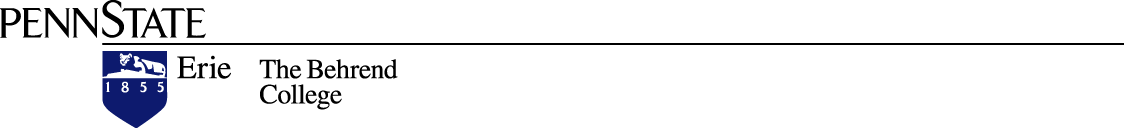
[](http://www.pserie.psu.edu/)

# PENN STATE BEHREND - SIGMA XI 2012 TWENTY-FIRST ANNUAL UNDERGRADUATE STUDENT RESEARCH AND CREATIVE ACCOMPLISHMENT CONFERENCE ABSTRACT BOOK

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Jessica Salley, Carl Kallgren IV, and Denise Hillen (Charisse Nixon), Penn State

Behrend, School of Humanities and Social Sciences – Psychology

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Courtney Sosinski, Meagan Perz, Melissa Hanigosky, and Lucas Kubeldis (Lisa Nogaj), Gannon University, Morosky College of Health Professions and Sciences – Chemistry

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School of Engineering – Electrical Engineering

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Vincent Rice (William Lasher), Penn State Behrend, School of Engineering –

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Everett Sargent (Oladipo Onipede), Penn State Behrend, School of Engineering –

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Jesse Altmire and Andrew Armstrong (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

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Mitchell Engelen and Tara Sitter (Joshua Shaw), Penn State Behrend, School of

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[**Invictus Imperium**](#First_Frey)

David First and Ian Frey (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

[**Castle Forest**](#Fornear)

John Fornear (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

**RUNNER UP -**[**Hands of Creation**](#Gordon_Gordon_Shaw_Lesniak_McGrath)

Nick Gordon, Trevor Gordon, Garrett Shaw, Kevin Lesniak, and Tyler McGrath

(Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences –

Game Design

**WINNER -**[**Tyrant**](#Grise_Torrelli_Chalker)

Joe Grise, Kit Torrelli, and Steve Chalker (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

[**The Pestilence**](#Gladitz_Kording_Latchaw)

Tammy Gladitz, Jeffrey Kording, and Charles Latchaw (Joshua Shaw), Penn State

Behrend, School of Humanities and Social Sciences – Game Design

**RUNNER UP -**[**Vitrification**](#Moore_Giewont)

Doug Moore and Kyle Giewont (Joshua Shaw), Penn State Behrend, School of

Humanities and Social Sciences – Game Design

[**Dream Catcher**](#Nolan_Smith_Zacherl_Ulmer_Lukjanczuk)

Kevin Nolan, Don Smith, Julia Zacherl, Sydonia Ulmer, and Elizabeth [Lukjanczuk](http://www.facebook.com/profile.php?id=100000050963858) (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

[**A.R.M.S. Race**](#Pcholinski_Wheat_McCormick)

Jordan Pcholinski, Samuel Wheat, and Matthew McCormick (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

[**Lost in Aster Travels**](#Pettigrew_Casella)

Deanna Pettigrew and James Casella (Joshua Shaw), Penn State Behrend, School

of Humanities and Social Sciences – Game Design

[**Final Battleground: The Movie: The Game**](#Plansinis)

Kevin Plansinis (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

[**Cyberspark**](#Shafferman_Knapp_Deml_Kenny)

Shane Shafferman, Jeff Knapp, Nathaniel Deml, and Matthew Kenny (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

[**MariSAR**](#Staab_Lindsey_Sayers)

Christopher Staab, Mark Lindsey, and David Sayers (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

#### MATHEMATICS AND PHYSICS

**WINNER -**[**Fluid Flow Interactions within a Deformable Arterial Wall**](#Boyer_Siddique)Thomas Boyer and Shehzad Siddique (Javed Siddique), Penn State York, School of Sciences – Mathematics

[**Orbital Stability of Massive Satellite Systems around Planets**](#Dominick)

Corey Dominick (Darren Williams), Penn State Behrend, School of Science – Physics

**Jamming Probability of Low Aspect Ratio Cylindrical Grains in a Vertical Channel**

*(Contains proprietary information – no abstract included)*

Gregory Speir and Nicholas Barr (William Baxter), Penn State Behrend, School of Science – Physics

#### PEDAGOGY AND EDUCATIONAL OUTREACH

[**Hybrid Learning Initiative for Black School of Business and Penn State Behrend**](#Barrett)

Kassandra Barrett (Mary Beth Pinto), Penn State Behrend, Sam and Irene Black School of Business – Marketing

[**Arboretum Website Enhancement with Digital Photographs and GPS Technology**](#Bialosky)

Elizabeth Bialosky (Ann Quinn and Michael Naber) Penn State Behrend, School of Science – Communication

[**Arboretum Website Update**](#Burbules)Brendan Burbules (Michael Naber and Ann Quinn), Penn State Behrend, School of Science – Communication

**RUNNER UP -**[**Zebrafish in the Classroom**](#Dougan)

Sarah Dougan (Sarah Ewing), Gannon University, Morosky College of Health

Professions and Sciences – Biology and Secondary Education

**RUNNER UP -**[**Behrend Land: Amusement Park of Mechanical Engineering Principles**](#Franks_Latchaw)

Catherine Franks and Charles Latchaw (Melanie Ford), Penn State Behrend, School of Engineering – Engineering Outreach

**WINNER -**[**Penn State Behrend Energy Management Team**](#Galdo_Nguyen)

Stephen Galdo1 and David Nguyen1 (Ann Quinn2 and Dave Causgrove1), Penn State Behrend, 1Sam and Irene Black School of Business and 2School of Science – Marketing

[**Facebook as a Complaint Method in Higher Education: Exploratory Study**](#Hess)  
Melissa Hess (Phylis Mansfield and Mary Beth Pinto), Penn State Behrend, Sam and Irene Black School of Business – Marketing

[**Engineering K-12 Outreach**](#Mischler_Mahdi_Lukjanczuk)

Nathan Mischler, Muamal Mahdi, and Elizabeth Lukjanczuk (Melanie Ford), Penn State Behrend, School of Engineering – Engineering Outreach

[**VIZQuick: Rapid Game Development Software**](#Smith_Hirn)

Matthew Smith1 and Joseph Hirn2 (Dawn Blasko1 and Wen-Li Wang2) Penn State Behrend, 1School of Humanities and Social Sciences and 2School of Engineering – Psychology

[**Solar Irrigation System as Centerpiece for Community Garden**](#Snowden)

Erik Snowden1 (Ann Quinn2 and Ralph Sprang1), Penn State Behrend, 1School of

Engineering and 2School of Science – Electrical and Computer Engineering Technology

#### PSYCHOLOGY

**RUNNER UP -[The Effects of Social Interaction and Social Isolation and Handling on Male and Female Sprague-Dawley Rats When Learning to Navigate a Multiple](#Adamson)**

**[T-Maze](#Adamson)**

Ashley Adamson (Rodney Clark), Allegheny College – Psychology

[**Violence and Narrative in Video Games and Their Effect on Stress**](#Bittner_Chadwick)

Brittany Bittner and Casey Chadwick (Dawn Blasko) Penn State Behrend, School of Humanities and Social Sciences – Psychology

**[The Effects of the Environment on Learning and the Diminishing of Positive](#Cook_Turner)**

**[Responses over Time](#Cook_Turner)**

Kimberly Cook and Ashley Turner (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

[**Our Spatial World**](#Fanning_Fleeson_Ohashi_Erdem)

Renee Fanning, Bryan Fleeson, Miri Ohashi, Bilge Erdem, and Carissa Stanko (Dawn Blasko and Kathryn Holiday-Darr), Penn State Behrend, School of Humanities and Social Sciences – Psychology

[**How Do You See It? Actions in the Workplace**](#Fanning_Wirr_Songer)

Renee Fanning, Amir Wirr, and Jamie Songer (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

[**Sarcastic Intent: Funny or Fearful?**](#Kerr_Fogle_Fleeson)Ashley Kerr, Robert Fogle, Bryan Fleeson, and Christie Leslie (Dawn Blasko and

Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

**RUNNER UP -** [**Money, Memory, and Romantic Relationships**](#Loker_Harding_Black_Morrow)

Emily Loker, Christine Harding, Lynzie Black, and Megan Morrow (Carol Wilson), Penn State Behrend, School of Humanities and Social Sciences – Psychology

[**Tan or Pale: What Are You Attracted To?**](#Manson)

Jamie Manson (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

**WINNER -**[**Examining Weight Discrimination among Males and Females**](#Myers_Cattron)

Megan Myers and Stephanie Cattron (Victoria Kazmerski), Penn State Behrend,

School of Humanities and Social Sciences – Psychology

[**The Influence of Others on One’s Own Perception of a Person’s Performance**](#Robson)

Kristen Robson (Melissa Heerboth), Mercyhurst University, The Hafenmaier School of Education and Behavioral Sciences – Psychology

[**Attachment and Pain Memory**](#Sally_Fuller_Vuich_Agato)

Jessica Salley, Lindsey Fuller, Leah Vuich, Ara Agato, Alexandra Johnson, and

Samantha Bates (Carol Wilson), Penn State Behrend, School of Humanities and Social Sciences – Psychology

[**The Relationships of Major Discipline, Workload, Class Year, and Problematic Internet Usage with Procrastination**](#J_Welsh)

John Welsh III (Joshua Searle-White), Allegheny College – Psychology

[**Restoring Self-Control Strength after Alcohol-Related Depletion**](#Zelinsky)

Nicole Zelinsky (Patricia Rutledge and Robert Hancock) Allegheny College –

Psychology

## Oral Presentations

### BIOCHEMISTRY I

#### Whole Genome Analysis Reveals That Conservation and Duplication Gave Rise to the Current V2R Gene Repertoire in Mammals

Alexander Berry (Kristen Webb), Allegheny College – Biochemistry

The vomeronasal organ (VNO) is the part of the olfactory system that detects specific semiochemicals known as pheromones, which allow for communication between members of a species, and also affect social and reproductive behaviors. The chemodetection function of the VNO in mammals is facilitated by G protein-coupled receptors (GPCRs) from two gene superfamilies: vomeronasal 1 receptor (V1R) and vomeronasal 2 receptor (V2R). Previously, V2R genes from eight mammalian genomes had been identified and their evolutionary relationships reconstructed. The objective of this study was to survey four additional mammalian genomes, *Loxodonta africana*, *Oryctolagus cuniculus*, *Cavia porcellus*, and *Equus caballus,* for V2R genesand to include these genes in evolutionary analyses. Known V2R genes and other GPCRs were aligned to each new genome and regions that possessed a high level of sequence similarity to known V2R genes were recorded. A neighbor-joining tree was reconstructed using genes from all twelve mammals. Ninety and fifty-two intact genes were identified in *O. cuniculus* and *C. porcellus*, respectively, and these genes appear to have mostly evolved through duplications after the rodent lineages diverged. Two and five intact genes were found in *E. caballus* and *L. africana*, respectively, and appear to be conserved in several other species.

#### Twin Studies: Determining the Zygousity of in vitro Fertilized Twins Born with Two Placentas

Colleen Burick and Abbie Marx (Matthew Gruwell), Penn State Behrend, School of Science – Biology

The objective of our experiment was to determine the zygousity of in vitro fertilized twins. Twins that are monozygotic typically have one placenta, whereas, twins that are heterozygotic typically are born with two placentas. There is physical evidence that the twins are monozygotic because they look very similar; however, the fact that they were born with two placentas suggests otherwise. DNA samples were taken from the twins, and a set of fraternal triplets was used as a control. DNA was extracted, PCR was used to amplify the DNA, gel electrophoresis was used to confirm that the PCR had worked correctly, and then the DNA was sent to a third party to be sequenced. Upon return of the DNA from the sequencing company, the sequences will be analyzed using GENIUS.

#### Recombineering Construction of a Haemophilus ducreyi hlp Deletion Mutant

Kirsten Guckes (Tricia Humphreys and Bradley Hersh), Allegheny College – Biology

*Haemophilus ducreyi* is a gram negative bacterium that causes the genital ulcer disease chancroid. *H. ducreyi* has numerous lipoproteins, including *Haemophilus ducreyi* lipoprotein (Hlp). Microbial lipoproteins stimulate the immune response via Toll-like receptors (TLRs) and mediate the host response to pathogens, making them probable virulence factors. This study focuses on the construction of an *hlp* deletion mutant to evaluate Hlp’s role in virulence. To acquire this mutant, we are using recombineering techniques which have been adapted from *E. coli* and *H. influenzae*. First, *hlp* will be replaced with a spectinomycin resistance cassette flanked by FLP recognition target (FRT) sites via recombination. Then this resistance cassette will be excised by FLP recombinase, leaving a scar peptide. We hypothesize that the *hlp* deletion mutant can be constructed through recombineering techniques and will be less virulent than the parent strain during human infection. We will present progress on the construction of this *hlp* deletion mutant.

#### Two Methods of Isolating Fibroblast Cells from Volar Oblique Ligament and Palmar Fascia

Dana Hyde1 and Jennifer Connell1 (Tim Cooney2, John Lubahn2, and Elisa Konieczko1), 1Gannon University, Morosky College of Health Sciences and 2UPMC Hamot – Biology

Basal joint arthritis and Dupuytren’s contracture are both diseases affecting the mobility of the fingers. Basal joint arthritis occurs when the carpometacarpal joint of the thumb develops osteoarthritis. The volar oblique ligament provides stability for this joint and degeneration of the ligament proceeds osteoarthritis. Dupuytren’s contracture is a disease of the palmar fascia resulting in progressive fibrosis of the palmar fascia and aponeurosis, and is caused by myo-fibroblast cells becoming the dominant cell type in the palmar fascia. In two separate experiments, fibroblasts were cultured from surgical waste tissue, the volar oblique ligament and the palmar fascia respectively. Cells from the volar oblique ligament were passaged into flasks, then six-well plates that contain sterile coverslips. The plates were treated for 48 or 120 hours with the hormones estrogen, and/or relaxin, or buffers only (control). Cells from the palmar fascia were passaged into flasks with hopes of eventually differentiating the cells into myo-fibroblast cells, which could then be treated with the hormones relaxin and estrogen. These hormones have softening effects on body tissues, and are being tested to see, if in the future, these hormones could help alleviate the arthritis of the basal joint or the fibrosis of Dupuytren’s contracture.

#### Determining the Evolutionary History of Haemophilus ducreyi Using Multilocus Sequence Analysis

Alison McKelvey and Ryan Cole (Tricia Humphreys), Allegheny College – Biology

According to the World Health Organization, there were approximately 34 million people living with HIV in 2010 and over 25 million people have died in the last three decades as a result of HIV infection. Some sexually transmitted infections increase the likelihood of being infected with HIV, and the genital ulcer disease chancroid is one of those infections. Chancroid is caused by the gram-negative bacterium *Haemophilus ducreyi*. By learning more about the pathogen *H. ducreyi,* it is possible to direct the knowledge towards producing preventative measures that help control and reduce the transmission of HIV. This study aimed to use Multilocus Sequence Analysis to determine the evolutionary history of *H. ducreyi* by amplifying seven housekeeping genes from 10 different strains of *H. ducreyi*, representing 10 different outbreaks of the disease. The gene uvrA has been amplified from all 10 strains. The resulting phylogenetic tree shows that class II strains cluster together and have diverged from class I strains. Progress on the amplification and phylogenetic analysis of the remaining six genes will be presented.

#### Regulation of the HOX target gene CG13222 by Ultrabithorax

Olivia Mesoras (Bradley Hersh), Allegheny College – Biochemistry

HOX genes are found in all bilateral animals and are responsible for the regulation of anterior-posterior body patterning. HOX proteins regulate target genes by turning them on or off in specific tissues. The purpose of this study was to look at the regulation of the HOX target gene CG13222, which encodes a cuticle protein. CG13222 is a known HOX target gene and requires Ultrabithorax (UBX) to bind its cis-regulatory element (CRE) for expression. UBX plays a role in haltere (hindwing) development. Ultrabithorax requires two TAAT sequences in the CG13222 CRE for expression. However, this is likely not the only signal for Ultrabithorax to bind, as TAAT is common in the genome. This study aimed to discover the other sequences needed for UBX to bind to the CRE of CG13222. This was accomplished by mutating base pairs in the CRE near the required TAAT sequence. The mutations were generated using PCR sewing to mutate two base pairs at a time, and inserted into a green fluorescent protein (GFP) reporter vector, which allows visualization of CG13222 expression. Because CG13222 is expressed in the halteres, we will dissect haltere imaginal disks and observe GFP to determine if the mutations alter expression.

#### Immobilization of E. coli via Dip-Pen Nanolithography Utilizing M-9 Ink

Elisa Russo and Shivik Patel (Carl Hultman and Sarah Ewing), Gannon University, Morosky College of Health Professions and Sciences – Biology

Dip-Pen Nanolithography (DPN) is a depositing and printing technique that can print a range of molecules and nanoparticles with 5 nm resolution. These molecules and nanoparticles may be printed on a variety of substrate surfaces. Using the sulfur binding affinity and orientation for the positive charge on an M-9 carborane thiol, a positive electrical field pattern can be printed on a gold surface. The goal of this study was to demonstrate how DPN can be used to print a pattern that will cause bacterial cells to be immobilized on an electrical grid. Controlling bacterial orientation and location relative to adjacent bacteria at the nano-level provides opportunities to investigate bacterial extracellular interactions. The cellular membranes of certain bacteria have a zeta potential across the extracellular border and intracellular cytoplasm that can be utilized to immobilize cells. DPN can use this charge for immobilization, which can be of practical use in the biological sciences. A common bacterium with a strong negative charge at a near neutral pH is ideal for this study. It was determined that *E. coli JM109* had all properties necessary for effective immobilization via DPN.

#### Building on the Mitochondrial DNA Phylogeography of Haplotypes of Eurosta solidaginis

Megan Silbaugh (Kristen Webb), Allegheny College – Molecular Biology and Bioinformatics

Host-associated differentiation of parasitic organisms is the development of genetically differentiated groups within the parasitic species based on the groups’ preferences for differing host variants. This form of sympatric speciation has been observed in many species interactions, including between goldenrods (*Solidago* spp.) and the parasitic gall fly, *Eurosta solidaginis*. Within this system, instances of host-associated differentiation have been implicated from behavioral and genetic evidence centered on the varying preference of the gall flies for one of two goldenrod species, either *S. altissima* or *S. gigantea*. Both geographic and phylogenetic data have been used to study this interaction throughout the goldenrod’s distribution across much of the continental United States. Previously, it was found that five new *E. solidaginis* haplotypes had arisen in the northeastern United States and they grouped into two distinct clades based on geographic location and *Solidago* host species. The purpose of this study was to survey *E. solidaginis* that had parasitized *S. altissima* from previously unsampled locations including Tennessee, West Virginia, Virginia, and Pennsylvania. A region of the cytochrome oxidase I gene was used to reconstruct a phylogenetic tree, revealing new correlations between geographic location, host preference, and differentiation within the gall fly.

### BIOCHEMISTRY II AND NEUROBIOLOGY

#### Auxin Activity and Root Development in Phosphate-Starved and Phosphate-Sufficient Nicotiana plumbaginifolia Seedlings

Hannah Briggs (Catharina Coenen), Allegheny College – Biology

Phosphate is an essential nutrient for plants. The model plant *Arabidopsis thaliana* demonstrates a phosphate-starvation response characterized by a shortened primary root and increased lateral root growth. This response is dependent on the plant hormone auxin. Auxin-responsive gene activity in *Arabidopsis* lateral root primordia oscillates with a six-hour period, but phosphate effects on this oscillation have not been investigated. This study assessed phosphate-dependent auxin activity in roots of *Nicotiana plumbaginifolia* seedlings transformed with a *GH3::Luciferase* promoter::reporter gene construct. This construct uses the gene that codes for luciferase as a reporter for auxin-inducible *GH3* promoter activity. When auxin is active, the corresponding region of the plant will emit photons, or glow. This glow can be captured by luminescent photography. Changes in auxin activity were recorded in seedlings growing in phosphate-starved and phosphate-sufficient conditions. While *N. plumbaginifolia* seedlings failed to exhibit a consistent phosphate starvation response *in vitro*, auxin activity in *N. plumbaginifolia* roots oscillated in a similar fashion to *A. thaliana*, but with a longer period.The role of auxin oscillations in determining species-specific differences in root architecture requires further investigation in plants with disparate root systems and phosphate starvation responses.

#### Biosynthesis of Gold and Silver Nanoparticles from Cave Microorganisms

Nicholas Choy and Jonathan Franks (Om Singh), University of Pittsburgh-Bradford – Biology

Outbreaks of infectious diseases by pathogenic bacteria and ongoing antibiotic resistance have led to a search for novel therapeutics. The nanoscale materials have emerged as novel antimicrobial agents owing to the unique chemical and physical properties. The bio-nanotechnology offers eco-friendly processes for the synthesis of stable nanoparticles. We hypothesize that the natural microbial flora of mineralized caves will contain unusual properties of biotechnological implications. Microorganisms were isolated from the soil samples collected from Shenandoah National Park cave, Virginia. The nutrient broth enriched soil samples revealed a total of 18 colonies on nutrient agar plates. The microbial colonies were purified and screened for biosynthesis of extracellular gold (Au) and silver (Ag) nanoparticles (NPs) in liquid culture. Two microorganisms, LC3 and LC4, revealed extracellular biosynthesis of Au and Ag NPs. Both Au and Ag NPs were characterized on a UV-Vis spectrophotometer and imaged by SEM and TEM for size determination. The antibacterial activity of both NP types was tested against 20 pathogenic microorganisms obtained from the ATCC Bacterial Collection including MRSA for antibacterial activity. The Ag NPs revealed greater zone of pathogenic inhibition then the Au NPs. We predict that the stable Ag NPs will be of value in antibacterial therapeutics.

