4-3-2017

2017 Abstract Book

Undergraduate Creative Activities and Research Forum

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UNDERGRADUATE CREATIVE ACTIVITIES AND RESEARCH FORUM

2017 ABSTRACTS

Student Center
Ballrooms A, B, C, & D
April 3rd, 2017
“We value undergraduate participation in research and creative endeavors because it enhances our students’ critical thinking and communication skills, which better prepares them to compete in the global society. Research also stimulates curiosity, which leads of course to answers. I know from my own research when I was a faculty member the excitement of discovering new information, and the satisfaction that comes from sharing those discoveries with others. The commitment of our students and their faculty mentors is an inspiration to all of us.”

—Randy J. Dunn, SIU System President
“Our undergraduates engaged in research are among our best and most successful students. Research is problem-solving—learning to ask questions and finding out how to answer them. From freshmen to seniors, these students are gaining knowledge and skills, and building collaborative relationships that will propel their lives and careers in every field and provide real advantages in their professional careers. We are very proud of their accomplishments.”

—Susan M. Ford, Provost and Vice Chancellor for Academic Affairs

“Creating new knowledge is the pulse of SIU. Our students have direct access to renowned faculty and facilities typically found at universities several times our size, leading to accomplishments in diverse places such as the laboratory, studio, and stage. Not only do our students leave SIU with a degree in hand, but also a creative mind. And with hard work and some serendipity, our graduates may also find themselves with a published article, a novel musical score, an unique piece of art, or most importantly, a fresh view of the world. At SIU, all things are within your reach.”

—James Garvey, Interim Vice Chancellor for Research

“Know No Bounds’ represents Southern Illinois University Carbondale without a doubt. Participating in undergraduate creative activities and research is a way for students to Experience the endlessly expanding boundaries available at SIU Carbondale. This Forum is a valuable showcase for the world to see students walking in the path ‘Know No Bounds’.”

—Rodrigo Carramiñana, Director of the Center for Undergraduate Research and Creative Activities
Undergraduate Creative Activities and Research Forum
April 3, 2017
Southern Illinois University Carbondale

Held by the Center for Undergraduate Research and Creative Activities

Program

Poster judging sessions: 8:30 a.m. - 12:30 p.m.
Public viewing session: 1:00 p.m. - 3:00 p.m.
Award presentations: 3:00 p.m.
  • Creative and Scholarly Saluki Rookies’ poster awards
  • Forum poster awards by category
  • REACH awards for 2016-2017 academic year
  • CURCA Faculty Mentor Award of Excellence

CURCA Organizers
Coordinator: Kevin Krouse, CURCA
Judges: Anthony Farace, CURCA
Event Manager: Maranda Brown, CURCA

Sponsors
  • Office of the Chancellor
  • Office of the Vice Chancellor for Research
  • Office of the Provost
  • The Sustainability Council
  • The Graduate School
**SIU Carbondale Literary & Art Award**

**Coordinators**
Allison Joseph, Department of English
Pinckney Benedict, Department of English
Jon Charles Tribble, Department of English

The SIU Carbondale Literary & Art Award recognizes creative excellence in the categories of poetry, fiction, and visual art as published in *Grassroots*, SIU Carbondale's undergraduate arts magazine. Award winners are chosen, through an identity-blind process, based on the scope and ambition of the project undertaken, the energy and intensity of the project's execution, and the effectiveness of the project's final form in achieving its high artistic aims. From 239 submissions, the *Grassroots* editors chose for inclusion in the magazine 10 pieces of fiction and plays, 25 pieces of poetry, and 17 pieces of visual art. Of those, one will be named the SIU Carbondale Literary & Art Award winner in each category, with two runners-up in each category.

**CURCA Faculty Mentor Award of Excellence**

The Center for Undergraduate Research and Creative Activities (CURCA) is awarding faculty from each college who have mentored undergraduate students in research and/or creative activities outside of the classroom. This award is created to recognize faculty mentors within each college who dedicate time and effort to help undergraduate students expand their knowledge through research and/or creative activities. Each faculty mentor is selected by their college. The awarded mentor will receive a commemorative plaque which is presented at the Undergraduate Creative Activities and Research Forum.
Thank you to all faculty, staff, and graduate students who are sharing time and expertise to serve as judges at the 2016 Undergraduate Creative Activities and Research Forum. The following list is of individuals confirmed at the time of posting.

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Tate, Ralph F.
Tio, Yee Pin
Umagiliyage, Arosha Loku
Valencia, Janice
Young, Jennica
Zieman, Elliott

10:30-12:30

Name

Abdul-Musawwir, Najjar
Ackah, Louis
Alnaqeb, Haitham
Amar, Kshitij
Ambati, Venkata
Bakkar, Said
Barkdoll, Michael
Bender, Kelly
Best, Kaleigh
Cashel, Mary Louise
Catenazzi, Alessandro
Chung, Sam
Cleary, Daniel
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Francis, Jesse
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Kim, Sandy
Kolay, Prabir K.
Konjufca, Vjollca
Langin, Chester
Lee, Fay
Lickteig, Duane Joseph
Lightfoot, David A
Massie, John
Melton, Katie
Miller, Jeremiah S.
Mogharreban, Namdar
Pandey, Sudip
Patil, Prasanna
Perinchery, Remya
Pilot, Zachary
Pitale, Gauri Anilkumar
Porter, Jared
Reichard, Ulrich H.
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Shaw, Thomas
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55  DeRossett  Lauren  Sharp  Andrew
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57  Geerling  Elizabeth  Narayan  Prema
58  Gleiser  Tali  Kibby  Michelle
59  Gonzales  Damaris  Hill  Jonathan
60  Gordon  Jahiah  Fuller  Janet
61  Greene  Avona  Collins  Sandra
62  Gulson  Natalie  Venable  Erin
63  Hagemann  Jami  Arbogast  Lydia
64  Feliciano  Anna  Nsofor  Emmanuel
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# Saluki Rookies

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The ERG1 K⁺ Channel Protein Increases in a Muscle Specific Pattern in the Denervated Skeletal Muscle of Rats

Skeletal muscle atrophy is a potentially debilitating condition which is defined as a reduction in skeletal muscle mass as a result of both decreased protein synthesis and increased protein degradation. It occurs with neural and muscle injuries, normal aging and diseases such as diabetes and cancer cachexia; however, the pathways that contribute to atrophy in skeletal muscle vary depending upon the initiating factor. We have shown that the ERG1a K⁺ channel increases the proteolytic activity which contributes to atrophy in the skeletal muscle of mice experiencing cancer cachexia and disuse. Because atrophy occurs rapidly in denervated skeletal muscle of rodents, we hypothesized that ERG1 would also increase in denervated muscles. To test this hypothesis, we performed sciatic nerve transection on adult rats and collected Extensor digitorum longus (EDL) and soleus (SOL) muscles 7 days after surgery. Both control and denervated muscles were cryo-sectioned and immunostained for ERG1 protein using fluorescently tagged secondary antibodies. Fluorescence was measured as point brightness using ImageJ and compared by ANOVA using SAS. ERG1 fluorescence was not different in the EDL and SOL muscles of the control rats. However, it was increased in both muscles after seven days of denervation, increasing only slightly in the denervated EDL, but significantly in the denervated soleus muscle. Thus, we conclude that ERG1 protein is upregulated in rat muscle in response to denervation and that it is more abundant in denervated SOL muscle than in EDL muscle. Because in rat, SOL is composed of mainly slow-twitch muscle fibers while the EDL is composed of mainly fast-twitch fibers, we suggest that ERG1 modulation may be a fiber type specific event. Further, because ERG1 is up-regulated in other atrophy models as well as denervation, we suggest that it may be a consistent early marker of skeletal muscle atrophy.
This study is examining the psychometric properties of the Implicit Relational Assessment Procedure (IRAP) when investigating attitudes regarding political candidates, gender and socioeconomic status. Psychometric properties such as predictive reliability and convergent validity are being investigated to assess if the IRAP can be used for applied purposes such as psychotherapy and education. This study will be using the IRAP as a potential measure of political ideology and how it relates to several self-report psychological measures. A convenience sample of undergraduate students attending a mid-west university participated in this study examining the relations between the IRAP and self-report measures. The conditions for this study are 1) attitudes regarding political candidates, 2) gender 3) socioeconomic status. Of the three conditions, only gender attitudes will be investigated due to the reason of this specific study being a smaller portion of a larger study. The participants are asked to complete a demographic survey, questions pertaining to the three conditions, and the IRAP. Thus, hypothesizing that the IRAP will correlate with the explicit measure of sexism. Also, that the sexism measure and the IRAP will predict voting intentions.
Demeri Adams, Stacy Thompson, Ph.D. and Brianna Scott, B.S.

Department of Curriculum and Instruction

*The Emergence of College Students’ Career, Marital, and Parental Identities*

This study was conducted to gather more knowledge on role projection and investigate individuals’ views towards career, marital, and parental identities in a sample of college students. The study consisted of 340 undergraduate students enrolled in class at Southern Illinois University who were recruited after gaining approval from professors/instructors to have students take a questionnaire in their courses. The sample included 73% females and 27% males. Of these participants, the race was significantly White (73%), but also included Blacks (15%), Hispanics (4%), Asian (3%), and biracial, multiracial, and races which were not included in other categories, such as middle eastern. The participants consisted of freshmen (22%), sophomores (31%), juniors (29%), seniors (30%), and “other” (1%). There were 46 different majors represented in this student sample as well. The questionnaires that the students completed consisted of The Pie (Cowan & Cowan, 1990), an adapted version of The Pie (Kerpelman & Schvaneveldt, 1999), Life-Role Salience Scale (LRSS; Amatea, Cross, Clark, & Bobby, 1986), and Identity Discussion with Others (Adapted Kerpelman & Schvaneveldt, 1999). After analyzing the data collected, a significant difference emerged in the portion dedicated to parental identity (F=2.53, p=.041), in which Blacks reported significantly higher portions than Hispanics (p=.040). Additionally, there was a sex difference that displayed females presenting more value and importance than males in the areas of value of occupation, commitment to parenting, commitment to marriage, and value of home care. Other significant findings and analyses are to be discussed as well as implications.
Norris Akpan, Aidan Smith, and Dr. Michael Hylin

Department of Biological Sciences

Effects of Probiotic Bacteria on Inflammation Following Juvenile Traumatic Brain Injury

Traumatic brain injury (TBI) is a serious medical issue, found to be the leading cause of death in juveniles. It occurs when the skull is exposed to a great amount of force or sharp object, which can pierce the bone and cortex, damaging brain tissue underneath. Lactobacillus rheuteri is a type of probiotic bacteria that is often used due to its anti-inflammatory properties and ability to cure adolescent digestive issues. The main objective of this research study is to be able to determine if there is a link between a probiotic bacterial based diet and the inflammation of a juvenile brain following a traumatic brain injury. The astrocytes, or glial cells that reside in the brain are the portion of the brain that will be examined to measure the relative amount of inflammation following the injuries. Astrocytes are a component which provide support, protection, and nutrients to the neurons. Subjects will be administered a diet containing the Lactobacillus rheuteri. At 28 days post-birth, the subjects will undergo a controlled cortical impact injury (CCI) near the hippocampus, a model which very closely resembles human TBI. Once the tissues are harvested, they are treated with a 1:2000 ratio of Glial Fibrillary Acidic Protein antibody and DAB, which allow the astrocytes to be seen clearly underneath a microscope. The data will be analyzed quantitatively, and a numerical count of the glial cells found in close proximity to the injury sites will be the determining factor in regards to the amount of brain inflammation. We expected to observe a lesser number of astrocytes in the brains that were treated with the probiotic bacteria. The results that were gathered from this study were not conclusive. However, further research needs to be done in this area before any definitive conclusions can be stated.
Skeletal muscle atrophy is the loss of muscle mass caused by an imbalance in protein degradation and protein synthesis. It occurs with normal aging, neural and skeletal muscle injuries, and with diseases such as diabetes, cancer cachexia, AIDS, etc. and can be very debilitating. We reported that the ERG1a K⁺ channel is up-regulated in the atrophic skeletal muscle of mice while it is not detectable in normal muscle. We have also shown that blocking ERG1 in unweighted mouse muscle can block atrophy and that over-expressing the channel in normal skeletal muscle can result in atrophic conditions: decreased myofiber size and increased ubiquitin proteasome proteolysis. To explore the extent to which ERG1 affects calcium activated proteolysis, we needed to develop a cell culture model. Therefore, we transfected C2C12 myotubes with either an adenovirus encoding human ERG1 (HERG) or an appropriate control virus and, in both experimental groups, measured: 1) myotube size using ImageJ; 2) MuRF1 protein abundance using immunoblot; and 3) calpain activity in depolarized and non-depolarized myotubes using a Calpain-Glo Assay Kit (ProMega; Madison, WI). Indeed, our data reveal that, relative to controls, myotubes expressing HERG1 undergo atrophy, experiencing: 1) a 55% decrease in size; 2) an increased abundance of the UPP E3 ligase MuRF1; and 3) an 18% increase in calpain activity. We conclude that transfecting cultured C2C12 myotubes with a HERG encoding virus produces atrophic characteristics and is a good model for atrophy that involves up-regulation of the ERG1a channel.
Summer Antrim and Cristina Castillo, M.S.

First Scholars Program for First Generation Students

Building Leaders for Tomorrow

The State of Illinois collected demographic information for the students of Murphysboro High School have concluded that 99.7% of their 618 student population are considered low income. Out of the 618 students 39% are considered college ready (Illinois Report Card 2016). The college preparedness percentage was calculated from students scoring 21 or more on the ACT. Murphysboro has the highest percentage of students that are considered college ready out of the surrounding Southern Illinois area, but over the past three years the percentage of graduating seniors enrolling in a 2 or 4 year college between 12-16 months after graduation have dropped by at least 10% each year. As a first generation student in the First Scholars program I have created a senior service project that reaches out to these high school students in hopes to prepare prospective first gen students for their journey ahead. I am presenting workshops that focus on leadership, responsibility, and how to maximize their college experience. Multiple surveys will be given to the students before, during and after the workshop presentation in order to attempt to evaluate the thoughts, behaviors and attitudes of the students regarding their own college preparedness. The surveys will also be used to evaluate the mode of delivery and the effectiveness of the information presented.
Louisa Arseneau and Barbara Bickel
Women, Gender and Sexuality Studies

*Dreaming Diversity: Socially Engaged Art as Unity*

“Without leaps of imagination or dreaming, we lose the excitement of possibilities. Dreaming, after all is a form of planning.” –Gloria Steinem

In the recent political climate of the US and abroad, diversity has become a hot button issue. With talk of a wall being built, federally revoked bathroom rights for transgender students and a refugee crisis with no resolution, tension is at an all time high. Political ideologies are spilling out of Washington and affecting students throughout the nation including those at Southern Illinois University of Carbondale. Last year alone several high-profile instances of racism were reported that were related to SIU in some way. In times of social revolution art has always been a way to defy the current power structure and give a voice to the oppressed. Art that incorporates social engagement is becoming more vital as a method of encouraging acceptance of a diverse population and giving individuals a space where they can express themselves without judgement or fear. Nap-Ins, an inactive art installation intended to combine personal development, deep thought and aesthetics, is one type of art that seeks to combine social engagement and creative expression. The Gestare Art Collective created Nap-Ins at an artist residency in Vancouver, Canada. My research project includes attending the Dreaming Diversity Nap-In led by Dr. Barbara Bickel and her graduate level Socially Engaged Art class and facilitating a Nap-In on SIU’s campus. At the completion of these activities I will write an auto-ethnography that details my experiences during the Nap-Ins. Through this experience, I hope to find honesty and purpose and create a conscious space in which to examine diversity and a dream of an inclusive future.
Malika Ashford-Smith

NSF SI Energy Scholarship Program

Wind Energy

This poster provides information to educate students about wind energy. Wind energy is a form of solar energy. Wind turbines, whether it is a horizontal or vertical, turn wind into rotational kinetic energy which can be used to generate electricity. In addition, wind energy does not cause pollution, which means there is no carbon exposure for the environment. Overall, this poster teaches about some parts of wind energy and how it is created and used.
Rudy Bacette and Dr. Chad Drake

Department of Psychology

Examining the Effectiveness of Specific Mental Health Stigma

This study investigated severe mental health stigma measures and how effective they were in predicting social distance. This study was based on a previous study conducted by Isiah Thompson and Dr. Chad Drake, which examined implicit biases towards those with posttraumatic stress disorder. The experiment examined three general mental health stigma measures (i.e., Attitudes to Severe Mental Illness, Community Attitudes Toward the Mentally Ill, and Perceptions of Stigmatization by Others of Seeking Help) and one specific mental health measure (i.e., the Posttraumatic Stress Disorder Stigma Scale) to investigate whether there was a correlation between social distance toward PTSD, social distance toward mental illness in general, and the measures used in the study. The purpose was to investigate which of the mental health measures was best at predicting social distance and stigmatization for a specific mental illness (PTSD).
John Barron and Dr. Saikat Talapatra
Department of Physics

Energy Storage in Layered MoS2/Graphene Composite Devices

Electrochemical Double Layer Capacitors (EDLCs), also known as supercapacitors, have gained much attention in the furthering of research into electronic devices and energy storage. Supercapacitors are unique because they bridge the “gap” between conventional capacitors and batteries. Nanomaterials are of interest in building these devices for various reasons. Some have very high specific surface areas, some have unique and applicable electrical properties, and some are light-weight and flexible. The goal of this project was to evaluate electrode materials for supercapacitor devices made of a composite of atomically thin layers of Graphene and Molybdenum Disulfide (MoS2). Both materials were synthesized using a liquid phase exfoliation method. The devices built with the composite materials (of varying concentrations) were then tested using various electrochemical methods including cyclic voltammetry and galvanostatic charge-discharge to determine properties of the capacitors. One major motivation will be to optimize the concentration of MoS2/Graphene composite electrode to which gives the top electrical performance as a supercapacitor electrode. The results of these measurements and discussion will be presented.
Samuel Beard and Sarah Lewison

Department of Philosophy

Understory, The Center for Subsistence Research: Fostering Community and Self-Determinacy From Below Through Education, Collaboration and the Sharing of Food

Understory, or The Center for Subsistence Research, expounds and acts upon the idea that the only way we can begin to restore our connection with the planet and each other is through a radical shift in perspective and adopting a practice of social, economic and biological subsistence. Subsistence production generates the resources necessary for sustaining life itself — increasing community and personal autonomy, allowing for more freedom in the pursuit of “the good life.” Subsistence production can be juxtaposed with commodity production as the former is the creation of what is needed, while the latter is the creation of as many goods as is feasibly possible. In our short time in Carbondale, Understory has brought together hundreds of people from various ethnic, social and economic backgrounds, fostering that much-needed sense of community oneness. The idea is that by learning, cooking, creating and eating together we can build essential community ties and develop a critical and cross-disciplinary understanding of just how it is that we can begin to become self-determinate and create the future that we, as humans, deserve. Some specific accomplishments of the project include an exhibition of art from incarcerated men from Statesville Prison, instructional cooking and educational workshops, a monthly Kwanzaa Unity Feast and a running Free Lunch program. The proliferation of the subsistence perspective not only develops a new sense of what is necessary and what is possible, it fosters a horizontally democratic way of relating to each other and our locale. The project has successfully encouraged the reconstitution of isolated individuals into a diverse, playful and productive.
Isolation and identification of symbiotic and non-symbiotic bacterial strains for colonization of the Hawaiian bobtail squid.

All multicellular organisms enter into life-long beneficial associations with bacteria. However, how our immune systems distinguish between the beneficial and the harmful bacteria is still not fully known. We utilize the association between the bioluminescence marine bacterium, Vibrio fischeri, and the Hawaiian bobtailed squid, Euprymna scolopes, in the lab as a model for understanding beneficial host-bacterial interactions. The host squid has a symbiotic organ, the light organ, which is colonized only by V. fischeri. In addition, many components of the squids innate immune system are characterized which makes the hosts’ immune response to different environmental strains of V. fischeri, as well as non-symbiotic bacteria, tractable. To begin addressing our hypothesis, we needed to isolate bacterial strains that vary in their ability to colonize the host. To this end, we created a culture library of unknown bacterial strains isolated from artificial seawater and characterized colony morphology, growth in liquid media, gram characteristics and luminescence. Each strain was grown alongside the lab strain that is an already known colonizer with low bioluminescence, ES114. Three strains, HF001, HF003, and HF010 have been identified as V. fischeri by the bioluminescent property that each strain portrayed. Most of the other strains that were collected did not portray this property, but did resemble the phenotypic properties of V. fischeri in terms of being a Gram negative bacterium that is rod-shaped. All strains in our collection will be further identified using 16s DNA sequencing. Once sequenced, all strains will be assayed for their ability to colonize the squid host, either alone or in competition, and their ability to activate the hosts’ immune system.
Bell Inequalities Enhanced with PR Boxes

In quantum mechanics, two or more quantum systems can demonstrate certain behavior that cannot be simulated using classical physics. N.D. Mermin has described this phenomenon in terms of a game played by two separated parties who each have a box with 3 input settings and 2 outputs. If the parties have quantum boxes, they can score higher in this game than with just classical boxes. We look at modifying Mermin’s game by allowing the two classical boxes to be connected by a PR Box, which is a device that allows the boxes to be correlated but unable to communicate. Our interest is to see if this addition will allow the classical boxes to match or beat the quantum boxes in the game. We also look at what can happen if instead of using a PR Box we use a general no-signaling box. We find that even one PR Box performs strictly worse in the game than a general no-signaling box, and therefore multiple assisting PR Boxes are needed to maximize the performance of classical boxes. Through this research we hope to gain a better understanding of the differences between classical and quantum mechanics.
Rachel Berner and Dr. Matthew Giblin
Department of Criminology and Criminal Justice

*The Shadow of Sexual Assault*

Many people fear crime but research shows that women have a heightened fear of crime compared to men. There are plenty of reasons to fear crime. However, there is a particular reason why women fear crime. The shadow of sexual assault is a theory, that arose in the nineties, which seeks to explain this pattern. The theory states that the difference in levels of fear stems from a woman's fear of sexual assault. This fear of crime leads to particular constrained behaviors and practices such as carrying weapons for self-defense, walking on different paths at night that are well lit, not walking alone, and changing habits or behaviors in accordance to this fear of crime. In this study, it looks to explain the findings that women are more fearful of crime, even though in general crime they are less likely to be a victim. It looks at why they have that fear and how their behavior changes because of that fear. This study of 5000 students was done on six Illinois college campuses and conducted through surveys. The focus is on college age women, their fear of crime, and their constrained behaviors.
Courtney Bingel and Salim Al-Ani
Communication Disorders and Sciences Department

The Need for Electrophysiological Testing for Patients with COPD

Much of the research conducted in communication disorders, regarding physiological responses and changes in individuals with speech and language disorders has been conducted using behaviorally/observable methods such as standardized tests. There is no doubt that behavioral measures are good, but there is an understanding that there may be covert physiological events that may influence behavior which are otherwise not apparent. As a result, there is a need in our field for instrumentation that can capture those events that currently are not addressed. One such form of instrumentation is the BIOPAC system. The BIOPAC system is a combination of hardware and software that measures a variety of electrophysiological signals such as respiration, brain function, heart rate, and pulse oximetry to name a few. This system will allow the examiner to simultaneously view a wide variety of electrophysiological responses along with speech and/or swallowing signals in real time. The BIOPAC system is of benefit to communication disorders. It has important clinical advantages for individuals who have difficulty with speech and language. The main focus of our research is to examine pulse oximetry (PO) levels during the ingestion of a variety of bolus consistencies to better understand the relation among PO, age, and gender in healthy adults, and to examine and compare the same in a sample of individuals with severe COPD. For future research, we plan on continuing and expanding on this line of research. We have collected and will soon analyze additional data on healthy and COPD subjects, swallowing a larger bolus volume of 100 ml of water. Our current research used smaller bolus volumes and while PO levels showed statistically significant drops, none went below the 90% level. The 90% threshold is important in that PO levels at and below this level for a sustained period of time are dangerous.
Georg Philipp Telemann (1681-1767) was a prolific baroque composer. In 1705-06, Telemann held the position of Kapellmeister for the court of Count Erdmann II of Promnitz at Sorau, Poland. The focus of this research project was to discover aspects of Telemann’s compositions that have Polish characteristics, focusing on the polonaise and mazurka dances. By isolating time signatures, rhythms, and accent structure characteristic of these dances, we present criteria for considering a composition as Polish. In Telemann’s 1752 Six Duos for two Flutes, for example, all three of these criteria suggest that the Andante movement in Duo IV is distinctive of a polonaise. With this knowledge, the structure of baroque ornamentation and style of playing change significantly. Understanding the national influences behind these compositions provides a historically informed performance that better interprets the musical gestures of the composer.
Amanda Blocker, Laura Stevens, and Vjollca Konjufca, Ph.D.

