases the likelihood that they will stay in school and eventually graduate. The objective of my work is to clarify what specific aspects of the already identified programs work best for specific veteran groups and also to identify other programs or aspects of programs that are particularly helpful. My survey asks student veterans which programs they have been offered and participated in as well as which programs or activities they found most useful. The survey for administrators is directed specifically at highly rated and successful veteran programs and asks about which programs are offered and how those programs are administered and funded. Preliminary, my findings show that having a veterans specific orientation and veteran peer mentors seems to be a top resource among programs used for veterans, along with this, having staff on hand just for veterans seems to be a top value among student veterans themselves.

**Author:** Bergman, Jeffrey

**Co-Authors:** Marinos, Dimitrius

**Mentors:** Tapinos, Nikos; Ness, Jennifer; Snyder, Jennifer; & Zepecki, Jennifer

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Investigation of the Role of Resveratrol Oligomers Isolated from Carex species in the Inhibition of Glioma Cell Migration

**Abstract:**

Glioblastoma multiforme (GBM), a type of non-neuronal brain cancer, ranks as one of the most devastating and fatal types of cancer; less than 10% of patients live more than five years past diagnosis. The high malignancy of glioblastoma is due in part to the migratory nature of cancerous glial cells. Our lab is investigating the potential use of new compounds to inhibit the survival and migration of GBM cells. We have analyzed the effects of two resveratrol oligomers isolated from native Pennsylvania Carex species plants (compound J and compound D) on primary GBM stem cells and normal rat astrocytes. Boyden chamber migration assays and viability assays were performed to determine the nontoxic and inhibitory nature of these compounds. Our collaborators responsible for the isolation of compounds J and D are Samantha Gromek, Daniel Niesen, and Geneive E. Henry, Department of Chemistry, Susquehanna University, Selinsgrove, PA.

**Author:** Bertram, Emma

**Co-Authors:** Sydnor, K.M.; Grisel, J.E.

**Mentors:** Grisel, Judith

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Alcohol reward in mice is mediated by the drug's ability to attenuate anxious states

**Abstract:**

Alcohol reward is mediated by both positive and negative reinforcing effects. The tension reduction hypothesis suggests that anxiolytic effects of ethanol are principal factors in the initiation of alcohol consumption, with this idea supported by the comorbidity of anxiety and alcohol use disorders (e.g., Cappell and Herman 1972; Pohorecky 1990, Gilpin and Koob.). We explored the relationship between anxiety levels and ethanol reward in an animal model by employing classically conditioned place preference to an ethanol-paired context. We hypothesized that mice with naturally higher levels of anxiety prior to a single ethanol exposure would show higher place preference to the context associated with this injection, and also that a pretreatment of the anxiolytic drug diazepam would lower place preference to ethanol. In Experiment 1, we measured basal anxiety using the plus maze and light-dark box assays, and split our subject pool of naïve, adult, Swiss Webster mice into high- and low-anxiety halves. It was found that mice with higher basal anxiety preferred the ethanol-paired context over one associated with a saline injection, and that lower-anxiety mice did not. Experiment 2 showed that mice pretreated with diazepam (1 and 2 mg/kg) also failed to demonstrate an ethanol place-preference. Our results support the hypothesis that the negative reinforcing effects of ethanol may contribute to individual differences in the initial subjective reward of the drug.

This research was supported by NIH grant #AA022506

**Author:** Best, Olivia

**Mentors:** Ball, Kevin

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** The Effect of Chronic Stress on Incubation of Palatable Food-Craving

**Abstract:**

Given the high rate of human addiction, and its debilitating effect on society as a whole, exploration of its etiology is imperative. Previous studies have shown significant relationships between episodes of acute stress and relapse to palatable food-seeking behavior in rats. Exposure to chronic stress, via a pharmacological stressor, yohimbine, has also been shown to potentiate reinstatement of food-seeking behavior given the presence of stress, re-exposure to palatable food itself, or food-related cues. The purpose of this study was to observe and analyze the effect of chronic restraint stress on incubation of craving, and ultimately rate of reinstatement of food-seeking behavior in rats. Additionally examined was the role of dopamine D1-like receptors, through introduction of SCH-23390, a dopamine D1-like receptor antagonist. This study utilized 24 male Sprague-Dawley laboratory rats for a controlled experiment with the reinstatement model, an accepted method for relapse studies. Following periods of cue-mediated self-administration of highly palatable food pellets, in operant chambers consisting of two levers (one active, one inactive), our experimental rats underwent a chronic stress phase, and a subsequent reinstatement phase, where the rate of food-seeking (as per number of active lever presses) was measured, after 1 day and 7 days post-restraint treatment. Upon statistical analysis, Results indicated a significant increase of food-seeking behavior 7 days after culmination of chronic stress; food-seeking behavior was not markedly different after only 1 day, a point at which prior studies had measured. Also, those rats which received injections of SCH-23390 displayed an attenuation of relapse, even in the presence of chronic stress, measured 1 and 7 days post-treatment. This reversal of stress effects was further demonstrated in the decreased adrenal weights of dopamine D1-like antagonist treated subjects. Results of this study suggest not only a significant effect of chronic restraint stress on the incubation of food craving following a stress-free period, but also the significance of dopamine D1-like receptors in the reinstatement of maladaptive eating behaviors.

**Author:** Bilcheck, Nicholas

**Co-Authors:** Michael, Andrew; Kozick, Richard

**Mentors:** Michael, Andrew, Kozick, Richard

**Institution:** Bucknell University

**Category:** Natural Science & Engineering

**Title:** On the Question of Hyper/Hypo Functional Connectivity in ASD: A Review of Previous Findings

**Abstract:**

Background: Technological advancements in recent years has allowed the field of neuroimaging to gain better spatial and temporal analysis of the human brain. With functional magnetic resonance imaging (fMRI), it is possible to identify both the functional activation and the functional connectivity of the brain. Researchers are actively searching for fMRI measures that can differentiate between neurotypical individuals and individuals with neurological disorders. The functional connectivity of Autism Spectrum Disorder (ASD) has been previously analyzed in many previous studies to find abnormality in functional connectivity.

Objective: The objective of this project was to review relevant previous manuscripts to provide possible answers to the following questions on functional connectivity in ASD: (1) Is ASD functional brain hyper- or hypo-connected? (2) What are connectivity differences in global versus local connections? (3) Are there inter-hemispheric differences in ASD? (4) What are the functional connectivity correlates of ASD symptom severity?

Methods: We searched research publications using PubMed and Google Scholar search engines using combinations of the following search terms: "functional," "connectivity," "autism," "fMRI," "hyper," "hypo," and "ASD." We then looked for papers relevant to our questions while prioritizing more recent papers and including appropriate papers cited within the papers we initially chose.

Results: In ASD, we found more reports of global under connectivity and region dependent, local hyper/hypo-connectivity. Inter-regional default mode network (DMN) connections and inter-hemispheric connections were found to exhibit hypo-connectivity in the majority of the papers reviewed. Additionally, specific regions within the DMN and regions known to be related to social deficits in ASD were found to be hyper-connected. Finally, the relationship between severity of abnormality in functional connectivity in ASD and severity of social deficit in ASD was found to be highly correlated in brain regions that are believed to be related to social deficits in ASD.

Conclusion: Our preliminary results indicate that there are strong functional connectivity differences between ASD and typically developing children. Researchers are currently investigating how functional connectivity measures can be used for early diagnosis and treatment of ASD.

**Author:** Bills, Kimberly

**Mentors:** Erdley-Kass, Shiloh

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Findings from a community based-affordable health care outreach project in rural Pennsylvania: Experiences and perceptions of working-age uninsured and insured adults.

**Abstract:**

Little is known about the health care experiences of residents living in rural areas despite attention to the health care crisis in the United States and the implementation of Affordable Care. Although research suggests that residents residing in rural areas generally experience barriers to access health care more information is needed to best understand the needs of this population (Lishner, Richardson, Levine & Patrick, 2008). Furthermore, information regarding the lived experience of individuals residing in rural regions will help to better identify innovative service delivery strategies to improve health care access for this population.

Key Words: Rural, Health Care, Service Delivery, Barriers

**Author:** Bowers, Brittany

**Co-Authors:** Ren, Neil

**Mentors:** Zhu, Zhiqun

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** The United States and East Asian Economic Integration

**Abstract:**

The United States has remained, despite some warranted apprehension, a world superpower economically, politically, and militarily. The nation's policies, strategic considerations, and actions affect all major global actors in diverse and transformative ways. This study works to define the position the United States has taken towards economic integration in East Asia, more specifically ASEAN, since its official establishment in 1967. Despite 48 years of existence, ASEAN has failed to reach the sophistication of a full economic union through the establishment of a monetary union. Why has the United States not supported ASEAN economic integration on a more consistent and dedicated manner in order to help facilitate and expedite the process? If the United States took a more active role in the development of this multilateral organization, would the ASEAN Economic Community be a realization by now instead of a mere aspiration? Would the development of the AEC help actualize a broader East Asian Community? In order to answer these questions, this study starts with a literature review of economic integration theory and the history of ASEAN as an organization. Following an analysis of theory and history, the study turns its focus to U.S. policy published directly by the government including public statements made by government officials to further understand and assess the nation's reaction to both European integration and Southeast Asian integration. More specifically, the study presents three cases of US involvement in integration policies in East Asia.

The research supports the thesis that United States' interests with respect to ASEAN and East Asia at large are predominantly motivated by and focused on narrowing security threats, addressing geopolitical concerns, and balancing regional power. Thus, when set threats and concerns are less prevalent, interest wanes and foreign policy focuses shift. This study works to unveil the United States' genuine incentives in the East Asian region. With the recent announcement of the Trans Pacific Partnership, which includes only a few ASEAN member nations, this insight is helpful in trying to understand and predict future policy implications for the U.S.

**Author:** Bridgham, Kelly

**Co-Authors:** Bridgham, Kelly; Dove, James; Fluck, Marcus; Hunsinger, Marie; Blansfield, Joseph; Shabahang, Mohsen; Wild, Jeffrey

**Mentors:** Wild, Jeffrey

**Institution:** Geisinger Health System

**Category:** Clinical Research

**Title:** Utility of Prophylactic Antibiotics for Non-Operative Facial Fractures

**Abstract:**

**Objectives:** The majority of patients with facial fractures are managed non-operatively. Patients with facial fractures involving the sinus cavities are often placed on prophylactic antibiotics for 7-10 days to prevent soft tissue infection from the cavity flora. However, no literature exists that shows this practice decreases infection rates. This study aims to compare the duration of antibiotics and the incidence of soft tissue infection found in non-operative facial fractures.

**Methods:** This was a retrospective review of the trauma database of a rural, level 1 trauma center between 1/1/2012 and 1/1/2015. Patients admitted with non-operative facial fractures were included. Patients were categorized into three groups based on the duration of prophylactic antibiotics. Group 1 received no antibiotics, group 2 received a short course (1-5 days), and group 3 received a long course (>5 days). All patients were followed through first outpatient facial trauma clinic visit to survey for soft tissue infections. Outcomes measured include facial soft tissue infections and *C. difficile* infections.

**Results:** During a 3 year period, 289 patients were admitted with non-operative facial fractures. Basic demographics and ISS between the groups are found on table 1. 50 patients received no prophylactic antibiotics, 63 received 1-5 days, and 176 patients received >5 days. Of the 239 patients receiving prophylactic antibiotics, 215 received a combination of Unasyn and/or Augmentin, and 24 patients received Clindamycin due to Penicillin allergy. No patients developed facial soft tissue infections. We found no significant difference in the incidence of *C. difficile* infection between the 3 groups.

**Conclusion:** Our results show that a short-course or no antibiotics may be just as effective as an extended course at preventing soft tissue infection in patients with non-operative facial fractures. Although not found in our study, prophylactic antibiotics in the surgical literature have led to multi-drug resistant organisms and worse outcomes. A prospective study comparing no antibiotics to a short course in trauma patients with non-operative facial fractures is warranted.

**Author:** Brody, Bethany

**Mentors:** Metpally, Raghu; Cook, Adam; Colonie, Ryan; Carey, David J; & Robishaw, Janet

**Institution:** Geisinger Health System

**Category:** Clinical Research

**Title:** Analysis of clinically actionable pharmacogenomic gene variants from 31,000 whole exome sequences identified in MYCode-Biobank Cohort

**Abstract:**

The use of a patient's genomic information, in combination with information about his/her family history, lifestyle, and environmental conditions, known as personalized medicine, can be used to further customize health management. By doing this, more educated predictions can be made about a patient's risk of developing a certain disease, and his/her response to drugs. Pharmacogenomics studies the patients' different responses to drugs based on their genetic information. Genetic factors can account for 20 to 95 % of patient variability (Belle et al 2008). The same dose of the same medication can be effective for one patient and cause no side effects, while being ineffective and possibly even toxic for another. 5 to 10 % of hospital stays are related to life-threatening medication side effects, and more than 2 million serious adverse drug reactions lead to 100,000 deaths per year, making them the 4th leading cause of death (Sundberg et al 2010). The use of personalized medicine in healthcare has the potential to benefit almost everyone involved-allowing doctors to make better informed clinical decisions, increasing the probability of a desired health outcome in a patient by using better-targeted therapies, reducing the probability of adverse drug reactions in patients, allowing earlier disease intervention, and reducing healthcare costs. The Clinical Pharmacogenetics Implementation Consortium (CPIC) provides guidelines, linking genotypes to phenotypes, and prescribing recommendations based on the genotype to help clinicians understand how available genetic test results should be used to optimize drug therapy (pharmgkb.org). The purpose of my study was 1) to build a pipeline to identify clinically actionable (CPIC) gene variants from exome sequencing data and 2) to build a potential pharmacogenomic clinical report with the CPIC recommendations for each patient. Identified variants will further need cross platform validation in a CLIA Lab, before including into consented patients' medical records, thus allowing physicians to quickly access the patients' pharmacogenomics information to use when making treatment decisions.

**Author:** Brown, Aaron

**Mentors:** Costanzo, Angelo

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Lexical Issues and Identity Formation in Rural Central Pennsylvania Drag Queens

**Abstract:**

Many linguistic and ethnographic studies (Barrett 1998, 1999; Mann 2011) of drag queens have been focused on communities in urban areas or areas with long-standing, centralized drag communities (e.g., Taylor & Rupp 2008). However, communities of drag queens exist across the United States and beyond. While it is well known that different genres of drag (e.g., camp, pageant, ballroom, etc.) are radically different, it would certainly be problematic to assume that drag communities would not be affected by the geographical areas they perform in as well. This study focuses on a distinctly rural and spread-out, yet rather close-knit, drag queen community whose members live and perform in rural central Pennsylvania. We expect that the ruralness in which the drag queens live and perform will influence the creation of a unique type of drag queen identity, perhaps signalled by a unique set of linguistic features. As the initial stage of a research program aimed to investigate language, gender, and identity in this specific community of drag queens (ultimately leading to an ethnographic study of drag performances and backroom talk), this paper examines three issues specifically located in the lexical domain, though the use of these features have wider social meaning. First, we explore the use of drag kinship terminology, i.e., which words (e.g., mother, sister, etc.) are being used and how their use reflects the values the community places upon social organization. Second, we examine a wide range of lexical items (some long-standing and traditional, others more innovative) associated with the wider drag community (e.g., sickening, gagging, eleganza, etc.) and gauge the members of this community's knowledge of, use of, and attitudes towards these words. Last, as drag communities appear to be a locus of innovative lexicon, we examine the role that innovative terminology and resulting speech style has as a marker of prestige and social position within this specific community. In closing, we hope to uncover a unique speech community which features shared community membership and shared linguistic characteristics; this speech community will not be limited to sexuality or gender, but rather a shared cultural competence of drag queen speech codes (Simmons 2014).

**Author:** Chung, Ty

**Mentors:** Massaro, Vanessa

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Policing in Gentrified Areas

**Abstract:**

Grays Ferry is a predominantly African-American neighborhood currently undergoing increasing levels of gentrification. My research analyzes the changes in police presence as well as the economic burdens that the families currently residing in Grays Ferry may absorb as a result of changes in policing as the neighborhood gentrifies. My goal is to better understand the impact policing in gentrified areas has on original residents, specifically African Americans, who are targeted by various policing strategies. From the arrest and crime data that I have collected thus far, the preliminary results have shown that over time, the number of arrests have increased and the level of policing has intensified with gentrification in Grays Ferry. During my time in Lewisburg, I prepared interview questions to add to a household survey that my mentor, Professor Massaro, is conducting. I will administer the survey once I get to Philadelphia in order to determine if and how much of an economic burden families take on as a result of this increase in policing. My choice of research draws on my interdisciplinary training in assessing and analyzing how infrastructures that are present in low-income, poverty-stricken communities affect the quality of life of the people who reside in those areas, as well as what local and national government systems do to combat or contribute to these issues. I believe that policies and infrastructure that are currently in place in these neighborhoods infringe on the basic human rights of the residents and once gentrification starts to occur, the police increasingly infringe on those rights. Community wellness is also an important factor that is often neglected in the conversation about these neighborhoods, as access to adequate housing, education, and healthcare dominate the discussion. While these resources are important, having a sense of community is just as important and if people are afraid to walk around in their own neighborhoods for fear of being harassed by police, attempts toward making these resources more accessible may never come to fruition.

**Author:** Conway, Abby

**Mentors:** Kubota, Toshiro

**Institution:** Susquehanna University

**Category:** Natural Science & Engineering

**Title:** Animal Recognition from Sparse Representations of Motion Signals

**Abstract:**

The strength of human visual perception is strong, and humans are able to recognize a wide variety of objects, including humans and animals, with astonishing accuracy from a small amount of information. Motion signals have been used to test the limits of human visual perception, as they have been deemed essential according to the J. J. Gibson's ecological view. The purpose of this research is to examine how much information can be removed, from motion signals, while retaining the ability to recognize moving objects, in particular humans and animals.