#### Role of Innexin and Vinnexin Gap Junctions in the Immune Response of Drosophila melanogaster

Caitlin Devor (Bradley Hersh), Allegheny College – Biology

An innate immune system is present in all organisms and relies in part on cellular responses to events undermining an organism’s health, such as pathogen invasion. We investigated the role of gap junction-mediated cell communication in innate immunity using the fruit fly, *Drosophila melanogaster*, and the gram-negative bacterium, *Serratia marcescens*. Invertebrate gap junctions are composed of Innexin (Inx) subunits that form pores between two adjacent cells. Gap junctions form between hemocytes (blood cells) when they encapsulate foreign cells. Endosymbiotic polydnaviruses of parasitic wasps carry their own viral innexin (Vnx) genes, which may interfere with normal gap junction-mediated communication, enabling the parasitic wasp embryo to evade the host immune system. We developed transgenic flies to express Inx6, VnxD, VnxG, VnxQ1, and VnxQ2 specifically in hemocytes. We expressed GFP specifically in hemocytes to identify transgenic cells and observe their encapsulation of agarose beads *in vitro*. In addition, we exposed transgenic flies to *S. marcescens* by ingestion and measured survival following the bacterial infection. We will report our findings and our interpretations for the role of Inx and Vnx in immune response.

#### Auxin Influx Carrier Effects on Transport Specificity and Auxin-Induced Gene Expression

Elizabeth Frick (Catharina Coenen), Allegheny College – Biology

The plant growth hormone auxin, indole-3 acetic acid (IAA), is crucial in plant responses such as growth, organ initiation, and tropisms. Because it is produced in the apical meristem, polar transport of auxin through the plant is vital for these responses to function. Both influx and efflux carriers are important for speed and directionality of auxin transport, but how these carriers recognize and transport auxins is insufficiently understood. This project examined the effect of two synthetic auxins, indole-3-methanesulfonic acid (IMS) and 1-methylnaphtyl sodium sulfonate (NSS), on auxin-inducible gene expression. Because both IMS and NSS are fully dissociated at any pH, they cannot diffuse into plant cells to activate intracellular auxin receptors, unless their uptake is facilitated by influx carriers. I used transgenic *Nicotiana plumbaginifolia* seedlings containing the *GH3::luciferase* gene construct to quantify auxin-inducible gene expression by measuring luminescence produced by excised hypocotyls. In this system, IMS activated the *GH3* promoter; however, it did so much more slowly than IAA. NSS activation of the promoter was slow and barely detectable, whereas napthlene acetic acid elicited IAA-like responses. Inability of NSS to elicit a full response indicates that auxin-induced gene expression requires activation of intracellular auxin receptors.

#### Auxin Signal Transduction in Pseudomonas fluorescens str. Pf-5: The Role of AuxREs

Garrett Gleeson (Catharina Coenen and Kristen Webb), Allegheny College – Biology

The plant hormone auxin is produced by many rhizobacteria and serves as a signal in plant-microbe interactions. Auxin responsiveness has thus far been demonstrated in one plant-associated bacterium, *Azospirillum brasilense*, where it appears to be based on plant-like Auxin Response Elements (AuxRE) in the promoter region of auxin-responsive genes. However, no bacterial transcription factors binding these elements have been identified. This study investigates the mechanism of bacterial auxin signal transduction in the biocontrol bacterium *P.* *fluorescens* str. Pf-5. To search for proteins that could bind to AuxRE in *P*. *fluorescens*, a Protein Basic Local Alignment Search Tool (pBLAST) of plant Auxin Response Factor (ARF) DNA Binding Domains (DBDs) will be run against a Position Specific Scoring Matrix (PSSM). The PSSM was built by four iterations of a PSI BLAST of the *ARF 2* DNA DBD against all sequences in the NCBI database. Auxin inducibility of ten candidate genes will be determined by Real-Time PCR. Candidate genes were selected based on the number and position of elements in their promoter regions that match the consensus sequence, TGTCNC, of AuxREs. Understanding bacterial auxin signal transduction will provide insight into communication between plants and bacteria and shed light on the evolution of hormone signaling in plants.

#### Neurological and Behavioral Effects of p35 Knockdown in Drosophila melanogaster

Gina Santonastaso (Brad Hersh), Allegheny College – Biology

Disrupted neuronal maturation and axon guidance errors are contributors to many human neurodegenerative diseases such as Alzheimer’s Disease (AD). AD patients experience the disintegration of microtubules, collapse of neuronal communication, and ultimately the visible loss of motor control. Cyclin-dependent kinase 5 (Cdk5) and its associated activator, p35 protein, aid in the processes of neuronal maturation and migration in the central nervous system (CNS). While Cdk5 activity is only evident in postmitotic neurons, high levels of *p35* expression are evident in the developing CNS and peripheral sense organs of the *Drosophila* embryo. Knockdown of *p35* throughout the animal by RNA interference (RNAi) causes axon guidance errors, decreased motor coordination, and reduced lifespan. To test the tissue-specificity of these effects, we used RNAi to knockdown the *p35* gene in just the neurons of the CNS. We performed antibody staining of embryos to identify axon guidance errors. To measure effects on motor control, we performed climbing assays throughout the lifespan of the animals. We determined that knockdown of *p35* causes a lack of axon branching and decreased motor coordination.

#### ****Identification of Glucose-Inducible Indolic Metabolites Produced by**** Pseudomonas fluorescens

Amber Wetzel and Kristyn Gumpper (Catharina Coenen), Allegheny College – Biochemistry

*Pseudomonas fluorescens* is a root-associated bacterium that increases crop yield and protects plants against disease. In addition, some strains of *P. fluorescens* promote plant growth, most likely by colonizing roots and producing indole-3-acetic acid (IAA), the most common form of the plant growth hormone auxin. IAA production in *P. fluorescens* grown in Castric media supplemented with tryptophan, a precursor of IAA, can be quantified spectrophotometrically after reacting bacterial supernatants with the Salkowski’s reagent. Two biocontrol strains of *P. fluorescens,* Clinton and Eaton, produce IAA only when glucose is absent from the growth medium. In the presence of glucose, a different metabolite is produced, which also reacts with the Salkowski’s reagent, but has a different absorption maximum. To identify this metabolite, I am analyzing products extracted from bacterial culture supernatants with thin layer chromatography (TLC) and the Van Urk-Salkowski’s reagent. Based on color and retention factor of the metabolite, it is not indole-3-acetonitrile (IAN), indole-3-pyruvid acid (IPyA), or indole-3-acetaldehyde (IAAld), all of which are common precursors of IAA. I am now testing the possibility that the metabolite is 1-methylindole or indole-3-carboxaldehyde. The regulation of bacterial indole production by availability of plant-secreted sugars is an essential component of plant growth regulation by root-associated bacteria.

### BIOLOGY GENETICS AND ECOLOGY

#### Comparison of Pharyngeal Apparatus of Round Gobies (Neogobius melanostomus) from Two Populations in Erie County, Pennsylvania

Noelle Blank (Greg Andraso), Gannon University, Morosky College of Health Professions and Sciences – Biology

Round gobies (*Neogobius melanostomus*) shift their diet from arthropods to dreissenid mussels as they grow, and this diet shift is correlated with developmental changes in pharyngeal structures. Changes in the pharyngeal apparatus may cause gobies to switch from arthropod to dreissenid prey. Alternatively, the dietary switch may drive pharyngeal remodeling. To test the possibility of phenotypic plasticity (i.e. that diet influences pharyngeal morphology), we compared prey availability, food habits, and pharyngeal morphology of round gobies from two populations: Presque Isle shipping channel (“dreissenid-rich” location) and Fairview gravel pit (“dreissenid-absent” location). If the pharyngeals are phenotypically plastic, we would expect to see less robust structures and the maintenance of narrow (< 0.3 mm) teeth in round gobies from the gravel pit, compared to those from the shipping channel. We have found that dreissenids are abundant in the shipping channel and compose nearly the entire diet of round gobies collected there. In contrast, dreissenids appear to be absent in the gravel pit. Round gobies collected from that site contain a variety of arthropods, but also contain small gastropod mollusks. Preliminary analyses of the pharyngeals of fish from the two sites suggest differences in morphology that are consistent with phenotypic plasticity.

#### Population Analysis of the Single Nucleotide Polymorphism Resistance to Strobilurin Fungicides in Downy Mildew Populations from Lake Erie Vineyards

Stephanie Chestnut (Christopher Gee), Penn State Behrend, School of Science – Biology

The downy mildew (*Plasmopara viticola*) is an oomycete pathogen that poses tremendous problems in grape vineyards. This pathogen is controlled using many types of fungicides, including strobilurins, known as quinone outside inhibitors (QoI). One issue facing the use of this class of fungicide is the high incidence of qualitative fungicide resistance conferred by a single nucleotide polymorphism (SNP) causing a glycine to alanine mutation at position 143. The purpose of this project was to determine the incidence of the resistant SNP in this population. Resistance SNPs have been found from several geographic locations in the Lake Erie region, although the specific levels measured have depended on the method used. Data will be presented on the geographic distribution of fungicide resistance, as well as discussion on the published methods for determining resistance, which suggests a need to develop better methods to measure this important fungicide resistance.

### A Census of the Bat Community on the Campus of Gannon University, Erie, PA

Kathleen Corello and Sarah Glancy (Steven Ropski), Gannon University, Morosky College of Health Sciences – Biology

The bat population in the United States is diminishing due to White-Nose Syndrome. It is important in this bat study to discern where they roost on campus and why certain locations are preferred. Bats were monitored five days a week between April and September of 2011 by walking a set path to obtain where specifically they prefer to roost. Building surfaces, temperature, human traffic, and the concentrations of insects nearby are several criteria that played a role when examining the bat population. When accessible, bats were marked with a non-toxic paint to see if any sites were used repeatedly. In 2010 the total number of bats recorded was 1,148, including 1,139 little brown bats (*Myotis lucifugus*), possibly three eastern pipistrelles (*Pipistrelus subflavus*), six big brown bats (*Eptescicus fuscus*), possibly one grey bat (*Myotis grisescens*), and one red bat (*Lasiurus borealis*). Of the 223 marked bats, 64 were observed one or two subsequent times on campus. These data suggest that bats are beginning to remain longer on the Gannon campus than previous years. These data are comparable with a previous census in 2010.

#### Method for Taxon-Specific Measurement of Algal Lipids and Biofilm Development

Thomas Croushore-Kysor (J. Michael Campbell), Mercyhurst University – Biology

Methods were tested for the quantitative analysis of neutral lipids and biofilm formation in a mixed system of green algae grown in an experimental aeroponic system. Lipids were detected through analysis of wet-mounted algae using fluorescent microscopy and Nile Red staining. Sequential pictures taken of clumps in the same field of view using bright field and fluorescent microscopy allowed for a way to test frequency of occurrence of lipid droplets in different types of algae. Extracellular polysaccharide biofilms associated with aeroponic algae were detecting by staining samples with Alcian blue stain and analyzing under bright-field microscopy, and we established criteria for rating the extent of biofilm development. Advancement of biofilm formation was often associated with aggregation of ciliated protozoans in algal clumps. Also the ciliates seem to be more important reservoirs for neutral lipids than the algae.

#### Investigating the Effects of Cryptic Diversity and Speciation in the Armored Scale Insect Chionaspis pinifoliae, and Their Primary Endosymbiont Uzinura diaspidicola.

Kristi Gdanetz1 and Rodger Gwiazdowski2 (Matthew Gruwell1), 1Penn State Behrend, School of Science and 2University of Massachusetts, Amherst – Biology

The pine needle scale insect, *Chionaspis pinifoliae,* is a pest of pine trees found across North America. It has recently been determined that *C.* *pinifoliae* is a cryptic species complex of nine different *Chionaspis* species. All scale insects host bacterial endosymbionts, and armored scale insects share the primary endosymbiont *Uzinura diaspidicola*. Three endosymbiont genes from different locations in the genome: 16S rDNA, rspB and groEL were sequenced and used to construct phylogenies. These phylogenies were used to strengthen the conclusion about speciation in *C. pinifoliae* evolution and test the role of endosymbionts in the speciation process; specifically whether or not the endosymbionts separate into specific groups before or after the scale insects.

### The Effects of Genetic Polymorphisms on Various Characteristics of Track and Field Athletes

Carl Kallgren IV, Courtney Smith, and Todd Cline (Matthew Gruwell), Penn State Behrend, School of Science – Biology

Research on genetic elements related to athletic ability has often centered on one gene or polymorphism and its relation to performance. The purpose of the research at hand is to assess the effects of several polymorphisms and genes on athletic performance in the different events of track and field, and on other psychological factors, such as desire to participate in certain types of events. The genetic elements that were tested coded for either increased sprint (explosive or “burst”) performance or endurance performance. Track and field athletes from Penn State Behrend were selected based on the events that they competed in, especially those in short sprint type events and those in longer endurance type events. Genotypes were analyzed by either a combination of polymerase chain reaction and agarose gel comparison, or by Sanger sequencing. Implications for collegiate and other levels of athletics are discussed.

#### The Active Ingredient in Antidepressants Can Influence Levels of the Fecal Indicator Bacteria E. coli in Recreational Freshwaters

Surafel Mulugeta, Eric Clark, Drew Spacht, Gillian Jones, and Irfan Haider (Steven Mauro), Mercyhurst University, Zurn School of Sciences – Biology

Fluoxetine is the active ingredient in antidepressant drugs and has been shown to accumulate in recreational waters at levels that have the potential to negatively impact aquatic organisms including fish, algae, and crustaceans. However, the impact of fluoxetine on aquatic microbes remains poorly understand. In this study, we examined how fluoxetine influences *E. coli* levels in the recreational waters of Presque Isle State Park in Erie, Pennsylvania. Our results demonstrate that fluoxetine is present in these waters and can decrease *E. coli* levels, presumably through bacteriophage induction. Since *E. coli* is used as an indicator of freshwater quality, the presence of fluoxetine in aquatic ecosystems can influence how water management decisions are made.

#### Determination of Polybrominated Diphenyl Ethers in the Sediments, Water, and Tissues of Lake Erie

Marissa Vartak1 (Weslene Tallmadge2 and Mary Vagula1), Gannon University, Morosky College of Health Professions and Sciences – 1Biology and 2Chemistry

Lake Erie is one of the five great lakes of North America. It is the shallowest, the warmest, and the most biologically productive of the Great Lakes, producing more fish than all of the other four lakes combined. It is a drinking water source for 11 million people and a recreational asset, as well as a magnet for tourism and fishing. On the flipside, it is also very vulnerable and troubled with environmental challenges because it has the smallest water volume, but the greatest pressures from the human settlement. One of the many issues faced by the lake is pollution. It receives larger loads of many pollutants than any other Great Lake. Concerted efforts and research of many agencies and universities along with the Clean Water Act of 1972 were able to restore the Lake and address the conventional pollution problem. However, even with the best pollution controls, many pesticides and organohalogens continue to enter the lake from many sources. Polybrominated diphenyl ethers (PBDE) are flame-retardants that have been used in a variety of consumer products since the 1970s. Ever since, PBDEs have become ubiquitous environmental contaminants. Being largely nonpolar and chemically stable, these chemicals are extremely lipophilic and resist degradation in the environment, giving them a high affinity for bioaccumulation. The current study reports the levels of these compounds in the sediments, water, and tissues of fish living in Lake Erie. The body burdens of these toxicants in biota living in the lake are also presented.

### BUSINESS AND HUMANITIES

#### Why do Gasoline Rates Vary so Much across U.S. Metro Areas?

Kyle Abbott (James Kurre), Penn State Behrend, Sam and Irene Black School of Business – Business Economics

Gasoline affects our lives daily, whether it is at the pump or on the front page of the newspaper. Why does such a critical good in our society vary as much as 52 percent across metro areas? In 2010, on average, a consumer would pay $2.474 for a gallon of gasoline in Oklahoma City, Oklahoma. During this same period, consumers paid $3.753 for the same exact gallon of gas in Kodiak, Alaska. What causes this variation? Population? Per capita income? Taxes? This research searches for these causes of pricing disparity at the U.S. metro level. Data from metro areas throughout the United States were analyzed and economic, demographic, geographic, and other theorized causes of price differences were evaluated using least squares regression. Specifically, average commute, number of gasoline establishments, percent of the population that carpooled, took public transportation or drove alone, number of tourism establishments, per capita income, population, and taxes were theorized as possible measures that influence gasoline prices. This study identifies significant factors that contribute to the difference in price across U.S. metro areas.

#### AppleTM or Orange? New Product Creativity from the Consumer’s Perspective

James Biebel (Pelin Bicen), Penn State Behrend, Sam and Irene Black School of Business – Marketing and Management

We are living in a dynamic and turbulent business environment in which customers’ needs and preferences are constantly changing. In order to succeed and have long-term competitive advantage in this volatile environment, firms must have the ability to generate and market creative ideas in new products. The creation and development of creative ideas and their manifestations as new products are considered as the *sine qua non* of a successful innovation strategy that results in superior financial performance in the long-term. Existing research on new product creativity in marketing and management has emphasized on the *firms’ perspective* of what new product creativity is. However, to our knowledge, there has not been any study that examines this from the *consumers’ point of view*. What is new product creativity for consumers and how do they evaluate creative products? Is a creative product for firms also the same for consumers? Through the utilization of literature review, gathering qualitative data by conducting in-depth interviews and focus groups, we aim to conduct this qualitative study to gather more information on what new product creativity means to consumer’s and what factors they use when evaluating new products.

#### Determinants of Poverty: An Analysis across U.S. Metro Areas

Justin Brunot (James Kurre), Penn State Behrend, Sam and Irene Black School of Business – Business Economics

The United States is one of the richest countries in the world, and yet 1 out of 10 American families was in poverty in 2009. Not only is this a high level nationally, but poverty varies greatly across metro regions. In McAllen-Edinburg-Mission, Texas, 31.8 percent of families were in poverty. Napa, California, however, only had 3.8 percent in poverty. What causes this variation? Lack of education? Single-headed families? This research searches for these causes of poverty at the U.S. metro level. Data from metro areas throughout the entire country were analyzed and economic, demographic, geographic, and other theorized causes of poverty were tested using least squares regression. Specifically, employment measures, age categories, education levels, family structure, ethnicity, and other traits of a metro area were theorized to impact poverty levels. The research identifies determinants that cause or inhibit poverty at the metro level and could be used to tackle poverty issues in a more efficient manner.

#### How Does National Culture Affect Supply Chain Disruptions Management?

Jodie Chan and Jade Buhite (Sanjay Kumar and Ozgun Caliskan Demirag), Penn State Behrend, Sam and Irene Black School of Business – Operations Management

Supply chain disruptions are events that could undermine the performance and at times survival of a company. Companies use a variety of methods and tools to manage disruptions. Strategies pursued by companies result in varying degrees of effectiveness in managing disruptions. Factors such as organizational policies and employee beliefs have an impact on the decisions made regarding disruptions management, partly motivated by local culture and traditions. We explore the impact of culture on disruptions management practices. We propose that different national cultural dimensions may have an effect when managing disruptions. Using Hofstede’s five dimensions of national culture, we identify factors that may help or hinder companies in managing disruptions. Specifically, we construct hypotheses related to power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation. We support our hypotheses using case studies of companies from different countries that have differences in Hofstede’s framework. The case companies chosen are primarily smaller organizations that have business practices rooted in local customs and traditions. Our findings have the potential to help companies identify cultural dimensions that could be effective in managing disruptions.

#### The Square of Opposition and the Aspect Theory of Predication

Milo Crimi (Allan Bäck), Kutztown University of Pennsylvania, College of Liberal Arts and Sciences – Philosophy

The square of opposition is a diagram that represents the logical relationships between the categorical sentences `Every *S* is *P*', `No *S* is *P*', `Some *S* is *P*', and `Some *S* is not *P*'. The square has been a fundamental component of Aristotelian categorical logic for more than two thousand years. In modern times, it is often claimed that most of the logical relationships represented by the square only hold under certain “existential import” conditions; e.g., in order to infer `Some *S* is *P*' from `Every *S* is *P*', we must make the assumption that at least one *S* exists. This means that propositions such as `Every unicorn is white' require special treatment. Another approach, called the “aspect theory of predication,” builds existential import conditions directly into affirmative categorical sentences. Thus, negative sentences can be true without existential import. Here I provide an account of just how the aspect theory of predication can be applied to the square of opposition to remove existential import assumptions from negative categorical sentences.

#### The Kennedy Administration and U.S. Involvement in Indochina

Jerrel Gilliam (John Rossi), Penn State Behrend, School of Humanities and Social Sciences – History

Newly elected President John F. Kennedy and his heralded group of advisors came to Washington D.C. in January of 1961 along with an incredible sense of excitement and anticipation. There was a belief that these were the men to get America moving again, and that these were truly the “best and brightest” our great nation had to offer. Within four years, however, the fanfare of 1961 was a distant memory and the United States found itself in the worst foreign affairs debacle in the nation’s history: the Vietnam War. This presentation explores the Kennedy Administration’s contribution to this tragedy and shows that President Kennedy and his advisors were the primary architect of the disaster and thoroughly committed the United States to the path of a costly stalemate *prior* to President Kennedy’s assassination in November of 1963. It dispels the myth perpetuated by some scholars that there was a realistic possibility of disengagement by Kennedy in his hypothetical second term, had he not been tragically assassinated.