Department of Microbiology

Uptake of particulate antigen by specialized epithelium in the avian bursa of Fabricius

The bursa of Fabricius is an organ unique to birds that is responsible for the generation of antibody responses and B cell development. It is located just above the cloaca and has a specialized function, cloacal sipping, which allows the bursa to “sample” intestinal antigens through peristaltic smooth muscle contractions. The bursa is comprised of folds and is covered by two distinct types of epithelia called interfollicular epithelium (IFE) and follicle-associated epithelium (FAE), which overlies individual follicles. The ability of the FAE to internalize antigens is known, but it has not been determined whether size has an impact on uptake. To address this question, we looked at the capacity of the FAE to take up particulate antigen of various sizes using 40 nm, 200 nm, and 500 nm nanoparticles (NPs) as model particulate antigens, administered directly to the cloaca. Bursal samples were analyzed 1 or 6 hours after NP administration and, based on our results, we found that uptake is both rapid and size-dependent. 40 nm NPs were efficiently taken up by the FAE 1 hour after administration and after 6 hours were heavily distributed within the FAE and deeper tissues of the follicles, which is where antigen processing occurs. 200 nm NPs were taken up by the FAE after one hour but were not extensively found in the follicles until six hours post-administration. Conversely, 500 nm NPs were minimally taken up and were primarily found along the surface of the IFE and scattered throughout the FAE after both one hour and six hours. The specific means of antigen transport and distribution are still unclear; however, the bursa is an ideal model organ for the investigation of antigen interaction at mucosal surfaces. Therefore, delineating mechanisms involved in antigen internalization could help advance the development of effective mucosal vaccines.
This project focuses on the motifs and attributes found on Roman sarcophagi featuring depictions of the Muses. Roman sarcophagi, decoratively carved vessels for receiving the dead, feature a variety of subject matter — from Dionysiac scenes to tales of heroic myth, the imagery on sarcophagi spotlight a wide possibility of themes. On sarcophagi featuring Muses, the nine Muses are typically presented with their attributes. While the attributes of most of the Muses appear only once, theatrical masks (which are the attributes of the Muses of Comedy and Tragedy, Thalia and Melpomene), frequently appear in multiples. Furthermore, these masks will sometimes appear next to other Muses to whom they do not belong. For example, Erato and Terpsichore both have lyres as their attributes, however, lyres only appear in depictions once, and are only located near the Muse to which they were attributed. I seek to find what particular associations masks carried within the Roman visual imagination that might account for their unexpected repetition within the visual repertoire of sarcophagus reliefs. To gain critical traction on this question, I rely on quantitative analysis of the surviving corpus of Roman sarcophagi. Working through the field’s standard compendia, the multiple volumes of the Antike Sarkophag-Reliefs series, I record every appearance of a mask to gain insight into the patterns of their appearance, and interpret the meaning of these multiple masks. Overall, I have found that these masks, more than any other attribute, function as a symbolic representation of the muses as a whole.
Ashley Booth and Tao Huang
Department of Industrial Design

Sustainability and Resilience of Southern Illinois Communities

My project focuses on investigating sustainability issues in Southern Illinois, particularly concerning disaster resilience and resource sustainability. Communities in Southern Illinois face multiple environmental and economic challenges, mainly the depletion of a major resource, coal, and the high probability of natural disasters. To find how these issues are being addressed, products and policies that aim to help victims of natural disasters and the subsequent rebuilding of communities were considered. In order to help build resilience to natural disasters, prevention of the cascading effects of disasters must be addressed. Therefore, the analysis of interactions between food, water, and energy in the Water-Food-Energy Nexus has been conducted to understand how communities could be better prepared and bounce back quickly after disasters strike. Additionally, the analysis of government policy regarding the environment, the impact of nature on the economy, the methods and ethics of permaculture, and the marginal agriculture system in the Southern Illinois region is conducted. This multi-issue analysis helps to explore many opportunities for improvement in policies, products, and GIS models. The findings will be included in a paper and will be open for further discussion and research.
Christopher Bretscher, Elizabeth Blalock, Bryce Benefield, Alexis Ortiz, Emma Johns, Matthew Gunn, Norka Rabinovich, and David G. Gilbert, PhD

Department of Psychology

*Magnetic Resonance Imaging and Electrocortical Brain Responses in Inhibitory Control*

Individual differences in depressive, neurotic, and impulsive traits predict smoking onset and progression towards nicotine dependence. These smoking-related traits are associated with abnormal resting-state (RS) functional connectivity (FC) in the default mode network (DMN) and reduced frontal lobe brain activity. The GoNoGo inhibitory control task we used presents three trial types: 1) frequent Go stimuli (white dots), 2) infrequent Go stimuli (yellow dots), and 3) NoGo stimuli (blue dots) that occurred with a probability of 75%, 12.5%, and 12.5%, respectively (N=538). Stimulus onset asynchronies were 1200ms. Participants were asked to respond quickly with the onset of Go stimuli and to withhold response on the NoGo stimuli. We are testing the hypothesis that individuals who have increased smoking rates across 15-months will exhibit unique RS blood oxygen level dependent (BOLD) fMRI patterns, including: 1) diminished FC among three large neural networks: executive control network (ECN), default mode network (DMN), and salience network (SN), as assessed by the Resource Allocation Index (RAI), and 2) decreased GoNoGo task-related activity in the right inferior frontal gyrus (rIFG) and superior frontal gyrus compared to those who decreased their smoking. Large RS RAI values reflect a high degree of positively correlated synchronization of the SN with the ECN and/or an anticorrelation of SN with DMN activity. Findings from our first 30 participants show the rIFG, the superior frontal gyrus, and the parietal lobes to have greater BOLD activation during NoGo inhibitory trials than during infrequent Go trials. EEG-based tomographic analyses have replicated these fMRI findings by showing strong and significantly greater current source density during NoGo trials than infrequent Go trials in the rIFG, superior frontal gyrus, anterior cingulate gyrus and parietal lobe; and EEG differences that correlated with trait impulsivity and depression. Future analyses will assess relationships of EEG and fMRI measures to smoking trajectories.
As any fashion forecaster knows, it takes a numerous amount of research, observation, statistics and much more to predict future fashion trends. Once a particular style (item, silhouette, design variation), raw material (fabric, findings, trims), and color/s (prints, motifs) hit the runway, retailers are instantly finding ways to sell a similar look in stores. Consumers then look for those similar products to buy from retailers. However, usually most fashion forecasters try to predict future trends through the use of surveys and questionnaires, but sometimes you get more accurate answers through seeing what people are actually wearing. We know some consumers instantly adopt new fashion trends, but are they always adopted and is the trend always predicted correctly? Therefore, the purpose of this study is to investigate if fashion trends are correctly predicted based on fashion forecasting agencies. Furthermore, the importance of this research will benefit the fashion industry, by seeing how accurately they predicted the trends for spring 2017. This research will focus mainly on new fashion trends and its prediction accurateness. Some questions would be: What are the actual fashion trends for spring 2017? Were the predicted trends widely adopted or partially adopted? And as technology continues to grow, does it tend to help predict upcoming fashion trends more accurately? For this study, as far as research goes, the method we will be pursuing is mixed method research. This will consist of qualitative research “content analysis”, as well as quantitative “in depth observations” of street style trends in Carbondale’s own University Mall. This will help supply the precise information, to answer all of the above enquiries. The results provided from this study will assist forecasters, advertisers, marketers, as well as retailers to acquire the most recent fashion trends as much as possible. Plus fashion students and the general public can benefits from this research as well.
As the world becomes more connected, the demand on network infrastructure has increased. To meet these challenges, new technologies have been developed to deal with the stress of increasing data transfers between the internet and local networks. Two of these technologies have been Software Defined Networking (SDN) and Wireless Mesh Networking (WMN). Traditional networking protocols require a physical connection between wireless access points to transmit data to end users from external networks. This is can be a challenge in certain scenarios as it requires existing infrastructure to provide sufficient network coverage, which is costly to implement and impossible in certain situations. WMN allows for traffic to be transmitted wirelessly through a network of nodes without having to rely on physical network connections. Current WMN implementations rely on a distributed protocol, in which sets of routing nodes calculate the quickest path to other nodes in the network. These calculations are expensive for individual nodes and provide little control to network administrators over the behavior of network traffic. Conversely, current SDN implementations rely on a centralized controller to calculate data paths between network nodes. WMNs have been successful in both research and live environments, as have SDNs, but few cases exist where these technologies work concurrently. This research aims at combining these technologies to provide a wireless network where network rules are determined by a centralized controller employing the OpenFlow protocol. A virtual machine will run Floodlight, an open source SDN controller, to communicate with individual nodes running Open vSwitch, an open source implementation of a distributed virtual multilayer switch. These nodes will be created by running Open vSwitch on inexpensive routers running an embedded Linux-based distribution. The goal of implementing these technologies is to test the viability of a Software Defined Wireless Mesh Network's capacity to replace current networking infrastructures.
feel like, look like, open-up: visual documentation of experimental social practice and Fresh Food

Community is a group of interdependent people who share the same interest, goal, or agenda in one space or surrounding area. Interdependence is the mutual reliance in relationships. In order for community to work interdependent groups must be active, and the effect of interdependent groups working together creates community. Social roles determine what individuals are accountable for in their daily lives. Among all primates, humans and animals alike, accountability develops environments surrounding, each person, and events that follow. A lack of accountability hinders respect, understanding, and organization within community. Subsequently accountability promotes awareness of community and sustainable efforts for those to come ‘after’ us. ‘The Center for Subsistence Research’ is an experimental investigation of how to create and maintain community interdependence in Carbondale. It is an artistic space that host community events. Documentation informs bodies of people about social, and political circulation. Documentation provides a body, a mark or a stamp embodying what goes on in a community. In my community my roles is a photojournalist. Every Saturday an interdependent group came together for various events. As people would come in, old and new, I watched through my camera lens as people tried to find their place in the kitchen. At this kitchen the meals are free because we bring food, and recipes to be shared; that is how everyone is accountable. My documentation is my accountability for my community. I provided a collection of audio, video, and photography of people in my community at ‘The Kitchen’. ‘The Center for Subsistence Research’ has taught me accountability within my community, improved my skills as a photojournalist, and how I can apply this knowledge to my future; transpire what it means to live and grow together.
Examination of the Corpus Callosum in Adolescents with and without Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) consists of a group of complex neurodevelopment disorders characterized by repetitive patterns of behavior and difficulties with social communication and interaction. ASD has a prevalence approaching 1%, although it is diagnosed much more frequently in boys (1/42) than in girls (1/189). Symptoms often appear in late infancy or early childhood. The cause of autism is unknown, but likely involves abnormal brain development. The corpus callosum is the major structure connecting the left and right hemispheres of the brain, and therefore plays a critical role in coordinating communication between brain regions. Some studies have suggested that aberrations in the corpus callosum’s function contributes to the symptoms of ASD. We hypothesized that this dysfunction would be reflected in a smaller corpus callosum in ASD versus control subjects. Adolescent (aged 13-19) subjects diagnosed with ASD were selected from Brehm Preparatory School in Carbondale, IL (n = 1) and a University of California Los Angeles database (n = 17); control participants (n = 13) were recruited through flyers and word of mouth from southern Illinois. Magnetic Resonance Imaging (MRI) was used to scan each subject’s brain. Using the midsagittal slice, the area of the corpus callosum was measured and normalized to the total brain area. Our results indicated that brain size had no effect on the overall size of the corpus callosum. In addition, contrary to expectations, our results revealed no difference in the size of the corpus callosum between control and ASD subjects. An analysis of other potential structural differences between subjects is currently underway.
In this two part, experimental and cross-sectional study, the influence of perceived stress and social support on undergraduate students’ decision to persist at a university was examined. Undergraduates (78) responded to one of two vignettes (student experiencing stress receiving social support or no social support) and also completed a survey with scales consisting of the Perceived Stress Questionnaire (PSS), Social Support Questionnaire (SSQ) and Degree Commitment Questionnaire. The objective in this study was to determine if there was a relationship between perceived stress, social support and a students’ decision to persist at a university. It was found that the student who was perceived as receiving greater social support would be more likely to persist within a university. Also, first generation college students (n = 35) reported having a significantly lower level of stress relative to non-first generation college students (n = 42). In addition to this, ethnic minority students reported having a significantly higher level of stress and lower level of social support than their non-minority peers.
The development of all organisms depends upon the coordination of multiple cellular processes in both time and space. Polarized tip growth is an important example of such spatiotemporal organization that occurs in both plants and fungi. In tip growing cells, the cell growth machinery is focused to expand one region of the cell. Previous studies from other research groups discovered that the Armadillo Repeat Kinesin 1 (ARK1) is necessary for proper tip growth of root hairs in the model plant Arabidopsis thaliana. Root hairs in the ark1 mutant do not grow straight and occasionally branch, suggesting that the kinesin is needed to maintain the directionality of tip growth. The objective of our research is recover and verify the ark1 mutant phenotype in our laboratory so that we can pursue further studies on the role of this protein in tip growth.
Histology, the study of the microanatomy and function of bodily tissues, is a vital component of medical diagnostics. While my own field work did not center around a single research “question”, work from the histology lab has research implications and is a major supporting component of other research projects across a broad range of fields. Using various case studies and outlining the histological process from intake to slide mounting, I will demonstrate how the preparation of tissues, along with microscopic analysis, has served dual diagnostic and research purposes. I will further demonstrate how the method of slide and dye processing is vital to the viability of a tissue sample, as well as how histological evidence is used within a medical diagnostic context.
Alana Cade and Dr. Seung-Hee Lee
Department of Fashion Design and Merchandising

Are You Up to the Beauty Standards?

We can date back hundreds of years and see how much the way we looked or carried ourselves has changed. Influenced by those who were seen as ones to follow, in the way we wear makeup or in how specifically proportioned our body measurements are. In today’s world, more than ever, there is an incline of people doing what they can to look like the next person on television or on the cover of a magazine. It is a never ending cycle when it comes to trying to fit into the standards of beauty. Even so, it will be a bigger challenge to change and add to what is true beauty. To emphasis the purpose of this study, is to address what the current beauty standards really are, find methods to how they have been used in the fashion industry and create a solution to how we can completely alter these standards for a greater good. This study will focus more on the American culture and how it influences other cultures from other countries like Europe and Asia. Developing answers from these questions: What are beauty standards really based off of? Who follows them the most? Who influences these standards the most? How can we change beauty standards? Or are they set in stone? Using the qualitative research method with the use of popular social media sites, magazines and blogs, to collect detailed information to find the answers to these questions for women around the world who show a stronger sensitivity to this topic, those who produce and make profit off of these standards, and for those who teach in any field that pertains to beauty.
Aleta Cardinal and Anthony Fleege

Department of Mortuary Science & Funeral Services

The "greening" of funeral service: the history, barriers, and future of the green burial movement.

The purpose of this research project is to identify the barriers the green burial movement has struggled with, and what steps need to be taken to overcome those barriers. To do this I will research the past trends in funeral service, the current trends, societal beliefs about death and dead bodies, the death positive movement, the history behind funeral service becoming a trade business, how religions play an important role, economic and ecological statistics and concerns. The green burial movement will be defined and looked at under a critical lens, and the difference between natural burial and green burial will be addressed. After these aspects are thoroughly explained I will dive into what the future possibilities are for the green burial movement. Using my diverse experiences as a member of the funeral industry, I am confident I will maintain an unbiased approach in this research project.
Jordan Caylor and Dr. Harvey Henson

Department of Geology


Fort Kaskaskia is a protected Illinois historical site that was constructed by the French army in 1759 or 1760 however, the fort’s construction was never completed. In 1765 the fort was occupied by the British military, in 1803 the U.S. army was stationed there, and it was even used as a refuge for farmers in 1812 (Orser & Karamanski 1977). This project aims to detect shallow geophysical anomalies that may indicate of buried artifacts, and to investigate a previous anomaly that was found North of the fort using a magnetic survey (Weymouth & Woods). The investigation was conducted over several months which included historical, field, and laboratory research. By combining Electromagnetic Induction (EMI), and Ground Penetrating Radar (GPR) we attempted to locate archeologically important structures in the shallow subsurface. Using the programs Surfer 9 and Radan we processed the data by statistical analysis, and signal processing to improve the signal to noise ratio which greatly increased the resolution of the maps we then created. Our field surveys found several interesting anomalies which support the belief that there are buried artifacts that were left behind by the inhabitants of the fort in “The New World”.
Chongwen Chen and Karen Johnson

Department of Aviation Technologies

Animation of Aircraft Hydraulic Schematics

This project, Animation of Aircraft Hydraulic Schematics is for use in the AVT204 Aircraft Hydraulics course in the Aviation Maintenance Technologies program. This project uses Adobe Illustrator to illustrate hydraulic schematics, which the Center for Teaching Excellence will then turn into animations. In order to do that, you must determine all the rules for each component. For example, selector valves have several ways to be connected into a system and those ways require other certain components. There are over twenty different types of components to determine rules for. This project's goal is for this animation to give students a better understanding of the hydraulic system. As you may know, hydraulic systems are one of the most important parts of an aircraft. It is crucial for students to fully understand how these systems work and to also know every possibility of how the hydraulic components can work with each other. However, it can be challenging for students to obtain a solid foundation by just seeing the pictures in a textbook. Therefore, the goal of this project is to create a program that allows students to connect the components together to create their own hydraulic system. Students can apply what they learned in class to create a working hydraulic system and the program will show them whether or not there are problems in the hydraulic system they created. The next phase of this project will be to introduce faults for troubleshooting and the final phase will be gamification of the program.
Assessing the Relationship between Hypermasculinity/Aggression and Mental Illness (Anxiety) in Men

The purpose of this study was to examine explicit and implicit aggression attitudes among men aged 18-30. I also determined whether aggression attitudes in men relate to mental health outcomes (anxiety specifically). The Auburn Differential Masculinity Index (ADMI-60) was used to assess explicit aggression attitudes. The Implicit Association Test (IAT) was used to measure implicit attitudes toward aggression. The Beck Anxiety Inventory was used to assess the level of anxiety in participants. Participants were administered an informed consent form. After, they completed the Auburn Differential Masculinity Index to measure explicit attitudes. This was followed by the IAT to examine implicit bias. D-scores reflected the degree to which persons possess a bias toward hypermasculinity and aggression (i.e., high d-scores reflect greater hypermasculinity and aggression). I performed a hierarchical regression analysis to test my hypothesis that greater hypermasculinity and aggression was predictive of poorer mental health outcomes for young adult males.
Brittan Cobb¹, Felicity Reiman¹, Clayton Whitmore¹, Abhinav Adhikari², Judy Davie², and Amber Pond¹

¹Department of Anatomy
²Department of Biochemistry

The Cytokine Interferon gamma Induces Expression of Cyclophilin, but not the ERG1a K⁺ Channel Gene in Mouse Skeletal Muscle

Skeletal muscle atrophy is a potentially debilitating decrease in muscle mass that results from muscle disuse (e.g., with injury and bedrest), many diseases, and normal aging. We have shown that the ERG1a K⁺ channel is up-regulated in atrophic skeletal muscle of mice and that over-expression of Erg1a increases proteolysis in normal mouse skeletal muscle. Because ERG1a co-immunoprecipitates with receptors of proinflammatory cytokines which induce protein degradation in skeletal muscle, we hypothesized that the cytokine interferon gamma (IFNγ) would induce transcription of the Erg1a gene in muscle. To test our hypothesis, we treated six mice with 1.69x10⁵ units of IFNg: 1.5x10⁵ units encapsulated by liposome injected intraperitoneally and 1.9x10⁴ units by tail vein injection. Six mice were treated with vehicle as control. We harvested plasma and Gastrocnemius muscles after 10 (n=6; 3 each group) and 24 hours. ELISA demonstrated that plasma IFNγ levels averaged 3560±1167 SEM pg/mL after 10 hours while no IFNγ was detected in plasma after 24 hours. Quantitative PCR was used to probe Gastrocnemius muscles for cyclophilinA, a marker of gene modulation by cytokines, and Erg1a. Data showed that cyclophilinA expression increased an average 142 fold±32 SEM after 10 hours and an average 125 fold±97 SEM after 24 hours. Contrary to our hypothesis, IFNγ had no effect on Erg1a expression. It is possible that higher or lower doses of IFNγ could affect Erg1a expression; however, higher doses are not likely to be physiologically relevant and an earlier attempt of this study using a lower IFNγ dose also yielded negative results. It is also possible that longer treatments could produce Erg1a expression. Obviously, our animal work is not exhaustive; however, more extensive work with cell culture has produced only weak evidence of Erg1a expression in response to IFNγ. Thus, we conclude that IFNγ does not affect physiological Erg1a expression.
Koleton Cochran and Jared Porter Ph.D.

Department of Kinesiology

The effects of virtual reality on motor behavior: Applications to physical therapy

The future applications for virtual reality seem to be truly limitless. By utilizing the latest technology in 3-D visuals and sounds, virtual reality systems (e.g., Oculus Rift) claim to “trick” the human brain into believing that what it sees is real. If this claim is accurate, then the practical applications of using this technology could be used to revolutionize the physical therapy industry. The primary purpose of this study is to investigate if practicing a motor skill in virtual reality results in similar movement and learning benefits compared to practicing a motor skill in real life. A secondary purpose of this study is to evaluate what motor behavioral changes occur as a person practices a motor skill in virtual reality in comparison to practicing using traditional established practice methods. Participants will be assigned to one of four experimental conditions. One condition will practice a motor skill in real-life using traditional practice methods. Another group will practice the motor skill in virtual reality using the Oculus Rift. The two groups will all take the same pre-test before testing begins. Each group will then practice a physical therapy oriented motor skill for two days. The groups will then be given the same posttest following the second day of practice. The motor behavior and learning measures will then be compared between the groups to evaluate if differences exist. We expect to see that practicing the motor skill in virtual reality results in changes in motor behavior compared to practicing the skill in real-life. Such a finding would suggest that using virtual reality is an effective way to learn a motor skill and could be used as an alternative form of physical therapy.
Lee Cooper, Hallie Martin, Ren Jing, Matthew Gross, Cody Lingle, and Dr. Nancy Martin

School of Information Systems and Applied Technologies

*Ascend SIU Student Chapter Website*

Our team has created a web application for the Ascend Student Chapter at SIU. This website is being created to help the organization schedule events, track event participation, learn about the regional and national conferences, and provide details about the student chapter and the members involved. There are five types of users on the website: Administrators (President, Vice-President), Committee Heads (Workshop, Community Services, Social, Fundraising), Treasurer, Secretary, and Member. Administrators of the site can accept and reject member sign ups, manage events, manage member points, and change the general content of the website. The heads of the four committees (Workshop, Community Services, Social, and Fundraising) are able to manage events and track member events attendance for each of their committees. The secretary may also manage and view all member points. Members are able to view general information on the site as well as event and conference information. During the development of the web application, our team used the Agile / Scrum methodology. We met twice a week for standup meetings and integration over two week sprint intervals. We also used these meetings for sprint planning and retrospectives, which helped us plan and estimate our work as well as look back and see what the team did well, what could be improved, and the changes we would make for the next sprint. The website was created using the Model, View, Controller (MVC) Framework and developed with the following technologies: HTML w/ Semantic UI Framework, ASP.NET Core, PostgreSQL, Docker, Balsamiq Mockups, and Visual Studio Team Services.
Exploring eDNA methodologies as a way to detect relationship between Anchovies and Krill in Monterey Bay Canyon

My research used environmental DNA (eDNA) to look at the distribution of zooplankton in Monterey Bay, California. eDNA is material that is sloughed by animals and does not require sampling live or whole organisms. In the fall months of 2013 through 2015 there was an increase in whale sightings and their prey, anchovies in Monterey Bay Canyon relative to the previous years (2010-2012). Was this increase in anchovies and subsequent whale sightings related to an increase in zooplankton? We hypothesized that zooplankton DNA would be present in large amounts in the environmental samples collected during 2013-2015. The second hypothesis is that zooplankton are less abundant over the shallow shelf than over deeper the slope. Zooplankton vertically migrate to escape predation and are not able to migrate deeply over the shelf. DNA was extracted from water samples procured at C1 Coastal Station in Monterey Bay during the fall months of 2010 through 2015 for the anchovy and whale study. Similar extractions were performed from a cruise in Monterey Bay in October 2015 when samples were collected over the shelf and slope. Polymerase Chain Reaction (PCR) was used to amplify the extracted DNA for the mitochondrial cytochrome oxidase gene, targeting invertebrates. After receiving the correct amplicons a PCR cleanup was done and the final target DNA was sent to Stanford University to be sequenced by MiSeq.
University Museum Market Research and Social Media

Using social media as a tool to track the attendance of the University Museum for the hope of increasing the SIU college level target audience. By using social media outlets such as Instagram, Facebook, Twitter, and YouTube my research is to obtain three main goals. To reach out to SIU students about the University Museum's programing and educational value that the Museum regardless of their major. Community outreach for our patrons in or around the Carbondale, Illinois area and other patrons further away. Fundraising and increased in museum attendance. While using Social media platforms, we were able to raise over $11,000 for the day of giving event. While this was a great success we have been using the benefits of social media to reach out to our patrons for future programming and fundraising. Having onsite interactive components to our exhibit helps the patrons connect to the University Museum's collection and exhibits in new ways. Using Instagram to host a Pokemon Go event, patrons find Pokemon in our exhibits while given a walking tour of the sculpture park then tagging us on Instagram. This event is helping to promote fun activities and spreading the word about the University Museum. We also combined a white board, in a form of a jumbo political button, where patrons could view our political button collection from the Jerome M. Mileur collection and then make their own campaign slogan on our button then post to Instagram and tag us. These events helped to reach out to SIU students and community members to enjoy our exhibits in exciting ways. Creating the accounts and securing the University Museum's presence on various social networking sites helped to educate SIU students of the University Museum, while bringing our existing patrons information and exciting ways to enjoy our collections.
Impacts of Stream Restoration on Food Webs

Ecosystems are closely linked by flows of materials and the movements of organisms. Streams are closely linked to riparian habitats via reciprocal subsidies across the land-water interface. Stream restoration is emerging as a go-to approach for addressing water resource issues as river managers turn from hard engineering solutions to ecologically based restoration activities to improve degraded waterways. These in-stream activities can alter subsidies to terrestrial habitats and impact riparian consumers. We examined the isotopic signatures (O and H) of spiders collected three stream restoration projects in Wisconsin and Indiana to examine how these stream restorations may be impacting prey availability and diet for riparian spiders. There were no significant differences between restored and unrestored reaches but there were significant differences between sites (p<0.001). The goal of a stream restoration project is to maintain or increase ecosystem goods and services while protecting downstream and costal ecosystems. Monitoring was reported in only 10% of projects and there are disagreements on what constitutes a successful restoration project as project goals are often unclear and post-restoration monitoring limited.
Are provisional species of Hyalella azteca capable of producing viable offspring, and are the resulting offspring less able to handle environmental challenges?