We recorded a number of clips with farm animals and humans who acted to imitate movements of some animal. We extracted motion signals by subtracting successive frames. The signals were sub-sampled at two block sizes, 3x3 and 10x10, to produce two dot representations of the motions (P1 and P2, respectively). Skeletons were extracted from each dot representation to produce corresponding line representations of the motions (L1 and L2, respectively). We prepared four surveys, each presented motion signals using one of the four representations. Each survey contained seven clips of motion signals derived from the original recorded clips, five animal and two human clips. Subjects were randomly assigned to one of the surveys and were asked to identify what they saw in each clip. There are a total of 1685 frames in the seven clips. The average numbers of dots per frame are 3299 for P1, 294 for P2, 505 for L1, and 79 for L2.

The average recognition rates were 82.4% for P1, 42.6% for P2, 73.8% for L1, and 39% for L2. The recognition rates and the average numbers of dots were positively correlated at 0.37 ( $p=0.05$ ), confirming that recognition is easier when more dots are available. The performance drop between point and line representations were insignificant, despite the large drops in dots, suggesting that skeletons retained essential motion information. Overall, the 3x3 block size line representation reflected good performance and data size trade-off; this representation is suited for efficient algorithms and practical applications like surveillance and robotics.

**Author:** Cowen, Robert

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**Mentors:** King, Brian

**Institution:** Bucknell University

**Category:** Natural Science & Engineering

**Title:** Application of n-gram prediction and Brown's Stages of Syntactic and Morphological Development to design augmentative and alternative communication for autistic children

**Abstract:**

The most recent data suggests that 1 in 68 children in the United States is diagnosed with autism spectrum disorder (ASD). Individuals with ASD exhibit impaired social communication skills, ranging from minor speech difficulties to complete lack of verbal communication. Even for children who are verbal, day-to-day communication can be a serious challenge, especially in social situations. With the advent of affordable personal computing devices such as smartphones and tablets, augmentative and alternative communication (AAC) applications, such as Proloquo2Go and Aacorn, have seen a rise in use by speech pathologists in the treatment of children with ASD. These applications typically provide children with a simple display of words which, upon selection, are spoken by the device to aid in communication. While these applications have proven useful, the user interfaces (UI) often lack the navigability necessary for children with ASD to use them efficiently, resulting in substantial learning-curves as well as significant decreases in word selection speed. The goal of our study was to develop an AAC application for Android tablets utilizing a word prediction model and streamlined UI in order to increase the communication rate and support the language development of children with ASD. The Android platform was selected due to its low cost and wide availability. Our application utilizes an n-gram model in order to predict the user's next target word. This decreases the number of keystrokes necessary to obtain the child's desired input. Our model is applied to corpora from the Child Language Data Exchange System (CHILDES), a database that contains thousands of transcripts of child speech. Transcripts were analyzed and organized by Brown's stages of child speech development. Our UI was developed with input from clinicians at the Geisinger Autism & Developmental Medicine Institute (ADMI) to be optimized for children with ASD. We plan on piloting the AAC app with patients from ADMI in the future.

**Author:** Dent, Katherine

**Mentors:** Troiani, Vanessa;, Sabatino DiCriscio, Antoinette

**Institution:** Geisinger Health System

**Category:** Biological Science

**Title:** Using pupillometry to understand the physiological basis of focusing spatial attention

**Abstract:**

Background: Pupillometry, the measurement of pupil dilation, is a validated biological marker of activity in the Locus Coeruleus (LC), a brainstem nucleus. The LC is the principal site of norepinephrine (NE) synthesis, which is collectively referred to as the LC-NE network. This network acts as the primary internal mechanism that guides arousal, mental effort and potentially, focused attentional states. With recent research highlighting atypical LC-NE function, pupillary changes and attentional states in schizophrenia, autism and other neurodevelopmental disorders, this study tested whether changes in attentional focus can be reliably related to changes in pupil dynamics.

Aims: This study investigates the relationship between pupillary changes and perceptual selection during a visual-spatial perception task. We hypothesized that changes in pupil response would be related to the relative size of the visual attention window, with pupil dilation reflecting a more focused attentional state.

Method: To explore these relationships, thirty-three adults (ages 19-30) completed a test of visual-spatial perception (i.e. Navon Figures Task) that consisted of participants viewing a larger, global figure composed of different, local elements across three blocks. Each block varied whether the target was the global or local element. A Tobii eye-tracker measured pupil response, with changes in pupil diameter subsequently analyzed on an individual and group level. Participants also completed several questionnaires, in order to explore the relationship between pupil metrics and the expression of quantitative behavioral traits related to the aberrant attention seen in autism and other neurodevelopmental disorders. Data analysis is ongoing.

Hypothesis: We hypothesized that a larger change in pupil diameter from baseline when participants selected the local element, compared to the global element. This result would indicate that a larger pupil diameter reflects a focusing of attention and would demonstrate the first link between pupil changes and spatial attention.

Conclusions: Group analyses confirm our hypothesis and indicate a larger average change in pupil diameter during local selection, compared to global selection. This finding reinforces that variation in pupil size is a useful metric for understanding the dynamic changes of spatial attention, and is critical for future research in neurodevelopmental disorders, in which individuals have aberrant attention.

**Author:** Deppen, Paul

**Mentors:** Feldhaus, Heather

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Examining the Link between Student Motivation and Academic Engagement

**Abstract:**

Access to, and participation in, higher education has increased dramatically in recent decades. This increase is being driven by changes in the job market as well as increasing expectations among adolescents of attending a postsecondary institution, with or without a clear plan for the future. There is growing concern over whether undergraduates are adequately motivated to apply themselves academically or if they are going through college “adrift”, making little academic improvement while developing neither clear goals nor a sense of purpose about their lives (Arum & Roksa 2011; Damon 2008). Prominent ethnographic work regarding undergraduate culture and experience has been done at large, research universities but does not capture the undergraduate experience at smaller, regional institutions (Nathan 2005; Grigsby 2009; Armstrong & Hamilton 2013). The current study examines undergraduate motivation and academic engagement of students attending Bloomsburg University, an accredited, medium-sized public university in Northeast Pennsylvania. Using Ryan and Deci’s (2000) Self-Determination Theory (SDT), students are conceptualized as having distinct motivational orientations for attending college including extrinsic (caused by external regulations or rewards) and intrinsic motivation (caused by an inherent satisfaction of learning). According to SDT, extrinsic motivation can be thought of as a continuum based on “the extent to which the motivation for one’s behavior emanates from one’s self.” (Ryan & Deci 2000; p. 61) Intrinsic motivation, according to SDT, is enhanced when three psychological needs are met- autonomy, competence, and relatedness. Consequently, academic engagement is conceptualized as a construct of behavioral and attitudinal measures largely related to these needs. Using anonymous, online surveys, students were asked for their level of agreement on a range of statements pertaining to their motivation for attending college, level of academic engagement, and extracurricular involvement. Data was also collected regarding students’ family and academic demographics. Pending analysis is expected to reveal that most students’ motivational orientation can be classified as extrinsic, although varied in the degree to which it is so, and is related to students’ level of academic engagement. Academic engagement level will also be compared to students’ extracurricular involvement with the expectation that higher levels of involvement negatively affects academic engagement.

**Author:** Doan, TN

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**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** High risk health behaviors among Asian Americans in the United States

**Abstract:**

The goal of this study is to explore racial differences in health behavior in the United States based on household income, educational attainment, and employment patterns. Even though previous literature has examined the relationship between race/ethnicity and differences in health-related risky behaviors such as smoking and drinking, this research largely examined Asians as a single ethnic group. This perspective masks the real socioeconomic and cultural differences between the Asian subgroups. For example, poverty rates also varied across subgroups: Hmong had the highest individual poverty rates (37.8 percent), followed by Cambodians (29.3 percent); the lowest individual poverty rates were for Filipinos (6.3 percent), Japanese (9.7 percent), and Asian Indians (9.8 percent). These differences in turn differentiate the health patterns of Asian American subgroups. For example, among Asian Americans, Japanese and multiple-race Asians were more likely than other Asian subgroups to have ever smoked and that Filipinos were more likely to start smoking at an early age.

Through writing syntax and analyzing data with SAS, statistical software, I have been able to select various socioeconomic determinants, such as education, household income, marital status and employment patterns. From performing this analysis, my thesis confirms that there are significant differences among Asian American subgroups. Even though Asian subgroups smoke less than non-Hispanic White and non-Hispanic Black, Filipinos smoke significantly more than Asian Indian and Chinese. While 12.3 percent of Filipinos are current smokers, only 6.28 percent of Asian Indian and 7.22 of Chinese are current smokers. 83.63 percent of Chinese and 86.6 percent of Asian Indian never smoker; for Filipinos, the number is 69.5 percent. The pattern is the same for alcohol drinking behaviors, with smaller gaps among Asian subgroups. I also find significant differences in socioeconomic determinants that potentially explain the differences in high risk health behaviors.

Data for this research is drawn from the National Health Interview Survey. This nationally representative survey measures different health related topics through interviews and representative sampling yearly. Personal household interviews are carried out face-to-face by trained individuals.

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**Institution:** Susquehanna University

**Category:** Natural Science & Engineering

**Title:** Assessment of Middle Creek Stream Using Water Quality Index (WQI) and Diatom Metrics

**Abstract:**

It is believed that small streams and waterways of the Susquehanna River cause the problems in the Chesapeake Bay. This study helps develop a better understanding of how these small streams are affecting Susquehanna River and eventually the Chesapeake Bay. Water Quality Index (WQI), Shannon Diversity Index, Pollution Tolerance Index, and Cocconeis percentage were used to assess the water quality of Middle Creek; a small stream located in Snyder County, PA. In addition, this study establishes possible trends among these indices. In the biological components, Diatoms were used to generate indices while eleven parameters including physical and chemical properties were used in the WQI. Data analysis showed visible interaction between the water quality and the diversity in aquatic species. A cause and effect dynamic was observed between WQI and diversity. As the WQI changes, the diversity was affected further downstream. The WQI seems to have a direct effect on % Cocconeis which in turn affects the diversity. This study establishes that looking at one biological index does not indicate water quality because of the inter-dependence of the organisms on each other. Generally, the water quality of MC remains good yet the runoff from the agricultural land and the two lakes do affect the water and the diversity downstream to a certain degree.

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**Institution:** Bloomsburg University

**Category:** Biological Science

**Title:** Diel Stream Phosphorous and Algal Polyphosphate Dynamics

**Abstract:**

Phosphorus (P), a key nutrient added to commercial agricultural fertilizers to support plant growth, also supports the growth of algae in streams. Stream algae grow on aquatic substrata within communities of other microorganisms collectively referred to as periphyton mats. Recent evidence suggests that streams may experience large 24-hour swings in P concentration (i.e. soluble reactive phosphorous, SRP) driven by shifting oxidation-reduction conditions, which can be stored by periphyton in the form of polyphosphates (polyP). The purpose of this study was to monitor (1) how stream SRP concentration varies over a 24-hour period, and (2) how stream periphyton respond to this variation with respect to polyP storage. We hypothesized that (1) stream SRP concentration would peak mid-day and (2) periphyton polyP storage would peak in response to the lowest diel stream SRP concentration. We collected periphyton rock scrapings and water samples every four hours over a 24-hour period beginning at 12 PM from Fishing Creek, accessed at Kocher Park in Columbia County, PA. We also deployed an automatic sampler that took one water sample per hour. Our periphyton samples were analyzed for polyP, chlorophyll a, ash free dry mass, mat P, and extracellular enzymes. SRP concentration displayed no discernable cyclic diel pattern, though the concentrations did generally increase. This lack of a cyclic diel pattern may have been due to disturbance by rainstorms preceding the sampling period, and subsequent concentrating of dissolved ions as water levels dropped. Our hypothesis that SRP concentration would peak mid-day was partly supported, as on day 1 the highest concentration occurred at 2 PM. Further support on day 2 was lacking. Our hypothesis that periphyton polyP storage would peak in response to the lowest diel stream SRP concentration was not supported, as polyP peaked mid-day on day 2 when SRP was neither relatively high nor low. No cyclic diel pattern was observed in polyP storage, but a general pattern of increase occurred. Further research will involve collecting stream samples in the early morning and late afternoon on consecutive days in streams with variable agricultural nutrient input.

**Author:** Erwin, Ryan

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**Mentors:** Blansfield, Joseph

**Institution:** Geisinger Health System

**Category:** Clinical Research

**Title:** Trends and Predictors of Multi-Modal Therapy Use for Gastric Cancer Using the National Cancer Database

**Abstract:**

**Introduction:** Gastric cancer is an aggressive cancer best treated with surgery plus systemic therapy. Multiple studies have shown benefit from combined modality therapy with surgery. However, the timing of these modalities is controversial. This study aims to examine trends in the use of neoadjuvant and adjuvant therapies in gastric cancer, identify predictive factors for neoadjuvant and adjuvant therapy and examine overall survival (OS) benefit from multi-modal therapy compared with surgery alone.

**Methods:** Patients with gastric cancers staged IB-III from 2005-2011 were identified using the National Cancer Database. Patients were placed into three categories: 1. surgery alone, 2. neoadjuvant treatment plus surgery, 3. surgery with adjuvant therapy. Statistical analysis was performed to identify predictors of systemic treatment. OS was analyzed by Kaplan-Meier methods.

**Results:** A total of 9637 gastric cancer patients were identified. The majority underwent surgery with systemic therapy (70%). This percentage increased from 62 % to 76% from 2005-2011. The biggest reason for this increase was neoadjuvant therapy rose from 28.0% to 48.8%, while patients receiving adjuvant therapy dropped from 35% to 27% and patients receiving surgery alone dropped from 37.3% to 23.8%.

Multivariate analysis identified predictors of systemic therapy. Age was a strong predictor, as patients over 70 were statistically less likely to get systemic therapy compared to their younger counterparts ( $p < 0.0001$ ). Males were more likely to receive systemic therapy in addition to surgery ( $p = 0.0273$ ). White race, lower Charlson-Deyo Scores, and higher American Joint Committee on Cancer (AJCC) clinical stage were also shown to be predictors of systemic therapy.

Next predictors of neoadjuvant versus adjuvant therapy were identified in patients undergoing systemic therapy. The strongest predictors of neoadjuvant therapy on multivariate analysis were tumor location in the gastric cardia ( $p < 0.0001$ ) and treatment in an academic research facility ( $p < 0.0001$ ).

Kaplan-Meier analysis revealed an OS advantage in those receiving systemic therapy versus surgery alone ( $p < 0.0001$ ), but no advantage to the timing of the therapy.

**Conclusions:** Systemic therapy use for gastric cancer rose dramatically since 2005, largely due to the increase of neoadjuvant therapy. Pre- or postoperative systemic therapy offers a survival advantage over surgery alone and should be offered.

**Author:** Fazio, Amanda

**Mentors:** Wilshusen, Peter

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Understanding International Climate Change Initiatives: REDD+ and the United Nations Framework Convention on Climate Change (UNFCCC)

**Abstract:**

Over the course of the last decade, international climate change negotiations have been legitimized by the United Nations Framework Convention on Climate Change (UNFCCC), with the next Conference of the Parties (CoP) coming up this December 2015. One mechanism that is to be presented at the conference is Reduced Emissions from Deforestation and Degradation (REDD+). REDD+ aims to reduce global greenhouse gas emissions from deforestation, which currently constitutes roughly 17 percent of emissions worldwide. By making forest conservation more profitable than forest clearing through incentivizing landowners in developing countries to conserve their forests, REDD+ strives to contribute to both environmental and economic development goals. While REDD+ also aims to soothe tensions of climate change conversations between the developed and developing world, it must first be understood how the program has shaped international climate change negotiations through the UNFCCC. Through analyzing the documents of the United Nation's and those of scholars in both the fields of climate change and deforestation, REDD+ was studied as a hybrid of a market-based approach and an economic incentive, as a network of environmental governance, and finally how REDD+ functions in practice. It is in hopes that these findings will lead to the larger implications of determining the success and shortcomings of REDD+ in the future and what role it will play at the Conference of the Parties in Paris this December 2015.

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**Mentors:** Haggerty, Christopher; Fornwalt, Brandon; Mojsejenko, Walter Dimitri; Suever, Jonathan D ; Wehner, Gregory J; Fogel, Mark A

**Institution:** Geisinger Health System

**Category:** Natural Science & Engineering

**Title:** Comparison of Magnetic Resonance Imaging Techniques in Assessing Left Ventricular Strain

**Abstract:**

Functional parameters of left ventricular (LV) contraction are an important marker of heart disease. For example, LV strain—a measure of how much the heart wall deforms while pumping blood—has been reported in many studies and shown to be a good predictor of poor outcomes. Several options for calculating strain exist, with commercial “feature tracking” (FT) software being the most common. Displacement encoded (DENSE) imaging is a more robust method that directly measures cardiac motion and may provide more accurate results. The goal of this study is to compare these two magnetic resonance imaging (MRI)-based approaches for quantifying the mechanics of LV deformation. We hypothesize that measurements of LV strain from FT analysis and DENSE will have good agreement. Cardiac MRI data were acquired in 25 healthy volunteers ( $23.2 \pm 17.1$  years) and 18 patients with heart disease ( $17.0 \pm 23.8$  years). Each subject had two imaging sequences performed: 1) standard anatomical imaging, and 2) DENSE imaging. For this study, we selected all instances in which these acquisitions were performed at the same spatial location to facilitate direct result comparison. Across patients, 93 imaging planes (68 ‘short-axis’, 25 ‘long-axis’) met this criterion. Commercial FT software was used to semi-automatically track heart motion in the anatomical images to compute strains. DENSE images were post-processed using custom MATLAB software. Short and long-axis images were used to compute circumferential and longitudinal strains, respectively. Agreement was assessed using Bland-Altman limits of agreement and the coefficient of variation (CoV). The average circumferential strain in FT and DENSE was  $26.5 \pm 3.7\%$  and  $17.3 \pm 9.2\%$ , respectively. The average longitudinal strain in FT and DENSE was  $27.9 \pm 2.2\%$  and  $13.4 \pm 6.9\%$ , collectively resulting in a mean bias of 10.2%. Furthermore, the limits of agreement were large with respect to the measurement means (CoV = 36%), indicating poor agreement. These results strongly suggest that the limitations of FT software’s ability to track features cause systematic measurement bias. Such bias indicates that DENSE is more clinically appropriate for patients where small changes in strain are relevant. Future work will examine the effects of 3D cardiac motion on measured LV strains through DENSE analysis.