#### Qualifying Identity Statements and the Primitiveness of Identity Jeremy Henry (Allan Bäck), Kutztown University of Pennsylvania, College of Liberal Arts and Sciences – Philosophy

According to Peter Geach, there is no identity relation without qualification. An identity relation without qualification is called absolute identity. Geach’s relation holds only relative to the context (e.g. the theory, the conversation) in which the relation was asserted. He contends that this notion is not captured by “*x* is the same as *y*.” The expression forms an incomplete thought. It is a shortening of the qualified identity statement, “*x* is the same *A* as *y*,” where *A* is a count noun given by context. By contrast, Willard Quine holds that this special form of identity is unnecessary. It can be formulated by coupling the syntactic rule |- F*a* ≡ (E*x*)(F*x* & *x*=*a*) with quantification theory. In my presentation I compare the views of Geach and Quine, beginning with a summary of Geach’s article, “Identity.” I show that the two views are compatible and that both qualify the identity relation. I also argue that Geach’s formulation of identity, although not semantically incorrect, does not solve the ontological problems it purports to. In conclusion I will give reasons for the view that identity is primitive, and that it cannot be defined semantically except in terms of itself.

#### Cave of Wonders: Interpreting a Novel Cave Structure in Petra, Jordan

Lindsay Hilldorfer (Leigh-Ann Bedal), Penn State Behrend, School of Humanities and Social Sciences – Anthropology

The Petra Garden and Pool Complex (PGPC) is an archaeological site established in the ancient Nabataean capital city of *Petra,* located in southern Jordan.The PGPC was a structure that consisted of a large pool with a central island and a garden of local and imported plants. Its purpose was primarily symbolic of the nation’s power by showing dominion over nature in the desert. During the 2011 field season, which lasted four weeks in May-June, Trench 24 was excavated. This trench is located on a slope overlooking the pool complex, at the base of a rock face supporting a cistern. It was opened to determine if the cistern above emptied into the area. This excavation unearthed a small cave, the interior decorated with small niches and a large shelf carved into the sandstone face. A wall of ashlars is built up in front of the cave entrance with a narrow doorway. I hypothesize that the cave served a religious purpose, possibly associated with the Roman god Pan as caves have been used for honoring him at contemporary garden and pool sites such as Sperlonga (Italy) and Baniyas (Northern Israel).

#### From Fantasy to Reality: The Stylistic Evolution of French Illumination in the Grandes Heures and the Très Riches Heures of the Duke of Berry

Allison McCann (Laurent Odde), Kutztown University of Pennsylvania, School of Visual and Performing Arts – Fine Arts

Jean de Berry’s books of hours, the *Grandes Heures* and the *Très Riches Heures*, have long been considered prime examples of the refined and enlightened patronage of French royal circles. They constitute perfect examples of the changes in Western Europe’s artistic tradition at the dawn of the fifteenth century. In my presentation, I will argue that while the books were produced almost simultaneously, each one embodies a different facet of this aesthetic revolution and is characteristic of the transition between the visual culture of the late Middle Ages and that of the Renaissance. For example, I will show how the *Grandes Heures,* with its abundant marginalia, intricate scrollwork, fantastic bestiary and centuries-old symbolism, follows the medieval tradition of book illustration, while the images included in the *Très Riches Heures*, devoid of such intricacies, offer a more accurate transcription of the world through the direct study of nature in a way that announces the Renaissance.

### CHEMISTRY AND MATHEMATICS

#### Statistical Arbitrage Investing

Scott Dombrosky (Joseph Previte), Penn State Behrend, School of Science – Mathematics

Statistical analysis has been used on the stock market for many years with mixed results. The purpose of this research is to apply arbitrage techniques to develop a strategy for trading within the stock market. I have created a computer program that is intended to detect and test the optimal-trading strategies of the stock and stock options based on the current market fluctuations.

#### The Effects of Dormitory Life on Students’ Academic Performance

Alex Johnson (Jie Wu), Thiel College – Actuarial Studies

I have found that my freshman living situation influenced my academic performance, as most collegiate work is completed outside of the classroom. Through literary research, I will find which environmental factors affect the way students study or work on homework, such as noise, study times, and gender. To investigate this topic and include a hands-on approach, I will create a survey for the residents of the four residence halls on campus: Hodge, Harter, Sawhill, and Florence West, which will provide me with quantitative and qualitative data. I will apply the techniques of regression analysis to investigate first, how the residential environments affect noise levels, and second, how noise levels affect academic performance (measured by G.P.A.). By the creation of certain regression models supported by Minitab, I will analyze the data using coefficients of determination, confidence intervals, and the F-Test. My goal is to use my statistical expertise to analyze the living conditions at Thiel College to address any hindrances these conditions may put on students’ academic performance.

#### The Exponential of Matrices

Evan Liu (Boon Ong) Penn State Behrend, School of Science – Mathematics

In a very old document it is stated that there are nineteen ways to find the exponential of the matrix from the author Cleve Molar and Charles Van Loan. This project will be going over four out of nineteen referred ways of finding the exponential of matrices. These varying methods are using differential equations, diagonalization, series, and partial fractions as a means of finding the exponential of the matrix.

#### Preliminary Investigations on Electrocatalyst Development for Selective Gasotransmitter Detection

James Pander (Jason Bennett), Penn State Behrend, School of Science – Chemistry

Gasotransmitters are endogenously produced, biologically important gas molecules with similar properties and physiological processes. Accurate detection of these molecules would aid in elucidating the mechanism of these processes. While electrochemical detection is attractive due to speed, accuracy, and cost, there are significant issues regarding the selectivity of current sensor materials. Specifically, gasotransmitter molecules (such as CO, NO, and H2S) are all oxidized at ~700 mV due to kinetic limitations of the oxidation reactions. This means that accurate detection of the concentration of one analyte using standard electrode materials is impossible. One way to overcome this challenge is to modify the electrode surface with a suitable electrocatalytic material that will exhibit selectivity for one analyte over the other gasotransmitters present. Our research group has initiated projects focused on developing electrocatalytic materials capable of performing such functions. To our knowledge, we are one of only a few groups with this objective. Common electrocatalysts include oxide layers and metalloporphyrin layers which can be easily electrodeposited on the working electrode surface. This presentation will report on the pioneering research that has led to the establishment of two separate projects intent on developing electrocatalysts for the selective detection of either H2S or CO.

#### Two–Dimensional Equilibrium Crystal Shapes

Clay Schuman (Antonio Mastroberardino), Penn State Behrend, School of Science – Mathematics

The Lokta-Volterra predator-prey system is one of the classical models of mathematical biology. This simple model can be adapted to fit more biologically relevant situations. In this study, we develop several two-dimensional models based on the traditional Lokta-Volterra model and use the results of these models to develop higher order systems of multiple species. Specifically, we introduce a second prey species to the model, thus obtaining a three-dimensional system. We then consider various cases of interaction between the predator and the two prey and compare these results with those obtained in the two-dimensional case.

#### Antioxidants from Spices

Koonj Shaikh (Fulgentius Lugemwa) Penn State York, School of Sciences – Chemistry

There is great interest in finding new and safe antioxidants from natural sources that could be used to prevent lipid peroxidation, if taken as food, to minimize oxidative damage to living cells. Recent studies also indicated that antioxidant spices reduced the effects of high-fat meals. In order to discover new and potent sources of antioxidants from plants, the following spices were studied: ginger, cilantro, cumin, anise, linden, eucalyptus, marjoram, oregano, sage, thyme, and rosemary. Whole spices were crushed and extracted for 96 hours at room temperature using a combination of ethyl acetate, ethyl alcohol and water in the ratio of 4.5:4.5:1 (v/v). Antioxidative properties of extracts were evaluated using 2,2-diphenyl-1-picryhydrazyl (DPPH) assay. Total phenols from each spice were determined using the Folin-Ciocalteau assay. Rosemary was found to be the most potent antioxidant with an LC50 of 414 mg of phenol/L, followed by eucalyptus with an LC50 of 3,241 mg of phenol/L. The least potent antioxidants were sage and cilantro with LC50 of 7,879 mg of phenol/L and 7,876 mg of phenol/L, respectively. A power relationship between total phenol and LC50 was observed, indicating that antioxidative potency requires a small concentration of active phenols.

#### Drainage of a Non-Newtonian, Power Law Fluid into a Deformable Porous Material

Shehzad Siddique and Thomas Boyer (Javed Siddique), Penn State York, School of Sciences – Mathematics

In this study we explore the one-dimensional drainage of a non-Newtonian, power-law fluid into a deformable porous material with and without the effects of gravity. To express the movement of both the fluid and solid phases we use mixture-theory. In the absence of gravity effects, the model admits the similarity solution, which we compute numerically. When gravity effects are present, the free-boundary problem is also solved numerically using method of lines. Our numerical solution quantifies the effects of gravity, capillarity, and solid to liquid density ratio on the time required for a finite volume of fluid to drain into the deformable porous material. In the absence of gravity effects, no equilibrium between drainage of the non-Newtonian liquid and the deformation of the solid is reached. Whereas, in the presence of gravity effects, we anticipate both curves initially follow the similarity solution but then depart from this pattern until all the liquid is completely drained into porous material. Note that this liquid and solid dynamics depends on the power-law index *n* and the power-law consistency index μ\*.

#### Electrodeposited Dicyano-Coordinated Ferriprotoporphyrin for the Selective Oxidation of H2S Gas Christopher Wheeler (Jason Bennett), Penn State Behrend, School of Science – Chemistry

Hydrogen Sulfide (H2S) is the newest member in a group of biologically generated gaseous signaling molecules known as gasotransmitters. It has attracted a rather large amount of attention due to its role in neurological diseases such as Alzheimer’s, making its detection *in vivo* an important step in understanding such disorders. Electrochemical detection methods are attractive due to their quick response times and high accuracy. The main obstacle preventing the accurate detection of H2S *in vivo* is the similar oxidation kinetic limitations it has in comparison to the other gasotransmitters, carbon monoxide and nitric oxide. One possible solution to selectively detect H2S is to modify the electrode surface with an electrocatalyst that will preferably shift the oxidation potential of H2S to allow the oxidation to occur at a lower potential than other gasotransmitters. This research focuses on electrodeposited dicyano-coordinated ferriprotoporphyrin (hemin) as an electrocatalyst capable of oxidizing H2S at 0.15V vs. Ag/AgCl while achieving minimal response from CO or NO. This presentation will serve to introduce this novel material which currently is 100x to 1000x more sensitive towards H2S over CO and NO, respectively, while also showing the stability of the electrocatalyst response.

### COMPUTER SCIENCE, ENGINEERING, AND PHYSICS

#### Tweet Categorization with Pattern Diffusion

Zachary Bush (Meng Su), Penn State Behrend, School of Science – Computer Science

Twitter exists for users to share what they are doing on a day-to-day basis. The purpose of this research is to design a data collection and analysis system which uses Twitter, ranking algorithms, and diffusion geometries to describe the data on Twitter. This system analyzes the use of diffusion geometries to find a more effective method of categorizing user tweets, compared to current methods of categorization. Similar methods of categorization require training sets, while pattern diffusion does not. Instead of requiring training data, the pattern diffusion method requires sets of keywords or characteristics to analyze as a vector. The effectiveness of pattern diffusion was to be tested by rating the accuracy and speed of its method, compared to other categorization methods. The tweets that create a *trending topic* were categorized and analyzed to determine which users were vital in causing the topic to trend. The tweets' metadata and contents were both analyzed to create a network. This was tested by analyzing the accuracy, consistency, and speed in identifying key users and messages.

#### Using Manifold Learning In OpenCV to Analyze Images for Facial Recognition

Steve Dudenhoeffer (Meng Su), Penn State Behrend, School of Engineering – Computer Science

Modern computer vision is accomplished by analyzing various points in an image to best approximate the details. Higher resolution images offer more detail but require much more processing to successfully analyze. Manifold learning is a general machine-learning method that can be applied to image recognition by breaking down an image into a much more manageable size so that many images can be processed much faster. The purpose of this research was to implement various manifold-learning algorithms alongside of the OpenCV (Open Computer Vision, which was developed by Intel Corporation) library to quickly scan images and sort them for various reasons, most notably for faster facial recognition. The two recently developed manifold-learning algorithms: diffusion geometry and the Laplacian eigenmaps algorithms, are used to compare with the traditional algorithm: Principal Component Analysis (PCA). The results of the research showed that the processing of the manifold learning on image recognition and sorting is far more accurate than the results when using PCA algorithm in OpenCV. Our results show that the new manifold-learning algorithms can be a nice addition to the popular OpenCV library.

#### Computational Models for Amorphous Materials

Brittany Hoard (Blair Tuttle), Penn State Behrend, School of Science – Physics

The purpose of the current research was to study the properties of amorphous materials used in electronic devices. Using C++ code written by Alicia Klinvex (class of 2008), I created periodic models of amorphous silicon by first placing the atoms in random positions and then using the cooling algorithm to relax the atoms. In addition to improving the code’s user-friendliness, I created amorphous models with point defects and wrote code to passivate dangling bonds with hydrogen atoms. I have used quantum mechanics simulations to study the electronic properties of defects in amorphous silicon. In this talk, I will describe my models and simulations and discuss my results. If time permits, I will discuss recent work on interfaces.

#### A Puzzle Game Controlled by Live MIDI Input

Dylan Karas (C. David Shaffer), Westminster College – Computer Science

Most well-known musical games have taken on the role of performance evaluators, requesting that the player perform a designated score and determining level of success by measuring the quality of the performance. Other musical software has served as performance illustration, allowing a live or pre-recorded performance to manipulate a virtual world in such a way that it provides a further theatric element to the performance or acts as a further tool of expression to the musician. This project uses a MIDI keyboard to directly manipulate objects in the game world, such that while a successful performance will lead to victory, the nature of that performance is not made apparent to the player in a musical sense, but is described through the arrangement of the game objects and the known effects that the performance enacts upon them. To achieve this, a puzzle game was created that consists of a universal set of game objects, each of which responds to the musical input in a unique way, and several levels that contain arrangements of these objects and exhibit varying victory conditions.

#### An Autonomous Room-Navigation Robot

Timothy Matyas (C. David Shaffer), Westminster College – Computer Science

The goal of this project is to construct an autonomous robot with simple inexpensive detectors that can successfully navigate a mock house floor layout. The layout must consist of hallways and rooms, must be square with fixed height walls that are parallel to the x or y axis and meet at right angles, and dimensions must be constrained based on the physical size of the robot. This work will be distinguished from past work by the robot only knowing the scale and geometry of the layout prior to the start of the traversal. The robot will be entered into the Trinity College Fire-Fighting Home Robot competition for evaluation. In this contest, the goal is to search a predefined house-floor layout and seek out a lit candle in a room and extinguish it. The scale of the robot and house layout will coincide with the rules of the competition. The project has direct real-life significance; the use of robots to fight fires that would traditionally be too hazardous for fire-fighters to extinguish.

#### Extending the Precision of Embedded Multipliers in FPGAs

Jacob Shaffer (E. George Walters), Penn State Behrend, School of Engineering – Computer Engineering

Many Field Programmable Gate Arrays (FPGAs) have embedded multipliers. Often, an application requires a few additional bits of precision resulting in multiple embedded multipliers being used for the operation. The objective of this research was to develop and test options for extending the precision of embedded multipliers in FPGAs. This research has the potential to reduce the number of embedded multipliers required for some applications by half.

**Modeling Candidate Solid-State Systems for Quantum Computers**Fiona Steel (Blair Tuttle), Penn State Behrend, School of Science – Physics

The purpose of this project is to analyze solid-state systems for their potential use in quantum computers. Spin defects in semiconductors will be analyzed with microscopic models and quantum computations. Two models of silicon carbide polytypes, 3C-SiC and 4H-SiC, have been setup, and are in the process of being analyzed. In this presentation, I will present the microscopic models for spin defects in silicon carbide and discuss the electronic properties of the defects.

#### “Student’s Friend” Task Organizer and Study Assistance Application

Jared Thompson, Alex Wardi, Brad Mason, and Domenic Palmieri (Gary Walker and Charles Burchard), Penn State Behrend, School of Science – Computer Science

This system will combine aspects of social networking with task management paradigms. Using modern web technologies such as the Facebook api it will provide instructors with a user-friendly interface to communicate with their students. Instructors will have control over a course page which will have utilities such as a class calendar. Students will have access to personal study materials such as flash cards, be able to view the course calendar, have the ability to post questions on the class forum, and will also have the ability to create study groups with other classmates. This system will run as a web application and will pass data to and from the user by means of a relational database.

### PSYCHOLOGY I : Communication

#### Communication Showdown

Preston Barrett, Zachary Cathcart, and Anthony Mead (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Over the past few decades, the use of Computer Mediated Communication (CMC) has significantly increased. This increase has led to research in the field questioning whether differences exist between CMC and Face-to-Face (FtF) communication, and if so, in what direction. This research study examines social anxiety as it relates to the use of CMC. The design for this study is a 2x2x2 ANOVA where gender (male or female), personality type (introverted or extroverted), and communication preference (CMC or FtF) are compared. The main hypothesis is that participants will report more anxiety in FtF than in CMC. Further hypotheses are that CMC will be used more by males and introverted personality types, and these groups will report less anxiety compared to FtF groups. The implications of this study will inform how communication style affects social anxiety while controlling for gender and personality type.

#### Using the First-Year Seminar to Reduce Academic Procrastination

Bianca Bramblett and Mark Connelly (Dawn Blasko),Penn State Behrend, School of Humanities and Social Sciences – Psychology

Procrastination is a problem that plagues nearly all college students; some more than others. We developed a procrastination intervention to prepare students for their college years. The college student participants completed a series of surveys before and after their first-year seminar class in which procrastination reduction techniques and tools were introduced and explored. There was a difference in response on participants’ procrastination score pretest to posttest, and we explored if certain personality characteristics had any relationship to procrastination. Those scoring high in the personality characteristic of conscientiousness were predicted to score lower on the procrastination score, but our data did not support this. Regarding time perspective, it was anticipated and supported by our data that those with a future time perspective would be more likely to have lower procrastination scores than those of another time perspective. A metacognitive awareness survey showed increased metacognitive awareness results after completion of procrastination awareness presentations from the first-year seminar class. This metacognitive awareness combined with increased procrastination reduction knowledge have potential to help the students achieve higher grades and to learn more with less stress.

#### Which Study Strategy Wins the Race? A Comparison of SOAR and SQ3R

Krista Campbell (Dharma Jairam), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Although researchers have long investigated ways to improve study habits and raise achievement, few studies compare study strategy systems with one another. No study to date has compared the popular SQ3R system with the more modern SOAR system. In addition, no study has ever tested SOAR with secondary education students. This study will directly compare SQ3R and SOAR to determine which is most effective. This study also sought to determine if either system is developmentally appropriate for high school students. Students will be assigned randomly to study a text using either SQ3R or SOAR methods in preparation for a test-assessing fact, relationship, and concept learning. Data will be analyzed with MANOVA. Effect sizes will also be reported. The more effective study strategy system will be discussed with regard to its theoretical advantages, specifically cognitive learning theory.

#### The Effects Sexual Assault Crimes Have on College Campuses

Rachelle Dagene and Erin Witmer (Ronald Kelly), Penn State Schuylkill, School of Liberal Arts – Criminal Justice

Sexual assault crimes have become a serious dilemma on college campuses. According to the literature, forcible sex offenses are defined as “any sexual act directed against another person, forcibly and/or against that person’s will; or not forcibly or against the person’s will where the victim is incapable of giving consent.” In this study there will be a questionnaire given to both criminal justice students, as well as, psychology students; to compare the awareness of sexual assault in a more mature and direct manner while dealing with Penn State students. If we directly focus on the Penn State students we can have a better understanding of their knowledge on what sexual assault is to them. This can help the study advance in a positive direction. With sexual assault offenses happening on- and off-campus more often, this paper will focus on the awareness and views of sexual assault crimes on the Penn State Schuylkill Campus. Information proposed by this paper will then be useful in creating primary and secondary preventions for past and potential victims of sexual assault crimes.

#### The Influence of Emoticons on Perception of Message and Sender in Text Messaging

Lauren DeIntinis, Faith Govan, and Brian McElveney (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

This study examined the effects that emoticons have on the perceptions of the conversational partners. Participants took part in a guided conversation via Google Gmail Chat where they discussed a current event article they read prior to taking part in the conversation. Scripts were randomly assigned to each participant. There were four conditions of emoticon use: positive, negative, mixed, or no emoticon. Following their participation in the conversation, participants rated their conversational partner on the Big 5 personality scale, and their enjoyment of the conversation. We hypothesized that the scripts using positive scripts would have a positive influence on perceived personality, and negative emoticons would have a negative effect. Data were analyzed using a series of one-way ANOVAs on emoticon condition (positive, negative, mixed, none) and perceived personality of sender based on Big 5 Personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Emotional Stability). The results show us that the chat partner was perceived as more agreeable when they used the positive (:-)) emoticon, and better liked. Data collection is ongoing to focus on gender and analysis of chat content.