The widespread use of pyrethroid insecticides to control pests in terrestrial landscapes has resulted in adverse effects to organisms in aquatic environments. One prevalent benthic amphipod, Hyalella azteca, is commonly used as a species for toxicological testing because they are easy to culture, have broad geographic distribution, and can tolerate a wide variety of environmental conditions. In California, H. azteca have been found in areas where pyrethroid concentrations are elevated and should be causing mortality; however, healthy populations of H. azteca exist and have been documented to have developed pyrethroid resistance. Southern Illinois University houses pyrethroid-resistant and non-resistant H. azteca populations that are separate provisional species due to an approximate 17% difference in their mitochondrial cytochrome c oxidase subunit 1 (COI) genes. The high level of genetic divergence is of concern because these provisional species cannot be separated based on morphological differences, as H. azteca is a cryptic species complex. Additionally, the resistant population has been documented to have lower sodium chloride tolerance than the non-resistant population. This raises additional concern about use of H. azteca as a test species for toxicological testing, because they are currently used in testing freshwater and estuarine systems, thanks to their tolerance to varying salinity levels. Recently, the resistant and non-resistant populations were successfully crossbred to create hybrid offspring. The resulting F1 generation; however, have failed to produce an F2 population in preliminary studies, suggesting that F1 organisms may be sterile. To further examine this issue, the ability of F1 organisms to produce offspring with other F1 animals or either parent population will be tested. Additionally, a sodium chloride toxicity test will be conducted comparing the tolerance of the parent populations and the F1 offspring. These tests will help shed light on questions revolving around the use of H. azteca as a standard toxicological test species.
Lauren DeRossett and Andrew Sharp

Department of Physiology

Selective Expression of Channel Rhodopsin 2 in Proprioceptive Neurons Using the Parvalbumin Promoter

Proper development of sensory and motor neurons is integral to the function of the peripheral nervous system. Proprioceptive neurons, a population of specialized sensory neurons, enable organisms to experience a sense of spatial orientation. Chicken embryos are ideal model organisms for the study of developing proprioceptive neurons because their development mirrors that of the human fetus. To better understand proprioception, it is essential to study how proprioceptive neurons develop. Typically, the means to do so would be invasive, damaging the cells. New optogenetic methods permit less invasive means of studying cellular development by utilizing heterologous expression of light-responsive proteins that can be evoked to change physiological function in vivo by light activation. Among the sensory neuron population, the parvalbumin promoter only drives expression in proprioceptive neurons. To further the study of development and function, the parvalbumin promoter has been cloned into a plasmid and coupled with a transposon system to drive stable expression of light-activated proteins in proprioceptive neurons. Standard molecular cloning techniques such as mutagenic PCR were employed to amplify and isolate the parvalbumin promoter sequence and replace the CAG promoter in a standard channel rhodopsin 2 expression plasmid, pPB-ChIEF-Tom, prior to transformation in E. coli. The resulting plasmid was named pPB-PARV-ChIEF-Tom. Embryonic day 2 chickens can then be injected with the transposon system containing pPB-PARV-ChIEF-Tom and CAGPBase. Stable expression in vivo will allow for the further study of proprioceptive development by enabling light-activated stimulation of the proprioceptive neuron population. Further study of proprioception can be conducted in the early stages of life by using the parvalbumin promoter to drive selective expression of light-responsive proteins.
Palmer amaranth (*Amaranthus palmeri*) is becoming a noxious weed in Midwestern agricultural fields. One reason for this rapid spread is that a single Palmer amaranth plant may produce over 400,000 seeds. Also, each plant only has male or female reproductive structures, leading to greater genetic diversity and the spread of herbicide-resistant genes through obligate outcrossing. Some introductions of Palmer amaranth to the upper-Midwest (especially Iowa) can be traced back to the introduction of native seed mixes that mistakenly contain Palmer seeds. The irony of the situation is that conservation programs have incentivized the use of these native seed mixes in order to promote pollinator resource establishment and health. These mixes are not tested for weed seed because many of the labels claim that the mixes are "weed free". This is a fairly recent occurrence in that contamination did not appear until the 2016 field season. Being able to identify both noxious weeds and native plants early in the season would allow growers to get a head start on preventing catastrophe in their fields. Although there are many guides to identifying noxious weeds, there are very few native plant identification guides for land managers. This Native Plant Seedling Identification Guide documents the characteristics of 34 native plant species (29 broadleaves and 5 grasses) for identification in the first stages of growth, so that they can be distinguished from invasive plant species. The guide will be accessible on electronic devices, as well as in print, so that growers looking to conserve land can easily diagnose a swift invasion of their crop fields.
Dakota Discepolo and Erin Venable

Department of Animal Science

Validating the efficacy of working canine decontamination

Disaster canines are often needed to work in environments that are contaminated with a variety of toxic substances. However, little data is available validating the decontamination protocol that is utilized for FEMA canines when working in contaminated environments. The objective of this study was to validate the effectiveness of the decontamination protocol currently utilized by FEMA teams. A pseudo-contaminant was applied to twelve dogs in a blinded study repeated with two treatment protocols. The pseudo-contaminant used (oil-based Glo-Germ®) was dosed on the canines in four locations. Each canine completed a mock search scenario and reported to decontamination immediately following. Protocol A (DHS 2012) utilized stiff bristle brushes, non-specific pet shampoo, and a double rinse system. Protocol B utilized a rubber grooming brush, Johnson & Johnson’s ® baby shampoo, the addition of a grated floor to facilitate drainage of the gray water, and a double rinse system. Pre- and post- decontamination images were captured for each previously mentioned anatomical location and were scored using a 0-3 scale for contaminant reduction. Data were analyzed using PROC FREQ procedure of SAS (version 9.4) as a Chi Square for each treatment and location. Our data indicate that minor adjustments to the current decontamination protocol may increase efficiency of working canine decontamination. However, data also reveal that even with modification, canine decontamination may be compromised by our current understanding.
Europe Doan and Judy Davie
School of Medicine

Investigating TCEAL7 as a Tumor Suppressor Gene in the Pediatric Cancer, Rhabdomyosarcoma.

Rhabdomyosarcoma (RMS) is the most common form of soft tissue cancer among children and young adults. RMS is a highly malignant cancer that derives from skeletal muscle precursors that do not differentiate into normal muscle. The Myogenic Regulatory Factors (MRFs) are a family of transcription factors that are the main initiators for the terminal differentiation of skeletal muscle. It is thought that MRFs are blocked from completing this task in RMS by unknown mechanisms. It is plausible that the down regulation of the transcriptional regulatory protein TCEAL7 may cause the inactivity of the MRFs or the oncogenesis of RMS. TCEAL7 is a candidate for a tumor suppressor gene in RMS. TCEAL7 is down-regulated in many cancer cell lines, including 95% of epithelial ovarian cancer cell lines. We have found that TCEAL7 is down regulated in RMS cells. We have found that over-expressing TCEAL7 in an RMS cell line causes a decrease in proliferation, decrease in motility, repression of independent anchorage growth, and decrease in expression of the oncogene Cyclin D1. We have also found that TCEAL7 directly binds to the Cyclin D1 promoter, suggesting that Cyclin D1 is directly regulated by TCEAL7. Additionally, we have found that forced expression of MRFs in RMS cells rescues expression of TCEAL7.

Funding: REACH at Southern Illinois University Carbondale, Center for Undergraduate Research and Creative Activities at Southern Illinois University Carbondale, and Southern Illinois Bridges to the Baccalaureate Program supported this research.
The purpose of this creative activity was to research, update and expand the Student Corner page on the Tobacco Free! Curriculum (http://tobaccofree.siu.edu) website. Faculty are often assigned a course or topic they have little or no background on. In addition, they have little time or training to create a teaching module on this topic. The Tobacco Free! Curriculum provides oral healthcare instructors with a comprehensive, evidence-based six-module teaching resource including power points, talking notes, lesson plans, learning resources and a self-study learning module in an open source format. The web site also contains a Student Corner, which provides students with resources and project examples to aid them in class assignments, poster and educational presentations or provide actual tobacco treatment in a clinical setting. This project included research on current evidence-based tobacco-treatment best practices, government and non-for-profit resources and clinical case studies. The updated resources include a summary paragraph and a link to the actual tobacco resource. This will allow the students to gain access to the most current and best practices in tobacco prevention and treatment. Patient case studies will be created and added to the Student Corner so students may practice a simulated clinical application of their tobacco treatment knowledge.
Kevin Drake and Lisa Morrisette

Department of Radio, Television, and Digital Media

Celtic Connections

*Celtic Connections* is a radio program that has been produced locally in in the studios of WSIU for many years. This program, distributed to National Public Radio stations nationwide, is designed to expose audiences to the rich culture of Celtic traditional music. Artists from areas such as Ireland, Scotland, Brittany, Wales, and many other places around the world have their music selected by the show’s host Bryan Kelso Crow, who also provides personal insights and details of the songs and tunes. As assistant producer of this nationally-syndicated program, I have learned to compile necessary CD tracks, record the host’s voice-overs, arrange said voice-overs and tracks in Adobe Audition audio software, upload finished episodes for other stations to receive, and maintain fluid communication with the head producer and host on a regular basis in order to provide the best production possible for mass consumption by a national audience. I have also learned techniques of microphone placement and working with mixing consoles to facilitate the live recording of special interviews. I worked with the head producer to resolve occasionally-apparent production issues such as timing on segments. My work on *Celtic Connections* has been to facilitate consistent production of episodes on a weekly basis and to help further knowledge and appreciation of Celtic traditional music amongst radio audiences across the United States.
Logan Druessel and Dr. Brent Bany

Department of Physiology

Abstract was asked to be omitted from booklet
Patrick Dudczyk and Garth V. Crosby

Department of Engineering Technology

*Developing, Testing, and Delivering a Lab-Intensive Course Online*

There is a broad consensus in Science, Technology, Engineering and Mathematics (STEM) academia and accreditation bodies that engineering and engineering technology courses with intensive lab activities can be delivered online. There is ample prior research that assessed the pedagogical effectiveness of lab intensive course delivered in a distance education format. Yet, ABET (Accreditation Board for Engineering and Technology) has only a handful of listed accredited online engineering and technology programs at its website. In an effort to increase accessibility to non-traditional students seeking to advance their career in STEM, a new lab intensive online Electrical Engineering Technology program was recently launched. This poster presents the results of a 2 year pilot study of the development and delivery of the lab component of one of the “hands-on intensive” courses in this program. The course was Digital Fundamentals, a technical core requirement for Electrical Engineering Technology. The overall objective of the project was to determine the feasibility and pedagogical effectiveness of online lab experiences in an Electrical Engineering Technology course. The research questions were: i) Can Electrical Engineering Technology lab intensive courses be delivered in a distance education (online) format while maintaining the rigor required to meet the ABET student outcomes? ii) Can lab teamwork be encouraged and maintained in an online setting? iii) Can the integrity of assessment processes be maintained? iv) Can the pedagogical effectiveness of the lab experiences be evaluated? Initial results indicate that the students performed as good as, and in some cases even better than, students who conducted the experiments in the on-campus facility. A survey is being prepared to evaluate students’ perception and attitude towards the distance education labs. The results are expected to indicate that these labs were seen as comparable to the traditional labs in the on-campus facility.
Heather Duzan and Claudia Peter-Hagene

Department of Psychology

The effect of gruesome evidence on a mock juror’s judgements

The American jury involves regular citizens who have to make important decisions based on evidence that often has a high emotional content (e.g., gruesome post-mortem photographs), especially in high-stakes court cases such as murder. Judges have taken into account in some instances the emotionality of evidence such as victim impact statements or gruesome photographs and have made it inadmissible in court in an attempt to keep jurors’ verdicts unbiased by emotion. Gruesome evidence has been linked with more severe judgments and higher conviction rates in court cases. The more gruesome the evidence presented in a court case, the more emotional a juror could become. For example, emotions such as anger and disgust are potential reactions to photographs of a victim’s injuries, commonly presented to juries in criminal and civil trials. These emotions have been shown to increase feelings of moral outrage and desire to punish. For jurors, such emotions could lead them to convict more and be more certain they made the right choice. I investigated whether seeing gruesome post-mortem photographs (versus reading descriptions of the injuries) would increase jurors’ negative emotional reactions to the evidence, and would make them more likely to convict.

Undergraduate introductory Psychology 102 students viewed a trial evidence presentation including opening and closing statements, based on an actual murder trial. Students were randomly assigned to see gruesome post-mortem photographs of the victim or to not see such photographs. Afterwards, participants indicated their verdict, verdict certainty, emotional reactions, and moral outrage. The data collection is ongoing. Results from this study can be used to assess what evidence has effects on jurors’ emotions and what could be admissible in court.
Previous research has shown that head injuries, such as concussions, can have detrimental and long-lasting effects on an individual; moreover, repeated injuries lead to worsened effects. Our laboratory has established a model for repeated mild traumatic brain injury (rmTBI) that demonstrates consistent learning and memory deficits. However, the mechanism underlying this process is still unknown. It is thought that memories are made by strengthening the synaptic connections between neurons. Electrophysiology is one technique to study the activity of neurons. An electrophysiological parallel to learning is called long-term potentiation (LTP), which is a long-lasting increase in synaptic strength induced by brief, but intense, stimulation. LTP was first discovered in the hippocampus, a brain region that plays a critical role in memory formation. The goal of my project was to assess whether rmTBI that caused learning and memory deficits would affect hippocampal LTP. I hypothesized that the head-injured mice would show decreases in LTP incidence and magnitude. Repeated mild closed-head injuries were produced in anesthetized adult (three months old), C57BL/6J mice using an impact device. Two weeks later the animals were tested in the Morris water maze task to confirm that they had learning deficits. Then, using an in vitro slice preparation, LTP in area CA1 induced by 100 Hz/1 sec stimulation was evaluated in hippocampal slices. How often LTP could be induced (incidence), as well as how much LTP was observed when present (magnitude), were the two parameters compared across test groups. Preliminary results show that robust LTP is present in the hippocampus of control mice. Data collection from mice that received head injuries is still ongoing.
Elizabeth Fahey, Brittany Wyatt, and Dr. Seung-Hee Lee

Department of Fashion Design and Merchandising, School of Architecture

Green is the New Black: Why Fashion Companies Are Striving Toward a More Sustainable Future

The fashion industry has production operations worldwide, in both developed and developing countries. The fashion industry is currently one of the world’s biggest contributors to climate change and environmental pollution, second only to the oil industry. The fashion supply chain and the globalization of textiles contribute to the downfall of our environment in a massive way. However, some fashion companies are working toward moving toward reducing their carbon footprint to become leaders in “sustainable fashion” in order to improve their environmental and social impact on the world. This research will be unique in that it seeks to provide specific cases of successes and failures in the pursuit of becoming a “green” industry. Therefore, the purpose of this study is to deliver models of possible improvements fashion companies can make internally in order to influence the external world in a positive way, as well as create a brand image of responsible, sustainable production practices. This study will focus first on analyzing the reasons and implications of purchasing fast-fashion apparel products. It will then question: What factors push companies to adopt sustainable practices and which of those practices can be used to improve their impact on the environment? In carrying out these practices, is there an ability to ensure the same quality and standards in working and production conditions throughout their respective supply chains? Through the use of case studies of successful companies and content analysis, this research will determine potential methods that will not only improve companies’ impacts on the environment as well as their own personal brand images. The fashion industry itself can benefit from this research, as rebranding the entire industry as a “green” industry can create an image of social and environmental consciousness.
Juliet Fitzgibbon and Dr. Sara Baer

Department of Plant Biology

Effects of Deer Browse on Plant Diversity in Restored Prairie

The Midwest U.S. once contained a vast expanse of tallgrass prairie that was home to a high diversity of plants and animals. Much of this ecosystem has been converted to conventional row crop agriculture resulting in limited habitat for wildlife and sharp declines in plant biodiversity. Historically, bison were the dominant grazers in tallgrass prairie. Bison grazing increases the abundance and richness of less common, non-grass species (forbs) because bison preferentially graze on C_4 grasses. Deer, however, are the dominant ungulate herbivore in small prairie remnants and restorations, however, their impact on plant communities is not well-understood. Similarly to bison, deer are selective browsers but they prefer forbs, which are the primary contributors to the floristic diversity of the tallgrass prairie. This study quantified deer browse in restored tallgrass prairie and the effect of deer browse on plant productivity and community structure. The restored prairie contained replicated plots with fencing to exclude deer and plots open to deer browse. Deer did not consume plants within the enclosures and they selectively consumed forbs in the plots open to deer browse. Volunteer forbs, sown forbs and grass, litter, and total biomass were all affected by plot age (P < 0.0007). Deer browse did not affect overall aboveground net primary production, but there was a significant interaction between age and treatment on volunteer grass (P = 0.02). Plots open to deer browse had significantly different species richness and diversity than plots with fencing to exclude deer (P < 0.05). These results will improve our understanding of the role of deer browse in prairie restorations, which could contribute to managing plant diversity in restored prairie.
Infrastructure Automation with Infrastructure as a Code (IaaS)

For the past two decades, networking as a discipline has remained largely unchanged. However, the development of cloud computing in the last four years has revolutionized the networking industry. For many businesses, networks are large behemoths that can be difficult to manage since devices were typically configured on an individual basis. Management of complex networks took a lot of time, especially when adjustments were required to the environment. Chef and Ansible are popular tools that can be used to centrally automate the management of all devices within an organization. Utilizing the underlying management server requires programming the Infrastructure as a Code (IaaS) and assigning the servers and network devices according to specific roles. Roles can be programmed to immediately adjust the whole organization’s needs by installing and updating software, reconfiguring devices, and encrypting sensitive data with data bags. Chef achieves this by employing cookbooks, which is the fundamental unit of configuration and policy distribution for the service. Each cookbook contains recipes which are used to manage specific services, software, or policies. Chef performs continuous integration on each client through the use of an agent which talks to the Chef server. This process is done at regular intervals to see whether the client needs to be updated with new recipes. This requires a new agile-style of programming to accommodate automated IaaS which was the focus of this project.
**Anna Frailey and David Gibson**

Department of Plant Biology

*Exploring allelopathic effects of two invasive species on plant growth and survivorship*

Nonnative invasive species’ success in the habitats they invade is a growing field of research. Invasive species can completely change the structure and function of an ecosystem. There are many hypotheses on how invasives successfully establish in new habitats so quickly, but a controversial mechanism being studied is allelopathy. Allelopathy is the inhibition of seed germination, growth, or plant performance of one plant, through chemicals released from another plant to further its own success. Japanese Stiltgrass (Microstegium vimineum) and Japanese Chaff Flower (Achyranthes japonica) are two invasive species that are detrimentally impacting Illinois native species. Microstegium vimineum is known to produce allelopathic chemicals in its leaves. However, A. japonica’s allelopathic potential is yet to be confirmed, but it is expected. In a greenhouse experiment, aqueous allelopathic extracts from these two invasive species were applied twice a week for 4 months and the growth and survivorship of four target species were recorded and measured. The target species included an Illinois native grass species, Switchgrass (Panicum virgatum), a species with known sensitivity to allelopathy, radish (Raphanus sativus), and the two invasives themselves. It was hypothesized that all species would exhibit inhibitory growth and lower survivorship from both M. vimineum and A. japonica extracts, with greater reduction in growth rates and lower survivorship in the allelopathically sensitive species. It was also hypothesized that the M. vimineum extracts would have more inhibitory effects on growth rate and cause lower survivorship than the A. japonica extracts and the control. Height measurements, observations, and above-and-below ground biomass are currently being measured and analyzed. This study is important for the conservation of native Illinois habitats and could further knowledge on allelopathic impacts on different species of plants, including the possibility of discovering if A. japonica is allelopathic.
Expression of a Genetically-encoded Fluorescent Voltage Sensor, ASAP1, in Neurons of the Embryonic Chick Spinal Cord

Understanding the interactions of large numbers of neurons within various circuits is a fundamental goal in neuroscience. However, obtaining membrane potential recordings from large numbers of neurons in freely behaving animals is challenging, especially for embryonic systems. Nonetheless, numerous approaches to record from large ensembles of neurons have been developed, but many of these approaches, e.g. large electrode arrays, are not amenable to embryonic systems due to the relatively small size and fragility of embryonic tissues. The new generation of fluorescent reporter molecules with increased temporal dynamics and greater fluorescence may now be ready to be applied to embryonic systems. The goal of this study was to adapt the recently developed genetically-encoded fluorescent voltage sensor Accelerated Sensor of Action Potentials 1 (ASAP1, St-Pierre et al. 2014) for use in chick embryos. The chick embryo has been one of the primary model organisms for studying vertebrate sensorimotor development. The similarity of chick developmental timing to that of humans along with its bipedal nature and development outside of the mother provides numerous experimental advantages over rodent models. Transposon systems can be used to establish stable expression of heterologous proteins via electroporation. It has been shown that the Piggybac system can be used to allow for channelrhodopsin-2 expression in chick embryos and that the relatively transparent nature of embryonic tissue allows for light stimulation of motor neurons in order to regulate motility in mid-stage chick embryos (Sharp and Fromherz, 2011). Therefore, it was hypothesized that a similar approach could be used to introduce ASAP1 and to allow for optical voltage recording from neurons in both freely moving embryos and reduced preparations.
There are many different ways for someone to save money and energy on lighting. This poster discusses three different money and energy saving solutions to lighting. The three types of lighting discussed here are LED, compact fluorescent, and energy saving incandescent. According to Energy.gov, if your top 5 most used incandescent bulbs were replaced with energy efficient bulbs, you could save $75 per year. As this poster suggests, energy efficient bulbs have a higher upfront cost, but usually last longer than regular incandescents and use less energy, which will save you money.
Evan Gebhardt and Dr. Om Prakash Agrawal