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**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Authenticity in Social Media Representations: Identity Multiplicity, Performativity, and their Effects on College Students

**Abstract:**

Existing scholarship on identity formation stresses information-sharing as a prime method of establishing one's idea of self. As social media usage grows, users share different sets of information with their friends, family, employers, and even strangers, in essence creating multiple different identities. A survey of popular sources [such as magazines and popular websites] shows how they stress the importance of "authenticity" and consistency in online representations while advocating for a "curated" self-representation at the same time. As these sources point out, employers and friends want to see different, often completely opposite content on a social media page. The paradox of "authentic" self-representation is well represented by these sources designed for general consumption: how is an individual supposed to follow the unwritten rules of social media to present themselves in a positive light while simultaneously maintain the undefined, peer-enforced expectation of "authenticity"?

This study surveys students at Bucknell University in order to create a third dimension in a look at authenticity and online representation. The survey serves to gain insight into what students' conception of authenticity is in relation to online representation, their attitudes about how online information-sharing effects their idea of self, as well as what attitudes and phenomena sustain this impossible standard of authenticity. This survey data, alongside scholarship on identity and popular sources guiding students in their online representation will add another lens to the existing discussion on the relationship between online and offline representation and the lack of a profound difference between the two. Social media platforms do not offer a radically new way for students to form identity, but rather simply provide a new realm to continue the existing identity construction process. The goal of "authenticity" is as unattainable online as it is offline; the multiple identities users present online is in fact quite similar to the ones they form offline.

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**Mentors:** Wright, Eric; Maneval, Jim

**Institution:** Geisinger Health System

**Category:** Clinical Research

**Title:** An Evaluation of a Continuous Medication Take-Back Program

**Abstract:**

Background: Estimates indicate that 250 million pounds of prescriptions go unused each year, ending up in our landfills and waterways or diverted for abuse. The results include huge economic waste, environmental damage, and negative public health effects. Community-wide medication take-back programs, for the public to drop off their unused, unneeded, or expired medications, have been developed to address these issues. Until recently, these programs remained as single-day events overseen by law enforcement agencies (LEAs). As of September 2014, DEA regulations allow community pharmacies, among other entities, to maintain collection receptacles to accept controlled substances. Research has been limited to evaluating single-day events, not continuous collections, and the impact of this expansion on public health is unknown.

Objective: Our objective is to evaluate the impact of a continuous medication take-back program on public health.

Data: Data was collected using Microsoft Access®. The data collected includes take-back facility, inventory date, medication, prescription category control status, date of fill, quantity dispensed, quantity returned, and pharmacy type.

Methods: This was a regional, cross-sectional scan of a continuous collection program run by LEAs in Snyder County, PA. MedReturn collection receptacles located in three LEA locations were inventoried. Data was collected for medications returned to one of these sites with an intact label. Empty containers, bottles without labels and medications not in original container were excluded from analysis. Total weight of medications among four locations in Snyder County was measured at a single time point. The data was summarized using descriptive statistics using Microsoft Excel® and combined with projections from the literature to model public health impact. We used MATLAB® to analyze expected drug flow fractions.

Results/Conclusions: Preliminary results indicate that 21% of items returned were over-the counter (OTC) medications, 12% were controlled substances, and 67% were non-controlled prescription medications. The most frequently disposed of prescriptions drug types included cardiovascular (22%), analgesic (13%), and psychiatric (12%). Of the prescription medications, 15% were mail-order, while 64% were from retail pharmacies. Mail-order prescriptions had an average of 81% of the initial fill remaining with retail prescriptions at 66% remaining. The public health impact model is still under analysis.

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**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Understanding the Impact of Social Entrepreneurship through Social Network

**Abstract:**

Social entrepreneurship and innovation [SEI] is quickly becoming a field of intense debate and interest for both academia and SEI-sponsoring organizations. While the new field has seen a healthy amount of debate about the definition of SEI, we argue SEI are actions that create social value instead of only commercial value while simultaneously increasing the capacity of the local social value ecosystem to produce more social value. The understanding of how the process in creating social value is not well understood is important. Understanding the process will allow us to better apprehend social value creation and hence to better understand the nature of SEI.

Typically, social entrepreneurs' research focuses on their inherent characteristics while forgetting the importance of the nascent, or emerging, social entrepreneur's environment. To address this issue, our research analyzes the social network of nascent social entrepreneurs. The social networks of nascent social entrepreneurs provide an opportunity to understand their milieu and the variables that affect the accomplishment of their project in the short and long-term.

This research takes advantage of a unique population: young people granted summer fellowship to create social change in a wide variety of contexts ranging from health care to women empowerment to farming. They describe themselves as promoting peace and sustainability. Some of them within a long term frame will create significant and measurable social values and others will not. How can we assess those differences? How do we measure varying amounts of success when it comes to creating social value? To understand how milieu answers these questions, we study their personal networks. We examine the demographics of the personal networks as well as structural features such as size, density, and cohesion. We are also interested in how this project network changes from the generation of the idea to the final implementation of the project. Our mixed method approach will allow us to explain the dynamics between the personal network and the implementation or adaptation of the social entrepreneurs' projects.

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**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Slavs of the Coal Region: Migration, Perception, Representation

**Abstract:**

When Slavs from the Austro-Hungarian Empire immigrated to America en masse in the late nineteenth and early twentieth centuries, many settled in Central Pennsylvania where job opportunities for unskilled laborers in coal mines and steel mills were plentiful. This first wave of Slavic migration saw Eastern Europeans working in the most dangerous and lowest-paying jobs and residing in communities hostile toward “Hunkies” and “Slavishness.” Texts written about Slavs in the Coal Region contain themes of violence, drunkenness, spousal abuse, and religion, which reflect the community disaffection for the recent immigrants. Our discourse analysis of Mt. Carmel newspapers, organized into word clouds, illuminates the public perception of Slavs as “laborers,” “strikers,” “murderers,” and above all “foreigners.” However, texts written by Slavs of the Coal Region, such as the poetry and prose of Carpatho-Rusyn writer Rev. Emil Kubek of Mahanoy City, reflect the ideals and aspirations of the first wave of Slavic migrants: hard work, honesty, honor, sobriety, the desire to assimilate, and nostalgia for the old country. Much of the first wave literature has not been translated into English, barring Slavic cultural contributions from playing a major role in American historiography. Coupled with the more recent consolidation of ethnic churches, the footprints of Slavic history in Central Pennsylvania are in danger of disappearing. As Slavic immigrants moved up the social ladder over time they engaged in a cultural “whitening:” learning English, moving to different neighborhoods, and identifying with social class rather than ethnicity. John Žinčak, Mahanoy City’s wealthiest Carpatho-Rusyn, changed his surname to Smith, nominally disaffiliating from his ethnicity. Slavic “whitening” is evident in our analyses of Mahanoy City censuses over time as immigrants’ posterity leaves their culturally unified neighborhoods and intermingle with other ethnic groups. As Slavs were accepted as “white” they began to acquire prejudices toward the new immigrants occupying their former jobs. This project aims to preserve the Slavic historical record of the Coal Region in order to highlight the contributions of Slavic immigrants and interrogate the ongoing tensions between race, ethnicity, and class.

**Author:** Fry, Olivia

**Mentors:** Hawrelak, Eric

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Continuing Catalytic Studies for the Production of Cyclic Organic Molecules Using  $[(C_6F_5)_5C_5H_4]Co(CO)_2$  as the Catalyst

**Abstract:**

Continuing the investigation of the catalytic cyclotrimerization of alkynes with pentafluorophenylcyclopentadienylcobalt(I)dicarbonyl  $[(C_6F_5)_5C_5H_4]Co(CO)_2$ , a new substrate, trimethylsilylacetylene,  $(CH_3)_3SiCCH$  was investigated. Catalytic reactions were initially performed by refluxing the reaction mixture in a reaction tube on a hot plate. The desired product, tris(trimethylsilyl)benzene, was reporting in poor yields of 56% at 23 hours and 80% at 46 hours. Comparing these results to previous production of Triphenylbenzene (86 %, 3 hours), a new method was investigated.

The substrates being investigated with their aromatic products are shown in table 1. As reported previously

Table 1. Substrates and their aromatic products

Substrate Substituted Aromatic

Trimethylsilylacetylene Tris(trimethylsilyl)benzene

1-pentyne Tripropylbenzene

Phenylacetylene Triphenylbenzene

To determine the time for the reaction to complete, the reactions were performed in J Young NMR tubes. The three substrates from table 1 were being investigated using J Young NMR tubes in deuterated benzene (boiling point 79oC) which resulted in long reaction times. The reactions were monitored using  $^1H$ NMR, which showed the decrease of reactants and increase of product.

**Author:** Gavala, Lacey

**Co-Authors:** Martine, Christopher; Jordon-Thaden, Ingrid; Martine, Rachel

**Mentors:** Martine, Chris; Jordon-Thaden, Ingrid

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Effect of fire on seed germination in *Solanum beagleholei*, an endemic spiny solanum of the Kimberley region, Australia.

**Abstract:**

Spiny solanums of the fire-prone Australian monsoon tropics are often assumed to be “fire weeds,” with increased levels of recruitment associated with frequent bush fires. During fieldwork on the Kimberley Plateau, seeds of the endemic *Solanum beagleholei* were collected from a habitat where an intense fire had recently burned. Seeds were removed from fruits exposed to three qualitative levels of burning: scorched, partially burned, and unburned. Fruits/seeds were then collected from an unburned *S. beagleholei* population ca. 25 km away. In the lab, half of the seeds of each of the four “fire treatments” were soaked and treated with gibberellic acid, while the other half were soaked in water only. To understand the effect of the fire on the seeds, time to germination and rates of germination were recorded. Seeds collected from the unburned population and unburned seeds from the fire site showed the highest germination rates and shortest time to germination, allowing us to infer that fire has a negative effect on seed germination in *S. beagleholei*. As a means to further confirm and clarify these findings, the seedlings were grown into mature greenhouse plants and hand pollinated to establish a new seed source for experiments replicating fire conditions *ex situ*. Seeds were given pre-sowing treatments exploring the potential roles of various ecological correlates of fire exposure in hastening or promoting seed germination and seedling growth. Understanding the effect of fire on *S. beagleholei* may be useful in conservation efforts. Because fire appears to hinder seedling recruitment in *S. beagleholei*, frequent incidences of fire (including prescribed burns) on the Kimberly Plateau could result in declines of this uncommon endemic species in certain habitats.

Funded by: Botanical Society of America Undergraduate Research Award, David Burpee Endowment, NSF STEM Scholars Program

**Author:** Gillette, Michelle

**Co-Authors:** Mausteller, Emily

**Mentors:** Matlaga, Tanya

**Institution:** Susquehanna University

**Category:** Biological Science

**Title:** Forest roads and streams as potential barriers in movement of red-backed salamanders (*Plethodon cinereus*)

**Abstract:**

Terrestrial salamanders are generally thought of as incapable of long-distance movement. However, there are records of individuals traveling up to 90 meters to return to their territory. Studies show that roads can be obstacles in salamander movement. The objective of our study is to examine forest roads and streams as potential barriers in the return of red-backed salamanders (RBS) to their territories. Such obstacles can inhibit movement in species with poor dispersal capability and greater sensitivity to habitat alteration. We hypothesize that the streams and roads will negatively affect the return rate of salamanders as compared to displacement of individuals into the forest. RBS, though abundant and widely distributed, are behaviorally and physiologically similar to other terrestrial species that may be susceptible to unfavorable effects from forest barriers. We began an experimental study at Camp Karoondinha in Millmont, PA in June 2015 to quantify recapture rates of RBS after displacement across roads and streams. All RBS collected within six cover board arrays were assigned to either the control, return to the cover board it was found under, or a treatment, displacement 25 or 50 meters through either the forest or across a road or stream. After data collection is complete (predicted fall 2016), we will compare return rates of RBS across treatments to better understand the effects of roads and streams on terrestrial salamander movement. We will also compare juvenile and adult movement patterns, hypothesizing that juveniles will return to their site of origin less often than adults due to dispersal in this life stage.

**Author:** Godwin, Mark

**Mentors:** Saracoglu, Safa

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** British Consular Perspectives on Ottoman Transformation in the 19th Century

**Abstract:**

The Ottoman Empire is important to study because during its lifetime it had a significant impact on European and world history. During the 19th century the British consular became increasingly influential in Ottoman politics. The purpose of the project is to analyze British consular correspondence regarding judicial and administrative reform in the Ottoman Empire to identify primary concerns of the British politicians. The details of this correspondence will reveal insights about the British Empire's perspective on the modernization of a very important Empire. The data for this project, the correspondence, covers a period of roughly 3 years (between 1858 – 1861). Clearly, the employees of the British Foreign Office continued to communicate on this matter outside of these three years; however, communication regarding these reforms between these years was significant enough for the foreign office to compile them into two significant volumes (over 1600 pages) that served as a reference to diplomats and politicians of the time period. The first phase of the project was to establish a detailed table of contents for the correspondence using a spreadsheet. This required me to go through more than 800 images and identify the author, the date, the origin, and the subject of each correspondence. Once the initial observation was complete, I decided to explore the British agenda for Ottoman Christians. After analyzing all the relevant documents, I concluded that from 1858-1861, the British continually pushed the Ottoman government to make social reforms that would elevate the position of Turkish Christians. This is significant because it reveals the British political agenda and influence on the 19th century Ottoman modernization.

**Author:** Gulasarian, Hovanes

**Mentors:** Trumbo, Toni

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Inhibition of Thrombus Formation by the Peptide: acet-WSPR-amide

**Abstract:**

Inhibition of thrombin-catalyzed fibrin clot formation by the tetrapeptide acet-WSPR-amide was determined by UV-Vis spectrophotometry. A commercially available irreversible serine protease inhibitor was employed as a control. Pefabloc ®, showed predictable inhibition at the manufacturer-recommended concentration, with changes in the time to form the clot and the cooperativity in clot formation. No change was seen in the maximum clot density, as expected for this inhibition type. The tetrapeptide showed only minor changes in clot formation at 14 and 30  $\mu$ M concentration. The peptide is not a good inhibitor, information was gained about the interactions of the peptide with thrombin and will be used in future inhibitor design.

$\mu$ M concentration

**Author:** Haddock, Kyle

**Co-Authors:** Patti, Marisa

**Mentors:** Martin, Christa; Hare-Harris, Abby; Nelson, Tristan

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Establishing genetic etiology of developmental brain disorders

**Abstract:**

**Objective:** Use whole exome sequencing (WES) data from the MyCode project to identify loss of function sequence variants (LOF) in individuals with developmental brain disorders (DBD) to provide additional support for DBD candidate genes previously identified to have a disruptive variant in one DBD case.

**Background:** In collaboration with Regeneron, Geisinger created a repository of patient electronic health record data (MyCode) that includes sequence variants identified through WES. The MyCode exome viewer, MEGAbase, queries specific genes and variants and also identifies correlating diagnostic data. Our group previously conducted a phenotype-based literature review of genomic studies of DBD cohorts (Gonzalez-Mantilla et al., submitted July 2015). We define DBDs to include intellectual disability, autism spectrum disorder, attention deficit hyperactivity disorder, schizophrenia, bipolar disorder and epilepsy. 232 genes were found to have de novo LOF (dnLOF) in 2+ DBD cases and 578 genes had LOF in 1 DBD case. We categorized genes into tiers based on the level of evidence for association with DBD. Variants in genes with dnLOF in a single case are considered to have moderate evidence for pathogenicity.

**Hypothesis:** Using ICD-9 diagnostic codes and WES data in the MyCode data set, we will be able to provide additional support for suspected DBD genes that were previously reported in the literature to have a dnLOF variant in one DBD case.

**Methods:** All data were analyzed using MEGAbase and automated scripts for parsing data were developed using the Python programming language. In order to prioritize variants that are likely to be deleterious, we identified 2826 nonsense sequence variants in 578 DBD candidate genes from the MyCode VCF exome files. Using the MEGAbase, we cross-referenced these LOF variants with ICD-9 diagnosis codes corresponding to DBD phenotypes.

**Results/Discussion:** Using the MyCode dataset, we identified LOF in 369 DBD cases in 227 DBD genes that were previously classified as having emerging evidence. The allele frequency and inheritance status of these variants will be determined. Rare, de novo variants will be compared with variants in control databases in order to assess the pathogenicity of these dnLOF variants and provide additional support for their association with DBD.

**Author:** Haney, Chrissy

**Mentors:** Boyd, Neil

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Donald L. Heiter Community Center Surveys

**Abstract:**

The problem my research is trying to address is related to the inefficiency of the surveys used by the Donald Heiter community center. This is an important matter because the surveys are helpful in assessing programs held by the community center as well as assisting the community center with receiving grants. Assessment of programs helps the community center to better these programs for the members of the community who utilize these programs. Receiving grants provides the community center with money they may use to fund their programs.

To get my results, I have gathered information on all programs conducted by the community center, read through 15 pieces of literature pertaining to focus groups and survey design, determined the stakeholders to each community center program, held multiple focus group discussions with said stakeholders as a way to gather information that may be used to create new surveys, compiled that data to inform new instrument designs for future program assessments, and designed new surveys.

As a result of completing the above procedure, I have learned how to conduct focus group discussions with parents, children, board members, and volunteers/staff members. I have also learned how to create a survey that accurately depicts questions that are easily understood and lead to results that may be analyzed by the community center. Through the conducting of focus groups, I have learned a great deal about the community through listening to and conversing with various members of the community. The results of completing this procedure is a survey that is easily understood and produce results that can be analyzed by the community center. The community center can use the results to better their programs and gather information that may assist them in receiving grants to support the center.

The larger implications of my findings revealed the areas of the community center programs that the community finds to be most important. This research produced surveys that properly addressed the current objectives of the community center as well as provide a platform for which participants may express their likes and dislikes related to certain community center programs.