#### Digital Solidarity among Penn State Harrisburg Students

Dylan Guarisco (Kenneth Cunningham and Chiara Sabina), Penn State Harrisburg,

School of Behavioral Sciences – Sociology

This thesis includes a quantitative analysis of Penn State Harrisburg student use of digital communication. The hypothesis is that the emotional significance of the digital communication is influenced by the technological medium being used and the social relationship of the communicators. Durkheim’s collective effervescence describes solidarity as forming from emotionally intense rituals; Collin’s ritual ingredients include bodily co-presence. Digital communications allows individuals to communicate despite distance, which may lead to the interpretation of a new form of solidarity: *digital solidarity*. Survey data will be statistically analyzed through a repeated-measures ANOVA test to determine the research hypothesis’ validity when compared to the results. During the discussion, the results will be interpreted in relation to the literature on ritual, solidarity, and student use of digital communication.

#### College Students’ Attitudes of Student Services

Julie Nguyen, Mark DeWolf, and Jewel Wright (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Students often encounter a great deal of stress during their college years. While many students cope successfully with the demands of college life, for some, the pressures can become overwhelming. There is a certain stigma that surrounds mental health services. Our purpose in the current research was to examine participants’ level of stigma associated with mental health before and after being exposed to successful counseling sessions. Participants were divided into four conditions: face-to-face counseling, online counseling, no counseling, and filler tasks, and were assessed on levels of stigma and empathy. Participants read a case study of a college student suffering from depression. They were then randomly assigned to read follow-ups that included the student in face-to-face, online counseling, or a no counseling control. A 2 (gender: male and female) x 2 (test: pretest and posttest) x 4 (intervention type: face-to-face counseling, online counseling, no counseling, and filler task with mazes) mixed design ANOVA was conducted. Results showed that all participants reported less stigma after exposed to the case; however, this did not vary by counseling condition. Those with more empathy were less likely to feel a stigma towards accessing mental health services.

#### Does Listening to Your Preferred Music Genre Affect Your Mood and Task Persistence?

Chelsea Perry and Michelle Godzinski (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

In general, people believe that music will enhance their performance on academic tasks. However, listening to music may also distract a person from his or her goal. Music may only be helpful when it is both familiar and enjoyable. In the current study, we examined whether listening to music would increase persistence at an impossible task (solving mazes). In a between- subject design, some participants were allowed to choose a song from four genres or were assigned a song. Music was either fast (170 beats per minute) or slow (70 beats per minute) tempo. The control condition had no music. Participants were randomly assigned to one of the five conditions. Participants were given a series of mazes to work on, one of which was impossible to complete. The dependent variable was the amount of time it took them to forfeit the task and participants’ mood state before and after the task. The results showed that the participants in the chosen genre groups persisted significantly longer than the other conditions. It was also found that participants in the chosen genre group reported being in a more positive mood post study than those participants who listened to an assigned genre or listened to no music.

### PSYCHOLOGY II: Media and Learning

#### The Effect of the Media on College Students’ Body Image

Ashley Brightwell, Paige Rogers, and Jessica Wilson (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The influence of the mass media and television has increased in recent years due to an increasing amount of people spending time indoors. Studies have not yet researched the influence that television commercials have on body image and self-esteem. In this study, participants will be randomly assigned to idealized images, average images, or control images in commercials. We hypothesize that those viewing commercials with idealized body image will have the highest body dissatisfaction. Body dissatisfaction will have a stronger effect in women than men overall. Specific body parts will predict body dissatisfaction dependent on gender. The findings of this study may help future advertisements be more positive towards all body types.

#### The Effects of Media on Attitudes and Empathy toward People Who Are Overweight, Obese, or Living with Disability

Megan Burwell, Jessica Higgins, and Jessica Storm (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Various studies have shown that both entertainment and news media have considerable influence on positive and negative stereotypes about stigmatized groups. The purpose of the current study was to explore the ways video media portrayals of people with disabilities (PWD) and overweight/obese people influence attitudes and empathy toward these stigmatized groups. We will conduct a 2 x 3 multivariate analysis of covariance, using gender and video type as our independent variables, empathy and attitudes as our dependent variables, and social dominance orientation (SDO) as a covariate. To determine whether SDO predicts level of empathy and degree of attitude change, we will conduct a multiple regression analysis; to determine the relationship between attitudes and empathy, we will also conduct a bivariate correlation and, when any interactions exist, Bonferroni post-hoc tests. We predict that both men and women higher in SDO will feel less empathy for PWD and OP and show negative attitudes toward both groups, while men and women lower in SDO will feel more empathy for PWD and OP and show more positive attitudes toward both groups.

#### Using Pro-Social and Animal Media to Induce Empathy in Aggressive and Non-Aggressive Individuals

Rebecca Cura, Alison Pope, Stephanie Povich, and Allison Radov, (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Recent research focuses largely on violent media inducing aggression. However, it does not address the impact of pro-social and animal media and their effect on empathy in aggressive individuals. The purpose of the current study is to address this by inducing empathy in both aggressive and non-aggressive individuals. It is hypothesized that pro-social media will induce more empathy in non-aggressive individuals and animal media will induce more empathy in aggressive individuals. It is also hypothesized that females overall will experience more empathy than males. This will be tested using a 2 x 2 x 3 analysis of variance (ANOVA). Implications could be used to help aggressive individuals feel more empathic emotions.

#### Music Structure and Social Movements

Dylan Guarisco (J. Scott Lewis), Penn State Harrisburg, School of Behavioral Sciences – Sociology

The sociology of music’s focus is predominantly oriented to the qualitative aspects of music and social movements, as represented by the work *Music and Social Movements* and by satellite journals, such as the *Music & Arts in Action Journal*, which focus on Punk, African American, and other social movements. This paradigm’s canon of literature focuses on the role of music as a cultural production, as an augmentation for group solidarity, as an environment for Do-It-Yourself ethic, and as a recruitment method for resource mobilization. The research hypothesis is that different social movements use different musical structures, specifically, keys and scales, to influence the success of the social movement. This research will use musical compositions from the social movement canon as data by determining the musical structure through analysis of sheet music, which provides information about musical structure such as the key, or specific notes the song has, and the scale(s) within the song.  The results will be determined through statistical analysis, which will be used to determine the validity of the research hypothesis. The discussion will consider the results and its implications through an anthropological and sociological lens.

#### Empathy in 3D: Creating New Perspectives on Peer Victimization

Carl Kallgren IV, Emily Sherry, Denise Hillen, and Paige Robertson (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Physical, relational, and cyber victimization remain a problem in schools worldwide. While recent meta-analyses suggest a decrease in peer victimization in several countries, it is still a prevalent concern that remains far from being resolved. Evidence-based prevention and intervention programs stand as a solution to this widespread issue. The quantitative and qualitative basic and applied research discussed within this study is intended to uncover new connections and to create novel solutions for peer victimization. A survey was conducted among college students in relation to their previous victimization in school, to evaluate past experiences and current adjustment. In addition, a never before utilized tool, an anaglyph 3D video, was developed with the intention of inducing empathy in those observing peer victimization: the victims, aggressors, and bystanders. This video seeks to promote positive perspective-taking amongst viewers, in order to educate on the reality of bullying and to prevent its future occurrence. Results and implications of all data are discussed, including necessary future steps towards preventing peer victimization.

#### The Effects of Unilateral Muscle Contractions on Global and Local Processing Tasks

Ashley Kerr and Kylie Peters (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

This study investigated the effects of unilateral muscle contractions (hand-squeezing) on the speed and accuracy of visual processing. Participants were randomly placed in one of three conditions: left-squeeze, right-squeeze, or no-squeeze control condition. The participants squeezed a stress ball to increase blood flow to the contralateral cerebral hemisphere which is expected to influence hemispheric activity which could affect object identification. Squeezing with the left hand should prime (activate) the right hemisphere which was expected to increase global processing. Squeezing with the right hand activates the left hemisphere which was expected to increase local processing. Following priming, participants were asked to identify Navon shapes and letters at global and local levels. Results indicated that figure identification was significantly more accurate on global trials than local trials for all three conditions. There was a significant difference in response time only for letter identification trials using a global processing strategy.

#### The Efficacy of Dextroamphetamine as a Learning Aid in Rats

Randy Kulesza (Rodney Clark), Allegheny College – Psychology

In our competitive culture, college students have been shown to use illicit substances to gain an academic edge over their peers. Obvious ethical implications and the anecdotal basis of the role of amphetamine as an effective study aid preclude an empirical investigation of the effects of these "study drugs" in human subjects. The current study seeks to ethically evaluate the role of amphetamines in the learning process by using dextroamphetamine as a stand-in for amphetamine study drugs and having rats take the role of students. Opposing theories of dextroamphetamine acting as a learning aid are tested by administering dextroamphetamine (or saline injections) either before or after each testing session. Data will consist of the number of correct lever presses made in a novel lever pressing schedule by water-deprived rats. The results of this study will provide a better understanding of study drug effects as well as empirical evidence of what effect amphetamine use and the timing of administration have on the learning process in mammals.

#### The Effects of Music on Memorization among College Students

Veronica McWilliams, Alexandrea Bobo, and Jennifer Baird (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The purpose of this study was to investigate the effect of music on memorization among college students. Previous research has provided inconclusive evidence on the effects of distractors among college students. The study consisted of participants reading from a list of nonsense words from four conditions. The conditions included silence, rock, pop, and classical music. Nonsense words, created by Ebbinghaus (1885), consisted of three-lettered words in a consonant-vowel-consonant combination used for the purpose of creating a state of disassociation. Based on past research, a main effect of condition was predicted, with both classical and pop conditions having higher performance scores than those in the rock condition. An interaction between gender and condition was also expected such that, females would have higher performance scores than males in the pop condition and males would have higher performance scores in the rock condition. Results were analyzed using analyses of variance (ANOVA). Results will be discussed as they pertain to the importance of music on studying behavior among college students.

### PSYCHOLOGY III: Relationships

#### Do Gender and Posture Affect First Impressions?

Julia Baker, Rachel Zacchero, and Ryan Ellsworth (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

This study examined the relationship between posture and first impressions. While studies have been done to test the effects that posture has on emotions, motivation, and rating personalities, the researchers were particularly interested in posture and gender of the character in terms of predicting perceptions of social or professional relationships. The participants were randomly assigned to either a social or professional group. Participants were shown in a counterbalanced order of four video clips of students walking into a room and then sitting down (male-good posture, male-bad posture, female-good posture, female-bad posture). They were then asked to rate the character based on their impressions of the students’ personalities from a social or professional perspective. The results showed a main effect of posture on all five personality traits. The results also showed a main effect of gender, with females being judged harsher than males being present in agreeableness, and interactions of posture, gender, and judgment type.

#### Humor Reduces Stress in a Challenging Task

Samantha Bates and Breanna Williams (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

This study explored how people handle stressful situations using humor as a coping mechanism. Participants completed a self-report measure on current mood and anxiety, before and after a stressful task. Participants were then assigned to either a positive humorous, positive non-humorous, or neutral video. They again rated their moods and completed a Humor Styles Questionnaire. We found that those who viewed the positive humorous video had more positive mood scores than those who viewed the neutral video. We also found that participants rated their moods as being more negative after completing the more difficult task than the least difficult task. Finally, we found that those who viewed the neutral video were more strained (had a higher anxiety score) than those who viewed the positive humorous video.

#### Cyber-Punch versus Physical Fist: Which is Worse?

Kimberly Cook, Alyson Eagle, and Jennifer Slane (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Face-to-face bullying has been researched extensively in the past. However cyberbullying, a more recent technological form of bullying, has received much less attention, yet it is growing in prevalence. The purpose of the current study was to examine the relationship between different forms of bullying (face-to-face and cyberbullying) and their associated trauma levels among older adolescents. Based on past work, it is expected that cyberbullying would be most traumatic in middle school and high school while face-to-face bullying would be more traumatic among college students. Study results will be discussed using both an at-risk model as well as a contextual model focusing on protective factors as they relate to optimizing adolescent development.

#### The Effects of Parental Attachment and Conflict on College Students’ Relationship Quality

Taylor Hennon, Emily Sherry, and Jessica Margosian (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Research has shown that marital conflict and attachment are correlated and that attachment is related to future relationship quality. Given the research relating to marital conflict and attachment, it is valuable to further examine coping mechanisms and its influence on relationship quality. The purpose of this study was to investigate whether marital conflict affects attachment styles, coping mechanisms, and relationship quality. The design is correlational in which we are analyzing our data using a multiple regression. This study will assess whether the degree of marital conflict predicts attachment style, if attachment style predicts relationship quality, and whether strong parental attachment predicts stronger relationship quality and coping strategies. Expected results will show that marital conflict will affect children's attachment, which can then potentially affect their overall future relationship quality (i.e., friend or partner) and how they cope with stressful situations as an adult.

#### Can Priming the Brain Influence Facial Recognition? Kristan Russell and Erin McCreary (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The current study examined if it is possible to improve or impair facial recognition accuracy by priming the brain’s lateralization. The first hypothesis was that performing a global lateralization task would improve facial recognition accuracy. The second hypothesis was that performing a local lateralization task would impair facial recognition accuracy. Last, it was hypothesized that the confidence of the participant would also have an influence on accuracy. In the study, participants first viewed a photo array, and then were randomly assigned to complete either the Navon Letters task, or the Hierarchical Figures Task. Research has validated these tasks as being useful to prime the brain to either a global or local lateralization. Participants were then asked to view a set of randomly presented photos and decide if they were present in the original set. They also rated their confidence in their decision. The over-arching goal of this study was to understand the effects of brain lateralization shifts on the ability to recognize faces. The results showed that local processing significantly impaired the ability to recognize a face compared to control and global conditions. However, priming the brain with global lateralization was not found to significantly enhance recognition.

#### How We See Ourselves in Relationships

Jessica Salley, Carl Kallgren IV, and Denise Hillen (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

While a positive *correlation* between self-esteem and relationship satisfaction has been established, there is no known research evaluating the causality of these two characteristics. Understanding if higher self-esteem could cause higher satisfaction in romantic relationships could have myriad applications in relationship counseling and future research. This link can be demonstrated through the use of priming. Participants in relationships will be primed for either high or neutral (no change) self-esteem by subliminal evaluative conditioning. Participants will have their implicit/explicit self-esteem and relationship satisfaction measured using the Self-Esteem IAT, Rosenberg Scale, and the Relationship Assessment Scale. The results will be analyzed with a 2 x 2 ANOVA. It is expected that participants primed for high self-esteem will report higher relationship satisfaction than those primed for no change in self-esteem. Based on past work, gender differences in self-esteem levels and relationship satisfaction are also expected. Implications for relationship counseling and research are discussed.

#### The Relationship of Family and Peer Connectedness and Spirituality with College Adjustment

Kyle Thiel (Victoria Kazmerski, Carol Wilson, and Charisse Nixon) Penn State Behrend, School of Humanities and Social Sciences – Psychology

Annually, a multitude of late adolescents begin the milestone of attending college. Academia and the college experience can be rigorous, and it is important that the student maintains connections or establishes new ones to minimize the stresses of college. Students may maintain a strong connection to their parents, turn to peer relationships to cope with college demands, or may seek God or another deity to bear the burden. This study examined which factor, family or peer connectedness or spirituality helps lead to the most positive college adjustment. Based on previous research, I hypothesized that undergraduates who experience the most positive college adjustment will be those who establish connectedness with their college peers. To measure adolescent connectedness to family and peers the Developmental Assets Profile (DAP) will be used. Spiritual connectedness was measured by subscales of the Spiritual Attitude Inventory (SAI). College adjustment was determined by employing the Student Adjustment to College Questionnaire (SACQ). Results of this study can be used to raise awareness among undergraduates of how important connectedness is in establishing positive adjustment to college.

#### Relationship Status as a Mediator for Sarcastic Interpretation

Danielle Williams and Joslyn Mesing (Dawn Blasko), Penn State Behrend, School of Humanitites and Social Sciences – Psychology

Sarcasm is an indirect form of speech intentionally used to convey a criticism. However, sarcasm is very ambiguous and therefore leaves the decoder of the conversation responsible to interpret the intent behind it. Previous research has discovered that sarcasm is highly situational and can be used in several different forms. The current study investigated the role of relationship status on the perception of sarcasm. Participants were asked to read scenarios that involved a conversation between two people in a romantic relationship, friend relationship, or stranger relationship. Each scenario ended with a comment that could be understood sarcastically or literally, e.g., "You are a great driver.” Reading times were recorded. Participants were asked to rate the scenarios on their degree of humor, sarcasm, insult, anger, and sadness using a Likert scale that ranged from one to seven. Reading times showed that sarcastic comments took longer to process than literal comments, but this effect was strongest in the stranger condition. For all three relationship types, sarcastic comments were rated more insulting and more humorous.

## Poster Presentations

### BIOCHEMISTRY AND NEUROBIOLOGY

#### Glow with the Flow: Monitoring Auxin Response Patterns through Luciferase Activity

Dana D’Amico1 and Catherine Wargo2 (Catharina Coenen1), 1Allegheny College and 2Penn State Hershey – Biology

Active auxin concentrations in plant tissues are controlled through polar auxin transport (PAT). To allow time-resolved monitoring of auxin activity, we recorded luminescence patterns in tobacco (*Nicotiana plumbaginafolia*) seedlings expressing a firefly luciferase reporter gene under the control of the auxin-inducible *GH3*promoter. A CCD camera system permitted monitoring of luciferase activity at high temporal and spatial resolution. The system detected luminescence in response to the weak auxin indole-3-methanesulfonic acid. Polar auxin application to apical or basal ends of excised, auxin-depleted hypocotyl segments and co-application of the polar auxin transport inhibitor NPA (N-1-naphthylphthalamic acid) induced different patterns of luciferase activity. In intact seedlings, de-etiolation in response to 24 hours of light exposure shifted regions of high auxin activity from hypocotyls to roots. The polar auxin transport inhibitors NPA, TIBA, and 1-naphthoxyacetic acid inhibited decay of luminescence in both light-exposed and etiolated seedlings, suggesting that PAT removes auxin from responding cells. Our data demonstrate that a commonly available camera system permits time-resolved imaging of auxin activity at the seedling and organ level in plants expressing a luciferase reporter under the control of a natural auxin-responsive promoter.

#### The Effect of DMN on Osmotic Response Regulation in Saccharomyces cerevisiae

Bradley Drumheller and Rajeev Varkey (Michael Campbell) Penn State Behrend, School of Science – Biology

DMN (1, 4-dimethyl naphthalene) has been shown to induce Mitogen-activated protein kinases (MPKs) and osmoregulatory proteins in potatoes to inhibit sprouting. How DMN regulates osmotic potential and sprouting in potatoes is unknown, but understanding this process has potential for the development of additional growth regulators to increase the shelf-life of agricultural products. The HOG1 gene in baker’s yeast (*Saccharomyces cerevisiae*)*,* an MPK homolog, regulates growth by signal transduction and effects the gene SIC1 (an inhibitor of B-type cyclins), arresting cells in the G1/S-phase of the cell cycle. We hypothesize that DMN inhibits MPK expression in plants and would inhibit the MPK homolog HOG1 in yeast. Yeast growth was reduced with 100 µM DMN application, but eventually reached the same steady state as the control. This suggests DMN slows the replicative process or acquired resistance to DMN. The regulation of this pathway in yeast will be studied using QT-PCR to test DMN effects on expression levels of HOG1 and SIC1 RNA. A similar response to DMN in yeast and potatoes would demonstrate the conservation of a major signaling pathway between fungi and plants.

#### The Effect of Essential Oils on the Growth of Escherichia coli and Staphylococcus aureus

Tyler Duma (Paul Barney), Penn State Behrend, School of Science – Biology

Essential oils from plants can harbor useful biomedical properties tested through the oil’s growth inhibition abilities against two strains of bacteria, *Escherichia coli* and *Staphylococcus aureus*. These bacteria were chosen for the study because of their prevalence in nature and cell permeability properties of Gram-negative (*E. coli*) and Gram-positive (*S. aureus*). Oil extractions of local plants were performed in a basic steam distillation apparatus and the nonnative oils were purchased. The disk diffusion assay of all the essential oils showed the native rose and red maple oils and the commercial peppermint and clove bud oil to have the strongest effect of growth inhibition. The peppermint had the most significant results of all the oils tested so far, greatly inhibiting both *S. aureus* and *E. coli* compared to the other oils. Isolation of these oils and pharmaceutical production could possibly provide a natural remedy to infection and disease. Further work is necessary to determine an optimal extraction technique of essential oils and testing of their biochemical properties in the growth inhibition of bacteria.

#### The Sprout Inhibitor DMN Alters the Expression of the Cell Cycle Genes KRP1 and CYCA3

Lindsay Hilldorfer and Leah Wolfe (Michael Campbell), Penn State Behrend, School of Science – Biology

The potato is the world’s largest non-grain agricultural crop and a dietary staple in many cultures. When sprouting, the potato produces the toxin solanine and begins to sweeten, a process that makes the potato undesirable for consumer use. Sprout inhibitors such as 1,4-dimethylnapthalene (DMN) are used to treat stored and shipped potatoes. In order to ascertain the mechanisms in which DMN prevents sprouting microarray analysis was conducted yielding transcriptional profiles for potatoes treated with DMN. The main focus of this analysis was on genes known to be involved with cell cycle regulation. QT-PCR was used to confirm the microarray results. Transcripts for the cell cycle inhibitor KRP1 were increased by DMN exposure while transcripts for the cell cycle inducer CYCA3 were decreased. We hypothesize that the increases and decreases in transcripts will also be observed in the quantity of KRP1 and CYCA3 proteins being produced within the potato. Currently antibodies have been made for KRP1 and CYCA3 proteins and experiments are being conducted to determine whether the production of KRP1 and CYCA3 proteins is equivalent to the observed changes in gene expression.