Department of Mechanical Engineering and Energy Processes

An Investigation of the Applications of Fractional Calculus

This study will consist of research into a form of calculus, called “fractional calculus,” where integrals and derivatives, the pillars of calculus, can be taken to fractional number orders, instead of just integer number orders like in “traditional” calculus. Fractional calculus, although relatively obscure compared to traditional calculus, has been known about for centuries but is only now gaining momentum in research and practical applications. The computations involved in fractional calculus are much more complex and require much more knowledge of mathematics than of “traditional” calculus, rendering it widely ignored by most undergraduate programs. My plan is to investigate the feasibility of modeling real-life phenomena, namely diffusion, with differential equations involving fractional operators. The wave equation, a model for the behavior of waves in diffusion, is a differential equation (that is, an equation that uses operators of calculus to model a phenomenon). The traditional wave equation uses traditional calculus to model diffusion, but my hypothesis is that the traditional form of the wave equation is an idealization, and that due to the nature of thermodynamics and imperfections in the real world (friction, entropy, and other irreversibilities), diffusion in real-world situations would be modelled better by a fractional operator. Studies have shown that differential equations with fractional operators can model the behavior of organic tissues in response to an electric current, so this makes biomechanics and bioengineering an implication of this research. If the wave equation is better modelled by a fractional differential equation than by a traditional one, then it stands that the applications of fractional calculus could prove innumerable and are worth professional investigation, from commercial applications to medical and prosthetic applications.
Luteinizing hormone plays an important role in reproductive function. Males with a gain-of-function mutation in the luteinizing hormone receptor undergo precocious puberty, Leydig cell hyperplasia, and have high testosterone levels, resulting in a condition called familial male-limited precocious puberty (FMPP). Our laboratory has generated a mouse model of FMPP, known as KiLHR mice. We previously determined that KiLHR mice became progressively infertile due to erectile and/or ejaculatory dysfunction. Histopathological analysis of the KiLHR ampulla revealed that low cuboidal epithelial cells were replaced with tall, ciliated pseudostratified columnar cells as early as 7-8 weeks of age. Additionally, chondrocyte metaplasia and decreased smooth muscle content were seen in the KiLHR penile body. We hypothesized that the metaplastic changes in the reproductive tract of KiLHR mice are due to high testosterone levels. To test this hypothesis, we implanted silastic capsules with the androgen receptor antagonist, flutamide, or empty control capsules into KiLHR mice and testosterone-filled or control capsules into wild type (WT) mice. Seminal vesicles from flutamide-implanted mice did not show a significant decrease in weight compared to control mice, suggesting that testosterone action was not inhibited. Serum testosterone levels were significantly increased at 5 weeks of age in testosterone-treated WT mice. Sections of the ampulla and penes from WT and KiLHR mice were examined for metaplastic changes at 8, 12, and 39-42 weeks of age. Chondrocyte metaplasia was seen in the penis of testosterone-treated WT mice at all ages, as was replacement of cuboidal epithelium with pseudostratified columnar epithelium in the ampulla. Metaplastic changes were still seen in the flutamide-treated KiLHR mice. As testosterone action was not inhibited in the flutamide-treated KiLHR mice, no conclusions can be drawn from these animals. However, data from testosterone-treated mice suggests that elevated testosterone levels are responsible for the metaplastic changes in the reproductive tract.
Tali Gleiser and Dr. Michelle Kibby

Department of Psychology

Working Memory Function in Children with ADHD and Depression

Children with ADHD frequently have problems in working memory. Deficits in WM also have been found in children with depressive disorders, which frequently co-occur with ADHD. Despite the frequency of the comorbidity between ADHD and depression, it is unclear how the interaction of these disorders affects WM ability in children who have comorbid ADHD/depression. Children experiencing depressive symptoms significant enough to be considered “sub-clinical”, who do not meet the full diagnostic criteria for depression, may still experience difficulty with WM compared to children who are symptom free. The current study aims to determine the additional impact, if any, of depressive symptoms on WM in children with ADHD, particularly in children who are experiencing depressive symptoms disruptive enough to score above average on the Children’s Depression Inventory (CDI), but not severe enough to qualify for a clinical diagnosis. The data was collected as part of a larger NICHD-funded, university-based study (R03 HD048752, R15 HD065627) run by Dr. Michelle Y. Kibby. Participants for the current study include 272 children, ages 8-12 years. ADHD diagnosis was made by a clinical psychologist. Total score on the CDI will be used to determine if a child has an above average level of depression (T score > 59). Sequences, Numbers Backwards and Picture Locations from the Children's Memory Scale (CMS) will be used to measure WM. A 2 (ADHD or not) X 2 (subclinical depression or not) MANOVA is being used to analyze the data. It is hypothesized that children with comorbid ADHD and depression will experience more deficits in WM compared to children with a single disorder and controls. If significant, it suggests that children with comorbid ADHD/depression have more deficits in working memory than children with a single diagnosis, which may affect their academic functioning.
The Latino and Latin American Studies Minor, as described on our website, is an interdisciplinary program that is designed to enhance the understanding of both Latino and Latin American people and their culture, language, history, literature and policy to the undergraduate students of Southern Illinois University. My position as an undergraduate assistant is to provide students with the opportunity to strengthen their academia by indulging in courses in our Latino and Latin American Studies Minor. As well as challenging students to take part of this growing study. Dr. Jonathan Hill and I have reached out and presented the minor to various departments and organizations, we hope that through community outreach we can attain the interest of undergraduate students. We cater to each student by providing a list of vital classes in which they can choose depending on the student's interest. Our goal is to more than double the amount of students taking Latino and Latin American Studies courses, therefore we are taking necessary steps to attract students with diverse backgrounds and studies to enrich not only the program but the availability of coursework as well. For that reason we have started developing ideas for a seminar. We want to be able to showcase what this minor can do to further the careers of our students and demonstrate the contributions Latinos have made to society. It is crucial for students to comprehend the distinct communities and histories that make Latin America whole, as well as Latinos here in the United States, and how the comprehension of these people creates a more interconnected world. Latino and Latin American Studies not only wants to enrich Southern Illinois students but the connected communities all of these students are part of.
Jahiah Gordon and Dr. Janet Fuller

Department of Languages, Cultures, & International Trade

What Does It Mean to Be “German?”/ “Was bedeutet es, Deutsch zu sein?”

“German,” in light of Germany’s current social development and policies on bi/multilingualism. In recent years, there has been a paradigm shift in the socio-linguistic discourse surrounding issues such as immigration and integration, and what that means for those who speak a language other than German, or have ancestry other than German (including mixed ancestry). This study seeks to examine how young people living in Berlin, Germany, understand belonging and diversity in a Germany that has become a “land of immigration.” The study includes analysis of related readings on Germany’s contemporary culture, changes in citizenship policy, and analysis of practices focused on the implementation of integration programs for non-native speakers of the German language and increased focus on multilingual education for German speakers. The study also includes an analysis of five interviews of Berliners aged 17-28, whose parents come from Angola, and Germany (East and West). The interviews were analyzed to identify common themes in the discussion about what it means to be German and what German culture is; the most prevalent themes identified were language, living, working, and representations/stereotypes of Germans. Analyzing these themes and the ideas within them presented a unique mixture of concepts that, collectively, make up the German “culture” as seen by these Berliners.
Avona Greene and Sandra Collins

Applied Sciences and Arts: Health Care Management

Perceptions of Diverse Identities in Healthcare Management

Our country needs people of strong moral character and a progressive value system. We cannot continue to be a great nation if our citizens and institutions are prone to discrimination and inequalities. That is why a diversified workforce that is inclusive of different cultures and embraces a variety of perspectives is so crucial. Diversity within organizations can facilitate understanding and respect for other viewpoints. Understanding and inclusion among employees will have the effect of aiding in conflict resolution and reducing conflict in general. That is the type of environment that gives patients the best chance to heal. Healthcare professionals need to promote excellence in service and the best therapeutic process in a non-combative setting that appreciates diversity. The research was dedicated to focusing on diversity issues in healthcare with a special focus on diversified access to executive positions in healthcare management. The research tool that was developed was used to gain knowledge about the perceptions of minority identities in health care management within the categories of gender and race. The goal of the research was to discover the correlation between the perceptions of Undergraduate Southern Illinois University Healthcare Management students, Graduate students at Southern Illinois University and hospital CEO’s around the country on minority identities in the healthcare management field. The research compares how the perceptions correlate to the current demographic within the field. This data was used to uncover where the differences in perceptions are between the three groups and how job growth for the different minority group categories can be expanded so that the healthcare management demographic can reflect the United States population more closely in the future.
Disaster canines are often called upon to travel via helicopter during the course of a mission. No data exists that measures the impact of that type of travel stress on the canine's search performance. These dogs are critical in our emergency response system and better understanding of what stresses them is crucial to ensuring their maximum performance. Researchers from SIU teamed up with Florida Task Force One to evaluate the effects of helicopter travel on the working performance of FEMA disaster canines. Nine FEMA certified canines were hot-loaded onto helicopters and then flown for 30 minutes. Canines were monitored for heart rate, core body temperature, respiration rate, and visible signs of stress. Saliva swabs were collected to monitor changes in cortisol, a commonly identified stress hormone. After flight, canines were unloaded at a search site and were asked to complete a standardized search exercise to monitor the effect of the helicopter travel stress on their performance. Fecal samples were monitored for 3 days following the flight to identify any effect on fecal microbial DNA. The data presented will identify changes in the working canine associated with the stress of helicopter travel and will include recommendations for future training protocols.
Models for Progesterone Effects on Luteinizing Hormone and Prolactin Surges in Estradiol Primed Ovariectomized Rats.

Estradiol and progesterone are sequentially elevated during the proestrous phase of the reproductive cycle of female rats. Estradiol is essential for the luteinizing hormone (LH) and prolactin surges which contribute to reproductive behaviors and ovulation. Progesterone is elevated during the preovulatory period, but the effects of elevated progesterone are less understood. The aim of this project is to characterize a paradigm for steroid hormone treatment that will mimic hormonal events during the reproductive cycle. Rats were ovariectomized and treated with estradiol after ten days by daily injections (10 µg/rat) or an implanted 30 mm capsule containing 250µg/mL estradiol. A jugular vein cannula was implanted and forty-eight hours after initiation of estradiol treatment, rats were injected with progesterone (2.5mg/rat) or sesame oil vehicle control (0.2 mL/rat) at 1700 hours. Blood samples were collected at 1500 hours and hourly from 1700-2200 hours following progesterone injection. Plasma prolactin and LH levels were measured by radioimmunoassay. There was no significant difference in LH or prolactin levels between vehicle- and progesterone-treated animals in the estradiol injection model. However, prolactin reached peak levels of approximately 200 ng/mL in vehicle- and progesterone-treated rats between 1900-2000 hours. In the capsule model, a LH surge (25ng/mL) was observed in progesterone-treated rats at 2000-2100 hours from basal levels of 1.4ng/mL at 1500 hours. In contrast, LH increased only to 4-5ng/mL in vehicle-treated rats. There was no detectable prolactin surge in the capsule model. To gather more data of progesterone effects on LH and prolactin, alterations to the models are being evaluated. The long-term goal of this project is to examine progesterone-induced changes in gene expression in the medial basal hypothalamus. These studies have implications in understanding physiological effects of progestins during the reproductive cycle and pregnancy as well as during pharmacological interventions as oral contraceptives.
The water, food and energy nexus is a framework for considering sustainability. It acknowledges that food, energy and water shortages are interrelated and suggests that their solutions should be as well. This poster details the design and construction of a system that links food waste reuse, renewable energy and water purification in keeping with the nexus. Drinkable water is increasingly rare; waterborne diseases kill millions and lower the quality of life for billions more every year. Solar distillation is the chosen method of water purification for this design because it effectively purifies water without contributing to greenhouse gases. In a still, evaporated water leaves behind contaminates while purified water condenses elsewhere in the system. Solar power is a clean source of energy but it is intermittent in its effectiveness. This new design enhances the effectiveness of a solar still by adding a compost-heat exchanger. As much as 30% of waste produced by Americans consists of plant waste from food and yards. Composting is a means of keeping the valuable nutrients from this waste out of landfills and available for future crops. Aerobic composting of organic materials produces temperatures as high as 80°C in the compost pile. A heat exchanger consisting of a tube that runs along one wall of the compost bin, can transfer some of this heat to contaminated water in the tube. The preheated water can then be pumped into the solar still, increasing the rate of evaporation within the still and even continue distillation when solar power is unavailable. This system was constructed with the help of volunteers from the SIU chapter of ASME and was constructed in the Carbondale Community Garden with permission from the Flyover Infoshop Garden Committee. Compost materials were donated by the Town Square Market.
Michael Halpin and Stephanie Speiser

Department of Animal Science, Food and Nutrition

The regional impact of equine youth activities held at the Southern Illinois University Carbondale College of Agricultural Science

The SIUC College of Agricultural Science has hosted the Southern Regional 4-H Hippology and Horse Bowl contest for the past two years. During the competition held in March, a short survey will be offered to the contestants and leaders to obtain accurate and anonymous feedback regarding the contest and the overall impact of this particular event on the regional 4-H members who participate. Specifically, the survey will focus on how the SIUC hosted Hippology and Horse Bowl contest prepares 4-H members for further competitions and if the contest encourages students to go into an agricultural field, particularly at SIUC. During the organization of the event, number of contestants and 4-H clubs present will be recorded to aid the statistical analysis of the survey. On March 25th, one survey will be given to contestants to determine effectiveness of the contest in preparation for future competitions in addition to the impact SIUC College of Agricultural Science has on determining future educational paths. The second survey will be directed towards 4-H leaders to gather opinions on content and set-up. Both surveys will offer information which the SIUC College of Agricultural Science will utilize for future contests. The results will also illustrate the importance of the College’s activity in the community and the impact of such activities in 4-H youth looking into their educational future. The survey will reveal areas needing improvement or areas of high success concerning the competition. In addition, the results will reveal if hosting youth activities is an effective means to bring new students to Southern Illinois University Carbondale. Data will be collect on March 25th, 2017 and analyzed the following week. The results and implications will be presented at the Undergraduate Research Forum.
Madison Harmon and Karla Fehr, Ph.D.

Department of Psychology

The Relationship between Parenting Style, Creativity, and Persistence in Preschool-aged Children

This study examines the relations of parenting styles with creativity, and persistence in preschool aged children. Archival data from a larger study and transcripts from Preschool Interpersonal Problem-Solving (PIPS) are being observed and scored for levels of creativity and persistence in children ages 4-5. The shortened-version of the Parenting Styles and Dimensions Questionnaire (PSDQ) has also been administered to assess parenting styles in the parents of the participants. Creativity (the ability to generate new ideas or come up with elaborate stories) in the participants is being assessed using a consensus scoring and persistence is being measured objectively through a percentage. Scores from the Kaufman Brief Intelligence Test (Kbit-2) are being used to assess the verbal and non-verbal IQ of the participants. This is being done to control for higher IQ as being an explanation for higher creativity scores. The current study consists of 52 participants. Data collection is currently ongoing. The variables that are being examined in the current study are 1) parenting style, 2) level of creativity in the children, 3) level of persistence in the children and 4) IQ scores in children. It is hypothesized that 1) there will be a positive relation between authoritative parenting and creativity and also permissive parenting and creativity; 2) higher levels of creativity will be related to higher levels of persistence; 3) authoritarian parenting will be related to lower level of persistence in children and 4) A child’s IQ will have no correlation with a child’s level of creativity. Once data collection is complete, Pearson correlations will be conducted to test relationships between parenting styles, creativity and persistence. Cross-correlations will be conducted to control for higher IQ scores being an explanation of higher creativity scores.
Muriel L. Hart, Kalene Huber, E.Dawn Grisley, and Joseph L. Cheatwood, Ph.D

Department of Anatomy

*Effects of Dietary Isoflavones on Estrogenic Pathway Activation in Adult and Aged Rats After Stroke*

The effects of stroke can cause long lasting impairment on not only one’s physical health but their quality of life and everyday function. Dietary modifications provide a potential solution to aid in neuroprotection and allow enhanced functional recovery post-stroke. Previous investigation tested this, and found the addition of dietary soy compounds does show significantly improved functional recovery through behavioral tests in our rat models. Further studies aimed to identify specific effects on gene expression on the dietary inclusion of isoflavones alone, using Daidzein and Genistein, known neuroprotective estrogenic receptor activators. We not only examined the effect of isoflavone content on altered gene expression, but also age as another potential mediating factor either promoting or inhibiting anti-inflammatory and neuroprotective pathways. In doing so, both adult and aged male Hooded Long Evan rats were separated into distinct dietary protein groups containing either Sodium Caseinate(CAS), Sodium Caseinate in addition to isoflavones Daidzein and Genistein (CAS+ISO), or Soy Protein Isolate (SPI) for two weeks before a permanent unilateral middle cerebral artery occlusion (MCAO) was performed. Tissue samples were collected from the injured hemisphere on Day +3 (n=6) and Day 0 (n=4; received no MCAO). Data was collected via a qPCR array after RNA extraction and cDNA synthesis, following the manufacturer's assay protocol guidelines (Qiagen). Expression of mRNA expression greater than 2-fold were considered significant. Detailed results will be presented on the poster.
Carly Haywood and Agustin Jimenez
Zoology Department

Are parasites of South American and Australian marsupial related?

Parasites become associated to their hosts throughout evolutionary time by a series of ecological interactions. Several groups of parasites are transmitted from their ancestral animal host to its descendants. In this manner, it is expected that a group of related vertebrates will host related parasites. In a particular case, extant marsupials share a common ancestor and occur in Australia, New Guinea and the Americas. A family of nematode parasites known as Vianaiidae is known to infect Didelphids (opossums) across the Americas, with representatives present from central Argentina to the United States. Other species of nematodes that look similar to Vianaiidae physically are known to infect Australian marsupials. The ancestral host of Vianaiidae is believed to be a marsupial, yet the relationships among the Australian and American species of the nematodes in question are unknown. Because marsupials share a common ancestor, and this predates the break up of Gondwana, it is likely that their parasites may also have a common ancestor that predates this split. While marsupials radiated into different species, their parasites may have followed an evolutionary path that paralleled that of their host. In this experiment, I plan to uncover the evolutionary relationships of six species of two genera of Vianaiidae based on molecular data.
Cody Heap, Matthew Jamnik, and Lisabeth DiLalla

Psychology Department

*Delay What You Want To Get What You Need*

This study examined correlations between children’s temperament (i.e., impulsivity and effortful-control) and ability to delay gratification, which can influence healthy versus unhealthy food preferences. Children with poor delay of gratification and self-control from ages 3-5 displayed the quickest gains in body mass index (BMI) over a 9-year period compared to children who had high self-regulation. Thus, children who have a challenging time with self-control and delay of gratification may consume more unhealthy foods, leading to a higher BMI. The present study examined children’s temperament and delay of gratification as predictors of healthy or unhealthy food preferences. It was hypothesized that healthy food preferences would negatively relate to impulsivity and positively relate to delay of gratification. Children were tested as part of the Southern Illinois Twins/Triplets and Siblings Study (SITSS). Parents rated children’s temperament at ages 2 and 3. Delay of gratification was measured when children were 5 years old; they were allowed to either take one snack immediately or take two snacks but not get them until later, therefore delaying gratification. Information was also gathered during a follow-up telephone interview when the children were aged 6-12 years. At this time, parents and their children rated their food preferences for 17 healthy and 13 unhealthy foods (i.e., 30 total food items). Results indicated parent-reported healthy food preferences marginally correlated with effortful control, $r(27) = .34$, $p = .087$, and significantly correlated with impulsivity, $r(27) = -.55$, $p = .003$. Observed 5-year-old delay of gratification marginally correlated with child-reported healthy food preferences, $r(36) = .29$, $p = .09$, and parent-reported unhealthy preferences, $r(36) = -.29$, $p = .09$. These findings suggest that early self-control may affect later food choices. Choosing to eat healthy foods requires self-control, and this study proposes that very early self-control is already predictive of healthy food choice behavior.
Theresa Heitz and Amer AbuGhazaleh

Department of Animal Science

*The Stability of Essential Fatty Acids in Dog Foods During Storage*

The objectives of our research project were to measure the stability of omega-3 fatty acids and the formation of peroxides (TBARS) in dog foods during storage at room temperature. To carry out the project, four different dog food diets (12 bags per diet) were obtained from a pet food production plant within 24 hours of production and stored at room temperature at SIU for 6 months. Paper type bags were used in two products (bags A and B) and plastic-type bags were used in the other two products (bags C and D). Three bags from each diet were opened on days 0, 45, 90, and 180 after arrival and approximately 200 g sample was collected from each bag. Samples were then placed in an air-tight zip-lock bag, wrapped in tinfoil, and stored in a freezer at -80°C until analyzed for fatty acids content and peroxides concentration (TBARS). Preliminary data shows that the concentrations of TBARS were greater in the paper bags than the plastic bags and the level of TBARS tended to increase overtime regardless of bag type. Additionally, the concentrations of omega-3 fatty acids in bags also tended to decrease overtime suggesting an increase in lipids oxidation in bags during storage.
Traumatic brain injury is the primary cause of death and disability for juveniles under the age of 15. Researchers have examined the health benefits of long-chain polyunsaturated fatty acids for almost two decades, but are just recently discovering the potential therapeutic benefits as well. Much evidence points to the usefulness of omega-3s, particularly docosahexaenoic acid (DHA), in treatment of multiple forms of TBI. Past research shows decreased brain inflammation and accelerated recovery of function in animals with high omega-3 diets, and increased cognitive deficits in animals that are omega-3 deficient. This study will examine the effects of either a corn oil or a fish oil (high in DHA) diet on a juvenile TBI model, where a rat that is injured post-natal day 28 is equivalent to children injured at the ages of six to eight years old. Two groups of Harlan rats will receive a moderate to severe cortical controlled impact TBI. The animals will then be tested 14 days after injury using the Morris water maze to measure spatial memory deficits. Analysis will include a factorial ANOVA of latency times between groups. We hypothesize that rats with higher omega-3 diet content will perform better on the Morris Water Maze.
Ashley Hemmen and Norm Lach

Department of Architectural Studies

Precast/Prestressed Concrete

Look around. Buildings are everywhere, many made with primarily concrete. Precast and prestressed concrete are a common building material. As an architecture student, it is a key element to know how to implement this material into a design. There are various ways concrete can be used in a design. Some of the benefits of precast/prestressed concrete is its time efficiency and its unlimited creative uses. With the ability to make the most complex and detailed forms, the design possibilities with concrete are endless. Participating in a concrete design studio and reading literature on how this material can be implemented into buildings would be a beneficial way to learn about the different uses. Additionally, visiting various precast plants and attaining hands on experience become advantageous opportunities to gain a better understanding and knowledge about how this material can be used. The Precast/Prestressed Concrete Institute is an organization that works to increase the knowledge and use of fabricating and designing precast structures. This group distributes grants that benefit schools implementing concrete design into their curriculum because they see the importance of attaining this knowledge. With the aid of this grant, SIU students in the School of Architecture will be more capable of pursuing the opportunities of site and plant visits, housing a precast library, and hosting speakers and events that foster the hands on experience promoting a growing learning environment.
Olivia Martinez, Emily Hennenfent, and Dr. Laura Kidd
Department of Fashion Design and Merchandising

*Half-Size History*

The historic costume collection in the Fashion Design & Merchandising Program has a number of garments from 1860 through the present time that are displayed to support course content and increase student understanding and learning. Three-dimensional examples of historic costume enhance the ability of the student to see the drape and silhouette of a garment, as well as help the student consider societal and gender perspectives related to fashion and its evolution. Unfortunately, the collection does not have garments from earlier historical time periods, and the objective of this creative research project was to research and replicate two examples of women’s fashions from the medieval time period that can be used as instructional aids in the study of western fashion history. These historic costume replicas were done on half-scale mannequins, and the patterns for the garments were developed from Margot Hamilton Hill and Peter A. Bucknell’s *The Evolution of Fashion: Pattern and Cut from 1066 to 1930*. Additional historical research on fabrications, silhouettes, and trims was also done, using a variety of photographic and print resources. Draping and flat pattern techniques were used to develop the garments, and appropriate trimmings in scale were adapted and applied. To add to the value of the replicas as instructional tools, headwear replicas were also created.
Javier Hernandez and Dr. Dale Buck Hales, PhD

Department of Physiology

Utilizing Epithelial-Cadherin to detect early stages of ovarian cancer in tissues

Ovarian cancer is one of the most deadly gynecological cancers due to the lack of early detection methods, and when it is discovered it is in its late stages. The hen is a great model due to the spontaneous nature of ovarian cancer, which is similar in how it occurs in women. We and others have shown that an increase in epithelial cadherin (E-cad) is the first event in ovarian cancer. Therefore, we hypothesize that utilizing e-cad as a histological marker would show which samples have ovarian cancer. Method: immunofluorescence to determine E-cad expression in tissue sections from hens known to have ovarian cancer in comparison to those who are deemed suspicious. This will be conducted by first performing simple histological stains then conducting immunohistological staining for E-cad on the tissues. Results: The degree of epithelial cadherin staining corresponded to the presence and severity of ovarian cancer. Future studies will employ Western immunoblotting to provide a more quantitative assessment of E-cad expression.
Jessica Higginbotham and Dale B. Hales, Ph.D.