**Author:** Hayes, Daniel

**Co-Authors:** Jordon-Thaden, Ingrid; Boni, Alexandra; Sharbel, Tim; Koch, Marcus; Martine, Chris

**Mentors:** Martine, Chris; Jordon-Thaden, Ingrid; Sharbel, Timothy

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Flow cytometric seed screen of the apomictic alpine mustard, *Draba oligosperma* Hook., from the North American Cordillera.

**Abstract:**

*Draba oligosperma* Hook. (Brassicaceae) has a unique and broad distribution, occupying alpine ecosystems from Southern California to Northern Canada. It was first demonstrated to reproduce through apomictic seed production using greenhouse tests and floral morphology. Preliminary flow cytometry data from one population showed this species to be apomictic, but historical herbarium sheets containing pollen suggests it is sexual in parts of its distribution. To determine if the species is apomictic throughout its distribution, seed collections from California, Nevada, Utah, Idaho, Montana, Wyoming, and the Yukon were made during the 2012, 2013, and 2014 alpine field seasons. A total of 29 populations were sampled with ~30 individuals per population. For the seed screen, we have analyzed approximately 50% of all samples (~4,350 seeds). Using high throughput flow cytometric seed screening (FCSS), we determined the stability and extent of apomictic reproduction for this species. The unique and large distribution of this species will allow for the role of apomixes in speciation to be better understood.

**Author:** Hellman, Delaney

**Co-Authors:** Strine, Neil

**Mentors:** Strine, Neil

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Interest Groups: Tyrannical Faction or Pluralist Function?

**Abstract:**

The United States has been hailed around the world as a model for democratic systems, however, as of lately the United States' political system has been called democratically into question due to some of the capitalist actors involved in the system. Interest groups, or groups of individuals who gather together utilizing fiscal means of persuasion, are a recently formed political actor. With the addition of groups such as Political Action Committees and Super Political Action Committees to this category, the political game has certainly changed. Utilizing quantitative methods to determine whether or not interest groups are tyrannical or serve the public, this paper seeks to answer that question through logical means. By analyzing 200 interest groups, PACs, and Super PACs through economic analysis, publically filed data, and an index system it can be determined whether or not these interest groups are aiding citizens in having their voices heard in the political world or whether they are systematically trumping on the right to representation.

**Author:** Johnson, Rachel

**Co-Authors:** Pitt, Amber ; Johnson, Rachel

**Mentors:** Pitt, Amber

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Hellbender Salamander Population Analysis in a Pennsylvania stream

**Abstract:**

Hellbender salamanders, *Cryptobranchus alleganiensis*, are long-lived species that have suffered dramatic declines throughout their range. Many declined populations have large, old individuals but few small, young individuals, indicating a lack of recruitment. Lack of recruitment will eventually lead to population extirpation. We sought to determine the size distribution of hellbenders in a stream that has not been assessed in order to determine whether recruitment was occurring. We surveyed the population between June and August 2015. We found individuals of varying size classes, indicating that recruitment was occurring, but we also found several major threats, including point source pollution, that may impact the population in the future.

**Author:** Kolb, Dean

**Mentors:** Hallen, Christopher

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Analysis of the Water Treatment Facility at Rausch Creek, Valley View, PA

**Abstract:**

To properly gauge the effectiveness of a water treatment facility, each section of the treatment process must be tracked and analyzed. This begins with the inflow of the water to the water supply, its journey through the facility, and analysis of the treated water supply down stream. This process was performed on the water treatment facility for Rausch Creek at Valley View, PA. Valley View is a mountainous region of Pennsylvania that contains the remnants of multiple mining operations that have existed there over the years. These abandoned mining operations all required an outflow for the water that is used in the mine to flow out of. Water leaving the mineshafts usually contains large amounts of anions, cations, and possibly heavy metals. These species, if not monitored, can cause numerous health issues to the general population who use the water supply. Rausch Creek is the meeting point for two different streams which both have mineshaft outflows feeding into their water supply. By taking a series of 12 water samples at different points in the treatment process it was possible to see how each step was affecting the water supply. The mine drainage that entered the water supply contained large amounts of sulfate, heavy metals, and was acidic. This water then flowed into the treatment facility where the acidity was treated, the sulfates and heavy metals were reduced to trace amounts, and any added species were removed in standing pools. After this process the water flowed out of the facility and back into Rausch Creek. Testing of the water downstream from Rausch Creek showed that the quality of the water was still acceptable after being treated. Analysis of the water treatment facility at Rausch Creek proved to be successful and showed that the treatment facility was working at or above expectations.

**Author:** Kozick, Zachary

**Co-Authors:** McGonigle, Colleen ; Summers, Megan; Rogers, Barrie; Ercolano, Lisa; Netwig, Todd

**Mentors:** Grisel, Judy

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Testosterone plays a role in mitigating ethanol consumption in the context of voluntary exercise

**Abstract:**

Alcohol consumption is impacted by a range of genetic and environmental factors, one of which is stress. Research indicates that males exhibit lower alcohol consumption and less stress vulnerability than females, phenomena suggested to be hormone dependent. Our research is aimed at understanding these sex differences by exploring the role of testosterone in voluntary oral alcohol consumption. We hypothesize that castrated males will consume more ethanol compared to sham-operated, or naïve mice. In Experiment 1, castrated, sham, and naïve C57BL/6J males were allowed access for 2 hr a day to 20% ethanol, in addition to 24 hr access to food and water. We measured consumption and preference for the alcohol solution. In Experiment 2, mice had the same 2 hr access to ethanol, along with the possibility of voluntary exercise provided by an activity wheel. The running wheel was available all the time, except on alternating test days when the wheels were locked beginning one hour prior to ethanol availability. Our results indicate that the effects of testosterone on drinking were context-dependent. There were no effects of testosterone on voluntary consumption in Experiment 1; naïve, sham and castrated males drank similarly. However, when the mice had an opportunity to engage in voluntary running on a home cage activity wheel, intact males drank less alcohol compared to castrated males. These results indicate that testosterone is involved in alcohol consumption in an exercise-dependent manner. Our data suggests that drinking can be mitigated by exercise in male mice, but testosterone plays a critical role in this effect. Better understanding the sex-dependent factors affecting alcohol use and abuse will promote more effective treatment and prevention of alcoholism. Support: NIH grant #R15 AA022506, Douglas K. Candland Undergraduate Research Fund, and STEM Scholar Program funded by the National Science Foundation.

**Author:** Kwiecien, Sara

**Mentors:** Fazzino, David

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** The Role of Anthropology in the Global Health Context: Healing in Belize

**Abstract:**

This research discusses the application of anthropology within the structure of the global health field. Medical terminology including biological and cultural definitions of health and sickness examine the cultural complexity of medicine in a global health context. Current anthropological theory illustrates a foundation for the application of field work that determines how global health procedures are developed and applied. Relevant global issues discuss how socio-political, cultural and economic factors influence the field of medical anthropology. With a focus on the developing nation of Belize, this research illuminates the conflict between local and global populations for resource allocations along with global perceptions of disease. Various department collaborations within Belize emphasize the strengths and challenges of the One Health approach, increasing awareness of the environmental and zoological impacts on human health. This analysis underlines that the arena of global health is an interdisciplinary process that requires equal consideration from both medical and anthropological professionals, while indicating some promising opportunities in the field of medical anthropology.

Keywords: [Anthropology Role, Anthropology Role Health, Public Health Anthropology]

**Author:** Lacey, Lindsay

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**Mentors:** Martine, Christopher; Capaldi, Elizabeth; Jordan-Thaeden, Ingrid E.

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Exploring the potential for Solanum fruit ingestion and seed dispersal by rock-dwelling mammals in the Australian monsoon tropics.

**Abstract:**

Little is known about the methods of seed dispersal employed by rock-specialist spiny solanums (*Solanum* subgenus *Leptostemonum*) in the monsoon tropics of northern Australia. Previous studies infer that endozoochory may play a role, but no specific animal taxa have been identified as effective seed dispersers. The elusive rock macropod species co-occurring with solanums are potential candidates, particularly species of *Petrogale* (rock wallabies) and *Macropus* (wallaroos). To assess the potential of these animals as seed dispersers, a study is underway to determine whether rock macropods might ingest *Solanum* fruits and pass seeds intact. Eight *Solanum* taxa endemic to northern Australia were grown from wild-collected seeds hand-pollinated at flowering maturity, and then used as sources of fruit. Ripened fruits will be presented to rock macropods in captivity to determine the following: a) Will rock macropods consume *Solanum* fruits, and which species?, and b) Do the seeds consumed with the fruits survive gut passage? Intact seeds were removed from scats and sown to test for germinability compared with uningested seeds. Determining whether co-occurring species of mammals participate in successful endozoochorous *Solanum* seed dispersal has implications for conservation efforts by highlighting the importance of plant-animal interactions among narrowly endemic species. Here we present preliminary data, including experiments on seed gut passage time and germination rates following ingestion by captive rodents as proxy subjects.

**Author:** Leshner, Devyn

**Mentors:** Lynd, Chris

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Using difference equations to analyze periodic continued fractions

**Abstract:**

Over the summer, we apply various techniques described in the papers, "Using Difference Equations to Generalize Results for Periodic Nested Radicals" by Chris Lynd (American Math Monthly, January 2014) and "Convergence Results for Periodic Left Nested Radicals" by Devyn Leshner and Chris Lynd (Submitted for publication to Math Magazine in September 2014) to find how difference equations can be used to study the class of periodic continued fractions.

**Author:** Lewis, Morgan

**Mentors:** Bell, Toni

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Inhibition of Blood Clot Formation Using the Tetrapeptides acet-FSPR-amide, acet-LSPR-amide, and acet-ISPR-amide

**Abstract:**

Inappropriate formation of blood clots are a leading cause of death in the United States. They can lead to heart attack, stroke or an aneurysm. Although there are currently choices in orally viable, direct thrombin inhibitors, there is still work to be done in improving safety and efficacy. Three tetrapeptides acet-FSPR-amide (FSPR), acet-LSPR-amide (LSPR), and acet-ISPR-amide (ISPR) were studied as clotting inhibitors at 14 $\mu$ M and 30 $\mu$ M concentrations. FSPR or ISPR was the most effective inhibitor at 14 $\mu$ M when all values were compared. The uninhibited clotmax was  $0.650 \pm 0.003$  OD325, the cooperativity was  $2.12 \pm 0.02$ , and the time<sub>1/2</sub> clot was  $6.25 \pm 0.0403$  minutes. The FSPR clotmax decreased to  $0.562 \pm 0.002$  OD325, the cooperativity decreased to  $2.05 \pm 0.02$ , and the time<sub>1/2</sub> clot decreased to  $5.11 \pm 0.03$  minutes when compared to the uninhibited results. The ISPR clotmax decreased to  $0.641 \pm 0.002$  OD325, the cooperativity was the same at  $2.12 \pm 0.02$ , and the time<sub>1/2</sub> clot increased to  $7.67 \pm 0.04$  minutes when compared to the uninhibited results. At 30  $\mu$ M, either ISPR or LSPR was the most effective inhibitor when all values were compared. The ISPR clotmax decreased to  $0.608 \pm 0.002$  OD325, the cooperativity decreased to  $1.96 \pm 0.01$ , and the time<sub>1/2</sub> clot decreased to  $5.42 \pm 0.02$  minutes when compared to the uninhibited results. The LSPR clotmax decreased to  $0.523 \pm 0.001$  OD325, the cooperativity decreased to  $1.91 \pm 0.01$ , and the time<sub>1/2</sub> clot decreased to  $4.56 \pm 0.02$  minutes when compared to the uninhibited results. If the working hypothesis was that the best inhibitor was the peptide that increased the time<sub>1/2</sub>clot the greatest, LSPR was the best inhibitor at 14  $\mu$ M. Time<sub>1/2</sub> clot increased to  $9.62 \pm 0.05$  minutes when compared to the uninhibited results. At 30  $\mu$ M, FSPR was the best inhibitor. Time<sub>1/2</sub> clot increased to  $6.89 \pm 0.06$  minutes when compared to the uninhibited results.

**Author:** McDonnell, Amber

**Mentors:** Knoedler, Jan; Glathar, Janine

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** American Economic History GIS Mapping

**Abstract:**

In recent months, events in the news have highlighted the deep historical roots of the antebellum regional conflicts that led to the Civil War and that, to a large extent, still define much of our economic history of recent decades. The early history of the United States, and specifically, the settlement patterns that led to financial centers in the Northeast, manufacturing and agriculture in the Midwest, and plantation capitalism in the South, set in motion regional differences that remain to this day. Patterns of economic activity have also been defined by land colonial acquisition, native American removal, immigration patterns, early transportation systems, locational patterns of early industries, and of course the rich natural resources of the North American continent. Regional differences that derived from these geographical features continue to drive conflict and change in the U.S. economy in this 21st century.

This project is utilizing ARCGIS along with data from the NHGIS to develop a series of layered mapping tools to visualize key demographic and other census data that define the key turning points in U.S. economic history and to help illuminate these regional differences. These maps will be used in Economics 418 in spring 2016, as the basis for a number of labs in the spring semester to help students visualize and integrate the changes to the U.S. economy over time and help them develop more original and more personally relevant research topics for their culminating experience for the course.

**Author:** McGonigle, Colleen

**Co-Authors:** Rogers, Barrie; Summers, Megan ; Ercolano, Lisa

**Mentors:** Grisel, Judy

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Ovarian hormones mediate stress-induced alcohol consumption

**Abstract:**

Stress is a psychological state correlated with behavioral and physiological changes reflecting some perturbation of homeostasis. Among its multifarious effects is an increase in voluntary alcohol consumption. The interaction between stress responses and alcohol consumption is sex-dependent in part and its mechanisms are poorly understood. Our general research is aimed at helping to clarify the connection between stress and drinking; the present study was designed to explore the effect of ovarian hormones on this relationship. Prior studies in our lab suggested that females are more susceptible to the negative reinforcing effects of alcohol than males, and therefore find it more rewarding under stressful conditions (Piza-Palma, et al., 2014). Our hypothesis in the present experiment was that the females' increase in stress sensitivity is mediated by gonadal hormones. In order to test this, 8 ovariectomy, 8 sham-operated, and 8 naïve female C57BL/6 mice were given continuous access to an activity wheel, food, and water in their home cage. Following a baseline period in which they were acclimated to the housing conditions as well as 2hr daily access to 20% EtOH, we manipulated access to the activity wheel in order to induce stress. On alternating days the running wheels were placed in a locked position, beginning 1hr before alcohol availability. In intact females there was a clear increase in drinking levels in response to a locked running wheel versus an unlocked wheel, as we expected. This effect was not observed in ovariectomy females. That is, alcohol consumption in ovariectomy females did not differ depending upon access to the running wheel, suggesting that ovarian hormones contribute to the effect of stress on drinking. Overall alcohol consumption between sham-operated and OVX females did not differ, suggesting that estradiol, and/or its derivatives, influence drinking in response to stress, rather than overall alcohol consumption. These data address an important yet understudied area of alcoholism research, where females have traditionally been underrepresented. A better understanding of the source of sex difference in alcohol consumption will help address the increasing use and abuse of this drug by women.

Support: NIH grant #R15 AA022506, Douglas K. Candland Undergraduate Research Fund and STEM Scholar Program funded by the National Science Foundation.

**Author:** McLaughlin, Connor

**Mentors:** Stayton, C. Tristan

**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Convergent evolution provides evidence of similar radiations in shell shape in the turtle families Emydidae and Geoemydidae

**Abstract:**

This study investigates phenotypic diversification in the species-rich and ecologically-diverse turtle families Emydidae and Geoemydidae. In particular, we are interested in whether these groups, with many ecologically and morphologically similar species, show similar patterns of evolutionary radiation. We focused on directions of evolution and evolutionary allometry; we also quantitatively investigated whether two supposed morphological analogs shared within the two groups (e.g., “box turtles” and “wood turtles”) show evidence of convergence. A set of 53 three-dimensional landmarks were digitized on 1029 turtle shells representing 50 emydid species and 62 geoemydid species. These data were analyzed using standard geometric morphometric techniques. Evolutionary patterns were assessed using tests for phylogenetic signal, and the relationship between size and shell shape was determined via phylogenetic regression. Significant phylogenetic signal was detected for shell shape, while tests for allometry also showed significance. Three hypothesis testing methods were applied in order to determine whether the supposed morphological analogs in the emydid and geoemydid families exhibited convergence. While there was no evidence of shared adaptive peaks among either box turtles or wood turtles, it was determined that both of these groups have evolved to be more similar to one another relative to their ancestors than would be expected by chance; they have, indeed, converged. Although each family shows some unique patterns of diversification, overall there is an impressive array of similarities between the Emydidae and Geoemydidae radiations.

**Author:** Mendall, Lexie

**Co-Authors:** Mendall, Lexie; Baker, Jessica; Pitt, Amber; Boettger, Anne; Klinger, Thomas

**Mentors:** Klinger, Thomas

**Institution:** Bloomsburg University

**Category:** Biological Science

**Title:** Spatial Separation Alleviates Food Competition in Co-occurring Sea Cucumber Species on Tidal Flats near Assateague, Virginia

**Abstract:**

Feeding habits can affect the ability of animals to coexist in tidal sand and mud flats. We examined trophic interactions of co-occurring sea cucumber species. Sea cucumbers are animals related to starfish which live in burrows and feed by extending oral tentacles up into the water column to collect suspended food particles. The purpose of our investigations was to identify potential overlap in feeding niches between the three co-occurring species of sea cucumbers: *Sclerodactyla briareus*, *Thyonella gemmata*, and *Leptosynapta tenuis*. The current project censused the sea cucumber populations, characterized sediments, documented co-occurring species, and compared food particle sizes selected by each species of sea cucumber. Our surveys revealed that the three species of cucumbers are never found together (Coefficient of Association  $C7 = -1.0$  for each species pair). *Sclerodactyla briareus* had a significant ( $X^2, p < 0.05$ ) negative association with *T. gemmata* and *L. tenuis*. The pattern of distribution of *S. briareus* is highly aggregated (Index of Dispersion,  $I = 5.1$ ), while *T. gemmata* and *L. tenuis* are randomly distributed. Preliminary analysis suggests that the three species of sea cucumbers do not compete for food because they maintain physical separation.