#### Age-Related Changes of CO2-Sensitive Olfactory Neurons in Mice

Annie Homan and Hudson Stoner (E. Lee Coates), Allegheny College – Neuroscience

In rodents, CO2 is detected by a small subset of olfactory sensory neurons. While the function of these receptors is not well known, it has been suggested that the CO2-sensitive olfactory receptors play a role in food location, social interactions, and/or the control of breathing. Previous research has demonstrated that CO2 detection occurs in olfactory sensory neurons that express Carbonic Anhydrase II (CAII), an enzyme that catalyzes the reversible hydration of CO2 to bicarbonate and a proton. The objective of our study was to determine the age-related changes in the density and distribution of CAII in wild-type mice. Nasal cavities from mice aged 4, 8, 16, and 32 days were stained for CAII expression using immunohistochemistry. Preliminary results demonstrated that the density of CAII positive neurons increases with age in the caudal and dorsal regions of the nasal cavity, with little to no CAII expression in the rostral or ventral regions. In addition, an increase in CAII positive neuron density was seen in eight-day old mice, correlating with known changes in CO2 sensitivity during early development in rodents. We hope to associate such changes in CO2 sensitivity with the critical period of human Sudden Infant Death Syndrome (SIDS).

#### Analysis of the Proposed Immunostimulatory Effects of Immune Defense™

Luke King (Susan Sapone and Michael Ganger), Gannon University, Morosky College of Health Professions and Sciences – Biology/Pre-Medicine

Under the Dietary Supplement Health and Education Act of 1994, manufacturers of dietary supplements are not mandated to receive FDA registration or approval of their products. Marketed by General Nutrition Corporation, Immune Defense™ is a dietary supplement advertised to enhance the immune response; however the cellular mechanism by which it elicits this proposed action is not known. In this study, Immune Defense™’s ability to elicit cytokine production in spleen macrophages was examined. Macrophages were selected for research due to their key role in the human body’s defense, triggering both innate and adaptive immunity. CRL 9850 macrophages, cultured from the American Type Culture Collection cell line, were exposed to PBS (negative control), LPS (positive control), and varying concentrations of Immune Defense™ stock solution. After a 24-hour incubation at 37**°**C and 5% CO2, Quantikine™ ELISA techniques were utilized to determine release of significant amounts of IL 6 and TNFα. Detection of significant amounts of either cytokine would provide insight into Immune Defense™’s ability to activate the macrophages to stimulate an immune response. Statistical analysis of the ELISA results determined that Immune Defense™, at any concentration, had no impact on activating macrophages to produce IL 6. The evaluation of the TNFdata was inconclusive due to technical errors.

#### Isolation of DNA from Fresh, Flash Frozen, and Herbarium Species for Quantitative and Qualitative Identification

Taylor Kline (MichaelCampbell), Penn State Behrend, School of Science – Biology

Genomic DNA from leaf tissue was isolated using a PowerPlant DNA isolation kit on fresh, flash frozen (utilizing liquid nitrogen), and dried samples. Products were quantified using spectrophotometry for record of the quality and quantity of isolated double strained DNA. Plant samples represented eight orders: two were a nonflowering vascular plant (Pinales), seven were eudicots, and the remaining sample was assigned to the core eudicots. Pure DNA preparations should yield an optical density of 260/280 between 1.7 and 1.9. Low OD260/280 indicates protein contamination; whereas high OD260/280 could indicate possible RNA or residual organic contamination. Absorption at 230 nm is caused by contamination by phenolate ion, thiocyanates, and other similar organic compounds. For pure DNA samples, the OD260/230 should fall around 1.8. After isolation, all samples were quantified based on the OD260, however some samples showed 260/280 values different from 1.7 to 1.9, representing possible contamination. The fresh samples yielded the highest concentration of DNA, but exhibited the highest level of protein and secondary-product contamination. The best results for OD260/280 and OD 260/230 obtained from dry samples indicated that preserved specimens yield higher purity but low concentrations of DNA.

#### Effects of Phosphate and Auxin on the Interactions between Pseudomonas fluorescens and Tomato (Solanum lycopersicum L.)

Gabrielle Lamoreaux (Catharina Coenen), Allegheny College – Biology

Rhizobacteria can benefit plants through protection from disease and promoting growth. Many plant growth promoting bacteria are able to solubilize phosphate and produce the plant growth hormone auxin, although the roles of bacterial auxin production and phosphate solubilization in plant growth promotion are currently unclear. I examined the relationship between auxin and phosphate in interactions between biocontrol strains of *Pseudomonas fluorescens* and tomato seedlings through (1) surveying *P. fluorescens* strains for ability to solubilize phosphate while growing on different carbon sources, (2) assessing the influence of plant auxin in phosphate sensitivity on phosphate starvation response of tomato roots, and (3) analyzing the effects of several *P. fluorescens* strains on root morphology and growth of wild-type and auxin resistant tomato seedlings. The ability of *P. fluorescens* strains to solubilize phosphate was correlated to genotype as defined by ADRA analysis of the *phlD* gene and was most pronounced in the presence of glucose, which is exuded by tomato roots. Auxin sensitivity effects on phosphate starvation responses could not be assessed, because tomato seedlings failed to alter root architecture in response to phosphate in our *in vitro* culture system. Bacterial effects on root morphology are currently under investigation.

#### Isolation of the Frost Gene in Eurosta solidaginis

Darnell Lewis (Sara Turner), Mercyhurst University – Biology

The goldenrod gall fly (*Eurosta solidaginis*) induces galls in its host plant, goldenrods (*Solidago sp.).* This species spends winter in its third-instar larvae stage, which are freeze and dessication tolerant. The *Frost* gene has been implicated in cold exposure and desiccation stress in *Drosophila melanogaster.* Here we attempt to isolate the *Frost* gene in the goldenrod gall fly. The isolation of the *Frost* gene in *E. solidaginis* may provide insight into the gall fly’s tolerance of environmental stress.

#### The Enantiomeric Effects of κ-opioid Agonist U-50488

Amon Manekul (Rodney Clark), Allegheny College – Psychology

A recent study revealed the potency of U-50488, a κ-opioid agonist as an up-regulating agent of the immune system. The purpose of the current research was to examine the differential effects the enantiomers of U-50488. Testing was done using six Sprague-Dawley rats on a Multiple, Fixed Ratio 10, and Fixed Interval 90” schedule of water presentation. Sessions lasted for 25 minutes. Each enantiomer and the racemate were administered intraperitoneally in volumes of 1 mL/kg body weightand the dose varied from 0.3 mg/kg to 3.0 mg/kg. The results of the experiment show that (+) U-50488 is responsible for the longevity of response suppression whereas (-) U-50488 is responsible for the magnitude of response suppression.

#### The Effect of Salicylic Acid on the Expression of FT in Arabidopsis thaliana

James McGivern (Michael Ganger and Sarah Ewing), Gannon University, Morosky College of Health Professions and Sciences – Biology

*Arabidopsis thaliana* is a model system for understanding the physiology of flowering plants. Flowering in *A. thaliana* may be initiated by changes in day length, resource state, temperature, and stress. There are many unique and shared genes involved in these flowering pathways, and these pathways are often induced by common signaling molecules. *FT* is a gene essential to many of these flowering pathways. Salicylic acid (SA) is known to be produced in plants under stress and has been qualitatively shown to cause premature flowering in *A. thaliana*. We hypothesize that SA application will induce *FT* expression. A spray containing 100 μM SA was applied foliarly to *A. thaliana* each day for four days, while control individuals were sprayed with water. RNA was extracted from individuals prior to spraying and 24, 48, 72, and 96 hours following SA application. Expression of *FT* was quantified relative to *Actin* expression using real-time RT-PCR. Expression of *NPR1*, a SA-induced gene, was also quantified in order to confirm the actions of SA. Our results will help clarify the mode of action of SA in the initiation of flowering in *A. thaliana*.

#### Preliminary Studies on the Effects of Dopamine on Neuronal Cell Viability

Monica Scarsella1 and Elizabeth Paine2 (Thomas Corso2 and Sarah Ewing1), 1Gannon University, Morosky College of Health Professions and Sciences and 2Lake Erie College of Osteopathic Medicine – Biology

Parkinson’s disease is pathologically characterized by death of dopamine-releasing neurons in the substantia nigra region of the brain. Decreases in dopamine are largely responsible for physiological impairment of motor skills seen in patients. Metabolism of dopamine involves breakdown by monoamine oxidase (MAO) into a toxic byproduct, DOPAL, and can result in oxidative stress. The objective of this study was to measure neuronal cell viability in response to increasing amounts of dopamine over time. Two neuronal cell lines commonly used to study dopamine metabolism, PC12 and SH-SY5Y, were used. PC12 cells were treated with nerve growth factor (NGF) to induce differentiation for 14-16 days prior to dopamine treatment, whereas SH-SY5Y cells do not require pre-treatment with NGF. Cells were treated with dopamine at various concentrations (0 – 1 mM) and cell viability was determined after 1, 5, and 24 hours. Cell viability was assessed using trypan blue exclusion or MTT assays. SH-SY5Y cells displayed a 15-20% decrease in viability at high doses of dopamine after 24 hours, whereas preliminary results in PC12 cells suggest a larger decline in viability. These results suggest increased dopamine metabolism in neuronal cells can induce cell toxicity and future studies will explore the mechanism of this toxicity.

#### Identification of Sequences Important for UBX Regulation of CG13222

William Sharpnack (Bradley Hersh), Allegheny College – Biology

Hox genes are a conserved gene family encoding transcription factors that control development along the anterior-posterior axis in bilaterally symmetrical animals through regulation of cellular processes. Ultrabithorax (UBX) is a Hox gene responsible for the proper development of the third thoracic segment in the fruit fly, *Drosophila melanogaster,* and other insect species. UBX binds to the nucleotide sequence ATTA in *in vitro* studies. However, because this sequence occurs very frequently in the *Drosophila* genome, additional sequence information is needed for UBX to distinguish merely potential target sites from actual target sites. The *CG13222* gene is expressed at the posterior edge of the haltere (hind wing), and is activated by UBX binding to two ATTA sequences in a cis-regulatory element (CRE) upstream of the gene. I hypothesized that conserved DNA sequences surrounding one of the ATTA sites in the CRE contribute to UBX binding specificity. To test this hypothesis, I have mutated the sequence of the CRE downstream of the ATTA site and generated transgenic flies carrying these mutated sequences hooked to a green fluorescent protein (GFP) reporter. We will present our observations of GFP expression to determine which specific nucleotides are vital for CRE function in the haltere.

### BIOLOGY AND ECOLOGY

#### Tracking the Bacterial Diversity on Individual House Wren Eggs

Ara Agato, Dixie Courtney, Holly Pier, and Dan Hoang (Beth Potter and Margaret Voss), Penn State Behrend, School of Science – Biology

Avian nests are made from various materials such as dirt, fur, twigs, and plant byproducts and are used for laying, hatching, and growing avian offspring. The environment created within a nest is ideal for microbial growth on eggs and within nest materials. Previous studies have shown that specific bacterial species do accumulate throughout the incubation period and could be potentially harmful and affect hatching success. The current study aims to show that hatching success of house wren (*Troglodytes aedon*) eggs may be correlated to a specific bacterial species by tracking each individual egg throughout early, middle, and late incubation periods. This is a novel experiment and has the potential to provide significant insight into how the microbial populations change in number and diversity on the surface of the eggshells throughout the incubation period.

#### Seasonal Water Quality Analysis of Fourmile Creek, Erie, Pennsylvania

Brianne Campbell and Emily Hyde (Anthony Foyle and Beth Potter), Penn State Behrend, School of Science – Geoscience and Biology

Poor water quality can have a negative impact on aquatic organisms and on human use of a water resource. Stream contamination tends to be greater in bodies of water that flow through or near urbanized areas, and can result in increased growth of bacteria. In northwestern Pennsylvania, poor stream-water quality can be reflected in changes to salinity, turbidity, and pH. Urban-related stream pollution can be expected to vary seasonally. The purpose of this research project was to identify the stream bacteria and the pH, turbidity, and salinity characteristics of Fourmile Creek. Weekly samples were collected and analyzed from four established sites along the creek during the spring through fall seasons of 2011. Salinity and stream temperature were monitored using a YSI Model 30 System. Stream velocity was determined using a Global Flow Probe. Turbidity was calculated using a Total Dissolved Solids method. Bacterial colonies were cultivated to determine species diversity and total number of bacteria. Stream pH was determined using an electrode device. Data show that the pH of the stream ranged from 6 to 9 and that the salinity ranged from 0.1 ppt to 0.3 ppt. Bacterial species varied between drought and flood conditions. Stream hydrodynamics monitoring revealed that the average flow velocity was maximized during flood periods at 125 cm/s and was significantly lower during drought periods at 5.1 cm/s.

#### Influence of Intermittent Incubation on the Invasion of Eggshells by Pseudomonas fluorescens

Brian Carlson (Beth Potter and Margaret Voss), Penn State Behrend, School of Science – Biology

*Pseudomonas fluorescens (*PF*)* has been shown to be selected for on the egg shells of house wrens. PF on eggshells has shown to be beneficial to eggs by acting as an antifungal/antimicrobial and harmful by causing egg spoilage. This study will determine if the intermittent incubation cycle of house wrens influences the PF community on egg shells and allows the bacteria to penetrate the eggshell. One incubation (A), containing 96 eggs for replication, was incubated at average temperatures of 23°C, 28°C, and 33°C for four days each. These temperatures fluctuated above and below the average temperature, stimulating natural intermittent incubation of house wrens. After four days at each temperature, eggs were sampled and external/internal PF concentrations were determined. Three other incubators, containing 96 eggs, were incubated at single temperatures (23°C, 28°C, or 33°C) for 12 days and processed the same. It is anticipated that greater PF concentrations, both externally and internally, would be seen on eggs in the incubators without temperature variation compared to the intermittent incubation.

#### Calcite Precipitation by Aquatic Plants as a Feedback Mechanism in Lake Eutrophication

Michele Cooney (Milt Ostrofsky), Allegheny College – Geology

Previous research has shown that phosphorus (P) is a limiting nutrient in freshwater bodies. Consequently, mechanisms and processes that affect concentrations of P are of great interest to limnologists. P dissolved in lake water readily complexes with calcite and is removed from the water column through sedimentation. In hard-water lakes, appreciable amounts of calcite are formed as a result of photosynthetic removal of CO2 by algae and submersed vascular plants. The purpose of this research was to explore the role of aquatic plants in removing phosphorus in Lake Pleasant, Erie County, Pennsylvania. Five species of aquatic plants were collected and encrusting calcite was measured using acid titration and atomic absorption spectroscopy. Results showed that the five species vary in calcite precipitation, measured as mg CaCO3/g plant tissue, with averages ranging from *Megaladonta beckii* precipitating 85.1 mg CaCO3/gplant tissue to *Potomageton amplifolius* precipitating 1,014.1 mg CaCO3/g plant tissue. Analysis of crude calcite scrapings from leaves of *Potamogeton amplifolius* indicated that each g of crude calcite removes an average of 121.7 µg of P. Using the average calcite precipitation of the five plant species and plant biomass data from a previous study, an estimate can be made for kg of P precipitated annually from Lake Pleasant’s water column.

#### Are Chipmunks Nosy Neighbors: Eavesdropping in Tamias striatus

Cameron Eddy (Scott Wissinger), Allegheny College – Biology

Recent studies have shown that some animals eavesdrop on heterospecific alarm calls and use the information to avoid predation. Despite the evidence for eavesdropping, we do not understand which heterospecifics are preferred by nonsocial animals. The purpose of this study was to determine the degree to which a nonsocial mammal, *Tamias striatus*, eavesdrops on the alarm calls of two different heterospecific animals, red squirrel (*Tamiasciurus hudsonicus*) and blue jay (*Cyanocitta cristata*), in a forest near Meadville, Pennsylvania. I exposed chipmunks to alarm calls and measured vigilance and feeding to test the hypotheses that 1) chipmunks eavesdrop on the alarm calls of other organisms in the forest, and 2) chipmunks are more responsive to the alarm calls of red squirrels than those of blue jays. I found that 1) chipmunks eavesdrop on the alarm calls of both red squirrels and blue jays, and 2) chipmunks are more vigilant, feed less, and flee more in response to red squirrels than to blue jays. One explanation for this difference is that chipmunks may be more likely to share predators with red squirrels than blue jays, and therefore benefit most from eavesdropping on red squirrel alarm calls.

#### Assessing Compost Bacterial Populations In Conjunction With Seasonal Change

Nathan Elbert and Josh Maccready (Beth Potter and Ann Quinn), Penn State Behrend, School of Science – Biology

Composting is a relatively easy way to divert man-made waste from landfills and reuse organic material because it ultimately relies on microbial processes and requires little human interference Though composting has been used to produce rich soil and reduce waste for many years, the identity and diversity of the bacterial microorganisms during the composting process is not well known. Starting January 2011, collections of the Greener Behrend compost pile, which was mainly comprised of food residuals mixed with leaves, tree limbs, and other landscape materials, were collected to determine the identity of the involved bacteria found in the composting process and their changes in diversity and population size over the course of several months. Identity was determined by isolating DNA from colonies grown on nutrient agar plates and amplifying the 16S rRNA gene using polymerase chain reaction (PCR). The number and identity of the isolated bacteria were correlated with several abiotic factors such as changes in compost temperature, compost composition, pH, CO2 and NH3 release, and other factors. The results the study will lead to a better understanding of both the biodiversity and abundance of microorganisms within compost.

#### Morphometric Predictors of Reproductive Success in the Invasive Cladoceran Bythotrephes longimanus

Sarah Glancy and Matt Legerski (Michael Ganger and Gregory Andraso), Gannon University, Morosky College of Health Professions and Sciences – Biology

The spiny water flea (*Bythotrephes longimanus*) is a non-native, predatory cladoceran identified by its long caudal spine with 1-4 pairs of lateral barbs. The addition of a new pair of barbs with each molt allows for individuals to be aged. The number of parthenogenically produced young can be easily determined since the young are held within a brood sac before being born live. The objective of this preliminary study was to determine if any of seven measurements of female size or age predicts the number of parthenogenically produced young in *B. longimanus*. *B. longimanus* were collected from an offshore site in Lake Erie near the town of North East, Pennsylvania. A stepwise regression was used to determine whether any of the seven size metrics or age predicted female reproductive success. Females with three barbs produced significantly more offspring than individuals with either one or two barbs and the length of the caudal spine between the first and second pair of barbs predicted the number of offspring in females with three pairs of barbs. Future work will compare reproduction in *B. longimanus* from the main body of Lake Erie and Presque Isle Bay to investigate plasticity in reproductive investment between sites.

#### Determining the Antimicrobial Effectiveness of Agion Silver Technology on Door Handles within the Penn State Erie Campus

Aubrey Hetzler, Vishall Kaistha, Marcelo Lob, and Emily Schmitt (Beth Potter), Penn State Behrend, School of Science – Biology

Agion antimicrobial solutions are relatively new, effective, and natural ways to control microbial growth. Through recent technological developments, scientists have been able to incorporate silver ions in a zeolite carrier. Unique to this material is the ability to provide a three dimensional mechanism to release silver ions. These ions are generally activated by sodium ions and moisture present on skin cells, allowing the silver ions to only be released upon contact. The antimicrobial effectiveness has been studied in a controlled laboratory setting, but the novelty of our study is that effectiveness will be viewed from a ‘real-life’ perspective. In the study, 50 door handles (25 silver-coated/25 control) within four different buildings located on the Penn State Erie campus were processed over a six-week period in both the fall and spring semesters. Bacterial samples were taken to determine the total bacterial counts and handles were also analyzed to determine the amount of silver released. Initial analysis of the data suggests that the silver-coated doors consistently had lower counts than controls but bacterial amounts varied considerably from week to week in the experimental and control groups. Overall, it is the anticipation that this study will provide a deeper insight into the broad-scale use of Agion silver technology for bacterial control.

#### Preliminary Observations of Sand Dune-Obligate Spider Geolycosa wright on Presque Isle State Park

Adam Hoke and Renee Foradori (Matthew Foradori), Edinboro University – Biology

*Geolycosa wrighti* is a sand dune-obligate spider currently inhabiting Presque Isle State Park. Although most wolf spiders are ambulatory in nature, *G. wrighti* spends most of its life in a burrow excavated from a sand substrate and reinforced with silk. *G. wrighti* is found sporadically in its range, exclusively in sandy environments along the Great Lakes from the eastern end of Lake Erie near Buffalo to Chicago, south to the middle of Illinois. *G. wrighti* is a rare spider species; several conservationists have suggested that it should be categorized as threatened or even endangered. Learning about *G. wrighti* on Presque Isle State Park could eventually lead to long-term conservation strategies to protect these rare spiders. Preliminary observations on behavior and density of *G. wright* were performed weekly on an established plot from May to October 2011. These observations included visible activity around each individual burrow, feeding behavior, and rearing of young. The data collected will help us understand more about these secretive spiders, including relocation tendencies and frequency.