Department of Physiology

Quantitative Analysis of Flaxseed Effect on Collagen Deposition in Ovarian Cancer's Stromal Microenvironment

Epithelial ovarian cancer (EOC) is one of the deadliest gynecological malignancy as of the approximately 20,000 new cases a year; of which, 72.5% of the women die. The high mortality rate is due to the lack of an effective early detection marker/procedure/technique. Lack of experimental animal models has also hampered ovarian cancer research. The laying hen is the only natural animal model of spontaneous EOC that recapitulates the human disease. We can exploit the similarities between chicken and human EOC, providing a robust model for studying the initiation of carcinogenesis and progression. This progression has been correlated to changes in the tissue microenvironment such as the surrounding stroma becoming fibrotic. Evidence from the Dr. Hales’ lab suggests that a flaxseed diet has an effect on this fibrosis created by the increased collagen deposition in the stroma. This ongoing study is currently attempting to identify the specific collagen that would be affected by flax seed and quantifying the affect flax seed has on the collagen. It is believed that as EOC progresses there will be an increased collagen deposition in the stroma and if the flaxseed diet is used then there will be a reduction in collagen deposition in the cancer microenvironment. Through a three-step procedure, Gomori’s One-Step Trichrome stain has distinguished collagen’s presence in the FOM2 tissue samples being used. To quantitatively analyze the different amounts of collagen in the whole flax, corn, and control diet groups from the FOM2 study an immunohistochemical stain will be run. With this data, the final step to do a protein analysis of the collage through western blot can be performed.
Natalee Hite, McKensey Hudson, and Michael Hylin

Psychology Department

*Examination of dendritic morphology of neurons in the limbic system following social isolation as mediated by the effects of age and enriched environment*

Stress is a common factor of life that has been shown to affect brain circuitry. Isolation is a social stressor that influences the neuronal growth of areas related to emotion and memory. The limbic system is a region of the brain that mediates memory storage and emotional processing. The central aspect of the study focused on the effects of isolation, both as a function of age and the presence of an enriched environment (EE), on dendritic morphology on neurons in the limbic system of rodent models. Fifty prairie voles were bred at Northern Illinois University. They were housed simultaneously in standard conditions and sibling pairs until the age of 2 months for the young group and one year for the aged group. Each age group was assigned to a subgroup of a) paired, b) isolated, and c) isolated with EE for a total of 6 groups. The voles were maintained in their assigned groups for four weeks, after which they were tested behaviorally. Following testing, the voles were humanely euthanized and their brains preserved using a Golgi-Cox solution. The brains were then analyzed using the Golgi-Cox staining method at Southern Illinois University. Two hundred micrometer thick brain slices were individually analyzed for dendritic length, branching, and spine density in circuitry involved in stress responses. The data of the morphological changes indicated significant effects of isolation on stress mediated circuitry, as well as significant effects of age and enriched environment on the influences of isolation on the limbic system. The results provide further information as to how social stressors influence the stress-mediated circuitry of brains in rodent models.
In order to study the formation of traveling waves, a predator-prey system that can easily be manipulated is needed. The genus Dictyostelium, consisting of social amoebae, is a possible system for this type of study. When feeding on bacteria, feeding fronts are formed and resemble the invasion waves of predators in predator-prey models. By using a Loka-Volterra with a Type I response model, we can determine the wave speed of which a predator invades the area of prey. The Dictyostelium system allows for all qualities and functions described by this model. Theoretical and experimental results can be compared with this model and determine if this would be a prediction of the wave formation and wave speed within these social amoebae. In our experiment, we will be observing the wave speed, reproduction rate, and diffusion rate of different species and strains of Dictyostelium. Past experiments have shown a difference in wave formation among different species and strains of Dictyostelium. By using our results, new models may be formed to explain the type of wave formation and movement that has been seen with Dictyostelium.
Jordan Holman and Dr. Novotny Lawrence

Department of Radio, Television, and Digital Media

Love & Hip Hop and the Portrayal of Black Women

This project utilizes critical race feminism to examine the fourth season of the reality television show “Love and Hip Hop: Atlanta.” Reality television, as a genre, appeared in the 1990’s and became wildly popular following its debut. Twenty-five years later it remains a popular form of television with viewers accepting the exaggerated story lines as truth. When these often exaggerated story lines are paired with stereotypes on reality television shows, they not only impact the community at large, but how the outside world views members of this particular group. My analysis of the show identifies the presence of both gender and racial stereotypes. Additionally, I conclude from my analysis of the shows that these carefully crafted caricatures alter themselves when in the presence of patriarchy. These findings support a growing number of studies which conclude that reality shows can be detrimental to marginalized groups in the larger society.
The fungus Batrachochytrium dendrobatidis (Bd) is associated with population declines and local extinctions of hundreds of species of amphibians worldwide. Some species are resistant to Bd infection, due in part to the bacterial microbiomes on their skin which have been shown to be inhibitory to Bd growth. The goal of our project is to assess the anti-Bd properties of 27 strains of skin bacteria isolated from 8 frog species along the Andean mountain slopes in southeastern Peru, a region that is rich in amphibian biodiversity and has been affected by epizootics of Bd. These hosts differ in elevational ranges, breeding biology (terrestrial direct development, aquatic eggs, and marsupial), and phylogenetic position. First we quantified the inhibition strength of these bacteria in co-culture assays on agar plates. For analysis we processed photos of each assay with image manipulation and data-plotting software. We quantified the growth of Bd in each photo, plotted the data as distance from the bacterial culture, and fitted a curve to the plot in order to model inhibitory strength. We expressed the final strength of inhibition as percent distance to 50% Bd growth. We found that 19 of 27 assayed strains inhibited growth, but their strength varied from 41.77% to 78.04% distance to 50% Bd growth. The terrestrial-breeding frog hosts showed greater average inhibition than either aquatic or marsupial breeders, as did the hosts that live in lower and middle elevations compared to high. Also the host species currently assessed as having a decreasing population trend had lower average inhibition strength than those assessed as stable. These results support the idea that aquatic-breeding frogs are more susceptible to Bd infection, and may help explain why certain species are in decline.
Blake Howard, Sarah Coffey, and Dr. Seung-Hee Lee

Department of Fashion Design and Merchandising, School of Architecture

How the meanings of makeup has changed in the 21st century

Living in a generation of such rapid technology advancements, the Internet and social media have both advanced the makeup industry in a big way. Our generation searches for communities on social medias like YouTube and Instagram interact and communicate with one another. There has been a lot of shame being put on the cosmetic industry for being such a superficial market, but makeup artists and the companies they get their products from have showed that makeup shouldn’t be a necessity to be perceived as beautiful. Makeup is now being appreciated as an art form and a skill that people practice and perfect over time. “Beauty gurus” on YouTube show people all around the world how fun makeup is and how it can be a positive outlet for creativity. James Charles has been named the first male Covergirl in history, which makes makeup universal to everyone. Makeup can be a way to own the face you were given and make it true to you. Everyone does their makeup differently based on his or her personal features. It allows people to be perceived how they want to be perceived. It is also used in more dramatic ways in the fashion and modeling industries. It can tie in with clothing to cohesively create the look as a whole. Therefore, the purpose of the study is to examine how the meanings of makeup has grown and changed for the better over time. We are going to research how makeup is changing over time from what used to be a shallow topic, to now being an uplifting cosmetic alteration that people of all races, ages, and genders can all appreciate. We will use multiple databases, such as YouTube, fashion magazines, and other social media sources as the research method. We will collect analyze, and interpret data to figure out where the makeup world stands now, and where it’s heading in the future.
The Ordway-Swisher Biological Station (OSBS) is a National Ecological Observatory Network (NEON) site with a broad range in habitat that is home to numerous plant species. Plant specimens were collected and vouchered to create a floristic inventory and DNA barcode data set for the site. From the plants collected DNA was extracted and amplified to obtain sequences from the gene regions: ITS, matK, rbcL, and trnH-psbA. A total of 687 vascular plant species were collected, with 156 species previously unknown to OSBS. With such a large data set, we demonstrate the efficacy of DNA barcoding using phylogenetic analysis for only the Asteraceae to show differentiation on the species-level. Asteraceae are an excellent example of a “worst case scenario” because they are notorious for having poor molecular divergence and high species diversity. Despite some instances of lack of differentiation, 88% of the species in Asteraceae were differentiated from each other. The data collected from this site will prove useful in aiding future metabarcoding studies to come.
Carrie James, Mallory Dechant, and Dr. Erin Venable

Department of Animal Science Food and Nutrition

*Investigating palatability in equine treats containing three levels of proprietary ingredient*

Palatability in equines is a complex and understudied subject. The objective of this study was to investigate the opportunity for enhancing palatability in horse treats containing three levels of a proprietary ingredient (palatant). IACUC approval (#16-032) was obtained prior to initiation of the study. Ten mature horses selected from our riding herd and broodmares were utilized in two separate projects. All horses received daily turnout and ad libitum access to water and a white salt block. They were acclimated to two identical feeding stocks and were offered four different treats over four periods. Treatments were as follows: A = 0 palatant; B = 1x palatant; C = 2x palatant; and D (currently available commercial product available as competitor). Project One compared the horse’s preference for A, B, and C. Project Two compared the more preferred treat from Project One (A) against D. Body weight and body condition score were monitored weekly through both projects and across all periods. Treats were offered for olfactory stimulation (10 seconds) prior to consumption (50 seconds). Variables recorded included: first choice (treat selection following olfactory period); first action (sniff/consumption); and any abnormal behaviors post consumption period. Project One testing indicated that Treatment A was selected (first choice) with greater frequency compared to Treatment B (60%, P 0.3616) as well as to Treatment C (53.33%, P 0.8555). Additionally, horses demonstrated a tendency to choose the treat that they had smelled first (P <0.0001). Project Two testing demonstrated that horses preferred the competitive product, Treatment D, compared to Treatment A (57.50% .2185). Few instances of abnormal behaviors were noted, but there were several instances of treats becoming lodged and hyper-aggressive eating (fast consumption). Equine palatability and its associated behaviors warrant further examination in order to understand what drives food preferences.
**Trevor Jones and Aaron Scott**

School of Art and Design

*Plastic Recycling & 3D Printing Filament Manufacturing Lab System*

**Phase 1**
Phase 1 utilizes the new lab equipment acquired from the SIU Green Fund to recycle used 3D prints, rafts, and supports and turn them back into 3D printing filament. This will be done with 3 different variations of plastic that are commonly used for 3D printing: Acrylonitrile Butadiene Styrene (ABS), 4043D PLA, and 3D850 PLA. Measurements such as extrusion temperature, extrusion speed, printing temperature, filament diameter, etc. will be taken as each plastic is tested. These results will be recorded and saved so that anyone that works in the SAM Lab in the future will be able to utilize the recycling equipment to create more filament for 3D Printing, and can utilize this data for their own research.

**Phase 2**
Once the three various plastics stated above have successfully been recycled and extruded into 3D printing filament, other plastics such as Polypropylene (PP) and High Density Polyethylene (HDPE) will be experimented on. The endgame is to create the necessary data (extrusion temperature, extrusion speed, printing temperature, filament diameter, etc.) to ensure that the SAM Lab can begin to recycle and create 3D printing filament out of plastics that aren’t often used for 3D printing, but are common plastics that are discarded throughout campus. Milk jugs, water bottles, bottle caps, etc. can then become a major source of material throughout every department on campus that utilizes 3D printing, transforming trash into treasure.
The microbial conversion of thermal hydrolysis treated wastewater sludge into value-added molecules

It is no longer economically or environmentally feasible to continue extracting hydrocarbon fuels to support the global infrastructure of our society. Research and development of alternative fuel, based on renewable resources, is a viable alternative. Consolidated bioprocessing (CBP) is a streamlined method that utilizes microorganisms, or a community of microorganisms, to covert biomass into value-added end products in a single step. A population of 26 million people can produce approximately 768,000 metric tons of dry solid waste per year. The solid waste is processed at water treatment plants and typically discarded into landfills. The disposal of this waste into landfills is not an optimal solution because of the odors and transportation costs. Microbial transformation of waste sludge offers an alternative solution that supports energy production, public health, and environmental protection. Microorganisms from extreme environments, such as detritus impacted, geothermally active, or carbon rich subsurface sites, possess enzymatic pathways to mediate the conversion of organic molecules. The purpose of this experiment is to evaluate which environmental samples contain microorganisms that can be used in CBP of thermal hydrolysis treated wastewater sludge. Samples were collected from an Illinois coal methane bed (CMB) mine, an algae impacted lake, and an 800-meter borehole from Armargosa Valley, CA. Wastewater sludge enrichment cultures inoculated from these sites were monitored by cell density, mass of the remaining solids, production or loss of short-chain fatty acids by HPLC analysis, and next generation DNA sequencing. Cultures originating from lake sediments and the subsurface borehole altered the chemistry of the waste sludge the most as compared to the CMB. Microbial diversity in these enrichments indicates several groups capable of the chemical conversion of the wastewater sludge. These results underscore the need to identify unique microbial environments that can be prospected for the conversion of underutilized renewable resources.
Kristina Jordan, Nancy Garwood, and Kurt Neubig

Department of Plant Biology

A phylogenetic and morphological study of Hispaniolan Trema (Cannabaceae) and the occurrence of interspecific hybridization

The Neotropical pioneer tree Trema can be found growing in many areas throughout the Neotropics, including Hispaniola. Unfortunately, the taxonomy and phylogeny of species in Trema is highly unresolved; the species Trema micrantha (L.) Blume encompasses multiple unrelated lineages, and hybridization is likely a contributing factor to this lack of resolution. Multiple distinct clades of Trema on Hispaniola grow in close proximity to one another, providing ideal conditions for interspecific hybridization. The purpose of this project is to determine, using a combination of DNA data and leaf morphological characters, if Trema is hybridizing on Hispaniola. DNA sequence data was used to evaluate the phylogenetic relationships between species and raw sequence data were used to identify patterns associated with hybridization. Leaf morphological characters were analyzed in a Principal Components Analysis, and leaf trichomes were imaged using scanning electron microscopy to determine if there is an association between species and trichome micromorphology and density. We determined that T. micrantha and T. cubensis (Urb.), as well as T. micrantha and T. lamarckiana (Roem. & Schult.) Blume are naturally hybridizing on Hispaniola. Analysis of DNA shows that each parent species is a clearly distinguished lineage, and the putative hybrids show phenomena consistent with hybridization. Morphological characters distinguish species and are intermediate in the hybrid offspring. There are some differences in trichome micromorphology and density between species; in hybrids these characters are intermediate between the parent species. These results are significant as hybridization is a major force in evolution and potentially speciation.
Kennedy Joseph and Dr. Walter Metz

Department of Cinema and Photography

Reconstructing Film Criticism

Film Criticism is an academic field that involves moving beyond aspects that make a film worth watching. It takes people years of school to become fully equipped with the skills it takes to understand the full possibilities of what films might mean. Everyone has an opinion. Therefore, it’s quite easy for anyone’s opinion to be considered valid, which means just about anyone can be a film critic. This isn’t necessarily a bad thing, but when the field is dominated by people who spew basic, subjective statements like, ‘this actor was good’, it needlessly reduces the potential eloquence of the world of film criticism as it is much more than an open forum for simple, effortlessly made observations about what you feel went well in with a film. The theoretical aspect that goes into understanding film as an art that’s been lost in contemporary Film Criticism. My research with Dr. Metz consisted of me delving into the world of academic film criticism. Every week, I saw a film in current release in a movie theater, wrote an academic review of it, met with Dr. Metz to workshop the writing, and then read it on the WSIU public radio station. The reviews I wrote consisted of comparisons between the film I watched and films I’d seen in the past, exploring Metz’ specialization, intertextual analysis. My reviews also involved exploring analytical elements such as theme, tone, and genre. While these are only some of the key elements of film form, many film critics speak about these things in a very elementary fashion. Our purpose in doing this research is to build a new analytical, academic approach to exploring movies that can be shared with the public via public radio.
Hong G. Jung\textsuperscript{1} and Dr. Sam Chung, Ph.D\textsuperscript{2}

\textsuperscript{1}Department of Automotive Technology
\textsuperscript{2}School of Information Systems & Applied Technologies

\textit{A Case Study of Software Reengineering a Database Application with Model-View-Controller (MVC) Architecture}

The purpose of this research is to demonstrate a software reengineering case of a database application that does not use software architecture. One of the major concerns of learning Java is that many examples in Java textbooks do not cover the concept of software architecture and its practice in real programming. Without using software architecture, the students cannot see how software architecture of an application can reduce future maintenance efforts. In this research, we demonstrate how a database application can be reengineered by using Model-View-Controller (MVC) and the three-layered (presentation, business logic, and data access layers) architecture. For this purpose, we choose a Coffee Inventory Management, which is a database application, from a reliable Java reference book. Then, by using a software re-documentation methodology called 5W1H Re-Doc with a Computer-Aided Software Engineering (CASE) tool, we create a visual model in Unified Modeling Language (UML) for the legacy application that consist of 4+1 views - Use Case, Design, Process, Implementation, and Deployment view. Based upon the visual model for the legacy system, we redesign the system with MVC architecture, which we call a target system. Then, we implement the target Coffee Inventory Management. As a result, we conclude that Java programming textbooks need to be aware of MVC architecture and infuse the concepts into their teaching material.
This undergraduate research project investigates the deformation, vibration, and load sharing in a three-planet planetary gear from a rotorcraft application. Despite the common nature of planetary gears in automotive transmissions, much can be benefited from a deeper understanding of the complex contact mechanics and vibration responses within the system. A finite element/contact mechanics software (called Calyx Planetary2D) is used. This software uses full finite element meshes of the sun, ring, and planet gears. These components rotate due to their prescribed kinematic motion during an analysis. The Calyx Planetary2D software specializes in the ability to accurately capture the changing contact conditions at each gear mesh within the planetary gear. The deformation of the ring gear is calculated for a full rotation of the carrier to capture the changes that occur as the planets pass fixed locations on the ring. The maximum ring radial deflection occurs just after the planet passes a fixed location on the ring. The ring gear acceleration spectrum has components at mesh frequencies and sideband frequencies at the planet pass frequency. The impact of planet pin position errors, which are common in practical applications, are investigated. Additional frequency content exists in the ring gear acceleration spectrum when the planetary gear is exposed to this error. Identifying and understanding the vibrations generated within the planetary gear system is significant for improved design and industrial operation in a multitude of applications.
In the span of less than a single generation, knowledge workers have gained unprecedented access to continuous informal learning opportunities through digital technology (Boileau, 2011). Digital technologies refer to all types of technologies that help you accomplish work, they include email, video, audio conferencing, virtual meeting spaces, electronic whiteboards, telephone, social networks, learning management systems and open educational resources. Knowledge workers are also adopting a myriad of hardware-driven digital interactive technologies in the mobile computing domain. This includes smartphones such as iPhone® and Blackberry®©, as well as the iPad® tablet mobile computing device. All of these devices are predicated on the use of ‘apps’™ (applications) that have been optimized for the device and the network they are deployed on, in addition to the Web-based technologies cited above which are also being accessed from these devices. Learning means you have improved practice perform tasks made sense about experiences creating guidance and materials validate materials and outcomes and shared your own learning outcome with others. Informal learning refers to activities initiated by people in work settings that result in the development of their professional knowledge and skills (Cofer, 2000; Lohman, 2000). Informal workplace learning is learning that occurs outside of a formal training setting. It is usually unplanned and occurs as you go about your everyday work. Examples of informal learning can include informal mentoring and networking knowledge sharing and management and reflection. Hence, the current research focusses on how digital technologies can bridge and enhance informal workplace learning.
Vineeth Kanteti and Dr. Prabir Kolay

Department of Civil and Environmental Engineering

*Investigating the use of Meta-kaolin along with Recycled coarse aggregate to prepare high strength concrete and freeze-thaw resistance*

The Worldwide consumption of concrete aggregates is approximately 11.5 billion tons per year for the construction of any infrastructures (Mehta and Monteiro, 2013). It has been predicted that more than 2.5 billion tons per year of coarse aggregates are expected to be consumed by the year 2020 for construction purposes (USGS, 2009). The raw material (i.e., coarse aggregate) used for concrete is becoming costly, depleting day by day, and its production uses a substantial amount of energy. Hence, the recycled aggregate (RA) provides the perfect solution for this growing problem. The use of RA can be cheaper than the natural or virgin aggregates (NA) that are commonly used now. It can replace the NA to some percentage on road pavement or partial replacement in concrete, which can reduce the depletion of NA resources. RA implementation would also help in reducing landfill costs. The energy consumed while preparing the RA is significantly less as compared to the energy consumption during NA preparation. Therefore, using these recycled aggregates presents a sustainable solution to the environmental impact at hand. However, the main drawback for bulk utilization of RA is its characterization and proper quality control. The physical and chemical characteristics of the RA differ from natural aggregate. It is found from literature review that recycled aggregate provides better room for water expansion inside the concrete than the natural aggregate. Hence, the current research not only focuses on characterization and utilization of the recycled aggregates from old concrete pavement, which would have been landfilled, to form new concrete for construction of road pavement, but also on investigating the freeze-thaw resistance of recycled aggregate concrete in the presence of meta-kaolin and air entrainment as one of the most damaging actions affecting concrete is the abrupt temperature change (freeze-thaw cycles).
Initially Correlated Open Quantum Systems and their Applications

Open quantum systems are an integral part of the quest to build a quantum computer. However, in the theory of open quantum mechanical systems, there is an assumption that asserts there are initially no system-environment correlations. It has been shown by Chitambar et al. that this should not be used in some cases, and certainly should not be assumed in general. For this research project, I presented a Mathematica code that does not require aforementioned assumption by using the methods described by Modi in Sci. Rep. 2, 581 (2012). I also provided an example to show outcomes for a family of systems with initial correlations. The Mathematica code presented is general enough to be of use for any system and unitary transformation with few modifications.
Dylan Kelly and Poopalasingam Sivakumar

Department of Physics

*Design and Construction of Controlled Environment to Mimic Specific Conditions for Laser-Induced Breakdown Spectroscopy Experiments*

The present work describes the modeling of ultra-high vacuum (UHV) system using Autodesk Inventor software and customizing the existing chamber with CNC mill to mimic the environmental conditions for Laser-induced Breakdown Spectroscopy (LIBS) experiments. The chamber is equipped with a motorized stage for x-y translation which automatically translates the sample to a fresh location for each laser shot and a manual stage with z translation to adjust the sample height. LIBS, an atomic emission spectroscopy based on laser-induced plasma generation, is one of the most sensitive and versatile spectroscopic techniques. LIBS has been successfully used to determine the elemental concentration of unknown samples in different phases (solid, liquid, and gaseous phase) in hazardous and difficult environmental conditions such as biological, industrial, space exploration, etc. It typically allows the local analysis in microregions in the order of tens of microns of spatial resolution. Different atmospheric conditions are generated by replacing ambient gas and changing pressure. Influence of experimental conditions on atomic and ionic emission lines are analyzed by performing the experiments in differential ambient gas. An ultra-short pulse (30ps) laser system from Altos Photonic (a subsidiary of EKSPLA) is used for creating the micro-plasma on the target samples and atomic and molecular emission from the micro-plasma is analyzed using 7-channel spectrometer (StellarNet, INC).
Ryan Kenny and Dr. Frances Harackiewicz

Department of Electrical Engineering

*Wireless Communications with RF Sniffing Robots*

There is a transmitter in an unknown location. The goal of this design is to find the transmitter. This type of technology along with remote-controlled vehicles and robots are useful especially in the military and law enforcement to avoid casualties or find fugitives. To decrease the time to find the transmitter but also minimize cost, several design parameters are to be considered. Design considerations include the number of transceivers, size of test area, range of distances over which it will work, frequencies used, how often signals are sampled, the number of vehicles, the types of antennas, the use of a GPS antenna, the algorithms employed, and whether to use a wireless control terminal or design an autonomous network. The entire system of which this work is a part, includes artificial intelligence, wireless power transfer, wireless sensor network, embedded systems, telemetry systems and antenna design. This work focuses first on the antennas to be used on existing small, less than one cubic foot, remote-controlled vehicles. The initial target frequencies are 900 MHz, 1.2GHz, and 2.4 GHz. Second, this work focuses on the design of a wireless power station for the vehicles. So, for example, the vehicles will simply park over a mat to charge when they are not being used.
Kyle Kieffer

Department of Electrical Engineering

Hydroelectric Power - NSF SI Scholarship Program

Falling water was first harnessed by the Greeks and Chinese back in the 3rd century BCE. They mainly used it to grind grain and do other light tasks. It has evolved into so much more since then. Just in Illinois, 381 MW of power are generated by gravity pulling water downhill across a turbine. As a society, we are looking at new ways of tapping into the energy of moving water. Sure dams and run of the river power plants do a great job but some places that is not feasible. Along the coast and even in the middle of the ocean water is still moving. Tidal energy would offset the amount of energy large cities need while still allowing business as usual. Wave energy would be deployed a few miles offshore to capture the motion of the ocean but still staying close enough that there would not be large overhead costs. Even though it has been around for centuries, does not mean it cannot power humanity for centuries to come.
Jeremy Y. Kim and Sam Chung, Ph.D

Department of Automotive Technology

A Case Study of Re-engineering a Beginning-Level Java Application with Model-View-Controller Architecture

In this research, we seek to determine if the Model-View-Controller (MVC) Architecture used in programming can be applied to a beginning-level Java application and be deemed useful. In today’s modern world, many software programs exist to make people’s lives more comfortable and efficient. From simple math calculators to complex operating systems, countless lines of code are run every day to produce valuable outcomes. However, there are many cases in which programs fail or encounter an error. For programs that have thousands and thousands of complex codes, it gets very difficult to find the error and correct the problem. In order to minimize spending costly time from trying to find the error in programming, coding in MVC can be used to improve overall program organization, interpretation efficiency, modification and development by separating the program into three different concerns. To test this, a beginning level Java application called the “Product Cost Calculator” is used, which asks the user for various inputs then calculates the total price of a certain product. We discover that the Product Cost Calculator program source code can be successfully changed from the legacy (original) to the target program using the MVC architecture and that the changed program improve upon maintenance and modification by having the separation of concerns.
This project was started back in the Fall 2016 semester by the SIUC German Club in association with the Morris Library Special Collections as an idea to increase club activity. The primary goals of this project, as outlined by Morris Library Special Collections, is to 1) transcribe and translate these postcards to the best of our ability; 2) identify the names of the a) primary correspondent, b) secondary correspondent(s), c) any other names mentioned and their context; 3) identify the dates of when the postcards were sent and received; 4) identify where the primary correspondent’s home/origin of the postcards is and a) any other locations mentioned in the postcards; 5) identify any a) battles, b) promotions, c) casualties, d) leaves, e) holidays, and f) any significant events at the correspondent’s home; and 6) anything else within the postcards that may be useful or interesting. As of now, we have divided up into groups in order to partition the work evenly across the multiple boxes of postcards, and have been able to mostly transcribe and translate several postcards per each group member that has been coming regularly to meetings. As far to my knowledge, not much of interest has been found in the early war postcards, those around 1914 and 1915, but as the groups moved on to their folders of postcards from 1916 and 1917 they are beginning to find interesting details of battles, newspaper clippings, and other events as stated in the criteria above. Progress is slow due to the students having to translate from an old form of German handwriting known as Kurrentschrift, and with each handwriting style being unique they have to adjust to reading each design. However, with constant and increasing participation I believe we will have enough to display for the upcoming forum in April.
The purpose of this study is to investigate indications of vocal risk in pre-professional voice majors, in order to understand the effects of substantial voice usage and related routine behaviors in this population. The literature suggests that there is a lack of awareness regarding voice disorders associated with vocal habits among some professional voice users. This investigation consists in the application of surveys entitled “Are you in the Vocal Danger Zone” created by The Voice Academy at the University of Iowa, and the “Voice Handicap Index-10” (Rosen, Lee, Osborne, Zullo, & Murry, 2004). Responses will include self-reported data regarding voice usage in university students majoring in singing voice and musical theater. Data collection is currently in progress. Results may be applied to both educational aspects of vocal health and the development of preventive measures for voice disorders in professional voice users. In a society increasingly focused on environmental health and education, prevention of disorders embodies a logical conduct and should be based on scientific evidence.