**Author:** Menz, Tyler

**Co-Authors:** Zuidervliet, Brian

**Mentors:** Lachhab, Ahmed

**Institution:** Susquehanna University

**Category:** Natural Science & Engineering

**Title:** Effects of Precipitation Events on the Movement of the Lateral Mixing Zone of the North and West Branches of the Susquehanna River at the shady Nook site

**Abstract:**

The North and West branches of the Susquehanna River converge at Sunbury, Pennsylvania to create a Lateral Mixing Zone (LMZ) that extends all the way downstream from Selinsgrove after which islands help facilitate mixing. In this study, the movement of the LMZ was observed in accordance with multiple precipitation events. YSI 556 Multimeter and a boat were used to continuously take data samples across the river between sites 1, 2, 3, and 4. Site 1 is located on the West branch of the Susquehanna River while Sites 2 and 3 are located on opposite sides of Byer Island, while Site 4 is on the East bank (Figure 1). A GPS was used to track movement and help identify the location of LMZ along with the data associated with each data point of the transit. Data was collected after various periods of precipitation and discharge rates. Four Hydrolab sondes were also deployed at each site to support the identification of the water of the two branches. Water chemistry was analyzed using an Ion Chromatography System (ICS). The machine simultaneously scanned cations and anions and plotted the samples against standard curves. The anions analyzed were fluoride, chloride, nitrite, bromide, sulfate, nitrate, and phosphate. The cations analyzed were sodium, ammonium, potassium, magnesium, and calcium. Among all the measured parameters including water chemistry, physical properties from both the YSI multimeter and the sondes have demonstrated that specific conductivity produced the clearest trends of LMZ between the two branches. Compared to previous data, it was determined that as the discharge increases due to precipitation events, the LMZ moves away from the West branch and towards the North branch up until a threshold point and then slightly shifts back to the West branch.

**Author:** Miao, Yilan

**Mentors:** Kubota, Toshiro

**Institution:** Susquehanna University

**Category:** Social Science, Arts & Humanities

**Title:** Surveys on programming with various supplemental materials

**Abstract:**

The purpose of this research is to investigate if supplemental materials such as visual aids, priming stages for analytical thinking, and words of motivation and encouragement can improve the learning process in computer programming. We conduct four different versions of surveys which share the same programming questions based on function, iteration, and recursion; they are the top three programming challenges for new learners. The first survey is comprised of three general questions followed by the programming questions. This serves as the control group of our study. The second survey is the first survey with some related pictures as visual aids. The third survey starts with logical questions to prime analytical thinking followed by the programming questions. The fourth survey starts with motivational sentences about programming followed by the programming questions. If the performance of one of surveys exceeds that of the control, the supplemental material of the survey may be used as effective teaching aids in the classroom. We will present the results of the surveys at the symposium.

**Author:** Miller, Greg

**Mentors:** Griffin, Duane; Pearson, Sam

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Changes in the National Flood Insurance Program policy and its implications for Lewisburg, PA

**Abstract:**

The Biggert-Waters Flood Insurance Reform Act of 2012 and the Homeowner Flood Insurance Affordability Act of 2013 enacted significant changes to Federal flood insurance policies. These reforms completely altered the financial outlook for many property owners who are now faced with unnerving spikes in flood insurance premiums. Given their potential effect on property values, the impacts of these changes on towns like Lewisburg where approximately 40% of Borough structures are within the FEMA-designated flood zone, have the potential to be extreme. The situation is aggravated by the fact that the reforms in Biggert-Waters address problems predominantly relevant to coastal areas subject to building destruction by rushing waters, rather than river towns where flood waters rise slowly and damage but rarely outright destroy buildings within floodplains. The Lewisburg Neighborhoods Corporation is in the process of analyzing these impacts to provide input to policymakers in hopes of making changes to the law when it comes up for reauthorization in 2017. Our goal was to aid the Lewisburg Neighborhoods Corporation in their preparation by using Geographic Information Systems (GIS) to conduct highly accurate and comprehensive spatial analyses of the Lewisburg floodplain. In conjunction with data supplied by Union County GIS, this research moves to model categories of flood depth and mitigation costs to inform floodplain residents of their options to relieve themselves of the impending financial burdens.

**Author:** Mohammed, Mona

**Co-Authors:** Abbiatici, Ray

**Mentors:** Sills, Deborah

**Institution:** Bucknell University

**Category:** Natural Science & Engineering

**Title:** Analysis and mapping of manure from Animal Feeding Operations in Pennsylvania

**Abstract:**

The Chesapeake Bay watershed suffers from nutrient pollution, which is largely caused by animal agriculture. A recent EPA report identified Pennsylvania as the greatest contributor of nonpoint source pollution that is impacting the Chesapeake Bay. The Pennsylvania Nutrient Management Act of 2005 (Act 38) mandates that all Concentrated Animal Operations (CAOs) submit Nutrient Management Plans (NMPs), site-specific plans detailing how manure is managed at CAOs, for review and approval by their county's Nutrient Management Technician. This study investigates changes in administrative compliance to Act 38 for dairy, veal, and swine farming operations. To assess changes in compliance with Act 38, we are collecting NMPs from 28 counties and cataloging acreage, manure generation, and seasonal application of manure at concentrated animal farming operations (CAFOs), CAOs and voluntary animal operations (VAOs). We are mapping the manure data using GIS and comparing current manure generation to data collected in 2009 by researchers from the Geisenger Center of Health Research. Preliminary findings indicate a large amount of overturn in VAOs—many of the farms that had previously been members of the program have dropped out, whereas a new set of farms have joined. This has led us to hypothesize that the incentives associated with Act 38 compliance are not enticing enough to encourage continued participation in the nutrient management program.

**Author:** Muchler, Ashley

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** "Thick Tweet Pedagogy": Multiliteracies in High School Writing

**Abstract:**

This project is the composition of an annotated bibliography that provides grounding for future research on the utilization of the five-paragraph essay model through Twitter posts, aiming to produce "technologically literate" high school writers. Drawing upon David Silver's concept of "thick tweets" and Stuart Selber's ideal "multiliterate" student, this research responds to current pressures of addressing student literacy as well as integrating technology in the high school writing classroom. Recent conversation about the five-paragraph essay and student literacy falls divided; some writing teachers dismiss the format for confining student creativity, other writing teachers praise the format for its guidelines that student writers can easily follow and grow upon. Alongside these composition difficulties, high school teachers find themselves pressured with calls for more technologically-based teaching practices. As the calls grow louder, however, there fails to be an increase in technological professional development, and teachers grow less confident and less likely to utilize technology in the classroom. This research replies to these high school writing and technology issues by providing a "thick tweet pedagogy". Using a quasi experimental approach, the research will enact lessons, surveys, interviews, and observations of student writers as they follow the "thick-tweet pedagogy". The goal of this project is to answer: Will a composition pedagogy based on multiliteracy and the use of Twitter produce technologically literate students? Will this instruction yield consistent writing results compared to students who have not been exposed to the same pedagogy? What are student perceptions of online communication, and how will a supplemental instruction of multiliteracy affect the thoughts and actions of these students? This research aims to be conducted in the high school writing classroom during the Fall 2016 semester.

**Author:** Mullen, Katherine

**Co-Authors:** Tapsak, Mark

**Mentors:** Tapsak, Mark

**Institution:** Bloomsburg University

**Category:** Biological Science

**Title:** Sulfobetaine Zwitterionic Polymer Synthesis and Analysis

**Abstract:**

Biological macromolecules such as polypeptides and polynucleotides control a myriad of functions throughout the body and are involved in nearly all cellular processes. These large molecules are comprised of smaller units called monomers. For example, amino acids are the monomer units of proteins and nucleotides are the monomer units found in DNA or RNA. Accordingly, a monomer is a repeat unit that can be chemically bound to another molecule to form a chain. For example, a train car could be considered to be a monomer. It then follows that when the cars are hitched together into a long chain, the complete train is like a polymer. Polymers can be either man made or biological in nature, making the field of polymer chemistry integral to advances in both medicine and industry.

Biomaterial chemists have long sought to create molecules that mimic the properties of biological macromolecules. Sulfobetaine zwitterionic polymers are a relatively new set of biocompatible polymers that exhibit antifouling properties.<sup>1</sup> As biotechnology advances the importance for biocompatible synthetic material increases. Biocompatibility is generally defined by the absence of a foreign body response when a biomaterial is implanted into the body. The foreign body response is a series of cellular processes that occur when a tissue is injured and an implant device is inserted. Biocompatible materials allow medical professional to implant sensors and drug delivery devices without adverse effects.

In this study, copolymers of acrylic acid (AA) and sulfobetaine methacrylate (SBMA) were synthesized with varying feed ratios of the two monomers. The copolymers were purified using a mixed solvent precipitation method and vacuum dried to remove excess solvent. Dried polymers were characterized with <sup>1</sup>H NMR spectroscopy and FTIR and crosslinked with polycarbodiimide crosslinkers. It was found that the SBMA moiety causes these copolymers to be highly polar. Through <sup>1</sup>H NMR spectroscopy it was determined that the ratio between SBMA and AA in the final products is significantly different from the initial feed ratios. Copolymers contain more SBMA than AA in the final products. The hydrogels created by the crosslinking process will then be further studied to determine their biocompatibility.

References

1.Kuo, W. Surface Modification with Poly(sulfobetaine methacrylate-acrylic acid) To Reduce Fibrinogen Adsorption, Platelet Adhesion, and Plasma Coagulation. *Biomacromolecules* 2011, 12, 4348; 4348-4356; 4356.

**Author:** Nwachukwu, Victor

**Mentors:** Feldhaus, Heather; Podeschi, Chris

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Mechanic Villages in Rural Nigerian Communities and the Environment: An Evaluation of Beliefs and Concern about Environmental Impacts and Mechanics' Willingness to Change.

**Abstract:**

Mechanic Villages (MVs) are areas with large acreages of land where mechanics cluster their car repair and car part disposal businesses. These locations lack proper disposal facilities and as a result car oil, gasoline, paint, car batteries, hydraulics, steering and brake fluids of all types are disposed of on the bare soil. Developing countries such as Nigeria, are embracing MVs instead of city wide auto-workshops/garages common in developed countries. This research looks at whether residents and mechanics believe MVs impact human health and the environment, if residents and mechanics are concerned about the impacts of MVs, why mechanics in these areas practice environmentally unfriendly waste disposal and how willing mechanics are to adapt an environmentally friendly method of automobile waste disposal. Data were gathered using one on one interviews and face to face surveys with mechanics and residents. Three mechanic village sites were surveyed (Orji MV, Nekede MV and Awka MV). Two of the MVs are located in Imo state and the other MV is Anambra State. A Mechanic Village is about 0.5 miles by 0.5 miles, accommodating over 500 mechanics. The data include 45 one on one Interview sessions with the actual local mechanics who work in the mechanic village, and face to face surveys with 120 mechanics and 90 residents of communities living in close proximity to the MV. Preliminary analysis suggests that about 53 percent of the participants agree on the fact that the MV is indeed affecting their health. Also 70 percent of the participants strongly agreed that mechanics in these MV sites do spill or dump used or condemned motor oil fluids on the bare soil and that mechanics should refrain from such activities. About 55 percent of the mechanics strongly agree on their willingness to adapt an environmentally friendly method of automobile waste disposal including their willingness to pay an increased tax fee to support such adaptation.

**Abstract: Author:** Osborne, Jacob

**Mentors:** Fazzino, David

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Ethnic Identity in the Health Outcomes of Early Anthracite Mining

**Abstract:**

Anthracite mining has been an important force in the shaping of Pennsylvania's history, especially in its economy and ethnic organization. The goal of this study is to identify any differential treatment of groups based on ethnic differences by focusing on periods of major immigrant activity and labor union organization from 1870 to 1920. Study methods include: review of current literature on Critical Medical Anthropology; review of Pennsylvania Department of Mines reports; and review of a few policies implemented during the temporal scope of this study. It was found that mining districts with high numbers of foreign groups tended to have higher rates of death per 1 million tons produced by that district and also tended to have higher numbers of miners' laborers. The Bulletin of The Department of Labor attempts to characterize essential qualities of immigrant groups its report from the year 1897, which followed an 1889 measure to certify miners via an English language test. These data support the claim that ethnic identity did in fact serve as grounds for discrimination in the anthracite mining industry. This is the first part of an on-going study and further research should consider the possible regional geographic differences in ethnic group experiences; commodification of ethnic identity in justifying injury and death, as well as an ethnic group's capacity for work; and implications for ethnic discrimination in modern labor industries.

**Author:** Page, Natasha

**Co-Authors:** Ressler, Dan

**Mentors:** Ressler, Dan, Niles, Jon

**Institution:** Susquehanna University

**Category:** Biological Science

**Title:** Predicting brook trout populations in un-sampled tributaries

**Abstract:**

Brook trout are a native and keystone species in Pennsylvania and often used as an indicator of environmental quality. Streams containing brook trout are given a higher level of environmental protection than streams without the species in Pennsylvania. Land use and terrain variables have been used to predict brook trout presence, but it is clear that anthropogenic impacts from mining, drilling, and development, as well as climate will affect our ability to predict fish populations. We are using trout population data collected in first and second order, un-named tributaries in three watersheds within north central and central Pennsylvania. With the data collected, we are identifying variables best associated with brook trout populations from terrain, land use, mining, and climate data sets. Watershed size and stream slope were found to be good predictors of trout populations. In Pennsylvania, there are about 62,000 streams, 5,547 of which have been sampled. Our goal is to find more variables which may be helpful to the Pennsylvania Fish and Boat Commission to prioritize stream sampling.

**Author:** Patti, Marisa

**Co-Authors:** Deitrick, Sara ; Zhang, Hyden

**Mentors:** Troiani, Vanessa

**Institution:** Bucknell University

**Category:** Clinical Research

**Title:** The influence of individualized sulcogyral morphology on face- and food- selective nodes in orbitofrontal cortex: towards an anatomo-functional parcellation.

**Abstract:**

**Background:** The orbitofrontal cortex (OFC) has an important function in codifying individual social and motivational behaviors. Atypical organization of the OFC architecture has been linked to psychiatric disorders, such as schizophrenia, and more recently with quantitative traits that are associated with subclinical manifestations of psychiatric illness. Little is known about the influence of atypical cortical organization on functional organization of the OFC. Here, we combine two methodologies to better understand the influence of underlying OFC structure on OFC function.

**Objective:** This study localizes face-selective and food-selective patches in OFC and identifies the location of these patches in individuals. We also characterize subject's OFC sulcogyral pattern types, in order to determine if a pattern exists between variation in OFC sulci and OFC peak signal location for faces and food.

**Hypothesis:** We predict that individuals with more consistent sulcogyral anatomy will have greater spatial consistency in the location of their face- and food-selective OFC nodes.

**Methods:** In this experiment, 31 healthy adults (mean age: 21; 14 females) were scanned using a 3T Siemens MRI. OFC structure was determined by classifying each hemisphere as Type I, II, or III, based on previous published work. Pattern type is based on the continuity of the medial orbital sulcus and lateral orbital sulcus. OFC function was determined using a BOLD fMRI study, during which subjects viewed pictures of faces, food, clocks, and common places. This data was used to localize the OFC peak signal locations for faces and food.

**Results:** Face-selective OFC peaks were located in medial portions of OFC while food-selective patches were located in right and left lateral portions of the OFC. Frequency of OFC sulcogyral patterns was consistent with previously published work, with Type I the most prevalent, followed by Type II and Type III. Ongoing analysis will combine the functional and structural characterizations and test for an anatomo-functional relationship.

**Future Directions:** Future studies will attempt to identify the developmental trajectory and stability of object-selective patches in OFC. This characterization will bring us closer to understanding the anatomo-functional parcellation of OFC and its impact on neurodevelopmental disorders and psychiatric conditions.

**Author:** Peyman, David

**Co-Authors:** Kozick, Richard J.; Michael, Andrew M.

**Mentors:** Kozick, Richard; Michael, Andrew

**Institution:** Bucknell University

**Category:** Natural Science & Engineering

**Title:** Development of a Software Toolbox to Browse Functional Brain Networks

**Abstract:**

Background: The past decade marks a significant improvement in imaging methods to better understand the human brain and brain disorders. This is largely due to the technological advances made in functional magnetic resonance imaging (fMRI), a method that can quantify brain activity. Through the connectivity analysis of fMRI data, functional brain networks (FBN) can be found to determine interconnected brain regions and to find anomalies in brain disorders.

Objective: Although a number of fMRI connectivity analysis tools are available, they often fall short of providing a seamless way of visualizing FBNs. The objective of this project is to construct a user-friendly, interactive tool to find and display FBNs. In this project, we developed a Graphical Interactive Functional Network Analysis Toolbox (GIFNAT).

Method and Results: Using statistical parametric mapping 8 (SPM8) and MATLAB, fMRI data is imported into GIFNAT. Upon launching GIFNAT, a window containing two plots as well as a 'Load Files' button is displayed. The left plot contains axial slices of the brain and can be clicked to select a seed voxel. Upon selecting a seed, the right plot produces the corresponding FBN with colors to represent the strength of correlation ( $r = \pm 0.5$  by default). The user can then easily select a different seed voxel to find its FBN. FBNs can be saved and reviewed through the buttons below the right plot. The play button enables the animation of the data by continuously incrementing the seed voxel index, which can be controlled by changing the delay and step size between indices. Atlas region analyses can be accessed through pressing the 'Inspect Regions' button, which produces a predefined atlas map on the left plot. Upon selecting a region, GIFNAT computes the average FBN between the region and every other region. Additional features include a loop checkbox for the animation and the ability to display the FBN of the seed voxel on the opposite hemisphere.

Future Work and Conclusion: A Python-based implementation of this software is currently in development and will enable GIFNAT to run on multiple platforms without third party licenses. GIFNAT will allow investigators to efficiently identify FBNs of the human brain in a convenient streamlined interface.