#### Formation of Biofilms in Wild Type Haemophilus ducreyi and the flp and ftpA Mutants

Erin Nawrocki (Tricia Humphreys), Allegheny College – Microbiology

Biofilms, which are populations of surface-attached microorganisms comprising one or more species, are extremely common in nature, with an estimated 60% of bacterial infections involving growth in biofilms. Biofilms differ from planktonic cells in their gene expression, cellular physiology, and increased resistance to antibiotics, necessitating a greater understanding of the genes required for biofilm formation. *Haemophilus ducreyi* is a fastidious gram-negative bacillus and is the etiological agent of chancroid, a sexually transmitted genital ulcer disease. Although biofilm formation has never been described in the species, *H. ducreyi* is known to form microcolonies, which are precursors in the formation of biofilms. This study demonstrates that increasing the concentration of fetal bovine serum in liquid cultures, which mimics natural infection and causes the upregulation of certain genes in *H. ducreyi*, increases the degree to which the bacteria adhere to a plastic surface. An isogenic *H. ducreyi flp* mutant, which is deficient in the formation of microcolonies, is unable to adhere to the surface even in the presence of 90% serum. An *ftpA* mutant, which lacks functional pili, appears to attach to the surface but may not form higher structures. Further research will use microscopy to assess whether this surface attachment is truly representative of biofilm formation.

#### The Impact of the Microcosm on the Survivability of Shiga Toxin Producing E. coli (STEC) in Recreational Freshwater

Hannah Opalko, Drew Spacht, Eric Clark, and Kyle Lindsay (Steve Mauro), Mercyhurst University, Zurn School of Science – Biology

Shiga toxin expressing *E. coli* (STEC) is a pathogenic bacterium that is the causative agent of many cases of human illness in recreational waters. Several labs, including our own, have characterized the distribution and abundance of STEC in the Great Lakes. This work has shown that the presence of STEC in recreational freshwater is not related to fecal indicators that are traditionally used to assess water quality. In this study, we examined the role that total microbe content has on the survival of STEC that was doped into beach water. Our initial findings indicate that removal of all microbes from a water sample dramatically increased STEC survivability in the water to which it has been added. This increased survivability was countered by adding bacterial competitors or protists that graze on STEC. Identification and characterization of how specific microbes alter STEC persistence in recreational freshwater will be presented.

#### Methyl Anthranilate Content in White Vitis labrusca Grapevine Hybrids

Alicia Quick (Christopher Gee), Penn State Behrend, School of Science – Biology

The purpose of this project was to quantify the grape flavor compound methyl anthranilate (MA) in post-veraison juice from two *Vitis labrusca* hybrid grapevine, Glenfeld (USDA PI: 597203) and Damoth (USDA PI: 588528). Methyl anthranilate is the aromatic compound responsible for the grape flavor and smell of Concord grape juice. Samples were obtained at one-week intervals between veraison and harvest. Reverse phase HPLC-UV using the method of standard addition and a 70% acetonitrile mobile phase was used to determine the concentration of methyl anthranilate in the samples. Data will be presented on the content of MA in each genotype time point sample, compared to known values for typical Concord juice. These results, along with other metrics of grape juice quality, will be used to determine the likely success of these two genotypes as white Labrusca grape juice replacements of Niagara juice in the Lake Erie grape belt.

#### The Characteristics of Field Resistance of Agrobacterium vitis in Concord Grapevine

Eric Schultz (Christopher Gee), Penn State Behrend, School of Science – Biology

*Agrobacterium vitis*, causal agent of crown gall, poses a significant risk to grape production in cold weather climates. This bacterial pathogen can transform plants, directing the growth of tumors. The formation of these tumors can ultimately lead to death of the plant. Concord grapevine is the most widely planted genotype in the Lake Erie Grape Belt, and is apparently resistant to crown gall. We set out to assess if populations of *A. vitis* can be found *in planta*, and if so, if the isolates are pathogenic. Bleeding sap samples were collected from actively growing suckers, and soil samples were also taken from rows at the base of vines in a vineyard at the Penn State University North East Research Lab. Bacteria were isolated from each sample using semi-selective media. DNA was collected from 10 individual isolates from each sample by boiling in 1% Triton X-100. Positive identification was made using primers for the *pehA* gene. Of all isolates collected, most were not *Agrobacterium*, suggesting small populations in the plant. Data will be presented on the pathogenic characterization of the isolated population. It is anticipated these studies will lead to a better understanding of this uncharacterized and potentially valuable form of host resistance.

#### The Contribution of Bacterial Pollution by Algal Mats in Recreational Freshwater

Drew Spacht, Prabhat Kc, and Irfan Haider (Steve Mauro), Mercyhurst University, Zurn School of Science – Biology

Fecal indicator bacteria (FIB) are commonly used indicators of recreational freshwater quality. There are many potential sources of freshwater contamination by FIB. One such candidate is algal mats, which have the potential to harbor high concentrations of these, and other, microbes. To understand better the extent to which algal mats contribute to bacterial pollution in recreational freshwater, we utilized plating, quantitative PCR, and a metagenomics approach to measure specific and total bacterial populations on algal mats and the recreational freshwater in which it resides. While we found high levels of FIB in algal mats, we found no correlation between the concentration of these microbes in the algae and nearby water. Moreover, population-based approaches indicated a different composition of bacteria compared to the water it was obtained from. Taken together, these results indicate that it is unlikely that algal mats are serving as a direct source of bacterial pollution to the recreational water analyzed in this study.

### CHEMISTRY

#### Divergent Reactivity Towards Nucleophiles in 1H-1-(1-Alkynyl)-5-methyl-1,2,3-benziodoxathiole 3,3-Dioxides Rachael Carmichael (Michael Justik), Penn State Behrend, School of Science – Chemistry

In previous investigations 'soft' nucleophiles in the form of arene oxides have been observed to attack alkynyliodinium salts in a Michael-type reaction to generate alkylidinecarbene intermediates which primarily undergo a 1,5-intramolecular C-H insertion reaction to afford benzofurans. In our investigations we have observed that 1*H*-1-(1-alkynyl)-5-methyl-1,2,3-benziodoxathiole 3,3-dioxides bearing aliphatic alkynyl groups instead produce products of aliphatic 1,5-intramolecular C-H insertion or products derived from alkenyliodonium salts upon treatment with arene oxides.

#### 1,2-Benzisoxazole-2-oxides, a New Class of UV-Absorbing Compounds

Jerry Casbohm (Martin Kociolek), Penn State Behrend, School of Science – Chemistry

Ultraviolet-absorbing compounds find uses in a variety of products that are subject to sunlight and artificial sources of UV light including plastics, paints, cosmetics, sunscreens and fabrics. With such a wide range of applications the search for new classes of UV absorbers with specific physical and spectroscopic properties is of interest. Common classes of UV-absorbing compounds include aromatic ketones, such as hydroxyacetophenone and hydroxybenzophenone derivatives, as well as heterocycles including benzotriazoles and hydroxyphenyl triazines. Recently, our investigations uncovered a facile synthesis of 1,2-benzisoxazole-2-oxides from 2-hydroxyaryl oximes in the presence of iodobenzene diacetate or N-chlorosuccinimide. When compared to the commercially used absorber 2-hydroxybenzophenone, the structurally related 3-(2’-hydroxyphenyl)-1,2-benzisoxazole-2-oxide showed a hypsochromic shift, absorbing very strongly in the UVB region (280 and 300 nm) as well as the UVC region (215 nm). This interesting observation led to the synthesis and study of a variety of substituted benzisoxazoles. All derivatives showed a significant shift in absorption from the parent ketones. Analysis of these results should provide rationale for tailoring the absorbance of benzisoxazole-2-oxides to specific wavelengths. Ongoing work is investigating the electrochemical response of this heterocycle to cyclic voltammetry. The synthesis, along with the electrochemical and spectroscopic studies, of these various compounds will be presented.

#### Thermostability Determination of Antibiotics at High Temperatures by Liquid Chromatography-Mass Spectrometry

Nikolette Disso and Andrea Eisenhart (Matt Heerboth), Gannon University, Morosky School of Health Professions and Sciences – Chemistry

Ciprofloxacin, tetracycline, and amoxicillin are broad spectrum antibiotics that have been used for decades to treat a wide variety of human bacterial infections. Currently, these antibiotics are routinely used to treat infections of the ear, nose, throat, and urinary tract. Regulations for the use of prescription antibiotics usually specify that they should be stored between the temperatures of approximately 65-85 °F (18-29 °C). According to storage regulations, exposure to high temperatures could lead to degradation of the antibiotic, reducing its effectiveness. During routine use, prescription antibiotics are often inadvertently set aside in locations such as personal bags, cars, or window sills. Therefore, there is a need to study the thermostability of these antibiotics in order to determine degradation. Liquid chromatography-mass spectroscopy (LC-MS) has proven to be an excellent analytical tool for the detection of low concentrations of antibiotics in a variety of aqueous matrices. It is expected that the observed thermal degradation would increase with the amount of time the sample is exposed to high temperatures. Thermostability data will be presented at temperatures ranging from 90-200 °F (32-93 °C). Results from the study will be used to evaluate the current recommended temperature ranges for the storage of each antibiotic.

#### Characterization of HxGeN2 (x = 1-3) Transient Intermediates Using Matrix Isolation Infrared Spectroscopy

#### Madelyn Hoover (Jay Amicangelo), Penn State Behrend, School of Science – Chemistry

Matrix-isolation infrared spectroscopy was used to characterize short-lived reaction intermediates that may be related to the production of germanium nitride (Ge3N4) chemical vapor deposition processes. Specifically, this project focused on characterizing intermediates of the general form HxGeN2 (x = 1-3), by depositing mixtures of germane (GeH4) in the matrix gas nitrogen (N2) onto a CsI window at 12 K while simultaneously photolyzing the mixture with vacuum-ultraviolet radiation using a hydrogen resonance lamp (121 nm). The photolysis products were characterized using infrared spectroscopy. The identification of the transient species produced was established by comparison to the spectra of un-reacted GeH4/N2, by performing matrix annealing experiments (warming to 20 and 30 K and refreezing to 12 K), by performing mercury-xenon lamp photolysis experiments (200-900 nm) with and without a long-pass cutoff filter (400 nm), by performing experiments with isotopic reagents (GeD4, 15N2), and by comparison to quantum chemical calculations (Gaussian 03W).

#### Synthesis and Evaluation of the Antioxidant Activity of Novel Benzisoxazole 2-Oxide Containing Flavanones

Torin Karsonovich (Martin Kociolek), Penn State Behrend, School of Science – Chemistry

Flavonoids are found throughout many plant species and serve a wide range of purposes serving as antioxidants and anticarcinogenic agents as well as others. These compounds possess a unique functional group, the 2-hydroxyl aryl group, which has been shown to be useful in the synthesis of benzisoxazole 2-oxides. Initial work has focused on the synthesis of modified flavonones such as naringenin and hesperitin by incorporating the benzisoxazole 2-oxide group. Ongoing research of the ability to scavenge DPPH radicals has shown a change in antioxidant activity of the modified flavonones. Preliminary results have shown antioxidant activity of these benzisoxazole 2-oxides. Ongoing work is investigating Cu2+ chelation and the copper reduction ability of these flavonones. Additional benzisoxazole 2-oxides will be studied from other naturally occurring flavonones other than naringenin and hesperitin.

#### A Computational Study of the Adsorption of Glycine to Single-Walled Carbon Nanotubes

Erin McCarthy (Ronald Brown), Mercyhurst University, Department of Chemistry – Computational Chemistry

The adsorption energy of glycine to single-walled carbon nanotubes was investigated computationally. Calculations were performed with Gaussian 09 using density functional theory with the hybrid density functional B3LYP and the 6-31G(d,p) basis set. Carbon nanotube models were designed for (3,3) and (4,4) armchair nanotubes with lengths 3.7 Å- 12.4 Å. Glycine was adsorbed to the models at both the N-centered radical and the C-centered radical sites. Full optimizations were performed on the clean- and glycine-adsorbed models in order to calculate the adsorption energies. Preliminary results show that the calculated adsorption energies ranged from -46.0 kcal to -7.6 kcal depending on the size of the models. Some initial trends with regards to the size and geometry of the tube models were observed. However, it is hypothesized that longer models have to be used and other computational methods explored in order to ensure converged results. Partial optimizations were also performed to determine the binding energy and relaxation energy components of the overall adsorption process.

Metal Catalyzed Arylation Reactions Using 2-[(Aryl)iodonio]benzenesulfonates

Brianne Sawders (Michael Justik), Penn State Behrend, School of Science – Chemistry

Diaryliodonium salts have long been recognized as potent arylating agents of various nucleophiles under mild conditions as well as highly active aryl donors in metal-catalyzed, cross-coupling reactions. Recently in our laboratory we have prepared a novel series of diaryliodonium betaines by the treatment of 1*H*-1-hydroxy-1,2,3-benziodoxathiole 3,3-dioxide with various electron rich to moderately electron poor arenes in 2,2,2-triflouroethanol under ambient conditions and explored the suitability of these compounds as aryl donors in Suzuki-Miyaura and other metal-catalyzed, cross-coupling reactions. Similar to previously investigated diaryliodonium salts, the most electron-rich aryl ring is preferentially transferred. However, the advantage of these betaines lies in the simplification of the reaction mixture. The reduced 2-iodobenzenesulfonate by-product is readily removed in the initial aqueous extraction of the reaction mixture and can be isolated and reused with high efficiency.

#### Controlling Structural Defects to Improve Carbon Nanotube Fluorescence

Courtney Sosinski, Meagan Perz, Melissa Hanigosky, and Lucas Kubeldis (Lisa Nogaj), Gannon University, Morosky College of Health Professions and Sciences – Chemistry

Single-walled carbon nanotubes (SWNTs) are hollow graphene cylinders that exhibit unique features like high strength and unusual optical properties, which arise from their one-dimensional structure. SWNTs may someday be used for biological imaging and sensing applications because they fluoresce in the near-infrared. To make SWNTs suitable for such optical studies, they must be isolated in a surfactant coating using ultrasonic processing, which severs the SWNTs and damages their sidewalls. Here, we control the density of SWNT defect sites in order to study their influence on optical properties. Nanotubes are placed into a sodium cholate/D2O solution, undergo high-shear mixing, and are intentionally damaged by sonicating at a range of amplitude settings for varying times. The sample is centrifuged to remove dense nanotube bundles and unwrapped SWNTs, leaving isolated SWNTs in the suspension. Subsequent absorption measurements confirm that nanotubes were suspended successfully, fluorescence spectra indicate how defect densities affect the ability of SWNTs to emit light, and SWNT length distributions are found with an atomic force microscope to ensure that they exceed the exciton diffusion length (~90 nm). We have demonstrated that we can successfully make standard samples and will report on the specific damage threshold at which SWNTs no longer fluoresce.

### ENGINEERING I: Computer, Software, and Electrical Engineering

#### Personal Computer to FPGA Data Interface

Joshua Arner (E. George Walters), Penn State Behrend, School of Engineering – Computer Engineering

Digilent Incorporated produces Field Programmable Gate Array (FPGA) development boards for use by researchers and industry practitioners to rapidly develop or replace hardware components. An important aspect of this hardware design is the ability to collect data about runtime operation, or accept user controls to modify hardware functionality. Usually these two operations involve a real-time interface with a personal computer (PC). Digilent provides the user with a software method to implement VHSIC Hardware Descriptive Language (VHDL) designs on FPGAs. This tool suite, Adept, is built on the Adept Software Development Kit (SDK) which is freely available to developers and includes a number of different modules for connecting to a Digilent FPGA. Using the Adept SDK we have developed a data transfer client for the PC and a VHDL component for use on Digilent FPGAs that allows bi-directional data transfer.

#### Design and Experimentation of Loosely Coupled Planar Inductors for Wireless Power Transmission Systems

Andrew Bauer and Walter Kerin (Dakshina Murthy Bellur), Penn State Behrend, School of Engineering – Electrical Engineering

Loosely coupled inductors form the basis of most near-field power transmission devices. In this work, research and designs of loosely coupled planar inductors for wireless power transmission (WPT) applications are presented. The designed planar inductors are embedded on flat surfaces as transmitting and receiving coils. Two sets of coils with different area ratios are constructed. The size of the receiving coil is selected to be similar to that of a typical handheld electronic device. The constructed coils are tested over a frequency range of 100 kHz to 1 MHz. FastHenry2 software is used to obtain the 3-D models of the planar inductors. The values of the self and leakage inductances of the coils obtained from simulation and experimental results are used to simulate a WPT system for low-power application.

#### LED Lighting System Using Energy Harvesting Technique

Timothy Burbules and Chris Saylor (Agasthya Ayachit), Penn State Behrend, School of Engineering – Electrical and Computer Engineering

Energy conservation and harvesting technology is improving due to their advantages over the non-renewable forms of energy harnessing. Piezoelectric devices are becoming a more viable method of harnessing electrical energy from vibrating sources, and thus are becoming one of the most popular methods of energy harvesting. This research project proposes an effective method of powering an LED array using a piezoelectric transducer (PZT). The high-frequency mechanical vibrations are converted into usable electrical energy for the LED. The stress and strain due to the vibrations of the piezo-transducer are converted into electrical charges. These charges are rectified to obtain DC power to drive various types of appliances. In this project, a boost converter was used to obtain the required power. The boost converter chosen is capable of driving a 30 W LED panel which provides sufficient illumination for a hallway or outdoor walkway. When the vibrations ceased, the power output drops in unison. So, an electro-chemical battery is used to store the energy so that the LEDs could function continuously. Furthermore, analysis was performed on these modules using PSpice and MATLAB. The output of the PZT could potentially power other devices, such as sensors for security or lighting for control panels on high-vibration equipment.

#### Embedded Controller-Based, Multiple-Channel Power Transistor Driver

Whitney Dewey, Andrew Bauer, and Walter Kerin (Dakshina Murthy Bellur) Penn State Behrend, School of Engineering – Electrical and Computer Engineering

Power converters are an important part of the design of efficient electronics. Their value comes from the reduction of losses associated with other methods of converting electrical energy. Switching power converters are the nominal way to convert one DC value to another. In order to design and test these converters application specific, isolated, Pulse Width Modulation (PWM) waveform generating circuitry must also be designed to drive the transistors in their topologies. However, productivity of laboratory experiments and professional research can be increased if a versatile signal generation system is built. Major requirements of such a system are PWM duty cycle ranges of at least 10% to 90%, duty cycle and delay resolutions of 0.2% for frequencies below 400 kHz and 2% for higher frequencies, a frequency range of 1 kHz to 1 MHz, and electrical isolation. While drivers with some of these features do exist, there is a need for an independent, adjustable power transistor driver that can drive at least six power transistors at the same time. The device would allow the user to enter settings for the frequency, duty cycle and phase shift at which the transistors will be operated and then create the corresponding signals.

#### Analysis and Equivalent Circuit Modeling of Bi-Directional Resonant Power Converters for Electric Vehicles

Mark Dombrowski (Agasthya Ayachit), Penn State Behrend, School of Engineering – Electrical and Computer Engineering

The electric vehicle is the possibility of the next generation automobiles. The efficiency of such vehicles is always of concern especially with respect to its power consumption from the battery during different load profiles. Such technology would focus on utilizing useful energy, which would otherwise be wasted or dissipated in conventional systems. A part of this process involves the use of highly efficient power electronic converters. The predominantly used is the resonant DC-DC power converter. Resonant converters are known for their high-efficiency, better power handling capability, and smaller size of components. These converters are designed to operate in bi-directional modes such that the excess energy obtained through the braking process during deceleration of the vehicle is supplied back to the source by appropriate switching action. This results in significant energy savings, improving the efficiency and thus, reducing cost by a certain factor. In this research project, this technology will be analyzed and various simulation results will be obtained for different load profiles of the vehicle. Also, an equivalent model of this converter will be derived and analyzed using MATLAB. A demonstration of the suggested technology will be provided through simulations using PSpice circuit simulator tool.

#### Closed-Loop Boost DC-DC Converter for LED Driver Circuit Operating in Continuous-Conduction Mode

Ali Ismail and Jeremy Hall (Agasthya Ayachit and Dakshina Murthy Bellur), Penn State Behrend, School of Engineering – Electrical and Computer Engineering

Light emitting diodes (LED) are being used extensively in a wide variety of applications due to their characteristics such as high efficiency, faster current to light response time, and ease in control. In order to drive these LEDs and enable them to operate at required brightness levels, LED drivers become essential. In certain applications, such as in LED panels, the brightness of individual LEDs vary abruptly and this can be avoided by using appropriate control schemes. This research project proposes an effective method of using a boost pulse-width modulated DC-DC converter for driving such panels of LEDs. The brightness of an LED is a strong function of current flowing through it and the voltage applied across the LED module. A voltage-mode control is used in order to maintain the output voltage of the LED driver constant by duty-cycle adjustment. A TL494 pulse-width modulator is used in the feedback loop to control the changes in output voltage. The driver is designed to power a 20 W LED panel. The entire system is portable and is capable of operating at low input voltages also. Furthermore, various results such as performance characteristics of the driver, brightness to current transfer function, and input to output voltage transfer function was derived and analyzed using MATLAB and PSpice.

#### Supercapacitor Energy Storage Device for Microsatellite

David Jesberger, Kathleen Nicholas, and Jacob Sherk (Dakshina Murthy Bellur), Penn State Behrend, School of Engineering – Electrical Engineering

Amateur Radio on the International Space Station (ARISS) is a volunteer program intended for the education of students through amateur radio communications. The objective of this project was to design and prototype a low-cost energy storage device for the next ARISS Satellite (ARISSat). The design will need a more versatile energy storage device than the current 825M3 battery. The energy storage device must be able to handle 16 charge and discharge cycles in a 24-hour period and also have sufficient energy stored to power the satellite during eclipse. The energy storage device must be able to operate in the temperature range of –40°C to +65°C and also be of the same (or lesser) size and weight of the current battery design. This work presents the exploratory research on replacing the existing battery of the ARISSat with a supercapacitor-based energy storage device. This project is a part of the capstone project for the Electrical Engineering program at Penn State Behrend.