This study was approved by the Southern Illinois University (SIUC) Human Subjects Committee (HSC), under # 15332.
Ayush Kohli and Dr. Amiangshu Bosu

Department of Computer Science

*Identifying Repackaged Android Apps Based on Static Program Analysis and Supervised Machine Learning*

Android users can easily customize the Android OS and install apps from unofficial marketplaces (e.g., GetJar, SlideMe, and AppBrain). Sometimes third-party developers modify popular apps obtained from the official marketplace by replacing some of the classes (e.g., ad library) or by injecting malicious code, and upload it to the alternative marketplaces. This practice not only violates the intellectual property of the original developer but also makes the users of the repackaged apps vulnerable to malicious code. Popular techniques to identify repackaged apps include pairwise comparisons based on similarities in opcode sequences (i.e., DroidMOSS and JuxtApp), similarity searches based on functionalities (i.e., PiggyApp and ViewDroid), pairwise comparison of the program dependency graphs (i.e., DNADroid), and similarity based statistical features like number of activities, permissions, and structural features (i.e., ResDroid). However, due to pairwise comparisons those techniques are not scalable (i.e., complexity $O(N^2)$) for market-scale app analyses. I plan to encounter the scalability issue based on a supervised machine learning technique on attributes extracted from the apps using a static analysis tool. Using IC3-DIALDroid, a static analysis tool, I extract the characteristics of the app components and their inter-connections. I have also developed a clone analysis tool to extract other app attributes, such as list of resource files, certificate information, and layout components. I am using overlap in different types of attributes in a pair of app as features to train my classifier. My initial results with 2000 app pairs, which was presented in the 2016 ACM Midsoutheast conference, looks very promising with 84% mean precision (i.e., the percentage of identified cases that are true clones), 97% mean recall (i.e., the percentage of present clones that are detected), and 95% mean accuracy. Currently, I am working on to validate my solution on a large-scale dataset of over 100k apps.
The Citizen Continental-America Telescopic Eclipse (Citizen CATE) Experiment will use a fleet of 60 identical telescopes across the United States to image the inner solar corona during the 2017 total solar eclipse. For a proof of concept, five sites were hosted along the path of totality during the 2016 total solar eclipse in Indonesia. Tanjung Pandan, Belitung, Indonesia had the best seeing conditions and focus, resulting in the highest quality images. This site proved that the equipment used is capable of recording high quality images of the solar corona. Because 60 sites will be funded, each set up needs to be cost effective. This requires us to use an inexpensive camera, which consequently has a small dynamic range. To compensate for the corona’s intensity drop off factor of 1,000, images are taken at seven frames per second, at exposures 0.4ms, 1.3ms, 4.0ms, 13ms, 40ms, 130ms, and 400ms. Using MatLab software, we capture a high dynamic range with an Arduino that controls the 2448 x 2048 CMOS camera. A major component of this project is to train average citizens to use the software, meaning it needs to be as user friendly as possible. The CATE team is currently working with MathWorks to create a graphic user interface (GUI) that will make data collection run smoothly. This interface will include tabs for alignment, focus, calibration data, drift data, GPS, totality, and a quick look function. This work was made possible through the National Solar Observatory Research Experiences for Undergraduates (REU) Program, which is funded by the National Science Foundation (NSF). The NSO Training for 2017 Citizen CATE Experiment, funded by NASA NNX16AB92A, also provided support for this project. The NSO is operated by the Association of Universities for Research in Astronomy, Inc. (AURA) under cooperative agreement with the NSF.
Madelyn Kramer, Asma Al Kabsh, Hassana Samassekou, and Dipanjan Mazumdar

Department of Physics

Optical Properties of Large-area MoS$_2$ Films Grown via Magnetron Sputtering

Transition metal dichalcogenides (TMDS) have gained exceptional attention because of their thickness dependent electronic structure which makes them suitable for electronic and optoelectronic applications. MoS$_2$ is among the most promising material in this family. In this work, we have investigated the large-area optical properties of few and bilayer MoS$_2$ grown on different amorphous underlayers (BN and SiO$_2$) using UV-VIS. A comprehensive analysis of thickness and substance dependence of optical properties of our large-area films will be presented and compared with existing literature reports and first-principles electronic structure.
Donald Larsen and Qingfeng Ge

Departments of Chemistry and Biochemistry

Abstract was asked to be omitted from booklet
Azarra Lee, Kandis Sullivan, and Dr. Seung-Hee Lee

Department of Fashion Design and Merchandising

Are Minority Fashion Models Underrepresented In The Fashion Industry?

If fashion can create fashion trends, then the industry should use its power to make social trends too. Social icons such as celebrities and music moguls stand as role models for children and young adults, influenced by their style, way of living, and dress. Going further, the fashions that are worn by these celebrities are first seen on runways. This research will examine whether fashion models of color are underrepresented and shown less, compared to European models with white European features. The fashion industry is minimizing what beauty can extend itself to. Hampering on how diverse the runway is will limit growth and innovation. This research will not focus on the effects of the industry towards children and young adults, but place more on the actual proof that the fashion industry’s view on beauty isn’t found in women of color. The purpose of this study is to investigate about minority fashion models that are underrepresented by designers in top runway shows. Some questions to answer during this research: Are there fashion models of color on major runways and if so how many? What is a designer's preference when selecting a model? What is the ideal look for a runway model? Are their designers and fashion professionals that actively support having models of color in their shows? What are some evidence of cultural appropriation in fashion shows? For this study, the qualitative research method will be used to collect thoughts and opinions of models and fashion professionals using scholarly journals. This will further be organized into an outline. Case studies and fashion ads and magazines will be reviewed and analyzed in depth to thoroughly provide a detailed answer for the questions posed. Meaning, information pulled from the case studies and fashion ads will related to the thoughts and opinions of models and fashion professionals. The study will benefit anyone in the fashion industry from designers to fashion advertisers and other Fashion professionals.
The purpose of this research is to study Governor Bruce Rauner’s Turnaround Agenda, which he initially unveiled in 2014 upon taking office. His plan was meant to overhaul state government with goals that were largely focused on keeping businesses in Illinois and convincing new businesses to take root, but proposals like limiting union power and decreasing workers’ compensation costs for employers have kept him at odds with Democratic lawmakers like House Speaker Michael Madigan and Senate President John Cullerton. This has led to an unprecedented budget stalemate in the Capitol as neither side is willing to compromise. Now, after about two years of gridlock between Rauner and Democrats in the Illinois House and Senate, the governor has had to put many items of his original 44-point Turnaround Agenda on hold. His wish list is down to seven key points: workers’ compensation reform, education reform, a property tax freeze, implementing term limits, pension reform, redistricting and creating local “employee empowerment zones”. Since the governor says time and time again that the state’s policies and economic climate causes residents and businesses to move to surrounding states, for each of the seven items I have outlined the background of the issue, the plan put forth by Rauner, and drawn comparisons to the policies in place in neighboring states. Through these comparisons, we can see if the governor’s claims that these states are more business-friendly are accurate and what Illinois could potentially look like under the laws of its surrounding states.
This research is aimed to explore K-12 geography education in USA and China with two questions: 1. What is geography teaching like in USA and how is it different from that in China? 2. What are good ways to teach geography? Geography is about the physical environment, the society and their relationships. It attaches importance to pressing global issues such as economy shift, globalization, and climate change. In the 1980s, a lot of efforts have been made to revive and transform K-12 geography education in USA. However I find, through interviews, only small part of schools have ‘world geography’ as required class in Illinois. On the contrary, there are more required classes in China, including world regions, Chinese geography in middle school and physical geography and human geography in high school. Teaching geography seems easy but it is difficult indeed. It is common for teachers to demonstrate incomplete, fragmented geographic knowledge instead of helping students develop synthetic thinking. World geography learning in USA is only confined to locations and memorizing facts about products of world regions though there are interesting games designed to help memorize. It is similar that a lot of students study geography by memorizing in the examination-oriented education in China. Through observations in classes in the university, interviewing and looking through other researches, I explore the ways of helping students engage in thinking. Inquiry, which includes problem-based learning may be a good choice. The inquiry can also be combined with Geographic Information Systems. However, it remains to be tested in the future experiments.
Lilianna Lichner and Paul Restivo
Center for Environmental Health and Safety

Saluki Safety and Sustainability

SIU is a unique campus full of both natural and manmade beauty. However, it is important to remember that despite being surrounded by all that beauty, safety is still the number one priority of those working and living on campus. As a reminder of the importance of basic safety when working at SIU I will a short informational video. This video will become easily accessible for both current and prospective employees of the University. It will cover basic safety information such as emergency procedures and workplace hazards. Additionally, a short documentary about Southern Illinois University's desire to strive toward becoming a sustainable campus will be created. This will focus on the foundation and importance of the Green Fund and the Green Fee, the Sustainability Office, and the HUB. Additionally, it will call out to students and members of the community to stay sustainable in their daily lives in order to help keep the University and the surrounding area clean and beautiful for the generations to come. This documentary will be not only be accessible to students and prospective students, but members of the community as well. The Sustainability Council will use this film on their website, as well as using the footage gathered by myself to create shorter informational videos and sound bites that will be used to promote activities across campus.
As fossil fuel reservoirs continue to be depleted, the world must look to other, more sustainable fuel alternatives. One of these fuel alternatives is biodiesel, which uses ethanol from plant sugars or oils as a fuel. In particular, vegetable oil from plants such as soybeans can be refined to produce a sustainable biodiesel. As much of the vegetable oil is treated as a waste product in the refinement of soybean for consumption, it is a viable species of plant to use as biodiesel. However, maximizing the total oil content of soybeans inherently decreases protein content, potentially increasing the cost of soybean-based food products. By reducing the total oil content of the soybean, its use as biodiesel can be viable. The goal of this experiment was to find a strain of the KAS soybean that could meet the aforementioned standards. This was done by measuring the phenotypic and genotypic oil contents across several strains.
Atmospheric ozone (O$_3$) in the stratosphere is beneficial to humans, as it prevents harmful ultraviolet radiation from penetrating to the surface. However, near-surface O$_3$, produced by chemical reactions involving naturally-occurring gases and pollutants, results in poor health outcomes for humans, particularly respiratory and cardiovascular issues. Despite the serious health risks posed by O$_3$ and its relevance for urban areas in the Midwest, few studies have examined the relationship between ground level O$_3$ and meteorological conditions in Illinois. We examine synoptic-scale atmospheric circulation features and corresponding surface weather conditions associated with elevated or extreme O$_3$ occurrences at nine locations throughout Illinois between 1980 and 2015. We find that over 98% of all extreme O$_3$ days occur between May and September, and they are significantly associated with dry tropical, dry moderate, and moist tropical air masses. These air masses correspond with elevated air temperature, solar radiation, and reduced humidity, consistent with previous studies connecting O$_3$ concentrations to weather. The similarity in meteorological conditions between all nine stations suggests the occurrence of extreme O$_3$ days is generally attributable to large-scale atmospheric processes. Significant, positive trends in the frequencies of dry moderate, dry tropical, and moist moderate air masses in Illinois suggests possible increased exposure to extreme O$_3$ conditions in the future.
A long-standing and well-known problem of explicit measures is social desirability bias, or the ability to skew one’s responses based on concerns about the perceptions of others on one’s responding. Instruments such as the Marlowe-Crowne Social Desirability Scale (MCSD; Crowne & Marlowe, 1960) have been developed to aid in detection of this kind of responding, but any explicit measure is susceptible to response bias. Recent developments in behavioral measures have attempted to circumvent this problem by comparing differences in response times in order to measure what some call implicit attitudes. The most popular implicit measure is the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), which provides a general metric of attitudinal biases. A more recent instrument has been developed in the wake of the IAT that provides more specific metrics of attitudinal biases, known as the Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes et al., 2006). The current study sought to examine attitudes regarding Abraham Lincoln and Adolf Hitler and to compare two types of stimulus presentations: using either names of these individuals (text condition) or images of these individuals’ faces (image condition). To date, no study has directly compared these stimulus conditions with the IRAP. Across both conditions, significant attitudinal biases were observed, including an unexpected pro-Hitler bias. Although no differences were detected in the magnitude of biases between the text and image conditions, there was a difference observed for response time; the image condition obtained significantly faster response times than the text condition. These data support the use of both stimulus conditions and raise some provocative questions about the nature of implicit biases.
Seanessy Lyons and Agustin Jimenez
Department of Zoology

*Genetic Structure of Aspidodera raillieti on the island of Martinique relative to populations in the mainland.*

Aspidodera raillieti is a member of the phylum Nematoda, and a common parasite found in the digestive tract of opossums native to South America such as Didelphis marsupialis and Micoureus demerarae. The effective range of the parasite includes Argentina to Southern Illinois. Due to its wide geographic range and varied hosts, A. raillieti is highly likely to have a large amount of genetic variation within its global population. This study focuses specifically on the population found on the Caribbean island of Martinique. In contrast to mainland populations, the Martinique population of opossums has been relatively isolated and as a result so have their parasites such as A. raillieti. Due to the much faster rate of reproduction in A. raillieti in comparison to their marsupial hosts, it is much more likely to have experienced the beginnings of a subspeciation event than its host. In this study, 109 A. raillieti were selected from opossums captured in several locations including samples from French Guiana, Panama, Peru, Bolivia, Guatemala, United States of America, and Martinique. Their midsections were excised and run through an extraction procedure containing Proteinase K and Chelex beads. The amount of DNA was then quantified through a spectrophotometer and select samples have undergone PCR. Those samples were then run through gel electrophoresis. Subspeciation is highly likely to have occurred in the Martinique population. This is measured through comparison of the genetic variation within populations. The Martinique population should have less genetic variation due to the restricted access to other populations in comparison to mainland populations interact frequently and will have greater genetic variation. Future work will include further investigation of genetic differences within populations of A. raillieti to find other subspecies or even brand new species.
Southern Illinois Power Cooperative is a coal fired utility located on Lake of Egypt, south of Marion, Illinois. I was tasked to complete a yearend review of water usage in the plant. To achieve this, I used data that had been collected over the previous year. I constructed a spreadsheet to analyze monthly water usage. Using this information, I was able to calculate the cost associated with this water usage per month as well as a yearly total. Moving forward, the plant and I will use this data to find ways to minimize water usage and increase efficiency while decreasing costs. Some possible avenues to decrease water usage are more efficient soot blowing and improving the quality of fuel. We will determine which of these is most effective and test them accordingly.
Eyaan Mahone

Department of Radio, Television and Digital Media

*Hands On*

As a Studio Supervisor it is my responsibility to assist or train other students and prepare for the many shows our crew showcases on the daily basis. River Region Evening Edition is an example of one student ran live-newscast, airing Monday thru Thursday at 5pm ending at 5:30pm. Even though the telecast is only 30 minutes, there is plenty of work constantly being done before, during and even after the show to produce the best quality for our viewers. Most of my time is spent helping to produce this show, whether as a cameraman, audio technician, or floor director. Each day jobs will vary and the relentless fast pace can overwhelm anyone but staying focused on your given task will be a shelter from the commotion around that is endless it seems. Adapting to the change and the needs of the organization is a must. Being transparent, patient and holding others accountable, myself included, are qualities I must possess to do my work effectively to ensure a healthy work environment. Criticizing constructively, staying authentic in all interactions will rub off on others leaving no room for miscommunication. When mistakes happen I do my best to understand the reasons behind the mishaps. People are not just employees. They have families, friends and a life beyond work. Sharing my wisdom, knowledge and experience with the employees helps them perform better. The power I have is not taken for granted cause even the smallest act can create a meaningful impact in the show and more importantly someone’s life.
Attention-deficit hyperactivity disorder (ADHD) is a neuropsychological disorder that encompasses structural, chemical, and neural connectivity differences in the brain (Frank, 2015). Individuals diagnosed with ADHD have deviances in executive functioning skills, including working-memory, organization, impulsivity, attention, and hyperactivity (Tannock, 1998). Plessen et al. (2006) found larger bilateral anterior hippocampus volume in children (6-18 years old) with ADHD with increased deficits in inattention and hyperactivity. Little evidence has been provided as for whether the volume of the body or tail of the hippocampus alters behavioral symptoms of ADHD. Based on this previous literature, the current study predicts children with more severe symptoms of hyperactivity and attention will show increased bilateral hippocampal volume with more severe symptoms of hyperactivity and attention. In addition, we believe there will be volumetric distinctions in the middle/body portions of the hippocampus. This project included structural magnetic resonance images (MRI’s) from middle childhood individuals (8-12 years old), with and without ADHD. Analyze software was used for tracing and segmenting bilateral hippocampal volume into three subregions (head, body, and tail). Hyperactivity and inattention were assessed with the Behavior Assessment System for Children (BASC). Linear regression will be used to predict anterior, middle, and body hippocampal volume from behavioral symptoms. The effects of hyperactivity and inattention symptoms on anterior, middle, and body hippocampal volume will be presented as well as the implications of our results and future directions.
Brianna Martin and Wesley Calvert

Department of Mathematics

*Natural Computations in Gene Regulatory Networks*

The purpose of this research is to implement computability theory in gene regulatory networks. A gene regulatory network is a collection of molecular regulators that interact with each other and other elements in the cell to output gene expression levels. These networks exhibit natural computation. The class of partial recursive functions is the smallest class satisfying the following five axioms: the successor function, the constant function, projection functions, composition, and recursion. This talk describes partial progress to realizing these axioms in gene regulatory networks.
Briana Mason and Najjar Abdul-Musawwir

2D Studio Art

Black Women’s Hair through Politics and Social Constructs

The research I am pursuing is to express the overall appeal and structure of Black women, as well as the appreciation of their hair through the use of mixed media. This research is not only personal to me, but is also a topic of today’s beauty standards towards hair. Black women have been drilled with the idea that “nappy” or “kinky” hair is stressful to have, or how it would be so much better if we straighten it. Even as far as to think it looks unprofessional and “ghetto” in its natural state. In actuality, a Black woman hair can be appreciated because of its versatility of curly and straight texture. My goal is to make the statement of Black women’s hair loud and proud towards the viewing audience. To address this social and political issue, I am creating these larger than life mixed-media pieces, as well as combining different weaves to create traditional and cultural hair styles.
Food, energy, and water are vital resources to sustaining life. As populations grow and non-renewable resources dwindle, the necessity to optimize the use of these resources becomes more prevalent. In the past, these sectors were studied separately in the hopes of optimizing said resource. However, in recent years, a focus has been placed on studying these resources simultaneously. Interactions between these resources include using energy to extract and purify water and process and transport food, using water to irrigate crops or create energy, and using food to potentially create energy. By gaining a full understanding of the relationship between these resources, we can begin to optimize the resources in mutually beneficial ways. In the hopes of understanding the relationship between water and energy at SIU, data was collected. The yearly consumption of water and energy resources were collected through utility bills and SIU records. Due to insufficient data on food consumption, that resource was left out of the study. The collected data was used to graphically analyze the relationship between energy and water. In the end, the graphs revealed a correlation between energy and water. While the graphs could not produce the exact relationship between water and resources, the study serves as a stepping stone in understanding how SIU utilizes energy and water.
Lea M. Matschke and Derek J. Fisher

Department of Microbiology

The Search for Binding Partners for the Chlamydia trachomatis Phosphatase Cpp1

Chlamydia trachomatis is a Gram negative, obligate intracellular bacterium responsible for the most common reportable bacterial sexually transmitted infection in the United States and the leading cause of preventable blindness worldwide. This pathogen undergoes a unique biphasic developmental cycle where it alternates between its infectious form, termed the elementary body (EB), and its replicative form, termed the reticulate body (RB). We hypothesize that reversible phosphorylation regulates the differentiation of the bacterium between these two forms. In order to study phosphorylation in Chlamydia, it is necessary to examine the role of individual kinases and phosphatases in the organism. My project focuses on using the Bacteriomatch II Two-Hybrid System and a Bacteriomatch variant system to search for binding partners for the chlamydial phosphatase protein Cpp1. In particular, my project will test for interactions with a cysteine desulfurase and the elongation factor EF-Tu. Binding will be determined by either streptomycin resistance and histidine production, using the Bacteriomatch system, or β-galactosidase activity using the variant system. Successful identification of binding partners for Cpp1 could further our understanding of essential regulatory mechanisms in C. trachomatis and could lead to the identification of potential drug targets in the future.
Aviance Mckinzie and Tanna Gillespie

NSF Energy Scholars

*Off-Grid Living*

Off grid living is a system and lifestyle designed to help people function without the support of remote infrastructure, such as an electrical grid. We created a poster to explore the different methods of living off grid as well as the benefits of living off grid. During our research we found that in 2006, Home power magazine estimated that more than 180,000 homes were supplying their own power. For electricity, Residential homes typically use photovoltaic solar panels. These panels are made up of silicon semiconductors that absorb and stores energy from sunlight. The panels then convert those electrons into Direct Current (DC) which is then inverted to usable Alternating current (AC). For those who don’t use solar power, wind power is always an option. A generator takes the energy produced from the blades of a wind turbine and the energy is converted into usable AC power as in solar. Many people who live off-grid use propane or tank less water heaters as a source of heat. A good way to dispose of waste when living off grid is by installing a septic system. As water flows into the large metal tank, the liquid in the tank is released through perforated pipes into a drain field. Using your own water is another way to live off-grid. A cistern is a tank that resides above or below ground. It holds the water from rain gutters and pumps it back into the off grid home as necessary. Through our research we found these are the most productive ways to live off grid and live a healthy waste free lifestyle.
Conrad McLaughlin and Dr. Julie Hibdon

Department of Criminology and Criminal Justice

*Environmental Indicators of Disorder and Officer Use of Force*

Neighborhood disorder has long since been associated with criminal activity to some degree. In their 1982 article, Wilson and Kelling summarize the issue and suggest that signs of lack of maintenance (not fixing 'broken windows') and other forms of disorder (vandalism, litter in the street) not only encourages crime, but also has the potential to discourage 'respectable' residents from remaining in the area. Current offenders notice the lack of maintenance and guardianship in the area, and are encouraged to offend further. They conclude that physical environment influences both offenders and residential guardians alike, in such a way that the cycle of crime and disorder is maintained in that location. While prior research suggests that environment can influence behaviors of residents and offenders, less is known about the influence of disorder on officer behavior. The present study examines whether physical signs of disorder in an environment (i.e. 'broken windows') influence officer-citizen interactions. The study will specifically examine whether certain environmental features impact decisions to use force by officers. The data comes from coding of body-worn camera footage from a large police department in the eastern U.S.
Applications and Processes Involving the Photovoltaic Effect