**Author:** Pham, Son

**Mentors:** King, Brian

**Institution:** Bucknell University

**Category:** Natural Science & Engineering

**Title:** Using Machine Learning to Automatically Predict Feature Representation on Sequential Data

**Abstract:**

During the past recent years, Artificial Intelligence has pushed human beings further in the field of data analytic. A new AI technology called Deep Learning is now able to automatically detect features from a set of abundant data. This technology does not need any other human input beside the set of data itself to build an accurate representative model for the data it is given. For example, scientist only needs to plug-in human face raw data into the Deep Learning machine to automatically detect eye, nose, or mouth and differentiate human's face with the accuracy on par with human vision.

Audio and image detection have been the primary motivator for this technology. There have not been, however, significant application of this technology on other kinds of sequential data such as biological strings (DNA, protein,...). Scientists have long struggled to find a meaningful classification model for these strings because these features have to be hand-engineered, which usually contain an incredible amount of anomalies and exceptions as well as humans' bias. This create great opportunities for computer scientists to apply Deep Learning technology to automatically detect better and unbiased features and build a better classification model for these strings.

Therefore, our project aims to apply Deep Learning to build a better classification model for Protein Secondary Structure. We will try to detect features on these strings and see if these features can be used in a meaningful way and help increase the accuracy of protein secondary structure prediction. Protein secondary structure is a good beginning position due to an abundance of protein data. Successful application of Deep Learning on protein secondary structure will lead to further expansion of the project into other fields of analytic such as meteorology, natural language process or finance.

**Author:** Place, Jean-Nicole

**Mentors:** Schwindinger, William

**Institution:** Bloomsburg University

**Category:** Biological Science

**Title:** Methylation of GNG7 in Human Breast Cancer Tissues

**Abstract:**

Epigenetic regulation of heterotrimeric guanosine nucleotide-binding protein (G-protein) subunits has been associated with human tumors and cancer. There are three families of genes that encode each of the three subunits of the heterotrimeric G-proteins:  $\alpha$ ,  $\beta$ , and  $\gamma$ . Epigenetic regulation of GNG7, a gene that encodes the  $\gamma$ -subunit, has previously been studied. Researchers found that the GNG7 promoter was highly methylated in head and neck cancers. Methylation is one of many DNA modifications that may cause epigenetic regulation and is commonly studied. A new insight may be provided to the understanding of gene regulation by quantifying methylation levels near the promoter region of the gene GNG7 in DNA from human breast cancer and adjacent normal tissue. Three methods were applied in this project to quantify methylation. One method involved digesting tumor and normal DNA with methylation-sensitive restriction enzymes. In the other methods, the DNA was treated with sodium bisulfite followed by either Sanger sequencing or methylation-specific PCR. HeLa cell DNA was used to optimize these procedures and as a positive control. To this date, four patients have been analyzed out of the total sample size of ten patients. The results from the restriction enzyme digest method suggest there is no difference in methylation between tumor and normal DNA. However, methylation levels vary among the patients. We plan to confirm these results with two additional techniques: Sanger sequencing and methylation-specific PCR. According to our results thus far, methylation of the GNG7 promoter is not significant in breast cancer as it was found to be in head and neck cancer.

**Author:** Prince, Ben

**Mentors:** Schneider, Geoff; Doces, John

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Educational Reform in Nepal

**Abstract:**

Over the last decade Nepal's political incompetence has prevented the economic growth needed to reduce Nepal's high rate of poverty. Surendra Bhandari who wrote Self-determination & constitution making in Nepal : constituent assembly, inclusion, & ethnic federalism believes this political incompetence stems from three major issues "people don't own constitutionalism, democracy has constantly been contested, and the civic state is eroding." (Bhandari, vii) He also states that " Above all other problems, these three deficiencies have pushed the country the most into a state of uncertainty, which I often call "diseconomies of politics." Under a condition of diseconomy, an enterprise assumes scale production but suffers either from inefficiency or a higher cost than average." (Bhandari, vii) This political conundrum creates uncertainty that hinders both foreign investment and demand which curtails growth. This raised the major question what could mitigate Nepal's political predicaments which would hopefully stabilize and grow their economy creating opportunities for the many Nepali citizens who are in need. To answer this question this essay will begin by looking into Nepal's history to understand the political and cultural context in which Nepal is trying to devise its constitution. Next it will examine where the problems are with their current political environment followed by the state of the Nepali national school system . The bulk of this paper will be proposing and supporting a hypothesized policy prescription that academic research suggest would help Nepal create a generation of politically engaged actors. This policy prescription calls for a change in teaching pedagogies towards one that is focused around thoughtful political discourse. Finally suggestions for how this solution would be put into place are recommended.

**Author:** Procopio, Rebecca

**Mentors:** Finucane, Brenda; Hare, Abby; King, Maggie; Taylor, Cora

**Institution:** Bucknell University

**Category:** Clinical Research

**Title:** Impact of family background on phenotypic differences in individuals with 22q11.2 deletions and duplications

**Abstract:**

Deletions and duplications involving chromosome 22q11.2 are among the most common genetic copy number variants (CNVs) found in clinical populations. Although considered clinically distinct, both deletions and duplications are associated with highly variable phenotypes that include several overlapping symptoms such as learning disability, intellectual disability, delayed growth/motor development, hypotonia, dysmorphic features, and congenital heart malformations. Because of the variability in symptom severity, it is difficult to offer clear prognostic guidance for young children with the CNVs. Further complicating the issue, slight differences in the structure or expression of the deleted or duplicated region cannot fully explain the observed range in symptoms. Based on previous research done at ADMI, we speculate that the influence of family background genetics has a significant impact on phenotypic social responsiveness and schizotypal traits. We have so far recruited 30 parents of individuals with CNVs involving 22q11.2 to report on themselves and their children using online versions of the Social Responsiveness Scale-2 (SRS-2) and the Oxford-Liverpool Inventory of Feelings and Experiences (Geisinger validated, GO-LIFE). In total, 8 families completed our surveys, and we expect to detect relative, quantitative shifts in social responsiveness and schizotypy between unaffected parents and their children with CNVs. These results may help to explain symptom variability and lead to strategies to refine prognosis in people affected by 22q11.2 deletions and duplications.

**Author:** Pu, Xiaoying

**Co-Authors:** Radsliff, Elliot

**Mentors:** Peck, Evan

**Institution:** Bucknell University

**Category:** Natural Science & Engineering

**Title:** Improving Decision-making via Wearable Biosensors

**Abstract:**

People tend to make bad decisions when they are under stress or high cognitive load. For example, studies have shown that stress can negatively impact the care of medical professionals by amplifying implicit biases. Wearable technologies can readily and unobtrusively provide computers with previously inaccessible information about people. This human-computer interaction (HCI) study works towards building an “attentive” computing system that can detect our state of mind, and mediate our decision-making in an intelligent way. With the Empatica E-4 wristband, we collect heart rate, electrodermal activity and skin temperature from the users. This portable and lightweight wristband monitors user’s physiological data while the user engages with the real world uninterrupted. The data is centralized and filtered by FlyLoop, a real-time physiological computing framework. Within FlyLoop we construct a personalized model for each user, and classify the data into high or low workload states in real time. To train our model, we use the n-back, a well-validated cognitive task, to induce high or low workload in the user. Currently, our study focuses on validating the classification of the user states using the E-4 data. We design a decision-making scenario that includes a primary and secondary task. The primary task requires the user to make a binary decision on a computer. The secondary task, digit span, is concurrent with the primary task and manipulates the user's workload level. We compare the recorded decision-making processes (movement of the mouse) and outcomes under different workload conditions; if successful, the system can determine when we are susceptible to making bad decisions. For future work, the system will respond to the high workload state of the user, and help counter the non-optimal decisions that the user might make.

**Author:** Riexinger, Luke

**Co-Authors:** Ebenstein, Donna; Briddell, Jenna

**Mentors:** Ebenstein, Donna, Briddell, Jenna

**Institution:** Bucknell University

**Category:** Clinical Research

**Title:** Degradation of Absorbable Sutures in a Saliva Solution

**Abstract:**

Surgical sutures are pieces of thread which hold tissue together so a wound will heal properly. Absorbable sutures are designed to degrade in the body as the tissue heals, eliminating the need to have stitches removed. Sutures degrade at different rates based on suture type and location in the body. Three common types of absorbable sutures are Monocryl, a monofilament synthetic (polymer) fiber, Vicryl, a braided multifilament synthetic (polymer) fiber, and Chromic Gut, a natural monofilament fiber. Absorbable sutures are regularly used in oral and pharyngeal surgery where they are exposed to saliva which contains enzymes to break down food. However, little is known about how these digestive enzymes affect the rate of suture dissolution. The goal of this study was to compare the degradation of suture strength in saline and an artificial saliva solution to help doctors make more informed decisions when selecting sutures for use in oropharyngeal surgery.

Samples of Monocryl, Vicryl, and Chromic were tied into loops and held in tension while submerged in either saline (median pH 7.25) or artificial saliva (median pH 6.24) at 37°C to simulate in ternal physiologic and oral environments. Six samples were removed at regular time points and breaking force was determined by pulling samples to failure using an Instron machine. Monocryl degraded the fastest, reaching 50% of its original breaking strength after 11 days in both environments. Chromic and Vicryl, when soaked in saliva, reached 50% of their initial breaking strength after 18 and 26 days, respectively. In saline neither Chromic nor Vicryl reached 50%. The saliva did not seem to cause degradation to begin at an earlier time, but rather enhanced the amount of degradation once the suture strength began to decrease. The average breaking strength of Monocryl and Vicryl in saliva was significantly less than in saline (by 15-47%) for time points greater than 10 days (except day 14). The average breaking strength of Chromic in saliva was significantly less than in saline (by 17-27%) for days 14-22, but not day 26 (the final testing date). Further investigation will include testing which saliva components increase suture degradation rate.

Source of Support: Geisinger Healthcare Research Initiative Grant and Bucknell Program for Undergraduate Research

**Author:** Robinson, Alexander

**Mentors:** Ryan, Nathan; Klobusicky, Elliot Joe

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Networks and Healthcare Policy

**Abstract:**

In mathematics, a network is a set of objects where some objects, called vertices, are linked by other objects called edges. The mathematics of networks have been applied to many areas of research, such as social networking, and optimal routing. We are developing network models and applying them to questions in healthcare policy. Specifically, some examples of networks in healthcare include:

- A network where the vertices are medications and two vertices are connected by an edge if the two medications have been co-prescribed to a patient. This network will be used to cluster drugs based on similarity in order to measure changes in adherence rates when drugs are co-prescribed.
- A network in which vertices are medical codes that represent symptoms, medications, and procedures that a patient might have in a hospital. Two vertices are connected if a patient has passed from one code to the other. This network can be analyzed in order to learn information about how patients flow through a hospital.
- A transport network in which vertices are latitude and longitude coordinates, with edges between points if you can get from one to the other using reasonable transport means. This kind of network is being used to investigate accessibility to healthcare by creating service areas around healthcare providers.

Preliminary results will be reported from each of these three ongoing projects, and based on those results healthcare policy recommendations will be made.

**Author:** Rothbard, Brian

**Co-Authors:** Alwali, Amir; O'Malley, Grace; Kutz, Dylan

**Mentors:** Holt, Jack

**Institution:** Susquehanna University

**Category:** Biological Science

**Title:** A Study Of Diatom Communities In Five Headwater Streams In Central Pennsylvania

**Abstract:**

During June and July 2015 we have sampled five headwater streams that flow down the north slope of Penns Creek Mountain (Bald Eagle State Forest, western Union/Snyder counties), each in a separate cut along the ridgetop. The streams drain a perched water table underlain by impervious sandstone and are approximately two meters wide and wadeable. Throughout the reaches studied the streams are shaded by a mixed forest of hemlock and birch with a substrate of small boulders, cobble, and sand. Because of the uniform geology, hydrology, and land use, the chemical and physical properties of the streams are very similar. Conductivity (19.4-31.9  $\mu\text{s}/\text{cm}$ ) and buffering capacity are very low (63-313  $\mu\text{eq}/\text{L}$ ), and pH rarely exceeds 6. Stones with intact biofilms were collected at each sample site. Biofilms were removed chemically without scraping. Diatoms were cleaned by a standard method using HCl and H<sub>2</sub>O<sub>2</sub>, identified to species, and counted using a JEOL 6010 SEM. Because of the uniform conditions of the streams and the size of the streams, we expected that the communities would be relatively depauperate and dominated by one or two common taxa. However, the diatom communities show a high Shannon Diversity (2.6-3.2) and SDI evenness (0.75-0.85) and the number of species is high (35-52 taxa in 600 valves). In general, the dominant morphological classifications are eunotids and monoraphids, most of which are pollution intolerant. Though many taxa co-occur in the streams, dominant taxa (>10%) seem to vary stream to stream. Diversity and water quality indices identify all five streams as having high water quality with very speciose communities; however, despite the similarities of the streams, particular members of the communities vary in occurrence and importance such that the Bray-Curtis similarity indices describe communities whose average similarity is only 42.5% (15.0-66.8). Thus, there is not a defined diatom community for these headwater streams that are adjacent to each other and whose abiotic parameters are quite similar.

**Author:** Scheimreif, Jesse

**Mentors:** Silva, Jennifer

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Beyond "Guns and Bibles": Politics and Identity in Central Pennsylvania

**Abstract:**

"Meet the Poor Republicans" (The New York Times, 2005); "Dear Poor and Working-Class Republicans: Why?" (Forward Progress, 2014); "Can we talk? Here's why the white working-class hates Democrats (Mother Jones, 2014)." Every election cycle, the media returns to an enduring puzzle of American political life: why do working-class whites, who would ostensibly benefit from Democratic policies such as higher corporate taxes, greater protections for workers, a higher minimum wage – continue to shift to the Right? Analysis of the 2012 Presidential election reveals that Obama lost working-class white voters by 26 points nationally and 15 points in the state of Pennsylvania. Many scholars, politicians, and popular writers dismiss working-class whites as "deranged," believing that Republicans have tricked working-class voters into prioritizing social issues like gun control and abortion over economic stability. Our project begins with the recognition that in order to understand the politics of the white working class, we need to understand their worlds from within. We chose the anthracite coal region of Pennsylvania as our field site. Through in-depth interviews and ethnography in the anthracite coal region of Pennsylvania, we investigate how political identity is constructed and deployed in support of powerful visions of what it means to be an American. We focus on political issues that are of crucial importance to this region – falling wages, government protections for the environment, rising rates of incarceration, a growing immigrant community, and soaring rates of drug addiction. We find that people's politics revolve around moral questions of dignity, self-worth, and who's deserving and who's not – the "wholesome v. the scum." Yet in practice, the working class displays much more flexibility and instability in their everyday reasoning, such as a young woman who simultaneously disparages "lazy people who make a living off collecting" yet helps a local drug addict access free housing and expresses anger toward pharmaceutical companies. As Americans grow increasingly isolated from and hostile toward the opposing side, it is vital that we abandon simplistic explanations and aim for a deeper understanding of the complex relationship among economic interests, moral visions, and the expediencies of daily life.

**Author:** Semon, Bryan

**Co-Authors:** Keiper, Tim

**Mentors:** Stine, Peter

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Non-linear Analysis of Harmonic Oscillations in Red Giant Stars

**Abstract:**

The objective of this project was to use several analysis techniques to determine certain properties about stars from data gathered by the KEPLER Space Telescope. KEPLER was launched in 2009 and its initial goal was to seek out extrasolar planets using the transit method. This method consists of carefully counting the number of photons hitting KEPLER's sensors from each star for years and watching for a slight drop in luminosity as a planet passes in front of the star. This phase of the KEPLER mission was known as K1. Unfortunately, things on the spacecraft started to break down and thus, almost four years after it was launched, the primary mission goals had to be abandoned. Although new data is still coming in and being used, this project focused on sifting through mountains of data that have still only been briefly analyzed, or in some cases, not analyzed at all. Red giants are inherently unstable, tending to expand and contract over time as well as experience turbulence throughout the interior of the star. These instabilities typically make their way to the surface, exhibiting themselves as changes in brightness. KEPLER may not have been intended to study star variability, but it turns out that its extremely precise photometric data does the job wonderfully. There are several different kinds of turbulence found in red giants: p-waves; g-waves; and radial pulsations. This study looked at an initial group of around 50 red giants with radii greater than eight solar radii. By first determining the type of variability in the star, more can be learned about the interior of the star. In particular, p-waves are known to propagate in a similar manner to sound waves. By looking at the separation frequencies of p-waves, one can determine the density and mass of the star. We found several stars that exhibited such waves and were able to calculate both mass and densities for these stars.

**Author:** Shannon, Hailey

**Co-Authors:** Persons, Matthew and Kutz, Dylan

**Mentors:** Persons, Matthew

**Institution:** Susquehanna University

**Category:** Biological Science

**Title:** The Effects of Prenatal Predator Cue Exposure on Offspring Substrate Preferences in Wolf Spiders

**Abstract:**

Prey benefit from recognizing predators at an early age. When perceived by gravid prey, predation risk could also induce a number of offspring priming mechanisms responsible for altering the behavior of the next generation. Spiderlings of the wolf spider *Tigrosa helluo* are eaten by adults of the wolf spider *Pardosa milvina*. Since female wolf spiders carry their eggsacs with them, mothers may prenatally expose offspring to different predator odor cues. We measured differences in substrate preferences of spiderlings produced from egg-carrying *Tigrosa* females that had or had not been exposed to cues of adult *Pardosa milvina* (N = 33). Over a 15-day period we counted the number of offspring climbing on substrates previously walked on by *Pardosa*, crickets, or clean control substrates. Spiderlings of *Pardosa*-exposed mothers climbed *Pardosa*-cued substrates significantly more compared to control mothers although this preference decreased over time. We found no significant preference in time spent on cricket-cued or control substrates across treatments. Predator cues influence spiderling behavior either directly through prenatal exposure in the eggsac or indirectly by modifying the mother's behavior prior to eclosion.