#### A Lightweight Multilayer GIS for Network-Centric Warfare

Daniel Linden (Xaiocong Fan), Penn State Behrend, School of Engineering – Software Engineering

Collaborative tools for information sharing  could greatly improve the effectiveness of situation awareness, and thus lead to better decision making. One type of information that is challenging to share among decision makers is geographic information due to the overwhelming amount of information to be processed under time pressure, the lack of trustable automation for information consolidation, and the deficiency of relevant information. To address this issue, we propose the concept of a decision-making network composed of intelligent agents, which together can facilitate effective processing of information flow and decision flow. In this project, we have investigated several viable approaches for building collaborative tools that may allow users to understand, visualize, and manipulate data. It can help a team of distributed-decision makers to develop better situational awareness, and therefore, to make better decisions pertinent to the current situation.

#### A Multiagent Based Diffusion Toolkit

Nathaniel Moraca (Xiaocong Fan), Penn State Behrend, School of Engineering – Software Engineering

The objective of this research was to build a diffusion toolkit for supporting real-life decision making where each decision maker is aided by an intelligent agent. Toward this goal, we have implemented a visual service composer tool. This tool allows a user to integrate existing web services, without getting involved in the coding process. By focusing on simple, visual representations of services and their operations, a user may construct a Business Program Execution Language (BPEL) process for deployment without writing a single line of code. Users can add and manipulate icons that take the place of complicated Extensible Markup Language (XML) structures. Once this tool is complete, a process may be deployed automatically with the use of open source software. This tool, which is built upon Apache’s open-source technologies, the Orchestration Director Engine (ODE) and Tomcat, will allow for future researchers to take greater advantage of BPEL and web services in the new age of cloud computing.

#### FPGA Test Bed for Digital Signal Processing Algorithms

Noah Rojahn (E. George Walters), Penn State Behrend, School of Engineering – Computer Engineering

Field Programmable Gate Arrays (FPGAs) are a versatile, powerful, and inexpensive technology used to implement digital logic circuits. FPGAs can be used to simulate hardware accelerators prior to implementation in application-specific integrated circuit (ASIC) or very-large-scale integration (VLSI) designs. The simulations, however, are more valuable if the simulations are run with realistic real-time analog inputs and produce analog outputs for evaluation. The objective of this research was to develop analog input and output capability for an inexpensive FPGA board and to demonstrate a finite impulse response (FIR) filter as a proof of concept.

### ENGINEERING II: Mechanical Engineering

#### Mechanisms at Work

Thomas Bonaquist, Jared Castaldi, and Christopher Pfaff (Edward Evans Jr.), Penn State Behrend, School of Engineering – Mechanical Engineering Technology

The world around us is filled with machines that perform functions to help us with our everyday lives, but how they work is a mystery to those of us who do not thoroughly understand them. Complicated machines, designed by mechanical engineers, may use simplistic mechanisms, such as a four-bar or a slider-crank, to achieve motion by working together to perform an overall function. However, in the beginning of their education, even engineering students may have difficulty visualizing how these mechanisms work. Two simple portable displays were designed to visually show how these simplistic mechanisms work. The first display will primarily be used as a visual teaching aid by engineering technology professors. Students will be able to see the operation and function of the simplistic four-bar and slider-crank mechanism and how they can be manipulated to perform different tasks. The second display will be used at Open Houses to showcase engineering by bringing the function of these mechanisms to life. This display will be interactive and sort colored spheres, using logic controls and sensors, into their appropriate locations.

#### Ceramic Pipes and the Petra Garden and Pool Complex

Bradley Brandt (Leigh-Ann Bedal), Penn State Behrend, School of Humanities and Social Sciences – History

Once a chief city of the Nabataean Kingdom, which controlled the trade routes linking Arabia and the Mediterranean until the 2nd Century CE, Petra shows the skill by which the water supply could be manipulated for the benefit of the populace. A monumental garden and pool complex within the city provides a wonderful example of Nabataean hydraulic technology. It utilized a series of channels, cisterns, and ceramic pipes to allow a large, ornamental garden with an open-air pool to be present in what is otherwise an arid environment. A study of ceramic pipes previously discovered in the vicinity of Petra produced a typology which defines the chronological association of various forms, with dates ranging from the first century CE until the fourth century CE (‘Amr 2001). The purpose of this research was to apply ‘Amr’s typology to several ceramic pipes unearthed during recent excavations in the Petra Garden and Pool Complex in order to determine if the forms and dates are consistent with the stratigraphic context of the excavated pipes. The use of the typology leads to further insight into the chronological development of the Petra Garden and Pool Complex and its hydraulic system.

#### Modeling Wind Turbine Blades Using Computational Fluid Dynamic Software

Timothy Kaminske (William Lasher), Penn State Behrend, School of Engineering – Mechanical Engineering

Modeling the flow of fluids can be a difficult, sometimes impossible process. This problem is apparent when designing flow-related technologies, such as wind turbines, where prototyping large designs can be expensive in time and resources. Because of this, computational fluid dynamics (CFD) has been used to create accurate models that simulate fluid flow around objects. The goal of this project was to model flow around airfoils with this software and find what makes an accurate simulation. Three software packages were used: ICEM and ANSYS Workbench for mesh generation, and FLUENT as a CFD solver. It has been found that values for lift are fairly accurate when run through average simulations, while drag requires a high-quality mesh in order to produce reliable results. In general, a high-quality mesh would include finer, smaller elements along boundary layers that follow the expected flow pattern, while using the least amount of total elements possible. The mesh quality can be validated by analyzing the non-dimensional y-plus values around the airfoil (low y-plus means finer mesh), the correct range of which depends on the solver functions being used. Therefore, FLUENT requires a high-quality mesh in order to calculate all around reliable results.

#### Pressure Drops in Single-Phase Flow through Curved Pipes

David Marogi, (Michael Willis), Penn State Behrend, School of Engineering – Mechanical Engineering

This research was intended to create a numerical model to analyze the pressure drop and secondary flow patterns in a curved pipe. Researchers have determined estimated values of pressure drop via experimental tests on pipe flow. However, no non-empirical method exists to accurately calculate this pressure drop. The purpose of this research was to study other previous experimental data in attempt to find a trend with the pressure drop and the secondary boundary flow phenomena. The results of this study will be used to provide insight for the potential crafting of such a non-empirical method.

#### Nanofluidics

Andrew Opalewski (William Lasher), Penn State Behrend, School of Engineering – Mechanical Engineering

Nanofluidics is the study of fluid behavior at the nanoscale (1-100 nm). This research project, which is currently in process, has three main goals. The first goal is to find major differences between nanofluidics and microfluidics. Microfluidics is based on the continuum model which revolves around solving the Navier-Stokes equations. It has been found that the same model can apply for microscale and some nanoscale applications up until the range of 1-10 nm. The second goal is to understand the physics of nanofluidics and find what models and methods could be used to describe nanofluidics, such as molecular dynamics models. The final goal is to investigate applications of nanofluidics such as biological nanopores and manufactured carbon nanotubes, both of which involve nanofluidic flow.

#### The Effects of Using the Free Surface in the Testing of Rudder Drag

Vincent Rice (William Lasher), Penn State Behrend, School of Engineering – Mechanical Engineering

Current research has shown that the most effective rudder design for a sailboat is using an elliptical shape. The testing done for this conclusion was conducted much like that for airplane airfoils, with the exception of the medium being water. However, doing testing in this manner may prove to be ineffective. The rudder is actually in contact with different densities, creating more complicated resistance properties compared to an airplane wing. With this is mind, it is desired to determine if accounting for the free-surface effects the outcomes of drag and lift. In order to get to the testing stage, several intermediate steps needed to take place. A three-dimensional mesh needed to be created for computational fluid dynamics testing. The goal was to create a mesh and test it against theoretical values already known to determine if the mesh and simulation were accurate. Through multiple testing approaches and simulations in Fluent, an outcome was determined that the current mesh and simulation procedures proved to be invalid. With this being said, a new approach must be taken, meshing will begin in the two dimensional phase, in order to simplify the procedures. In addition, the root of the problem for inaccurate data can be determined, as well as, how to account for any other discrepancies.

#### Analyzing Modes of Vibration in Wind Turbines

Everett Sargent (Oladipo Onipede), Penn State Behrend, School of Engineering – Mechanical Engineering

The modes of vibration determine the general motion of a system. By analyzing these modes through the use of numerical models, it is possible to discover the causes and sources of vibration in the wind turbine. Since the motion of individual modes does not affect the motion of other modes, locating and determining the causes of the dominant modes can drastically reduce the overall vibration in the wind turbine. This can resolve fatigue- and noise-related issues that many wind turbines suffer from as a result of high vibration. The results of the research will be a working numerical model of the tower structure, where many of the vibrations are generated and transmitted. The tower will be modeled as a cantilevered beam with a mass fixed to the free end. Additional consideration will be given to the nacelle, blades, and internal structures such as the gearing and the motor. All results will be compared to experimental tests performed on the Southwest Windpower AIRBreeze, Land 24V wind turbine.

### GAME DESIGN

#### The Last Hunt

Jesse Altmire and Andrew Armstrong (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

Game development is a huge feat, requiring creative ability to fuse with applied mathematics, creative writing, and craftsmanship to produce a product. Our game, currently titled *The Last Hunt* is a table-top game based off of Richard Connell’s *The Most Dangerous Game*. *The Last Hunt* will offer players a unique game play experience. First, our game contains a classical character creation system. Players will be able to write their own character’s biography and history, and be able to choose the skills from a list of skills that will translate into in-game abilities. Second, *The Last Hunt* will feature a cooperative element. Three unarmed hunters will attempt to eliminate an armed hunter and his host of lackeys. Our game will offer benefits to hunters that opt for cooperation, at an increased risk of discovery. Last our game will feature a unique tracking system that will incorporate a spinner to reveal direction of a player or lackey, and a player can mask their scent through certain means. We would like to present a playable prototype of our game and a poster presentation on the design and development process.

#### Vulgate

Mitchell Engelen and Tara Sitter (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

We would like to give a poster presentation along with a game-board presentation of our game, *Vulgate*. We devised this game in response to an up-and-coming genre of board games. The first thing that makes our game unique is its two-tiered set up. The game board is made up of a large game board with a smaller one suspended above, like a two story house. Another unique quality about our game is the role playing ability. Typically, players do not actually act out their characters while playing board games; they simply move their piece around the game-board mindlessly. However, players select a character at the beginning, which will affect the outcome of the game. As you progress through the game, you will make decisions that change the game for your character. Each character can have a different ending depending on who finished first. When we present, we will have a poster as well as the playable game-board.

#### Invictus Imperium

David First and Ian Frey (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

*Invictus Imperium* is a political strategy game where players will compete against other players to obtain resources and territories to propagate the sustainability of their own empire. The games elegance and uniqueness comes from its focus on player generation and politics. The players are encouraged (if not forced) to trade and interact co-dependently, using trade, resource acquisition, alliances, and military strategy as tools of politics. Politics between nations is a power struggle for survival and though modern conflict deals with issues of de-escalation, extreme preemption, international human rights and militant extremism, country competes against country for the same reasons they always have. They compete for land, resources, and power in an international community, within the state of nature. The goal we set out with was to build a game that reflected real-world politics. *Invictus Imperium* is unique in its conception because it allows the players to experience these issues and experience international politics.

#### Castle Forest

John Fornear (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

I propose to give a poster presentation on my game, *Castle Forest*. I created *Castle Forest* in response to several game-design challenges. First, this game is based off of the medieval fantasy role-playing game *Dungeons and Dragons*. A problem with *Dungeons and Dragons* is that it has no winning condition. My game combines a board game with a medieval-fantasy setting to give players a feeling of accomplishment after finishing the game. A second unique feature of my game is its board, which will be broken up into puzzle pieces. This will allow the players to experience some new paths they haven’t traveled down. For my presentation, I will be presenting a playable prototype of my game as well as a poster presentation in which I will explain its design and development process.

#### Hands of Creation

Nick Gordon, Trevor Gordon, Garrett Shaw, Kevin Lesniak, and Tyler McGrath (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

Our group proposes to give a poster presentation on our game, *Hands of Creation.* We created *Hands of Creation* in response to several of our class’s game-design challenges. The game is a digital game being made in the game engine Unity 3.5, and written in C#. The main concept is that the player will take control of an anonymous deity who rules over a civilization, and will guide them to either prosperity or ruin. First, our game features a system where the player cannot directly control his civilization; he must instead “puzzle out” how to indirectly influence them using the skill set they have unlocked. This is what differs from other “god” games – generally there is no puzzle element and much more direct control over the people. Second, the player’s powers will be determined entirely by how his or her civilization believes in him or her, using a complex system of artificial intelligence. For our presentation, we will be presenting a playable prototype of our game as well as a poster presentation in which we highlight the key points of its design, creative goals, and development process.

#### Tyrant

Joe Grise, Kit Torrelli, and Steve Chalker (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

We created a unique turn-based role-playing games (RPG) for the PC called *Tyrant* in which players take on the role of a hero leading a rebellion against the tyrannical King Udgahn in the fantasy world, Venirra. This game will introduce a dynamic party size mechanic that has never been done in an RPG like this before. Typically, players choose roughly three of eight pre-determined party members to fight in battle. In *Tyrant*, players can choose six out of a max of 50 party members for a battle. With the addition of this unique feature, numerous macro and micro management strategies that were never before possible in RPGs will be needed by the player to succeed. Players will be responsible for maintaining the well-being of their army by providing them with weapons, armor, and food. We will have a playable demo on a laptop as well as poster presentation which will describe the development process of the game as well as its design.

#### The Pestilence

Tammy Gladitz, Jeffrey Kording, and Charles Latchaw (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

‘The Pestilence’ is a third person, RPG video game, targeted towards a demographic of 18-30 year old hardcore gamers. The game is set in medieval times. A kingdom is infested with a demonic pestilence that has possessed its inhabitants; it is the job of the player to defeat the pestilence while preserving the lives of the citizens. Two unique challenges we set for ourselves in this game’s design were: diverse plot lines that depend upon moral decisions, and an interactive control system using the mouse as an extension of the player’s hand. The first alters the progression and outcome of the game’s plot by keeping track of the player’s decision to save or slay characters in the game; this makes each game unique and encourages multiple plays. The second allows players to control their character’s actions with a directional motion of the mouse; this includes attacking with sword/magic and blocking. For our presentation, we will be presenting a playable prototype of our game as well as a poster presentation in which we explain its design and development process.

#### Vitrification

Doug Moore and Kyle Giewont (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

We propose to give a poster presentation on our game, *Vitrification*. We created *Vitrification* in response to several game-design challenges. Our game most closely fits in the role-playing genre. However, we recognize a huge flaw in this genre of gameplay: due to chance-based mechanics, a player who should be good at performing a certain action can easily fail due to a bad roll of the dice. In response to this, we designed *Vitrification* to completely remove the mechanics of chance, instead using a skill- and strategy-based conflict resolution mechanic. For our presentation we will be presenting a playable prototype of our conflict resolution mechanic, along with a detailed poster describing the conversation mechanics and the rules that the game is built upon. The poster will also act to explain the design and development process used to create *Vitrification*.

#### Dream Catcher

Kevin Nolan, Don Smith, Julia Zacherl, Sydonia Ulmer, and Elizabeth [Lukjanczuk](http://www.facebook.com/profile.php?id=100000050963858) (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

We propose to give a poster presentation on our game, *Dream Catcher*. We created *Dream Catcher* in response to several game-design challenges. First, we have a unique storyline that can appeal to a wider audience than other role-playing games. Most role-playing games are placed in a medieval setting, while ours is set in the present day. The game’s story focuses on Olivia, the daughter of the god of dreams who must defeat all the nightmares to wake up her father. Second, we are exploring innovative ways to harmonize the game’s aesthetics, mechanics, and storyline. For example, the game’s background will change from nightmare to dream in accordance with the shift in power. It will start out with a dark color scheme and slowly turn to lighter shades as Olivia defeats more of the Boogeyman’s minions. For our presentation, we will be presenting a playable prototype of our game as well as a poster presentation in which we explain its design and development process.

#### A.R.M.S. Race

Jordan Pcholinski, Samuel Wheat, and Matthew McCormick (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

We propose to give a presentation on our digital game *A.R.M.S. Race*. We created *A.R.M.S. Race* in response to various game-design challenges. First, our game blends multiple genres into one package. We want to take elements of traditional role-playing games, combine them with modern shooters, and mix them with combat based on piloting giant robotic tanks, otherwise known as mechs. Because of this combination, we are able to create a distinctive gaming experience. We hope to recapture the lost audience of mech gamers, entertain avid fans of shooters and role playing games, as well as make a reputation among new gamers. Second, our game will implement an innovative weapon system that provides the player with many possibilities. Individual pieces of equipment will be made up of several components, each containing its own attributes. This system allows for an exponential number of possible combinations creating a wide variety of weapons. For our presentation, we will be presenting a playable prototype of our game as well as a poster presentation in which we explain its design and development process.

#### Lost in Aster Travels

Deanna Pettigrew and James Casella (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

We propose to give a presentation on our currently titled game, *Lost in Aster Travels*, at the Undergraduate Student Research and Creative Accomplishment Conference. Our goal in creating this game is to bring dating simulations, a game style more rooted in Japan, to America and have it appeal to gamers here. Here, a dating sim is highly story based with little player interaction. A typical Japanese dating sim has high player interaction, but at the cost of the story. Because of this, we plan on combining the two ideas to give a quality story while also allowing multiple-player interactions. It will be fantasy-based to set it apart from everyday life. The player is teleported to another world that is more nature-oriented. As the story advances, five different love interests are met as the player tries to find a way back to his own world. In order to gain the western audience’s interest, we are making this a role-playing game as well as a dating sim. Western audiences are more familiar with RPG’s, so the transition should be smooth. We will present a playable prototype of our game along with a poster presentation explaining the design and development process.

#### Final Battleground: The Movie: The Game

Kevin Plansinis (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

I propose to give a poster presentation on my game, currently titled *Final Battleground: The Movie: The Game*. I created this game in response to several game design-challenges. First, I intended for it to be more accessible than other table-top strategy war games. Most of these games tend to be rather complex, with large numbers of rules, pieces, and varying situations. This all adds up to games that have a steep learning curve for younger players. My game seeks to be simpler so that younger age groups can enjoy it, while leaving enough strategic depth to hold the interest of the main strategy demographic. Second, I intend for the game to have a good sense of humor. Most strategy games that are set in medieval-fantasy settings tend to be rather serious business. My game will humorously subvert most of the stereotypes of the genre. For my presentation, I hope to at least have a rough prototype of the game, as well as a poster presentation where I explain its design and development process.

#### Cyberspark

Shane Shafferman, Jeff Knapp, Nathaniel Deml, and Matthew Kenny (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

We created *Cyberspark* as a response to several game-design challenges. *Cyberspark* is a blend of two different game styles. The first, role playing games (RPGs), traditionally use conversation and personal character development to progress the story. The second, action shooter/top-down shooter, have a thin story to justify a fast-paced action set piece. *Cyberspark* will merge those two ideas to create an action-heavy game with an interesting story. The game will also feature two distinct art styles: one of a post-war dystopia, for the RPG phase, and one of a simple vector-graphics, for the combat phase. For our presentation, we will be demonstrating a playable prototype of our game, as well as a poster presentation, in which we explain its design and development process. The demo will include both phases of gameplay in a few settings.

#### MariSAR

Christopher Staab, Mark Lindsey, and David Sayers (Joshua Shaw), Penn State Behrend, School of Humanities and Social Sciences – Game Design

We created our game in response to several game-design challenges. First, we chose the naval theme because we found through our research that there is not a game in the current strategy board game market that uses a naval scenario. We decided that we should create a game that focused on strategically moving naval pieces around a board. Second, we found that current strategy board games such as *Risk* and *Chess* are still popular with board game players today. We decided to use these games as examples in creating a game that was very easy to pick up but still had great depth. However, we will use a unique game condition where we focus our game on rescuing allies instead of elimination or capture the flag. For our presentation, we will be presenting a playable prototype of our game as well as a poster presentation in which we explain its design and development process.

### MATHEMATICS AND PHYSICS

#### Fluid Flow Interactions within a Deformable Arterial Wall Thomas Boyer and Shehzad Siddique (Javed Siddique), Penn State York, School of Sciences – Mathematics

In this study we model fluid-flow interactions within the arterial wall. Our motivation in this study is the case where the arterial wall is surrounded by cerebral spinal fluid (CSF). Here, the blood pressure exerted on the arterial wall is modeled using a Fourier series, the arterial wall is modeled using spring-mass system, and cerebral spinal fluid is modeled using standard Navier-Stokes equations. We model a problem of ﬂuid-ﬂow interactions within a deformable arterial wall with linear and nonlinear boundary effects. The resulting system of partial differential equations is solved numerically using method of lines. The applications of the model are to understand the deformation of the arterial wall as a function of its material properties and the relation of this deformation to the growth of aneurysm.

#### Orbital Stability of Massive Satellite Systems around Planets

Corey Dominick (Darren Williams), Penn State Behrend, School of Science – Physics

Numerical integrations were conducted to determine the conditions that a massive multiple moon system would remain stable. As a model, the Galilean system (Jupiter along with its four closest moons) was chosen. The effect of the host star on the stability of the system was examined by varying the semi-major axis (proximity of the planet system to the Sun). The eccentricities of the moons’ orbits were then used to determine trends in the overall stability of the system. The effect of moon mass on overall stability was also examined by varying the masses of the four moons of the system by a multiplier.