A goal for the Solar Applications Research Project was to gain an understanding of the functionality of photovoltaic cells and their applications in our society. To achieve this goal research was conducted to understand the workings of the photovoltaic effect in photovoltaic cells. After an understanding of the functionality of a photovoltaic cell was reached research continued into the applications and effects of photovoltaic cells in our society. An investigation into applications in solar rooftops and solar roadways was conducted.
The goal of the Kinsel Research Group is to examine the correlation of gas-phase thermodynamic properties of amino acids with the relative ion intensity of these analytes using MALDI-MS (Matrix Assisted Laser Desorption/Ionization-Mass Spectrometry). Our group has previously reported a linear correlation between the protonated amino acid peak area over the deprotonated matrix peak area (ln[AAH+/M+]) as a function of the gas-phase basicity (GB). This correlation strongly supported a mechanism of analyte ion formation via gas-phase matrix-to-analyte proton transfer. However, this previous study involved the grinding of solid samples together, and then affixing these samples to the MALDI target. Since the method of sample preparation could lead to a bias towards gas-phase analyte ion formation, there is a compelling interest to repeat these studies using more conventional MALDI sample preparation approaches. In initial studies, glycine, alanine, isoleucine, valine, and phenylalanine were co-crystallized with various MALDI matrices, both individually and in mixtures. Preliminary data for co-crystallized mixtures of the 5 amino acids and the matrix α-cyano-4-hydroxycinnamic acid yielded similar results to the previous studies. This study also indicated that the relative intensities of the ion signals for the amino acids increased as the GB of the amino acid increased. Currently, various other conventional MALDI matrices are under investigation. Studies are also being performed to examine the influence of the time allowed for delayed ion extraction on the relative yield of analyte ions. These studies will ultimately aim to provide insight into the kinetics of the gas-phase ion formation process.
Countless cases reach the supreme court of their state each year, their outcomes and transcripts logged in an online database known as Lexis. I have spent days crawling around the inner workings of the Lexis database, a vast archive of state supreme court cases, collecting data as best I can so that we might have a better understanding of how the law is influenced in our country. Our approach is simple - throughout these cases there are dozens of citations, explanations for why each justice made the decision they did. These citations link to other cases, from different state or federal courts, including the United States Supreme Court. By counting and measuring which states are most affected by which other states, we develop a grasp of who it is that’s most influencing the decisions reached by these justices. For instance, if a case from Alabama cites its own state court six times, one Georgia case, and the US Supreme Court four times, we can conclude that the decision reached in this case was based primarily on the state of Alabama itself as well as the USSC. If say, fifty cases from Alabama all follow this pattern, then we’ve got real evidence that this state primarily sticks to its own guns, as well as those of the boys upstairs (them being the Supreme Court.)
The purpose of this research is to identify correlations between Search Engine Optimization techniques with overall website quality. The goal is to show that optimizing your website's search engine presence not only brings more users to your site, but improves the overall experience and structure of the site itself. This research draws on data gathered through the enterprise Search Engine Optimization platform Bright Edge reflecting results of optimization efforts on the siu.edu domain. Website quality is measured in terms of three components: accessibility, content, and structure. Accessibility is a measurable metric of a website's availability in non-traditional mediums, especially mediums used by people with disabilities. Content, while more nebulous in nature, is the measure of the quality of writing on the web page itself. Finally, structure refers to the underlying architecture of the page, from the code it is written in to the server that it is hosted on. All of accessibility, content, and structure are focal points of good Search Engine Optimization, and improving a website's search engine presence is shown to have a positive correlation with improvements in these metrics. Underpinning the effects on website quality is the effect of Search Engine Optimization itself. Using Bright Edge's platform, we can see quantifiable metrics over time measuring organic traffic from search engines directly, top devices used to access the website, and the effects of applying proven Search Engine Optimization techniques on overall website usage. By pairing these results with the three metrics of website quality, we anticipate that the two not only work together, but actually improve one another. The findings will encourage webmasters to focus on Search Engine Optimization as a means of improving website quality overall.
Familial male-limited precocious puberty (FMPP) is a genetic condition that is caused by a gain-of-function mutation located in the luteinizing hormone receptor (LHR). Males with the condition have symptoms such as high testosterone levels, early onset puberty (as early as two years old in some humans), and Leydig cell hyperplasia. To study the long-term reproductive consequences of FMPP, our laboratory has created a mouse model, referred to as KiLHR, with a similar phenotype as that seen in FMPP patients. In previous studies, it has been concluded that KiLHR mice grow to become infertile due to either erectile and/or ejaculatory dysfunction. To distinguish between the two mechanisms, apomorphine can be used. Apomorphine is a dopaminergic receptor agonist that can induce penile erections in mice and humans. The purpose of my study is to determine the optimal dose and time of apomorphine administration that results in erectile behavior in wild type mice. Once these parameters have been determined, apomorphine can be used to determine if penile erections can be induced in KiLHR mice. This information can then be used in later studies to narrow the two possible mechanisms of sexual dysfunction in KiLHR mice.
Evidence suggests status characteristics (e.g., age, sex, race) affect an individual’s ability to influence others in a face-to-face setting; however, it is unknown if the status of a person is enough to impact people in a virtual setting (Shollen & Brunner, 2011). Because more and more leaders in the online workforce are of minority status (Houston, 2015), it is important to learn whether race influences how others perceive their effectiveness. The Leadership Categorization Theory (Rosette, Leonardelle, & Phillips, 2008) will be implemented to discover racial prototypes for online leaders and how those prototypes affect leader evaluations. Participants will be presented with vignettes that vary in virtuality from face-to-face to purely online interactions. In the first study, the e-leader racial prototype will be investigated by having participants choose which race they believe the leader described in a vignette to be. Based on leader prototypes in face-to-face workplaces and the current trends of racial demographics in technology leadership positions, it is expected that Whites will be seen as e-leaders more frequently than minorities in all scenarios. In the second study, another vignette will be given, as well as a photo and name of the leader. Participants will then decide how effective they think the leader is based on what they read. If a non-White person is the leader, the evaluators’ prejudice should lead to lower leadership effectiveness ratings since Whites are most likely to be the prototype of online leaders.
Haruna Miyata¹ and Dr. Matt Geisler²

¹Department of Biological Science
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Verifying Function Of cis-Regulatory Element In Plant

Cis-regulatory elements are non-coding sequences that control nearby protein-encoded gene expression in all developmental stages with respect to environment stimuli such as plant hormones and abiotic stress. They mainly located at upstream or downstream of promoter sequences. Here we have designed an experimental approach to study the function of cis-regulatory elements (CREs) in gene expression in all developmental stages with respect to environmental stimuli such as hormones and abiotic stress. Novel and known cis-elements were recovered using an algorithm that compares gene expression data with promoter sequences. One 8bp sequence ACCGACAT was found to be correlated with genes which are responsive to cold stress. It has also been associated with circadian rhythms; so it may function relying on day and night cycle. We made two hypotheses: One is that an artificial promoter (AP) containing 6 repeats of this CRE will be in response specifically to cold and related abiotic stresses. Secondly is that the cold stress response will be modulated with circadian rhythms. This experiment has been designed as the following: the AP was ligated into the vector PORE-R3 adjacent to the green fluorescent gene (GFP) reporter, and will be transformed into Agrobacterium (strain LBA4404). The AP-GFP construct will then be transformed into plant, and if the gene is expressed in following conditions; cold evening, warm evening, cold daytime and warm daytime; is examined. Furthermore, as a positive transformation control and extra study, a novel gene with a constitutive promoter on the Gp319 vector was examined if it would express indigo color in phenotype in plant. As a negative control the empty vector PORE-R3 (no promoter, but with GFP) will also be transformed. Reported in this presentation are the experimental design and our initial results from construct creation, plasmid extraction and transformation of E.coli and Agrobacterium with different concentrations of control vectors PORE-R3 and Gp319.
Fifty-nine bulls, produced by 30 independent farms, were fed as a single group in an 84 day growth performance test. Ten bulls were assigned to a pen and bulls were fed a common diet in a Calan gate feeder system to measure individual daily feed intake. Bulls were tested amongst each other based on age and breed. At the initiation of the test, bulls were divided into one of two age divisions: 1) Senior, 12 - 14 months old, or 2) Junior, 8 - 11 months old. Bulls were then divided within their breed with the following breeds being represented; Black Angus, Red Angus, Simmental, Simmental x Angus cross, Hereford. Data collected included daily intake, average daily gain, feed efficiency, and residual feed intake for 84 days. On day 84 blood samples were collected for commercial DNA genomic testing for average daily gain, feed efficiency, and residual feed intake. Once genomic testing data is received a correlation analysis will be conducted to compare measured performance to DNA marker predicted performance.
Daniel Morales, Lucas J Kirshman, and Robin Warne

Department of Zoology and Center of Ecology

*Immune Functions May Contribute to Life-History Specializations in Cricket Morphs*

Animals cannot maximize all traits simultaneously, as a result physiological trade-offs often shape phenotypic expression and evolution of animals. Immune function in particular is often considered a central component of physiological trade-offs because mounting responses to infection are energetically and nutritionally costly. However, immune function is a collection of immune factors and animals should emphasize the factors that combat the parasite with the highest fitness costs. Animals on expanding population fronts, for example, may be released from density dependent diseases. Indeed, our previous work has shown that immune strategy differs between sedentary and dispersal phenotypes of a wing-dimorphic cricket. Specifically, the sedentary phenotype prioritize constitutive, cellular immune factors, which require high maintenance investment, but provide a rapid response against density-dependent microorganisms with short generation times. Alternately, the dispersal phenotype emphasizes cellular immune factors, which are specific for parasites and require less maintenance cost, but have slower response times. However, the costs of immunity are context dependent, where ontogenetic shifts in phenotypes may canalize these distinct immune factors in relation to development. In this study, we test for canalization by assaying how diverse humoral and cellular immune factors vary across development of both sexes among differing morphs. This examination will provide insight into how immunity constrains and contributes to shaping life-history specialization among animals with differing life-histories.
There is a form of self-reflection known as rumination, which enables and enhances one’s symptoms of depression. Rumination and disparities in cognition work together to predict duration and severity of depression. Rumination interacts with cognitive styles to affect not only depression, but other forms of psychopathology as well. It is plausible then that rumination may predict mood disorders in children because of underlying deficits in cognitive control. Yet, the effects of rumination on mood disorders and cognitive control in children specifically has been widely understudied. Furthermore, it is possible that cognitive control deficits—that is, problems in the way one processes information and directs attention—may serve as an enabler for rumination. Using a sample of 15 children, the current study has two core aims: (1) explore the effects of a negative mood induction on cognitive control in children, and (2) examine if baseline cognitive control deficits in children predict their negative affect and rumination levels in response to a mood induction. The current study hypothesizes that rumination will be associated with decreases in cognitive control and that children with greater deficits in cognitive control at baseline will have greater rumination levels and negative emotion in response to a mood induction.
Shane Mueller and Sam Chung

School of Information Systems and Applied Technologies

Software Reengineering a Legacy Game Application with Model-View-Controller (MVC) Architecture

Software complexity is increasing exponentially in our modern era, as this trend continues software architecture becomes increasingly important. The intention of this research is to investigate the use of 4 + 1 architectural views using a Unified Modeling Language (UML) for reverse engineering as well as the re-engineering phase in order to redesign an existing legacy game application into Model-View-Controller (MVC) architecture. Software re-engineering involves first reverse engineering the legacy system to a visual model in order to understand the design and its functionality. The legacy system is reverse engineered using 4 + 1 architectural views in order to comprehend the different aspects of the system. After the 4 + 1 architectural views are created with UML, and the functionality of the system fully understood, a new target system is modeled with MVC architecture using the 4 + 1 architectural views. The target system's code is then written (with the help of automation from a Computer-Aided Software Engineering (CASE) tool) by using the new architectural models, maintaining the same functionality as the legacy system. The target system contains three different classes, each class with one specific purpose represented by a component of the MVC architecture. The Model consists of the logic of the game and manipulating the users input. The View consists of prompting user input and providing game results to the user. The controller organizes the general logic of the game through the use of the View and Model classes.
My research includes designing, art directing, and creative directing for the Design Area’s annual professional and alumni conference called Design Days. My research responsibilities include brainstorming, researching conference trends, finding the best solutions for our needs and collaborating with the four other students on the design team as well as my advisor to create the best experience for our conference. A majority of my research has been design based; I have collaborated with the team to develop and design the overall brand identity for the conference based on our conference theme: Evolution. This year’s event features Harold Cohen, the man who started the design program at SIU. Our concept revolves around the idea that our program was started in 1955 and has evolved over the past 62 years, yet the DNA that the program began with is still at the heart of what we are doing and what we have achieved. The goal for the identity is to showcase our concept in an engaging and aesthetically pleasing manner that attracts people and creates interest for our event while still communicating the idea properly. We will draw students, professionals, and alumni to our event, which in turn produces more student involvement in our program and more interest from potential students. As the organizer for the event, it is my job to delegate duties that fit each person’s skills and interests. For the event, we created a mark/logo, a color scheme, posters, postcards, name tags, fun collateral like mugs, canvas bags and customized chocolate that all relate back to our original concept and identity.
Michael Nelson and Mark St. George

WSIU Public Broadcasting

WSIU Television Productions

My main objective the current academic year is to produce quality television programming to air both on WSIU Public Broadcasting channels as well as the World Wide Web. During my pre-production of Scholastic Hi-Q, I studied previous seasons of the program & took notes on how to improve production as well as looked at all of the available resources in order to find ways to continue the long standing tradition of the television series. I then sent out applications to various schools in the WSIU viewing area to obtain participants for the upcoming season for the show. I stayed in constant contact with them throughout the season, and also worked on various projects that were needed in order for the show to begin. Some of these include working to order the questions for the show, finding various media forms to create questions with, and also data entry so we had everything we needed in order to start building the show. Once tapings began, I worked to make sure the staff, and the school was ready for the TV tapings, trained them on their positions, as well as organized the games that were to be done for each show. Besides Scholastic Hi-Q, I also helped on Expressions assisting the Executive Producer Mark St. George in various ways such as field production, setting up the studio, as well as various capacities inside the studio to make sure the show goes on. I also travel to various locations throughout the state to help produce various programs such as the Lincoln Academy Awards, River Region Evening Edition, and other various programs that air on WSIU Television Station. Having the ability to work as an Undergraduate Assistant for Mark St. George & WSIU has prepared me with the skills needed to be successful after college.
Phaedra Norrell\textsuperscript{1,2}, Aidan Smith\textsuperscript{1}, Ryan Holden\textsuperscript{1}, Paige Niemet\textsuperscript{1}, Carlesha Hines\textsuperscript{1}, and Dr. Michael Hylin\textsuperscript{1}

\textsuperscript{1}Department of Psychology
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Unilateral versus bilateral craniotomy and effects on recovery of function in the juvenile rat model

Traumatic brain injury (TBI) is the leading cause of death and disability in juveniles under the age of 15. In research, it has become common practice to assess injury and recovery using a unilateral (one-sided) craniotomy model. Prior research has shown that utilizing a bilateral craniotomy causes axonal strain and impacts the contralesional hippocampus. By using a unilateral versus bilateral (two-sided) testing model, we were able to assess mechanisms of recovery of function following brain injury that may or may not be lateralized to one side of the brain that influence the process by which functional recovery takes place in the rat model. In the current study, a unilateral craniotomy was given to one group of rats, and a bilateral craniotomy to another group. We then analyzed functional recovery between the two models. We expect there will be no difference in behavioral dysfunction between the two models, but there will be neuropathological differences. These differences will contribute to lateralization of mechanisms underlying recovery of function.
In my year and a half with the Sustainability Office, under the guidance of Geory Kurtzhals, I have managed and accomplished many different projects. In my presentation, I will highlight two of my bigger creative activities that I have done during my undergraduate assistantship. First, I am showcasing new recycling signage for Touch of Nature. This signage was initiated due to a need to communicate more clearly what can be recycled on campus. The Sustainability Office reached out to a team of design students from AIGA for support of this project. The Touch of Nature signage is an extension of this project. As an AIGA officer, I led both initiatives. The full set of signage is composed of posters, twelve inches by three inches labels, and a variety of labels for different recycling bins. The biggest challenge was communicating exactly what goes into each bin through simple vector graphics and a varying amount of text to differ the posters from the labels. The second project is called Faces of Sustainability. This is a slideshow that highlights individuals on campus, faculty, staff, and students alike, that have played a part in or are actively involved in sustainability at SIU. I manage this project; including the design of a template and a process for self-submission of slides. I work to continuously update this as needed. It is currently on display in the window of the Innovation and Sustainability Hub. Working in this office provides the opportunity to learn and grow as a designer, while combining my love for design and sustainability. I feel that I can accomplish what I strive for and accomplish new goals I did not know I would be reaching. The Sustainability Office continues to be a great experience for me.
Atmospheric pollutants can be transported great distances over various countries and can cause environmental impacts where the pollutants are deposited. Moisture, such as rain, is one of the most common carriers of atmospheric pollution and how it is deposited. Pollutants can cause damages and effect chemical compositions where it is deposited. Carbondale is not necessarily close to major pollution sources, but because of pollution transport in the atmosphere, we can test the rainwater that falls in Carbondale to see what, if any, amounts of pollution it contains. To test, we collected individual water samples from various rainfalls over the course of a few months and can then analyze the samples chemical composition. We then will be able to trace the source of the water back to where it originated by combining the chemical composition with stable isotope data. By running the water samples through the Geochemistry Lab Dionix machine, we find that the chemical makeup of Carbondale rain water has 5-7 chemical components that we can identify, and more that remain unidentified. Additional study and analysis is needed to incorporate stable isotope data to be able to track the source of the rainwater. This study shows us that atmospheric pollutants can be spread all over the globe and potentially deposited great distances away from the source of the pollution. Further study will be needed to connect stable isotopes in our samples to the origin of where each chemical trace was incorporated into the atmosphere, which will shed light on the impacts of pollution and how far reaching the effects of pollution can truly be.
Physiological and psychological effects of dysphagia and dementia can be substantial; participation of significant others (SOs) of patients is essential for successful management of these disorders (Ekberg, Hamdy, Woisard, Wuttge–Hannig, & Ortega, 2002). Caregivers and SOs should strive to foster strong communication channels and nurturing relationships with people with dysphagia and dementia (Douglas-Dunbar, & Gardiner, 2007). On the other hand, SOs oftentimes feel the immense strain of their loved one’s comorbidity (Diwan, Hougham, & Sachs, G. 2004). In order to investigate the effect of communication between patients’ SOs and healthcare providers, a pilot study was conducted using SOs of people with dysphagia and dementia in the Southern Illinois area. A survey was applied to SOs that responded to a questionnaire evaluating their loved one’s feeding treatments. Questions included the type of feeding treatment, perceptions of individual’s current ability related to swallowing, and opinion of pervasiveness of individual’s dysphagia and feeding treatment in daily functioning. Results demonstrated that the rate of the SO’s satisfaction with the feeding treatment may potentially be associated with the safety and quality of life that treatment may provide. Further studies based on this preliminary investigation should be achieved in order to correctly identify the presence or lack of relation between critical factors.
Sarah Orkin, Clayton Killion, and Yasuko Taoka

Department of Languages, Cultures, and International Trade

Decoding SIU’s Meditationes Vitae Christi Manuscript

SIU’s edition of the Meditationes Vitae Christi (“Meditations on the Life of Christ”) may be one of the oldest versions of this text—the other three oldest editions, from the late 1400s, are in the Vatican; Oxford, England; and Leipzig, Germany. This work was a very popular devotional text used primarily by nuns, and there are over two hundred total copies of the work in existence. This project examines the SIU version of the work: first, we familiarized ourself the idiosyncratic handwriting in which the text is written, then compared it with the critical edition of the text. Then, we transcribed and translated an epilogue which appears unique to the SIU manuscript and which has never been published before.
Katy Ovington and Dr. Philip Anton

Department of Kinesiology

Long-term participation in the Strong Survivors program: a caregiver case study

Cancer caregivers often seen a steep decline in their quality of life (QOL) and activities of daily living (ADL) performance. In previous studies, it has been shown that exercise can be used to benefit individuals physically, and psychosocially, but the majority of these investigations have only followed participants during a participation period of 12 weeks. This case study examines the progress made by a long-term participant of the Strong Survivors Program. The individual examined in this case study is a female participant who has been in the program for 7 years while serving as a caregiver. The participant exercised twice a week for the duration of her participation under the guidance of three different staff members. During this time, several physical and psychological assessments were completed to evaluate her progress. The physical assessments were designed to simulate ADL and included a lift and carry task, stair-climbing, balance evaluation, standing from a chair, and walking for short distances. On the psychological side, she completed questionnaires that evaluated her perceived fatigue and QOL, as well as exercise enjoyment and social support. Data was collected approximately every 6 months across the 7 years she has been involved in the program. Recently, the participant also completed a qualitative analysis that consisted of several open-ended questions that evaluated her feelings/thoughts on her overall program experience to date. The quantitative data revealed a fairly consistent improvement in her fitness level and perceived quality of life that corresponds well with the themes that emerged from the open-ended questions. Strong Survivors has numerous participants (both survivors and caregivers) who have been with the program for multiple years. This case study sets the stage for a larger study to come that will further study long term participation trends.
The purpose of this research is to demonstrate how a sales management system using array list data structure is reengineered to a new target system using MVC architecture. Nowadays, it is important for an undergraduate IT major student to learn software architecture to improve the maintainability of a software system. However, when the students learn programming in Java, they only concentrate on programming without studying the architecture of an application. In this research, we reengineer a Java application using array list for sales management showing the total and average sales, and the highest and lowest amounts of sales as the legacy system. The 5W1H (Why, Who, When, Where, What, and How) model-driven re-documentation methodology is used to examine the legacy system and create a 4+1 view visual model by using a Computer Aided Software Engineering (CASE) tool. Then, we create a new target model that uses MVC. Based upon the target visual model, we implement a target system that is secure and uses the MVC. By exploring new possible architectural modeling standards for Java applications, students can increase collaboration and efficiency.
Delaney Parker and Namyun Kil, Ph.D.

School of Social Work

Animal Assisted Intervention as an Effective Intervention for Anxiety Symptoms of Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a broad term for a group of developmental disorders, which includes a wide range of symptoms and disabilities. According to the National Institute of Mental Health (2016), one in sixty-eight children are diagnosed with some form of ASD. Research into the effectiveness of Animal Assisted Intervention (AAI) is vital towards broadening alternative drug-free therapies for children with ASD that will increase social skills and help decrease levels of stress symptoms. AAI is in the first stage of research, called “proof of concept,” meaning that more quantitative research is needed to verify that AAI is an effective intervention for the treatment of ASD. This study incorporates the Autism Spectrum Rating Scales (ASRS), surveys given to parents regarding their child’s specific ASD symptoms, and cortisol samples obtained using ELISA test kits to prove that AAI decreases cortisol levels effectively. It is hypothesized that: (1) the levels of cortisol and/or stress symptoms will be lower after AAI than those before AAI; (2) the levels of ASD symptoms will be lower after AAI than those before AAI. This study aims to obtain responses from at least thirty to forty participants, of either gender, between the ages of five and ten, from the Southern Illinois community. A Repeated Measure Design will be implemented to examine whether AAI is an effective treatment for ASD. Results would potentially improve health and well-being among ASD children.
Davey Peppers and Walter Metz

Department of Cinema & Photography

*Reconstructing Film Criticism*

Film criticism is one of the few academic disciplines that is often misconstrued as a more common and colloquial discipline than something truly academic. Dr. Metz has set out to combat that with a personal mission to redevelop the structure of common film criticism, in what I refer to as his own personal Don Quixote-style ‘mission to civilize’. In doing this, Dr. Metz has helped us transform our writings about cinema from subjective but pleasant fluff into quick, immediate pieces of academia that not only raise the bar for film criticism, but allow academic film criticism to come into the modern day, as criticism of this caliber is often left for only the most notable and acclaimed films years after its release. That’s not good enough for us, so we are working together to update academic criticism and reform the state of current criticism through our own work, which is revised, critiqued, and studied many times before it goes on the air. These reviews are recorded by the authors and broadcast on WSIU, allowing myself as a young person to have a wonderful opportunity that very few my age are afforded: to have a tactile professional record of the work we’ve done. Personally, I’ve spent the majority of my reviews discussing topics like intertextuality and cinematic connections, but other unconventional topics are always welcome (such as classical music or ethical dilemmas). By having the opportunity to write, review, and record these pieces of immediate academic film criticism, we film students are able to grow our knowledge of cinema. I have also grown in my ability to discuss cinema of the past and present succinctly, sufficiently, and powerfully.
Alexandra Perry, Kendra Wills, and Dr. Diana K. Sarko Ph.D.