**Author:** Slone, Avram

**Co-Authors:** Walter, Tyler

**Mentors:** Feldhaus, Heather

**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** 2015 Columbia County Needs Assessment

**Abstract:**

In 2006, a team of researchers conducted a social services needs assessment of Columbia County residents at the request of a coalition of human services providers in the county. This assessment culminated in a report outlining the results of the study, which included interviews with community leaders and service providers, as well as a survey completed by 1094 Columbia county residents. The assessment served as an outlet for residents of the county to voice their concern in ways that could lead to real progress, and a way for local service providers and government bodies to see where residents of the county feel that their public services are lacking.

Recently, the same coalition of services providers has requested a follow up to the 2006 assessment. Our study uses both pre-existing census data and new interview data that we have collected to learn about both how Columbia County has changed and what Columbia County residents would like to see improved.

Collection of the data began with analysis of secondary data attained from the United States Census Bureau. Upon analysis of the secondary data we observed growth among the elderly population of the county and a decrease in the amount of single mothers in poverty. In order to collect our new data, we have spent the summer traveling around Columbia County interviewing and surveying both social service providers and recipients. In discussing the needs of the County with various social service providers, we have determined that three of the main groups of concern in the county are: disabled poor, the elderly, and parents of young children. Our surveys and interviews discuss the services that these groups receive, as well as the quality of the services and the desires of county residents regarding them. Upon completion of the collection of our data, we will use our findings as well as findings from the previous needs assessment to create a document to be distributed to social service providers county-wide that will discuss some of the main concerns that residents who take advantage of the services have.

**Author:** Smith, Rebekah

**Mentors:** Matlaga, Tanya; Iudica, Carlos

**Institution:** Susquehanna University

**Category:** Biological Science

**Title:** Salamander species diversity as a biological indicator for headwater stream comparison in the Susquehanna River Basin

**Abstract:**

The Susquehanna River is the longest river on the American east coast, and an important waterway supporting a variety of wildlife and supplying water to thousands of people. The health and water quality of the Susquehanna River is declining due to human interference and pollutants from agricultural runoff and sewage. Research that assesses water quality in the Susquehanna River and its headwaters is becoming increasingly urgent in the attempt to preserve and rehabilitate this vital water system. Salamanders are vital consumers and predators in a stream's ecosystem and therefore studying their populations offers one way to assess the health of the headwater streams. We are using visual encounter surveys and mark recapture methods to study salamander diversity in four headwater streams located on the north slope of Jacks Mountain, in Snyder and Union Counties, Pennsylvania. The surveys are conducted in the stream bed as well as the adjacent forest and constrained by a plot of 10 x 10 m and 0.5 hours. We expect our data to contribute to a better understanding of the health of the Susquehanna River watershed which will aid in protecting this valuable water resource.

**Author:** Soloviev, Anton

**Mentors:** Kubota, Toshiro

**Institution:** Susquehanna University

**Category:** Natural Science & Engineering

**Title:** Moon Illusion in Virtual Reality

**Abstract:**

The Moon and other celestial objects, on the horizon, appear to be bigger to the average human observer, and appear to be smaller when above the observer. The visual system of the human brain is working its magic to produce these effects. Can this effect be replicated in a virtual world? On a simple computer monitor this might be impossible, but with the help of virtual reality goggles – that imitate the way that humans perceive depth and scale – this is a realistic goal. To answer the question, we have created a virtual world using a popular game engine, Unity3D, and projected it to Oculus Rift DK2 goggles. This world incorporates many aspects of reality, such as buildings, trees, clouds, lighting, and of course the Moon. The Earth's natural satellite was replicated using the actual texture map of the Moon and placed a couple of thousand units relative to the observer's position. The spectator will observe the Moon rising from the horizon to the zenith, and will be able to compare it at different intervals. The actual size of the Moon relative to the position of the observer will be unchanged. The human visual system will be tested.

Currently, we have not been able to observe enlargement of the Moon near the horizon in our virtual world. We can think of several possible causes. First, the environment we constructed was not realistic enough to induce realistic VR experience. The observer sees everything artificially fabricated despite improved depth and scale sensation. Therefore, the Moon is just one of many weird objects, and it doesn't stand out. Second, the field of view supported by the Oculus is smaller than that of our natural vision. This introduces confined feeling to the observer and may distract the experience. Third, the distance and the size of the Moon were scaled down due to computational issues, which affect motion parallax and binocular disparity of the Moon.

**Author:** Spence, Laura

**Mentors:** Mirshahi, Tooraj; Hartle, Cassandra; Wardeh, Amr; Mirshahi, Uyenlinh ; Moore, Bryn

**Institution:** Geisinger Health System

**Category:** Biological Science

**Title:** Genetics of ciliopathies compared in familial and population-wide studies

**Abstract:**

Primary cilia are specialized organelles that regulate important signaling cascades. Cilia dysfunction results in a subset of diseases collectively called ciliopathies which include Joubert syndrome, polydactyly, and retinitis pigmentosa, among others.

Specific genetic variants have been reported in familial studies to cause ciliopathies. We found subjects carrying some of the same variants in the Geisinger population collected in the MyCode database; however, we found no patients coded for previously-reported ciliopathies.

Two of the genes that we studied were TULP3 and GLI3. Tulp3 null mice display morphological defects during embryonic development, and Tulp3 heterozygous knockout mice show developmental defects. TULP3 binds to the IFT-A complex and promotes trafficking of G protein-coupled receptors to the cilia, which is critical to cell signaling. Patients carrying variants in the IFT-A binding region of TULP3 were not coded for ciliopathies. To test the effect of these variants, we mutated TULP3 in the IFT-A binding region to those found in the patient population. We will test the effects of these mutants on TULP3 localization and function.

GLI3 is a transcription factor critical in embryonic development and cancer. Mutations in GLI3 are associated with the Greig cephalopolysyndactyly syndrome, Pallister-Hall syndrome, and polydactyly. A familial study found that GLI3 G727R (rs121917710) causes postaxial polydactyly, type A1/B. We identified 430 subjects carrying the GLI3 G727R allele, including two homozygous carriers. One heterozygous patient was coded for polydactyly, which was not greater than the rate of polydactyly found in the general population. We are testing the effects of the G727R mutant on the function and localization of the GLI3 protein.

The findings from familial studies do not necessarily establish a causal relationship. Functional testing of each mutation will provide additional information that may help to determine the relationship between genetic variants and human disease.

**Author:** Stann, Henry

**Co-Authors:** Alaparathi, Rajasri; Huang, Jiayu

**Mentors:** Faull, Katie; Tranquillo, Joe; Jakacki, Diane

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Health and Wellness App

**Abstract:**

An interdisciplinary team of students from Bucknell University spent the summer working on the development of a smartphone application for the Health & Wellness Initiative. This new initiative brings Geisinger Health System in partnership with the National Park Service, PA Department of Conservation & Natural Resources, the Borough of Danville and the Montour Area Recreation Commission. This smartphone app reflects Geisinger's interest in improving public health and wellness while reducing healthcare costs. The project includes a multi-year development of a self-tour and fitness smartphone application which will engage employees, patients and private citizens in activities that improve health through physical activity while also educating, rehabilitating and improving quality of life.

Students spent this summer making a proof of concept application on the iPhone to highlight the app's key features. The 'pilot' project areas are Montour Preserve, downtown Danville, and Geisinger campus.

**Author:** Stein, Aviel

**Mentors:** Kubota, Toshiro

**Institution:** Susquehanna University

**Category:** Natural Science & Engineering

**Title:** Challenging the Cognitive Capability to Connect the Dots – Recognition of Biological Motions with Point Light Display

**Abstract:**

Humans have an innate ability to connect and understand complex visual data. Specifically, Gunnar Johansson showed that we can recognize activities of people only from movements of their joints. This kind of biological motion is an intrinsic part of how our brain decodes visual information. The purpose of this study is to pinpoint the aspects of natural human sight that are most important for understanding biological motion.

We attached ten LED lights to human actors, who performed movements of varying complexity in the dark. We then recorded their performance to create the point light displays and then applied seven different distortion types of changeable degrees to them: random jittering of the dots, random resizing of the dots, periodical resizing of the dots, random removal of the dots, removal of k-successive frames, reverse ordering of k-successive frames, and flipping the frames upside down. For all but the upside down frames, whose natural counterpart is the control group, there were two levels of distortion intensity, resulting in a total of fourteen surveys. Each participant was presented one of fourteen surveys and asked to describe the activities seen in the videos.

The total number of participants was 106 with a total of 1059 reviewed videos. The net levels across disturbed surveys was 94% full recognition, 4.4% partial recognition, and 1.6% no recognition. The control group survey received 1.73 times more responses than the average distortion group. Participants made 2.16 times more errors on level 1 distortion than on the control and made 1.77 time more errors on level 2 distortion than level 1. The results suggest that the disturbance levels do have an effect on the viewer's ability to recognize biological motion. However, the results also show resilience of the human vision against both random and systematic disturbances, and suggest no single local information alone is critical to recognition of biological motions.

**Author:** Stulting, Turner

**Mentors:** Silva, Jennifer

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Class Differences in Transgender Students

**Abstract:**

Transgender people experience staggering rates of discrimination in all areas of life. For transgender college students, these experiences partnered with the typical challenges that face young people in the academy, create a grueling path to success. While there is limited research on the ways in which transgender students' socioeconomic class shapes their ability to overcome these obstacles, there are compelling reasons to believe that fundamental resources such as access to healthcare, supportive family relationships, the availability of mental health advocates, and education, vary by class. Within the general population, research has shown how class differences are becoming more prominent; virtually all aspects of children's lives, from parenting to mentoring to educational opportunities, are growing increasingly unequal by class. By examining how these trends are specifically affecting transgender college students, this study considers the unique barriers faced by the transgender community in regards to class.

Through interviews of transgender college students at colleges and universities across the United States, this study has examined how socioeconomic class impacts the experiences of these individuals. The interview constructed for this study has four basic sections: childhood and upbringing, the process of coming out as trans, healthcare, and college life. Each section probes into what the participant's socioeconomic class is, how that has impacted that specific area of their life, and how their transgender identity is affected by or has affected that area of life. Also explored in the interview is the individual's hopes and dreams, their views on certain current events, and involvement in activism and politics.

While each interviewee proved to have very unique stories and experiences, there were common threads throughout the study that arose. These trends included the impact of family acceptance, how class affects access to healthcare, and a willingness to advocate for one's self and community. This presentation explores these findings, along with where gaps in understanding still exist. Utilizing stories from participants, this presentation will have a narrative focus and examine how the findings can help advocate for policy changes in higher education to support transgender students.

**Author:** Swart, Suné

**Mentors:** Beasley, Thomas; Jakacki, Diane

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Visualizing Networks in the Ancient Mediterranean

**Abstract:**

Visualizing Networks in the Ancient Mediterranean (VNAM) is a web-based application that can be used to visualize a variety of networks in the ancient Mediterranean and to explore the primary evidence on which they are based. By specifying a time period, geographical center (where applicable), network type (economic, religious, political, colonial, etc.), and evidence type (literary, inscriptional, material), users will not only be able to dynamically generate a visualization of their desired network, but also explore the evidence on which any given network "edge," or link between places, is based. Users will also be able to see information about the places when they click on the place's marker. Since it is possible to access and cross-reference many different types of data, users will be able to map literary and mythological journeys onto their real-world referents. Apollo's travels, for example, will result in an overlay of places mentioned in the text of the Homeric Hymn to Apollo against a map of cities with temples to the god.

In my presentation, I will show all of the progress we have made with creating this application so far this summer. I will show how we have added the functionality to visualize the journeys of gods, as well as specific places. I will also present the ways in which we have updated the user interface of the application. Finally, we have spent a great amount of time this summer optimizing and organizing the code behind the scenes, which prepares the way for connecting each network visualization to the appropriate evidence that supports it and displaying that evidence.

This electronic presentation is a demonstration of the application and therefore requires a monitor that can be connected to my laptop (I need to be able to use my laptop because the site is currently hosted on a local server).

**Author:** Thompson, Eric

**Mentors:** Hallen, Christopher; Venn, Cynthia

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Determination of Water Quality of Natural Water Sources in State Parks around the Susquehanna River Valley

**Abstract:**

Water of state parks around the Susquehanna River Valley was tested in order to collect baseline quality data. Monitoring the quality of the water in state parks is important in order to ensure the water is safe for both the park's ecosystem as well as the people who depend on it for outdoor recreation. In order to assess the quality of the water in the different lakes and streams within these parks, samples were collected from the shore or by boat and analyzed in a lab. With the Susquehanna Valley lying within the Marcellus shale region of Pennsylvania, the proposed development of hydraulic fracturing pads within the region have raised environmental concerns for the continued safety and cleanliness of the natural water sources in the area. In order to determine the water quality of these sources, water was tested for turbidity, conductivity, pH, and dissolved oxygen in the field before collecting samples for lab analyses. In the lab both non-filtered and filtered portions of each sample were acidified and stored in the freezer to be run through the inductively coupled plasma atomic emission spectrometer which was calibrated to test for concentrations of eleven different heavy metal ions in each sample. More of the sample was then filtered and stored in the freezer to be run through the ion chromatographs. One of the ion chromatographs separates common cations as they pass through a chromatography column and the other separates common anions. Both analyze the concentration of each ion relative to a standard as it passes through the detector. More filtered portions of each sample were titrated with either sodium hydroxide or hydrochloric acid to test for acidity or alkalinity, respectively. All of these data were collected in order to create an environmental "snapshot" for each park to be compared to later studies to assess the environmental impact of future events on these state parks.

**Author:** Tighe, Haley

**Co-Authors:** Och, Sarah

**Mentors:** Tincoff, Ruth

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** The Effect of Touch on Infant Word Learning

**Abstract:**

**Objective.** At six months of age infants begin to understand names and body part words. This presents the question of how infants are able to learn these words? Body part words, unlike names, do not often occur in isolation when parents are talking to infants.

**Background.** Previous research shows how touch cues help infants find words in the talk they hear, a process called word segmentation and a key step to word learning. Further research shows that when teaching infants word games, caregivers initiate informative touches that might naturally help infants segment these early words.

**Hypotheses.** In the present study, we hypothesize that if touch is relevant for infants' initial understanding of early words, then infants feeling touch while listening to a word pattern will map the word to the body part where the touch was felt. In contrast, infants should not map word patterns that are not paired with touch to body parts.

**Method.** We tested these hypotheses using an Exposure + Test experimental design with 4- to 6-month-old and 9- to 11-month-old infants. Infants were exposed to a stream of syllables. One string of three syllables was always paired with a touch to the body (e.g., elbow). A different three syllable string was paired with a touch only once. The speech-touch hypothesis predicts that, when tested for learning the mapping between the syllable string and the body part that infants in the Always Touch condition should look longer at a video of a person's elbow than to a distractor video. Infants in the One Touch condition should not show learning.

**Results & Conclusions.** Coding of the direction and duration of the infants' looking times is in progress.

**Author:** Tompkins, Daniel

**Co-Authors:** Venn, Cynthia; Ricker, Matthew; Hallen, Chris

**Mentors:** Venn, Cynthia; Ricker, Matthew; Hallen, Chris

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Anthropogenic effects on soil and stream chemistry in the Middle Schuylkill River Watershed.

**Abstract:**

On July 10th, 2015, surface water samples were taken as part of a comparison of the Perkiomen Creek's and the Schuylkill River's water quality and soil chemistry to show the effects of different types of land use. We collected surface water samples and in situ data near the confluence of the two streams just East of Phoenixville, PA. We collected six samples total, three cross sectional samples, one on each bank and the middle from both streams. At each sample site in situ data was taken, which included pH, temperature, dissolved oxygen, and conductivity. After being put on ice, triplicate analyses of alkalinity and acidity were run in the field on filtered samples. Turbidity was analyzed on each sample in the field and unfiltered triplicate subsamples collected for later analysis of selected metals. Samples were filtered in the field and triplicate subsamples collected for metal analyses and additional triplicate samples collected and frozen for analysis of major cations and anions. On July 23rd, 2015, two soil cores were drilled with an auger on two islands corresponding to each of the surface water sampling sites. They were persevered, and brought back to the lab to be analyzed. Samples were dried and analyzed using an X-ray Fluorescence Spectrometer and then completely saturated to suspend ions within the soil. The water filtered through the soil was then tested for metals and simple cations/anions. The maps created in ArcMap illustrate the area and the land surveying done which includes a soil map, digitized locations of mines impairing the watershed, land cover, and a topographic map of the sampling area.

**Author:** Tong, Tong

**Mentors:** Faull, Katherine

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Fusion and Reconstruction: Translation Politics in China after the Cultural Revolution

**Abstract:**

The main aim of this research is to investigate the intercultural exchange between China and the rest of the world in the 1980s; specifically, why were certain non-Chinese authors translated into Chinese. I'm interested in conducting this research project because many active and renowned contemporary authors in China have confessed that they are deeply influenced by world literature rather than by the traditions and classics of China. Also I chose the decade in 1980s because it is the so-called Golden Age for translation activities in China. This is an ongoing project with Professor Faull which was started in the Spring 2015. It will continue into the summer under the auspices of the PUR. Currently a database is being constructed of all the literary works translated and published in one of the most influential literary magazines in China, *Shijie Wenxue* (World Literature). In next phase I will focus on the translated novels or collections of poems and short stories that were published in 1980s in China. In the process of investigating the data, I will employ specific Digital Humanities methods, such as network visualization, historical timeline creation, and geospatial analysis. This is a common way to explore research questions in the Digital Humanities and will definitely contribute to the rigor of the project.