### PEDAGOGY AND EDUCATIONAL OUTREACH

#### Hybrid Learning Initiative for Black School of Business and Penn State Behrend

Kassandra Barrett (Mary Beth Pinto), Penn State Behrend, Sam and Irene Black School of Business – Marketing

Providing hybrid courses is becoming an increasingly popular trend in higher education today. In 2002, Dr. Graham Spainer contended that “Hybrid instruction is the single greatest unrecognized trend in higher education today.” The research in this study will answer the following questions: (1) What are student expectations regarding hybrid learning? (2) What are student perceptions of hybrid learning and its effectiveness? (3) Are students prepared to succeed in the hybrid environment? (4) How satisfied are students with hybrid learning? (5) What can be done to improve hybrid teaching and student learning? Secondary research was conducted and data were collected in the form of survey responses from 44 students that were enrolled in an upper-level marketing course that was modified and transitioned into a hybrid-learning format. Students were given three surveys; the first was a pre-course survey that focused on “preconceived expectations” and was given before the students were aware of the hybrid delivery format; the second focused on “informed expectations” after students were told they were going to be taking a hybrid course and reviewed the syllabus; and the third survey given at the end of the course measured perceived performance. The results of these surveys are currently under analysis.

#### Arboretum Website Enhancement with Digital Photographs and GPS Technology

Elizabeth Bialosky (Ann Quinn and Michael Naber) Penn State Behrend, School of Science – Communication

The Penn State Behrend Arboretum has a long history of being recognized as a very beautiful environment and home to many of the area’s and world’s most notable trees. An educational resource, the arboretum contains more than 80 trees including species that represent all of the 50 states in the United States. To help visitors learn more about the arboretum, the Penn State Behrend Arboretum website provides information about the kinds of trees and other plant life in the arboretum and was last updated six years ago. The goal of this research project is to update the website with new digital photographs and Global Positioning System (GPS) locations of the trees in the arboretum. This semester I focused on the conifers in particular. Visitors can currently find the trees on an illustrated map on the website, including detailed digital photographs of each tree to provide a more visual guide for the website and make the arboretum more “user-friendly” for visitors. The updates will provide students, staff, and other members of the community with valuable resources to help promote the diverse range of trees in the arboretum and to encourage visitors and donations to the arboretum.

#### Arboretum Website Update Brendan Burbules (Michael Naber and Ann Quinn), Penn State Behrend, School of Science – Communication

The goal of this research project will be to provide a digital mapping of the Penn State Behrend Arboretum which is accessible to students, faculty members, and visitors via the Internet. The completed mapping will be presented in an interactive web applet using ESRI’s ArcIMS system. In addition to the map of the arboretum, the applet will also contain information on each tree, as well as pictures of the bark and leaves.

#### Zebrafish in the Classroom

Sarah Dougan (Sarah Ewing), Gannon University, Morosky College of Health Professions and Sciences – Biology and Secondary Education

The average high school classroom is more hi-tech than that of the past and with this increase in technology, a larger variety of teaching methods have arisen. Many teachers now use cutting-edge tools to create more exciting and hands-on classroom experiences. Unfortunately, many of these tools are expensive and schools in lower socioeconomic districts may not be able to support these types of experiences. The purpose of this research was to develop and assess the effectiveness of an inexpensive hands-on experience with differential education using novel lesson plans and assessment tools for biology students in an inner city high school. Students were recruited to participate from two sections of a ninth-grade honors biology course at Strong Vincent High School located in Erie, Pennsylvania. The developed activities and tools were 1) evaluated to determine whether they effectively map to current Pennsylvania learning standards in biology, mathematics, and language arts, 2) increased student performance, and 3) gained student interest. Success of this research may allow for implementation of this less expensive yet engaging activity by a wider audience of high school biology teachers.

#### Behrend Land: Amusement Park of Mechanical Engineering Principles

Catherine Franks and Charles Latchaw (Melanie Ford), Penn State Behrend, School of Engineering – Engineering Outreach

Behrend Land is a collection of amusement-park-themed demonstrations of fundamental engineering principles. Two demonstrations were developed in summer 2011: *Conservation of Energy* and *Conservation of Momentum*. Both demonstrations feature a brief lesson with a physical example, hands-on experiment, and review questions. Examples and projects can be purchased or made inexpensively. Lessons and questions are tiered by difficulty to accommodate a range of students, kindergarten through twelfth grade. Exploring the principles of engineering can be difficult without a visual aid to represent their physical meaning. Combining mini lectures with real-world experimentation etches important concepts in the student’s memory. Behrend Land seeks to excite students about S.T.E.M. (Science, Technology, Engineering, and Math) studies and encourage them to further their exploration of these subjects.

#### Penn State Behrend Energy Management Team

Stephen Galdo1 and David Nguyen1 (Ann Quinn2 and Dave Causgrove1), Penn State Behrend, 1Sam and Irene Black School of Business and 2School of Science – Marketing

Colleges and universities spend close to $2 billion each year on energy. ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy, helping us all save money and protect the environment through energy-efficient products and practices. Results are already adding up. Americans, with the help of ENERGY STAR, saved enough energy in 2010 alone to avoid greenhouse gas emissions equivalent to those from 33 million cars — all while saving nearly $18 billion on their utility bills. Our goal this year for the project is to reduce energy consumption by 10% in the Smith Chapel. We are already experiencing success with the project. We have managed to bring the data collection process for meter readings up to industry standards, increase environmental awareness across campus, find areas in buildings where energy is wasted, and collect feedback from students, faculty members, and staff. Our project aims to create student awareness about sustainability methods that will help preserve the environment.

#### Facebook as a Complaint Method in Higher Education: Exploratory Study

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This study was conducted to see how college students use Facebook as a way to complain about various topics associated within higher education. Three issues were identified regarding higher education and Facebook. First, we wanted to understand if there was a difference between genders on Facebook usage. Second, we investigated the relationship between the age users began using Facebook and the amount of time they now spend on it. Third, we wanted to determine the complaining methods college students use in higher education settings. Based on the findings, in any given day females are more likely to be on Facebook longer than males. In addition, there is a negative relationship between at what age users acquired a Facebook account and their current usage. Last, regarding students complaint behavior pertaining to problems in higher education settings, when there is a problem, 9.7% are likely to complain to a professor in the classroom, 3.7% are likely to post a comment on Facebook regarding an issue, and 23.2% will never take another class from that professor. Based on the results, professors should encourage dyadic communication with students and welcome any course-related complaints to be directed to the source of their dissatisfaction.

#### Engineering K-12 Outreach

Nathan Mischler, Muamal Mahdi, and Elizabeth Lukjanczuk (Melanie Ford), Penn State Behrend, School of Engineering – Engineering Outreach

Many kids from elementary to high school are often not exposed to fields and careers that could be potentially interesting to them. By introducing students within this age group to engineering projects that are both fun and basic enough to understand, these kids can develop an interest in engineering fields. The focus of the K-12 Outreach Program summer research was to expand and develop old and new projects that will demonstrate common engineering concepts to students between elementary and high school. These projects can be easily transported and setup in a classroom where kids can experiment with them. They often include something the kids can take home with them that illustrates what they have learned. In the past these projects have included mechanical advantage in pulley systems, model home security systems, circuit elements, and Hooke’s Law. New projects added will demonstrate concepts such as speakers and amplifiers.

#### VIZQuick: Rapid Game Development Software

Matthew Smith1 and Joseph Hirn2 (Dawn Blasko1 and Wen-Li Wang2) Penn State Behrend, 1School of Humanities and Social Sciences and 2School of Engineering – Psychology

For almost a decade, the VIZ project has worked to create new methods in education which address spatial learning. Unfortunately, creating new activities to educate students requires a large time investment. Thus, the purpose of our project is to create game development software that allows non-programmers to quickly develop experiments and gauge performance. These experiments would improve three areas of spatial learning: mental rotation, spatial visualization, and spatial perception. Previous experiments found serious gaming to be an ideal tool to teach all ages about spatial learning. After examining these games, the software team decided that the best approach would be to design around the current paradigms. With this in mind, the team developed a package of resources to be implemented in future games for the Android platform. This package includes a dice roller, a board and pieces, and a deck of cards. The team created these with the Unity game development tools and the Qualcomm augmented reality package. This software was chosen due to its ease of use and its ability to interact with physical objects. After completion, it became clear that the program would need an additional design interface in conjunction with the Unity engine to streamline game creation.

#### Solar Irrigation System as Centerpiece for Community Garden

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In recent years, there has been a push in using green technology to protect the environment and become more sustainable on the use of our energy. Rain water from a rain gutter will be routed to a 500-gallon barrel that will be provided and installed by Maintenance and Operations. A solar-powered-pump system will be designed to irrigate a plot of land (roughly 22’ x 12’) near Dobbins Dining Hall. This plot of land will be used to grow herbs for Housing and Food services and other communities throughout Behrend. The solar panels will store energy harvested from the sun into batteries. At night, the pump will draw water from the rain barrel and irrigate the garden using a drip irrigation system. This design will act as a pilot design that can be expanded upon to grow throughout the years. It will allow the college to have a completely sustainable garden.

### PSYCHOLOGY

#### The Effects of Social Interaction and Social Isolation and Handling on Male and Female Sprague-Dawley Rats When Learning to Navigate a Multiple T-Maze

Ashley Adamson (Rodney Clark), Allegheny College – Psychology

Many experiments have been conducted studying the effects that isolation has on the body and on ability to perform tasks, but not much research has focused on how to overcome the negative effects of isolation or on how to improve learning through social interaction methods. Two experiments were conducted in the time allotted. The purpose of Experiment 1 was to examine the effects of isolation and interaction and to see if negative effects of isolation could be overcome while enhancing the positive effects of social interaction. The main purpose of Experiment 2 was to examine retention of learned behavior over a short period of time. Sprague-Dawley rats were placed in eight total conditions consisting of isolated, grouped, handled, and sex conditions. All rats were housed in the same colony, but in their respective conditions for ten days prior to testing. Latency and number of errors were recorded for each rat. Results showed that while handled isolated rats met criteria the fastest in Experiment 1, handled grouped rats performed better error and latency wise. In Experiment 2, isolated rats demonstrated the best performance.

#### Violence and Narrative in Video Games and Their Effect on Stress

Brittany Bittner and Casey Chadwick (Dawn Blasko) Penn State Behrend, School of Humanities and Social Sciences - Psychology

Research has disagreed on the positive and negative effects of video games. In the current study we attempt to assess whether violent video games impact the ability to reduce stress. The most popular games tend to be violent and may have a desensitization effect. This may be due to the narrative aspect of the game. Participants in this study consisted of 53 undergraduate students at Penn State Behrend. Participants were randomly assigned to play a violent video game (with a narrative or without), or a nonviolent video game (with a narrative or without). In order to increase stress, participants completed the Paced Auditory Serial Addition Task. To assess whether there were changes in stress, participants were given a pre- and post-current mood survey. They also completed a Serious Game Measure that examined perceptions of video games. Results showed that stress was increased after completing the stressful task and decreased after playing the game. The results showed no difference between game type (violent, nonviolent). Females experienced more engagement in the nonviolent video game than the violent game and also enjoyed the nonviolent game more.

#### The Effects of the Environment on Learning and the Diminishing of Positive Responses over Time

Kimberly Cook and Ashley Turner (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The environment is known to have an impact on both physical and cognitive productivity of an individual. One area of research that has often been overlooked when considering the educational field is the impact of the environment in a college setting. Studies have shown that students perform better under certain conditions in a stimulating classroom environment. Our first study examined the feelings and attitudes that college students had toward a newly renovated psychology lab in comparison to the previous psychology lab on campus. Opinions were obtained on physical qualities, work qualities, and overall attitudes about the new lab. Students’ ratings in comparison to the previous lab were positive. Our current study examined the attitudes and feelings about the psychology lab after several years of being in its new building. Although the responses were again positive overall, a significant decrease in positive attitudes was found. These results suggest that overall satisfaction decreases when individuals no longer have a benchmark for comparison.

#### Our Spatial World

Renee Fanning, Bryan Fleeson, Miri Ohashi, Bilge Erdem, and Carissa Stanko (Dawn Blasko and Kathryn Holiday-Darr), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Spatial skills are needed for many of today's professions, such as math and engineering careers. However, these skills are not taught or developed in basic public school curriculum. Males on average have better spatial skills than females, which may contribute to the lack of women in math, science, and engineering fields. A pretest and posttest were given to high school girls to determine their spatial skills. A group of the girls went through a four-week training session. Each week the girls completed a training module and played a spatial board game. Overall the girls improved in their spatial skills pretest to posttest and evaluations found that the girls enjoyed the training sessions. We analyzed games for the computer and Kinect as well. A fun, an educational, and a game specifically for improving spatial skills were tested for their spatial-training capabilities.

#### How Do You See It? Actions in the Workplace

Renee Fanning, Amir Wirr, and Jamie Songer (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

This study focuses on the effect of gender on perception of sexual harassment. Sexual harassment is defined as unwanted or inappropriate sexual attention, either physical or verbal. This study is being conducted due to the fact that current research on this topic focuses primarily on female views of sexual harassment. The gender gap for this research topic comes from the neglect of focus on males as victims. Students will be exposed to one of four different scenarios (male employer with a female employee, a male employer with a male employee, a female employer with a female employee, and a female employer with a male employee) through random assignment. Participants will rate appropriateness on a Likert scale. It is hypothesized that females will rate male boss female employee scenarios as the most inappropriate, and that males will rate male boss male employees as the most inappropriate.

#### Sarcastic Intent: Funny or Fearful? Ashley Kerr, Robert Fogle, Bryan Fleeson, and Christie Leslie (Dawn Blasko and Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The understanding of sarcasm relies on the consideration of social and cultural factors which are often ignored in models of language. Some have hypothesized that sarcasm is used to mute a criticism by infusing it with an element of humor. Others have focused on sarcasm as one aspect of relational aggression or bullying. We examined how college students perceived sarcasm. In previous work, we found that pictures of male and female faces were rated as having bad intent when paired with sarcastic prosody (based on intonational contour and stress). In the current experiment, short scenarios were paired with the faces. Participants were asked to rate how well faces with different emotions (sad, angry, disgusted, neutral, surprised, happy) matched the speaker’s intent. In addition, they completed measures of personality, relational aggression, and romantic relationship attachment. Gender emerged as a key factor in perception of intent, with male faces more likely to be perceived negatively in a sarcastic situation. There were correlations between the tendency to use sarcasm and the personality trait of agreeableness. These data support interactive models of non-literal language processing, in which social and cultural factors serve as early-acting constraints on interpretation.

#### Money, Memory, and Romantic Relationships

Emily Loker, Christine Harding, Lynzie Black, and Megan Morrow (Carol Wilson), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Prior research shows that people primed with money prefer more physical distance between themselves and others, are less helpful, and are less interpersonally sensitive. In the current study, we are testing whether people with certain personality traits will be less susceptible to the ill effects of money. Approximately 60 individuals were randomly assigned to either a control or money-primed condition. We predict that personality variables would play a significant role in how susceptible an individual is to such effects. We expect to find that individuals primed with money will be more inclined to focus on the self, in being less helpful to a stranger, less accurate in deciphering others’ emotional expressions, and report less desire to work with someone on an interactive task; although, they will also work longer on a task. However, individuals with certain personality traits (e.g., secure attachment, communal orientation) should be less likely to demonstrate these monetary-based effects relative to those who are characterized by opposite tendencies (e.g., avoidant attachment, exchange orientation). Thus, whereas the money primed condition should generate positive self-focused attributes as well as negative interpersonal attributes, individuals who are more interpersonally oriented in general may be less likely to display these patterns.

#### Tan or Pale: What Are You Attracted To?

Jamie Manson (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Recently, tanning bed use has increased dramatically despite an increase in the evidence of tanning’s harmful effects. The primary motivation to continue tanning has been the belief that being tan makes you more attractive. Research suggests that intervention programs that have focused on appearance – damaging effects of tanning have produced short-term changes in tanning, but they are not effective in the long run. The purpose of this study was to examine whether tanning attractiveness attitudes could be decreased through an intervention program. I hypothesized that individuals who completed the appearance–based tanning intervention program would rate tan individuals as less attractive. Participants were randomly assigned to one of three interventions (health risks, appearance–damaging, or control). The results indicated a significant difference between pale and tan attractiveness ratings. The tan ratings were rated higher than the pale in the control group and there were no differences in the other interventions. There were also no differences were found between interventions. The intervention was somewhat more effective for males than females. These results suggest that attractiveness attitudes are not changing during a brief intervention, which may be a factor on why they are not showing long-term effectiveness.

#### Examining Weight Discrimination among Males and Females

Megan Myers and Stephanie Cattron (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Weight discrimination occurs in many domains including the workplace, educational settings, and healthcare. In this study, we investigated weight discrimination in helping and bullying scenarios using images of people from the five body mass index (BMI) categories. In experiment 1, participants read scenarios and selected the picture of the woman they were most and least likely to help or bully. Participants completed self-report measures of empathy, aggression, anti-fat attitudes, and had their BMI calculated. Images of obese women were picked least often in the helping condition, followed by emaciated images. Images of emaciated women were chosen most often as the targets of bullying followed by obese women. The only significant predictor was the anti-fat subscale of willpower. These results suggest that weight bias occurs at both ends of the spectrum. In experiment 2 we added male images. Weight biases were strongest in the bullying situations for both male and female images. The only significant predictor was the anti-fat subscale related to dislike of overweight females. No significant predictors were found for weight bias of males. These results suggest that gender does indeed play a role in differences of weight bias as females were subjected to greater discrimination based on weight.

#### The Influence of Others on One’s Own Perception of a Person’s Performance

Kristen Robson (Melissa Heerboth), Mercyhurst University, The Hafenmaier School of Education and Behavioral Sciences – Psychology

There is a large body of research on the matter of gender stereotyping. However, there is no study that looks into the effects of the immediate surroundings that could influence a gender’s perception when assessing another person; or more precisely, how other people in the environment influence a person’s judgment of another. This study aims to look at the effects that might result when different genders are present at the time of an assessment. In order to do so there will be three different groups; an all-male group, an all-female group, and a mixed-gendered group. They will all assess a series of people and their career successes (through short biographies) to see if people are more critical of the opposite gender when in a group made up of only the rater’s gender as compared to a mixed-gender group. By doing so, this study will demonstrate the degrees to which people are likely to stereotype against genders and also when they are most likely to stereotype.

#### Attachment and Pain Memory

Jessica Salley, Lindsey Fuller, Leah Vuich, Ara Agato, Alexandra Johnson, and Samantha Bates (Carol Wilson), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Literature suggests that attachment-working models can distort memory in a model-congruent fashion. Studies have researched attachment and the memory of the emotional pain of conflict, but not physical pain. Our study is testing the hypothesis that attachment-working models can influence immediate and recall pain perceptions. This research included120 female romantic partners being subjected to a tourniquet acute pain procedure while randomly assigned to view either an image of their romantic partner or of a stranger. It is expected that more anxiously attached individuals would report greater immediate pain and that their pain perceptions would become even more negative over time (i.e., 4-6 weeks later). On the other hand, it is expected that avoidantly attached individuals will report less immediate pain and that their memory of pain perceptions will become less negative at later recall. Evidence of these patterns would suggest that insecure attachment (particularly attachment anxiety) may pose a risk factor in coping with and remembering physical pain.

#### The Relationships of Major Discipline, Workload, Class Year, and Problematic Internet Usage with Procrastination

John Welsh III (Joshua Searle-White), Allegheny College – Psychology

Ever since there has been work to do, people have been putting it off. Procrastination affects many people today, particularly when people are required to complete important projects they do not enjoy. This study on procrastination is looking to further the current knowledge of procrastination in the college setting. The goal of this study was to identify groups of people who are more susceptible to procrastination and to develop better educational practices that inhibit the occurrence of procrastination. This study examines class year, problematic Internet usage, major disciple, workload, and overall levels of procrastination with the specific focus of academic procrastination. This study predicts that underclassmen with high problematic internet usage or low workloads would be more likely to procrastinate in an academic setting. Results are still in the process of being collected and analyzed.

#### Restoring Self-Control Strength after Alcohol-Related Depletion

Nicole Zelinsky (Patricia Rutledge and Robert Hancock) Allegheny College - Psychology

Self-control strength is a limited resource that can be depleted and replenished. In separate lines of research, it has been shown that smelling an alcoholic beverage depletes self-control strength and that self-control strength can be replenished with rest. The present study examined alcohol-related depletion and rest-related restoration. College student drinkers (*N*=52) were randomly assigned to either a 2- or 10-minute rest period. Self-control strength was measured twice by a handgrip task, once at baseline directly prior to sniffing alcohol, and once after the rest period which followed the sniffing task. Squeezing a handgrip is a measure of self-control, because a participant must resist the urge to relax their hand. Additionally, alcohol urge was assessed during the rest period. The data were analyzed with multiple regression, predicting the second measure of self-control (i.e., handgrip duration) from the baseline measure, rest period length, alcohol urge, and the interaction of rest-period duration and alcohol urge. A follow-up analysis examined gender and the gender-rest period interaction. Neither analysis found results indicating self-control strength had been depleted in the 2-minute control group, or that the 10-minute rest period replenished self-control strength. Gender norms are discussed along with other potential factors underlying this finding.