**Author:** Vajdic, Stephan

**Mentors:** Jiang, Fan

**Institution:** Bloomsburg University

**Category:** Natural Science & Engineering

**Title:** Implementing Software FM Radios Using GNU Radio Companion and the Universal Software Radio Peripheral

**Abstract:**

The goal of this research project was to build two FM radios that have frequency-hopping capabilities based on software-defined radios (SDR). SDRs are reconfigurable radios utilizing state-of-the-art technologies whose traditional hardware components of a radio are removed and replaced by a computer processor. Incoming analog signals are converted to digital signals and then processed by a computer program. This research uses the Universal Software Radio Peripheral (USRP), a hardware platform for SDRs and the GNU Radio Companion (GRC), a graphical user interface programming environment, to implement the code and process the signals. Both USRP and GRC are developed by the Ettus Research, a subsidiary of National Instruments. The structure of this research project was to learn the basics of analog communication theory, the modern methods with which humans transmit electromagnetic signals, and how to program in GRC. From there the aim was to implement the frequency-hopping functionality for a SDR. GRC consists of blocks of code written in the C++ and Python programming languages, so it was also essential to this project to learn how to read and use these two languages. First, FM transmitter and receiver were constructed. This was followed by attempts to develop the frequency-hopping capability. Methods to bestow frequency-hopping capability using the time domain signals were well-developed conceptually but proved to be too difficult to implement as they required the expertise of an experienced programmer. Instead, efforts were redirected to focus on using the frequency domain method to realize the frequency-hopping capability.

**Author:** Vynalek, Ethan

**Mentors:** Faull, Katie; Jakacki, Diane; Perrone, Felipe

**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Text.0: Coding a Bridge from Archival Documents to Emotion Density Maps

**Abstract:**

Traditionally, within the humanities, the written word has been the only reliable link between the past and the present. Every medium, however, has its limitations; words convey information, but in a limited, narrative mode. Any craftsman will tell you that a variety of tools are necessary to make a quality product - the same can be said of thorough text analysis; by employing technology to transform the written word into other analytical modes, we gain new insight and understanding. To demonstrate the power of document digitization and text encoding (specifically, XML compliant TEI) to aid comprehension, we encoded segments of the diary of an 18th century Moravian missionary (Martin Mack) linking emotions to the places they were experienced to produce an emotion-density gradient mapping of the area around the mission at Shamokin, the present day site of Sunbury. The resulting visualization helped us to identify the most commonly expressed sentiments at each locale visited or described by the author of the diary. The software package we created to perform the analysis has been made into a standalone analysis tool, to be made available for further research in the Digital Humanities and beyond. By creating an automated document analysis tool that successfully generated a series of meaningful emotion mappings, we have shown that this technology can collect data from historical documents, analyze that data to identify key trends and connections, and present the collected information as a map to enable non-linear examination of the contents of a document.

**Author:** Wade, Alex

**Co-Authors:** Hare-Harris, Abby E; Mitchel, Marissa W; Flax, Judy F; Brzustowicz, Linda M; Martin, Christa

**Mentors:** Hare, Abby; Mitchel, Marissa; Martin, Christa

**Institution:** Bucknell University

**Category:** Clinical Research

**Title:** Assessment of developmental deviance as predictor of ASD diagnostic status for individuals with language impairment

**Abstract:**

Background: Individuals who exhibit developmental delay achieve developmental milestones at a slower rate than typically developing individuals. Individuals with an autism spectrum disorder (ASD), however, often exhibit developmental deviance and attain milestones in an atypical order. While individuals with deviance have a different developmental trajectory than those with delay, these individuals often obtain similar scores on clinical measures of development. To distinguish between delay and deviance, one must determine the distribution of correct responses on an individual item level. For an individual with language delay, a series of correct responses until a ceiling is reached at the limit of their ability is expected. For language deviance, an individual would exhibit a scattered response of correct answers and not display a traditional ceiling effect.

Hypothesis: A scatter metric will be able to distinguish between developmental delay and deviance in a cohort of individuals with language impairment (LI). We anticipate that scatter can also be used to predict ASD diagnosis.

Methods: The New Jersey Language and Autism Genetic Study (NJLAGS) is a cohort of 157 families ascertained for at least one individual with ASD and another with LI. All family members were given standardized tests to measure basic language skills, metalinguistic skills, and phonology. A scoring algorithm was developed to analyze the itemized language measures for each individual. We define scatter as the product of the peak item passed and the sum of the weights of the items missed (as determined by the percentage of correct responses from unaffected individuals).<sup>1</sup> Logistic regression will be used to determine whether or not scatter accurately predicted ASD status. All algorithms were developed using the Python Programming Language (v2.7).

Results/Discussion: A total of 154 individuals were diagnosed with LI, of those, 63 were diagnosed with ASD. Inefficiency was calculated for each individual with LI regardless of their ASD diagnosis. Using a regression model, we will determine the effectiveness of inefficiency as a predictor of ASD diagnostic status for individuals with LI.

(1) VanMeter, L.; Fein, D.; Morris, R.; Waterhouse, L.; Allen, D. Delay Versus Deviance In Autistic Social Behavior. Journal of Autism and Developmental Disorders, 1997.

**Author:** Walters, Hannah

**Mentors:** Hirsch, Annemarie; Swartz, Brian; Mercer, Dione; Mowery, Jacob; Brandau, Sy; Sundaresan, Agnes

**Institution:** Geisinger Health System

**Category:** Clinical Research

**Title:** Population-Based Studies of CRS: Challenges and Potential Solutions

**Abstract:**

**Objective:** To construct a questionnaire to accurately identify patients with chronic rhinosinusitis (CRS).

**Background:** CRS is a common and burdensome disease. The European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) criteria for CRS requires the presence of symptoms for 3 or more months (e.g. facial pain, facial pressure, nasal obstruction, loss of sense of smell, mucopurulent drainage, post-nasal drainage) and objective evidence of sinus inflammation based on sinus computed tomography (CT) or endoscopy. CRS research has been hindered because these objective tests are expensive and poorly correlated with self-reported EPOS symptoms. Here we present our preliminary data on the correlation between EPOS symptoms and CT scans and describe a possible alternative to using EPOS-based symptoms to identify patients with CRS.

**Methods:** We sent the CRS questionnaire to 23,700 Geisinger Clinic primary care patients. We categorized patients as having current CRS if they met the EPOS symptom criteria. We then used latent class analysis (LCA) of nine questions from the questionnaire to identify primary patient classes based on nasal and sinus, allergy, headache, and fatigue symptoms. To date, we have invited 847 baseline respondents with a range of nasal and sinus symptoms to complete a sinus CT scan. We compared our two methods of categorizing sinus symptoms to CT scan results.

**Results:** The baseline survey response rate was 33%. Of the 7,847 patients who responded to the survey, 1,866 respondents were categorized as currently having CRS based on EPOS criteria. LCA identified four latent classes: CRS (n=941), headache (n=773), minimal nasal and sinus symptoms (n=5,508), and pan-symptomatic (n=246). Of the 1,866 patients who met EPOS criteria, 36% were categorized as CRS based on LCA. Of the 65 EPOS CRS patients who had a CT scan, 50% had a positive sinus CT scan. Analysis by LCA class is ongoing and will be presented.

**Conclusion:** These preliminary findings are consistent with literature that reported poor correlation between EPOS symptoms and CRS positive sinus CT scans. If our alternative method of identifying CRS patients by LCA is successful, it will be a critical contribution to efforts to conduct large epidemiological CRS studies.

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**Mentors:** Robishaw, Janet

**Institution:** Geisinger Health System

**Category:** Clinical Research

**Title:** Identification and improved classification of hypertrophic cardiomyopathy variants through the integration of bioinformatics tools and functional splicing assays

**Abstract:**

Hypertrophic cardiomyopathy (HCM) is a progressive disorder in which the heart muscle is structurally and functionally abnormal. It is usually associated with mutations in genes encoding sarcomeric proteins that comprise the building blocks of muscle. However, the extreme molecular heterogeneity and clinical presentation of this disorder remain poorly understood. To accelerate the molecular diagnosis and improve the clinical care of these patients, whole exome sequencing is a promising approach because it assesses both common and rare variation in all genes in an individual. The goal of my project was two-fold: 1) to identify genetic variants in our patient population associated with HCM; and 2) to integrate bioinformatics and experimental tools to better predict pathogenicity. Using large-scale data generated by the Geisinger-Regeneron Exome Sequencing Project, we first surveyed coding region variation within eight sarcomeric genes that are collectively responsible for nearly 70% of HCM. Specifically, we analyzed sequence data from 31,058 research participants of predominantly European-American ancestry. This analysis revealed 850 genetic variants with the majority (~25%) concentrated within the myosin binding protein-c (MYBPC3) gene. Subsequently, we used a suite of bioinformatics tools to predict which variants are most likely to be pathogenic. Aberrant splicing leading to premature truncation of the MYBPC3 protein is a newly identified mutational mechanism underlying HCM. A search for patients carrying one or more splice site region variants revealed 42 predicted splice site region variants including several novel variants of unknown clinical significance. From these, we identified 17 variants that affected the canonical splice sequences themselves that are likely pathogenic. Three variants were selected for experimental validation using an in vitro splicing assay. On-going work revolves around PCR amplification of fragments containing the variants of interest followed by heterologous expression in cells to confirm aberrant splicing and loss of protein. By integrating genetic, transcriptome, and protein analyses, we seek to advance the understanding of the molecular mechanisms underlying HCM, and the translation of this information into earlier diagnosis and clinical management of HCM patients.

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**Institution:** Bucknell University

**Category:** Biological Science

**Title:** Side-necked versus hidden-necked: A comparison of shell morphology between pleurodire and cryptodire turtles

**Abstract:**

This study explores the potential morphological differences between pleurodire and cryptodire turtle shells. Pleurodires (suborder Pleurodira), as suggested by their name, retract their heads into the shell by bending the neck to the side; this is different from cryptodires (suborder Cryptodira), which withdraw their necks in a sagittal plane. Pleurodires also have evolved a unique pelvic morphology typified by two columnar pelvic elements fused to both the carapace and plastron; the pelvic girdle in cryptodires is partially fused to the carapace only. These differences may put very different selective pressures on shell shape in these animals: the different head retraction strategies in the two groups could lead pleurodires to evolve wider and flatter anterior apertures, while the differences in pelvic structure might permit the evolution of flatter carapaces (particularly in the posterior carapace) and narrower bridges, compared to cryptodires. We used 3D landmark data to characterize shell shape. Given that evidence was found for significant phylogenetic signal, in shell shape, a series of phylogenetic M/ANOVAs were conducted to test our hypotheses. Pleurodires differed from cryptodires in the expected directions for all of our hypotheses. However, none of the phylogenetic tests produced significant results (even though non-phylogenetic analyses indicate significant differences). This lack of significance is likely due to the fact that, given the fact that cryptodires and pleurodires each form a monophyletic group, the tests had little statistical power to detect differences. Thus, phylogenetic tests alone cannot support our hypotheses. Future studies could seek support for the hypotheses through mechanical tests of shell performance, to determine whether the mechanism of neck retraction and the presence of columnar pelvic girdles can influence the functional morphology of turtle shells.

**Author:** Wood, Jessa

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**Institution:** Bloomsburg University

**Category:** Social Science, Arts & Humanities

**Title:** Predicting Student Success in Logic

**Abstract:**

The Bloomsburg University philosophy class Logic, PHIL 270, teaches students the basics of symbolic logic: representing natural languages with symbols and manipulating them to understand their logical properties. This study is invaluable to analytic philosophy, the predominant philosophical paradigm today, and thus the course is required for all majors and recommended to minors. However, students routinely struggle in the course, which has a D-F-Withdraw rate of about 30%. To help address this problem, this project examines the factors that predict success in Logic. Every student who took the course since 2011 (approximately 200 total) was e-mailed a survey that asked questions about their experience in Logic, from their study habits to their grades. Students were also administered two short personality tests, the TIPI and Saucier's Mini-Markers. These tests both measure, and will be compared to determine, students' levels of five traits broadly recognized as fundamental to one's personality: conscientiousness, agreeableness, neuroticism, openness to experience, and extraversion. Students' various features were then compared with their grades to determine which factors most strongly predict success in the course; this predictive power will enable us to target interventions to at-risk students in future iterations of the course. In the presentation, the factors that are, in fact, predictive, as well as potential interventions based on this project's findings, are presented and examined.

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**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** Severance Tax in the United States

**Abstract:**

This research aims to study the severance tax, which is a tax applied to minerals severed from the earth. The study is timely because the tax plays a significant role in the economies of several states due to the recent expansion of oil and gas production. Today, oil and gas production, triggered by hydraulic fracturing, has increased because this technology has made it possible for the extraction in places where conventional technologies are not cost-effective. Oil and gas are non-renewable resources. States that have large deposits of oil and gas must be careful to implement severance tax policy that can generate revenues either to mitigate the environmental impact brought about by resource production or to build future long-term wealth to compensate for the current loss of oil and gas deposits. This research will primarily focus on the second aspect of tax policy; in particular, I analyze how states invest revenues generated from the severance tax and whether these revenues contribute to future generations' well-being and long-term wealth. To perform my analysis, I first select five states—Texas, Alaska, North Dakota, Wyoming, and Pennsylvania. I select these cases based on the following two criteria: the share of severance tax in total revenue and whether the state has a permanent fund, where a permanent fund is a device for investing current revenues collected from several tax sources for the benefit of future generations. I evaluate the distribution of energy revenue based on the following two broad categories of spending and investment: 1) long-term investment, which means to invest tax revenues from energy production into permanent funds (or legacy funds) to create long-term income to compensate for the permanent depletion of finite resources; and, 2) support for investment in education and jobs training, infrastructure, and general government investment spending, which build states' human and physical capital and has the potential to diversify states' economies and develop alternative industries. The data I use include severance tax revenue, total states tax revenue, state Gross Domestic Product, and production data from U.S. Energy Information Administration.

**Author:** Young, Jennifer

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**Institution:** Bloomsburg University

**Category:** Biological Science

**Title:** Measuring Methylation of GNG11 in Human Breast Cancer

**Abstract:**

Research is focused on treating cancer, but also finding its origin. Current cancer research involves epigenetic regulation, which investigates changes that do not affect the sequence of the genomic DNA. DNA methylation was the form of epigenetic regulation studied in this project. High levels of methylation have been identified in different cancers, and correlated with down regulation of expression in certain genes. Human breast cancer has been predicted to have low expression levels of GNG11 and therefore the focus was on comparing levels of methylation of ductal carcinoma to adjacent normal breast tissue. The promoter of the gene, GNG11, is transcribed and subsequently expressed as a gamma subunit of a G protein. These G proteins are coupled to receptors and function in cell-to-cell communication, breakdown of which can lead to unregulated growth, and potentially tumors. Two regions of the promoter were studied in this project. The methods used to compare the DNA involved using restriction enzymes that were either sensitive to methylation or were not. After this treatment the products were amplified using PCR followed by gel electrophoresis to view the intensity of the bands produced by the DNA fragments. By comparing the bands a percent level of methylation was calculated. The second method involved treating the DNA with sodium bisulfite, amplifying the products with PCR, and then sequencing the DNA fragments. Bisulfite treatment allowed an examination of the exact sites of methylation and changes that occurred. After analyzing the first four patients by restriction enzyme digest, the results have shown that there is no significant difference in methylation between the tumor and adjacent normal tissue. However, we do find a trend toward more methylation in the upstream promoter region rather than the transcription start site. Based on our results methylation would not be predicted to affect the expression of the GNG11 gene in human breast cancer. Further work will confirm these results by bisulfite sequencing and examining six additional patients.

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**Institution:** Susquehanna University

**Category:** Natural Science & Engineering

**Title:** Particle Tracking in Match-Index-Refraction (MIR) to Study dispersion Porous Media

**Abstract:**

An experiment was performed to track particle tracers in a MIR Porous media. The objective of these experiments is to calculate the dispersion of a material flowing through a porous medium using different velocity values of the flow. An important application of these experiments includes predicting the dispersion of various pollutants such as oil spilled into groundwater and colloids in the environments. In this test, 6mm glass beads were randomly packed in a mixture of 80% Wesson oil and 20% mineral Oil. A HD Nikon DSLR camera recorded a total of 80 particles. Video segments were digitized to individual frames and particle were tracked using Logger Pro. MATLAB was used to organize the data into graphs that show the length of trajectories and frequency of velocities along two axes to study the dispersion. The main graph shows the dispersion of all 80 particles, and the frequency graph shows the tendency of the particles to disperse and calculate the magnitude of the dispersion in this type of porous material. Other tests are scheduled to run in different conditions including: different diameter beads in combination with different flow velocities.

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**Institution:** Bucknell University

**Category:** Social Science, Arts & Humanities

**Title:** FEMA's Community Rating System and Flood Management by Pennsylvania's Small Communities: Federal Intent, Local Implementation

**Abstract:**

Flood mitigation planning, land use, and policy decisions in the US, largely made at the local government level, are profoundly influenced by multiple Federal and State policy instruments, regulatory requirements, and financial incentives. In Pennsylvania, among the most susceptible states to flood damage, about one-fourth of the population lives in rural or small communities, which are especially reliant on Federal and State programs. One federal program, the Federal Emergency Management Agency's (FEMA's) Community Rating System (CRS), offers flood-insurance rate reductions under the National Flood Insurance Program (NFIP) to residents of communities that voluntarily enact flood mitigation beyond the minimum standards. However, most eligible communities do not participate: of more than 21,600 US NFIP communities, only about 1,000 participate in CRS, and only 31 in Pennsylvania. Most of these reach the lowest levels: class 8 or 9 on a scale where 1 is most active and 10 is fewest. This research investigates several case-study small communities in Pennsylvania's Central Susquehanna Valley, with the objective of identifying ways in which small communities participate in CRS; the extent to which CRS promotes flood mitigation; and ways in which CRS could enhance participation among small, rural communities. Research methods acquire and analyze publicly available information: CRS national and statewide data to characterize activities by communities nationwide, especially Pennsylvania participants; and routine reports and re-certification studies by selected case study communities for in-depth analysis of their CRS activities, and reasons for their limited participation. Preliminary findings indicate municipalities in the target region employ a range of flood mitigation strategies, differing widely from one another; these activities are captured only to a limited extent by CRS documentation; and they seldom undertake new or more-intensive activities for the purpose of gaining in CRS ratings. The CRS application and reporting paperwork is seen as highly burdensome and the rewards to municipalities seen as limited. Preliminary recommendations suggest that reducing reporting and documentation, and increasing FEMA personnel support to communities, may increase the number of participating communities and may incentivize them to more actively seek out and implement strategies of the kinds recommended by CRS.