Department of Anatomy

*Elucidating Perceptual Processing of Social Robots to Improve Therapeutic Outcomes in Children with Autism Spectrum Disorders (ASDs)*

Individuals with autism spectrum disorders (ASDs) struggle with understanding and interpreting the social behaviors of others, including speech communication, emotional expression, and body language. Social robots have recently been shown to help children and adolescents with ASD by increasing attentional engagement and decreasing social anxiety. Because social interactions inherently rely on the effective integration of sensory cues, particularly auditory and visual, we sought to examine whether social robots elicit enhanced perceptual processing of audiovisual cues, contributing towards their therapeutic benefits. In the current study, we examined perceptual processing of human vs. robotic audiovisual stimuli (videos of speech with congruent biological motion) in adolescents diagnosed with ASD compared to typically developing adolescents. We assessed the acuteness of audiovisual integration by calculating the temporal binding window (TBW, a timeframe in which two stimuli from different sensory modalities are likely to be perceptually bound as a unified, synchronous event) in a simultaneity judgment task. We hypothesized that, 1) children with ASD would exhibit enhanced perception and integration of audiovisual cues (as indicated by a narrower TBW) for social robotic stimuli compared to human stimuli, whereas 2) typically developing children would exhibit enhanced (or equivalent) perception of human stimuli compared to robotic stimuli. Although multisensory processing (including audiovisual integration of speech) is known to be significantly impaired in individuals with ASD, social robot interactions may confer their therapeutic benefits by allowing children with ASD to experience these audiovisual social cues through a simplified version of human interactions. By better understanding the perceptual substrates underlying therapeutic benefits of social robots, such benefits could be highlighted and extended. These experiments have the potential to strengthen the efficacy of social robots in therapeutic treatments for individuals with ASD, with the ultimate goal to extend perceptual and behavioral benefits to human social interactions.
Joshua Peters, Madison Self and Isaac Lausell, D.M.A.

School of Music, Department of Guitar

Decoding Ancient Lute Notation

Generally speaking western music instruction tends to begin with repertoire from the Baroque period (1600-1750) and the 19th century. However, music for plucked string instruments such as the guitar, lute, and vihuela can be traced back to the 15th century. In order to understand compositional forms, dance genres in the baroque period it is vital to see them in their inception during the renaissance period. Approaching renaissance repertoire presents some challenges for the modern guitarist. Most music of this period is documented through an ancient notation system known as tablature. The tablature consists of five to six lines, each line representing one string. The composer then writes a number (or letter) on the line indicating which fret is to be played. The tablature system also provides indications of meter and symbols that indicate rhythm. Our research seeks to provide immediate access to the repertoire through the use of familiar mediums of transmission such as standard music notation and modern tablature. The later is commonly used nowadays by electric and folk guitar players. By removing the initial hurdle the lute apprentice can focus on achieving a working knowledge of the instrument first and later on delving into the ancient notation systems for further context. Composers in this project include John Dowland, Luys de Narvárez, and Gaspar Sanz among others. All this work will be compiled into an instructional book. This book will be used by guitarists, or any other interested musicians, who wish to learn how to play the lute. Each piece will be accompanied by a description of the piece, and a plethora of information with regard to style and technique. Each piece can be played on either a guitar or lute.
The Process of Students Creating Original Content

Alt.news 26:46 is a student run magazine-style television show that airs on WSIU. The objective of our show is to teach students how to produce their own short documentary segments or creative skits. In order to achieve this, we hold workshops to teach students how to use a camera, how to light interviews, and how to record and monitor sound. Students research unique and interesting events or businesses to see what they want to film. After that have done sufficient research on their topic, staff members help them compose professional and concise emails to employers and potential contacts asking about filming a short documentary featuring their event. Once the employer has agreed, the student makes a list of questions designed specifically for the type of story they want to tell about the event. The student gathers a crew and utilizes the skills learned from our workshops to film their documentary segment. When filming is completed staff members aid the student in the post-production process. This includes showing them how to properly store footage, how to upload it into an editing program, and how to use that program to edit the footage in a well constructed and beautifully thought out finished piece that will then air on television. We submit our finished episodes to numerous awards contests every year and are on track to finish the academic year with three full episodes.
Plants alter their growth to maximize fitness in response to changing environmental conditions. Herbivory is a biotic stress that may reduce growth due to the reduction in photosynthetic tissues or it can stimulate growth to over compensate their debilitated state. Achyranthes japonica is a highly invasive, perennial plant species from Asia. It’s first North American documentation was in Kentucky during 1981, but it has now spread down the Ohio River. Today, it can be found in forested habitats with large deer populations across nine states. This study examined the growth rate of A. japonica before and after simulated herbivory treatments of different levels of stem clipping and partial leaf removal. The study was conducted in the greenhouse, where A. japonica plants were grown for three months before the treatments were applied. The treatments consist of two levels of leaf removal, four levels of stem clipping, and an untreated control group. Measurements were taken each week during the duration of the experiment. The results have shown a relatively steady growth rate of the plants before the treatments were applied. There were a few signs of new branches growing from the second node and higher, but the majority of the growth was height growth from the apical meristem. After the treatments were applied, all of the clipped plants began to show signs of greater branch growth. The results will demonstrate A. japonica’s ability to tolerate herbivory. The results will also show the extent and type of damage that an immature A. japonica seedling can sustain before it cannot recover and the level of damage that may lead to overcompensation.
**New Developments in Stopped-Flow Spin-Exchange Optical Pumping of 129Xe and 131Xe**

We describe progress on (1) the use of aluminum-walled cells for clinical-scale production of hyperpolarized (HP) 129Xe via stopped-flow spin-exchange optical pumping (SEOP); and (2) efforts to improve production of HP 131Xe. For (1), a simple Al metal cell with optical windows was used to demonstrate the feasibility of the approach, where ex situ high-field (9.4 T) NMR showed PXe~2% and an in-cell T1 of ~25 min; ongoing work investigates possible improvements with better cell designs, lasers, coatings, and in situ detection. For (2) a new setup with 3”x3” cell, 120 W laser, and high-temperature oven has so far yielded PXe values of ~0.6% for 131Xe, as studied via in situ low-field (~1.6-5.8 mT) 1H, 129Xe, and 131Xe NMR.
Traumatic Brain Injury (TBI) is caused by an outside force being applied to the brain and can cause death if severe enough. In a healthy individual, levels of adenosine monophosphate-activated protein kinase (AMPK) are regulated and control the activation of glycolysis, which in turn, maintains energy homeostasis. Energy homeostasis is especially important in brain injured individuals because the brain needs energy to repair itself and function normally. The amount of AMPK during the first few weeks of recovery are largely unknown. Rats were given unilateral lesion in the right hemisphere of their brain and the levels of AMPK were measured at different times during the recovery process. After sectioning off the hippocampus and preparing the tissue, the sample was run through a micro BCA at different concentration levels to determine the best concentration of protein to use. Too little sample and the protein would not appear on a Western Blot, and too much would overload the system and the outcome would be unreadable. A Western blot was then preformed to determine the amount of AMPK in the sample.
Amelia Raymond, Bradley Taylor, Sarah Bowman, and Amanda Weidhuner

Department of Plant, Soil, and Agriculture Systems

Vineyard Response to Reduced Mowing Frequency

Currently vineyard floor management decisions are not made on biological, soil, or vine based needs. Growers fail to consider the costs associated with excessive mowing. Today vineyard floor management decisions are made primarily upon aesthetic value or tradition rather than on biological needs. Thus erosion, compaction, labor, operation and maintenance costs may be unnecessarily increased. This project investigates the impact of three different mowing frequencies, on vineyard soil structure, and mineral content. The three treatments applied were: grower control (mowed at two and a half week intervals), one year (not mowed for one year), and 7 year (not mowed for seven years). Treatments were arranged in a randomized complete block design with five replications. The mowing treatments were applied to vineyard aisles on mature own rooted vines trained to a high bilateral cordon system. In fall 2015 and 2016, soil compaction (0-3”, 4-8”, and 9-12” depths) was measured. Soil nutrient levels were sampled (0-8” and 8-16” depth). Vineyard floor aisle biomass was collected in a 20 inch square from two sub samples per experimental unit. Reduced mowing frequencies have the potential to not only decrease fuel and labor costs, and compaction and erosion of topsoil, but also increase longevity, yield, and fruit quality of a vineyard, provided competition of ground cover with grapevines is managed.
Sentiment Analysis is a natural language processing technique that analyzes people’s attitude towards entities such as products, services, organizations, individuals, issues, or events. While majority of current research focuses on analyzing customer reviews and social media posts to derive marketing decisions, various other domains can possibly benefit from the application of sentiment analysis. For example, an analysis of the software developers’ discussions can provide insights into the mutual relationship among the team members and can be useful in improving mutual impressions among developers and ultimately improve project outcomes. Since each of the domain has its own custom vocabulary, natural language techniques like sentiment analysis requires a customization for that domain. My initial results suggest that current sentiment analysis techniques, which are built primarily for analyzing social media posts, perform poorly on messages written by software developers. To build a customized vocabulary, I randomly selected 2115 code review comments from 20 popular open source projects. I worked with two more researchers to classify those comments as positive, negative, or neutral. We used majority voting to decide the final rating of a comment from individual ratings. I used Fleiss Kappa to measure the level of agreements among the three raters. Fleiss Kappa was valued at 0.43, indicating a moderate agreement. Using our dataset, I am customizing SentiStrength, one of the most popular sentiment analysis tools. SentiStrength uses an emotion lookup dictionary to determine the sentiment expressed in a sentence. However, SentiStrength works poorly on our dataset and therefore require customizations. Based the frequency of different misclassified words, I am updating the emotion term weights for those words. Once I have achieved acceptable precision and recall, I will be applying this classifier to conduct a large-scale empirical study regarding the impacts of expressed sentiments on software developer interactions.
Kelsey Reed, Chase Campanella, Hayden Kelly, Cameron Reed and Dr. Andrew Wood

Department of Plant Biology

Abstract was asked to be omitted from booklet
Children with Autism Spectrum Disorder (ASD) have altered postural control that may be described as rigid and less adaptive behavior. However visual-spatial perception is one of their strengths. Hence we hypothesized that presenting a static visual target will have a stabilizing effect on the posture of children with ASD. Center of pressure (COP) was recorded in 6 children with ASD and 22 typically developing children in two randomized visual conditions: without a static point and with a static point target on a television monitor adjusted to the eye level of each child. COP segments were further processed using custom Matlab scripts to generate the root mean square (RMS). Lyapunov Exponent (LyE) and Sample Entropy (SampEn) measures of variability in both the anterior-posterior (AP) and medial-lateral (ML) directions were calculated to examine the temporal aspect of variation and predictability in the time series. Our results showed that LyE and SampEn of COP in AP direction were significantly lower for children with ASD. The present data suggest that the postural sway variability of children with ASD differs from typically developing children. The results further imply that the repetitive and restricted behavior, which is a cardinal feature of ASD manifests in the control of COP in children with ASD. Having a static point target did not present any significant differences between children with typical development and children with ASD.
SMARCA5 is a protein coding gene that encodes a chromatin remodeler protein that is often deregulated in cancer. SMARCA5 expression is abundant in the pediatric cancer, rhabdomyosarcoma, which arises from skeletal muscle. The goal of the project is to understand the expression and function of SMARCA5 in skeletal muscle and its potential deregulation in rhabdomyosarcoma. We found that SMARCA5 is expressed in proliferating myoblasts and expression decreases upon myoblast differentiation into myotubes. Thus, we hypothesize that SMARCA5 promotes proliferation and may be an oncogene in rhabdomyosarcoma. To determine if SMARCA5 affects proliferation and can promote oncogenic properties in normal muscle cells, we sought to clone an expression vector of SMARCA5 to force expression in normal skeletal muscle. To clone SMARCA5, we isolated RNA and used it to synthesize complementary DNA (cDNA). We then amplified the cDNA using Polymerase Chain Reaction (PCR) with primers against SMARCA5. Following the PCR, we used agarose gels to determine if the PCR product was the expected size of the SMARCA5 transcript. The expression vector for SMARCA5 will allow us to mimic the high levels of SMARCA5 observed in rhabdomyosarcoma in normal muscle cells. This will allow us to determine if SMARCA5 can cause the dramatic changes in cell function and growth seen in rhabdomyosarcoma cells.
Courtney Rudloff and Shannon McDonald

School of Architecture

Bike Sharing Abstract

The objective of this research project is to create a Bicycle Sharing program for the Southern Illinois University campus. Other University bike share systems were evaluated. In order to evaluate other universities transportation share programs, a spread sheet with data on various topics regarding bike share programs was created. This spread sheet includes data regarding costs, technology, use-times permitted, the number of bikes in the program, and what happens if a bike is lost or stolen. After the research, a proposal was created for a bike share program on SIU Campus. This was submitted to Geory Kurtzhals, sustainability coordinator, January 30, 2017. Our proposal included the use of abandoned bikes found on campus, a locking system that tracks bike location, and costs students $35 per year, or $20 per semester and faculty/staff $55 per year or $40 per semester. We are hoping the bike share program will go into affect this fall, opening for the solar eclipse at the beginning of the fall semester with the solar ambassadors riding the new bikes that are painted to match with an SIU theme. A contest is being considered for a design. A bicycle master plan is also in the process of creation. Therefore, information regarding a campus bike share is to be included in the master plan. Through the Bike Share program, SIU will become a campus with greater access to transportation for students without motorized vehicles. As the program is completed, the needs of SIU students, faculty, and staff relating to transportation will be assessed and suggestions for improvement and expansion will be proposed.
Alexus K. Rusk\textsuperscript{1}, Katie Flynn\textsuperscript{1}, Kexin Jiao\textsuperscript{1}, Amala Kaja\textsuperscript{2}, Sukesh Bhaumik\textsuperscript{2}, and Punit Kohli\textsuperscript{1}

\textsuperscript{1}Department of Chemistry and Biochemistry
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\textit{Hanging Drop Culture Modification Utilizing Biofunctionalized PDMS Ribbons}

As cell research has progressed, so has research on cell cultures in an attempt to further improve yield and overall viability of cells during culturing. In recent years, there has been a considerable push towards 3D cell culturing. This is in fact due to the wealth of research available that suggests traditional 2D cell culturing can cause significant loss of pluripotency and differentiation when compared to its 3D culture counterpart\textsuperscript{1}. A number of 3D cell culture systems have been produced in order to combat this concern. From electrospun fibres to hydrogels, each technique serves to enhance some aspect of cell culturing and mimic in vivo conditions. The ultimate goal for our investigations is to increase cell yield in Hanging Drop Cell Culture. This technique utilizes gravity in order to center the cells into a large mass called a spheroid. The primary issue with this technique arises from the fact that the spheroid can easily reach an unfavorable radius. At this point, the core of the mass will begin to necrose because the essential nutrients and other ingredients are deleted due to large cell population. We proposed to use micro-ribbons to reduce the size of the spheroid and to increase the homogeneity within the spheroid such that nutrients is available for larger cell population.
Jordan Russell, Jane Geisler-Lee, and Howard D. Motyl

Department of Cinema and Photography

A Saccharine Complex

Film is a timeless medium that provides an artist with an unequaled canvas to tell stories that they know. Sometimes though, as a filmmaker, you want to liberate yourself from that comfort zone. For my senior thesis I decided to do exactly this. I have long wanted to work with my brother, a Biosystems Engineering student at Iowa State University. Food science has always been a shared interest of ours, and I proposed the idea of fusing both of our talents into a project so we could work together for the first time. Thus, A Saccharine Complex (ASC) was born. ASC is the story of two brothers- one a journalist, the other a student- investigating the discovery of a glowing plant, which they believe could be connected to a new drug being abused by the local youth community. What they find takes them deep into the food manufacturing and biotechnology industry, where plants can be exploited for good or bad. I am currently working on a ‘proof of concept’ of my script to use as a promotional tool during an upcoming crowdfunding campaign. I have some fantastic artists onboard to help me in different departments, such as art/design, audio engineering, and cinematography. I am also currently working on expanding my 48-page screenplay into a feature length film. I am very excited for this opportunity because it will strengthen the relationship between the local film and science communities. Shooting inside Dr. Geisler’s lab, and using real equipment instead of props, will be an incredible experience. In addition, I will be shooting micro-photography with the use of microscopes. The finished piece, will show how creativity and science can work so well together hand-in-hand, and will be an entertaining look inside of an industry not often shown on the silver screen.
Matlyn Rybak and Dr. Stephen Bloom

Department of Political Science

Crisis Within a Crisis: Mental Health and Syrian Refugees

In an attempt to provide a comprehensive understanding of the mental illness crises occurring throughout the refugee community, this research will specifically analyze the Syrian refugee crisis with a focus on women and children. In order to gain an accurate overlook of the outbreak of mental illness disorders within Syrian refugee communities due to the Syrian civil war and the exceedingly arduous journey from their homes to their destinations, my research analyzes the statistics of the war, the routes and foreign states the refugees chose as their destinations, and the challenges (physical, political, and social) faced by refugees throughout their experiences as relevant background information. My research also gives clarity to how these common experiences are generating mass quantities of people with unaided mental health disorders such as chronic depression, anxiety, and Post Traumatic Stress Disorder. It spends time studying how states receiving these millions of refugees are politically and financially unable to provide even basic health supplies in sufficiency, let alone mental health counseling. I also analyze how organizations such as the UNHCR, Unicef, Médecins Sans Frontières/Doctors Without Borders, Oxfam, the International Red Cross, and Save the Children are providing assistance and proposed resolutions in regards to mental health services. I have chosen to focus my research on the plight of women and children involved in this conflict due to their extreme vulnerability, exposure to violence, and the burden of restructuring the cultural dynamics within the Syrian family.
Francesca Sanchez and Dr. Vjolca Konjufca

Department of Microbiology

An investigation of particulate antigen transport between the vaginal tract and the large intestine.

The female reproductive tract (FRT) is a major site of entry and transmission of sexually transmitted infections (STIs), including Chlamydia and human immunodeficiency virus (HIV). In spite of research efforts, the development of mucosal vaccines against STIs has generally been unsuccessful, due to the fact that the FRT mucosa is a poor induction site for immune responses. Recently, Dr. Konjufca’s group has shown that epithelial cells (ECs) lining the vagina and uterus of the FRT are capable of internalizing fluorescent virus-sized biologically inert nanoparticles (NPs) from the FRT vaginal lumen. Within one hour of per-vaginal NP administration to the vaginal tract, NPs are seen in the lymphatic ducts that drain the FRT and its regional lymph nodes. Furthermore, following vaginal administration, the NPs were found within the serosa of the colon; a phenomenon that had not been previously described before. This is an indicator that a mechanism of transport from the FRT to the colon is present, and allows antigen, such as NPs, to travel to the colon. The objective became characterizing this transport and identifying if this mechanism of transport can occur in the opposite direction (from the colon to the FRT). In this experiment, two C57BL/6 mice were administered intra-rectally (IR) with 40nm NPs, and the colons and FRTs tissues were collected after 2 hours or 3 hours later. Collected tissues were then sectioned and analyzed using immunofluorescent microscopy (IFM). Understanding the modes of antigen transport between the intestines and the uptake that are present in the FRT will aid in creating effective mucosal vaccines that target against STIs.
Potential Feasibility of an Electromagnetic Regenerative Active Suspension System

A substantial amount of energy is wasted during the oscillatory damping process of most automobile suspension systems. With the introduction of the active suspension system, many new methods and technologies for controlling vehicle dynamics are being investigated and, in turn, the traditional passive spring-viscous damper system is being phased out of most mid-high end vehicles. This study researches the feasibility of an active electromagnetic regenerative suspension system. A regenerative suspension system, similar to existing regenerative braking systems, utilizes the energy dissipated in the dampening process to generate usable electricity. Various methods are considered for utilizing electromagnetic concepts. The financial practicality, energy efficiency, ability to smoothly retrofit for existing vehicle frame designs, and operational quality will all be discussed. Operational quality will be evaluated using parameters such as passenger comfort, safety of handling, and regeneration capabilities. Much of the empirical data regarding drive conditions will be taken from existing research and a mathematical model developed using solenoid theory and established vibrational analysis. Funding: SIU CURCA Research funding supports this research.
Zachariah Seaman\textsuperscript{1}, Dr. Jane Geisler-Lee\textsuperscript{2}, and Dr. David Lightfoot\textsuperscript{3}

\textsuperscript{1}Department of Zoology
\textsuperscript{2}Department of Plant Biology
\textsuperscript{3}Department of Plant, Soil, and Agricultural Systems

Abstract was asked to be omitted from booklet
Daniel Sears and Jason L. Brown, Ph.D.

Department of Zoology

Predicting the distribution of the nine-banded armadillo (Dasypus novemcinctus) under future climate change

Rapid human-induced climate change imposes a serious threat to global biodiversity. Species are inherently connected to the local environment they evolved in, being specifically adapted to their local climates (such as temperature and precipitation ranges). In the face of changing climates, species are left with limited options to survive: track their habitats to higher latitudes and higher altitudes or attempt to adapt to new conditions where they are currently found. Here, we study the potential effects of future climate change on the nine-banded armadillo (Dasypus novemcinctus), a species becoming increasingly common in southern Illinois. To better understand potential distributional shifts, we estimated species ecological tolerances by correlating climate data and occurrence localities in a species distribution model (SDM). We generated a database of 251 vetted species localities and then modeled the species’ contemporary distribution using Maxent (Philips et al. 2006). We evaluated 120 different combinations of regularization and feature class parameters to properly parameterize the best distribution model. The final optimum model was then projected into ensembles of 10 future climate models and two emission scenarios to estimate the potential impact on the species’ distribution. Based on its natural history and current distribution, we predict the nine-banded armadillo will expand its range into northern habitats, increasing the total area occupied. Our models confirm this and suggest that the nine-banded armadillo will expand its range broadly into northern habitats across the contiguous United States and Canada.
Haleigh Sever and Michael Lydy

Department of Zoology

Assessing dominance of pyrethroid insecticide resistance in Hyalella azteca by crossbreeding homozygous resistant (L925I) and non-resistant (wild-type) populations

Hyalella azteca is a cryptic species complex of epibenthic amphipods grouped together based on their morphological similarities. Organisms belonging to H. azteca serve important ecological roles, are used as an indicator species to determine relative health of aquatic systems, and are used by toxicologists to determine the relative toxicity of pesticides, like pyrethroids. However, recent analysis of the mitochondrial cytochrome c oxidase subunit I (COI) gene suggests that H. azteca has diverged into multiple provisional species separated by substantial genetic divergence. In addition, resistance to pyrethroids has been documented in some populations of H. azteca due to mutations that alter the pyrethroid target site on the voltage-gated sodium channel (VGSC). This mutation reduces pyrethroid binding affinity, resulting in increased tolerance. Southern Illinois University currently maintains two genetically distinct populations of H. azteca, belonging to provisional species that have separated by about 17% divergence on the COI gene. The first is a pyrethroid-resistant strain that has a resistance-granting mutation at the L925 locus on the VGSC. The other is a non-resistant population with no known mechanisms for resistance. To better examine the validity of genetic sequencing in determining H. azteca species classification, the two populations were crossed to determine whether they are capable of producing offspring. Genetics were examined and confirmed that all offspring were true hybrids, heterozygous at the L925I locus for resistance. The resulting F1 population was used in a permethrin toxicity test to determine relative pyrethroid resistance. The F1 H. azteca responded similarly to the non-resistant population suggesting that the resistance substitution is a recessive mutation.
Dalton Shaffer and Dr. Michael Hylin, Ph.D.

Department of Psychology

The Neuroprotective Effects of Nicotinamide on Cortical Tissue Following Traumatic Impact Damage

Traumatic brain injury (TBI) is a classification of trauma that is associated with tissue damage in the brain, often leading to impaired function that can be permanent. The effects of a TBI can vary depending on factors such as the force of the traumatic impact or the age and health of the patient. Every year, TBIs account for millions of emergency department cases. In a study conducted by the Centers for Disease Control and Prevention, the rate of hospital visits related to TBIs has steadily risen between 2001 and 2010. Several compounds are currently being tested for their capabilities as neuroprotective agents. In this study, we looked at nicotinamide as a possible candidate. By using rats that had sustained acute bilateral cortex injuries and then orally administering nicotinamide doses of either 125 mg/kg or 500 mg/kg, we sought to characterize the effects of nicotinamide by using cresyl violet staining to determine cortical tissue volume compared to saline-dosed control rats. Cresyl violet is a commonly used histology stain for identifying neural tissue. We hypothesized that the total cortex volume of the nicotinamide-treated rats would be greater than that of the control rats. The data showed no significant correlation between nicotinamide dose and neural volume.
Kathryn Shields and Dr. Bethany Rader

Department of Microbiology

Bacterial Mechanism of Host Tolerance in the Euprymna scolopes – Vibrio fischeri Beneficial Symbiosis

All animals enter into life-long beneficial associations with bacteria, however, how the animal hosts ameliorate the potential for those bacteria to cause inflammation is currently under investigation. One such inflammatory molecule is lipopolysaccharide (LPS), a cell wall component in gram-negative bacteria. Here we utilize the Euprymna scolopes – Vibrio fischeri symbiosis to investigate whether modification of the endotoxic lipid A portion of LPS with removal of phosphate groups from glucosamine moieties by phosphatase enzymes is a mechanism used by beneficial bacteria to promote host tolerance to their presence. This mutually beneficial relationship is established and fostered in the squid’s epithelium-lined light organ where the gram-negative symbiont, and therefore lipid A concentration, accumulate to high concentration. V. fischeri’s lipid A acts as a signal during early colonization events to establish a mature symbiosis. After initial colonization, we hypothesize that at times of high bacterial density, the bacteria modulate the amount of endotoxic lipid A to avoid an inappropriate immune response from the host. In this ongoing study, we identified a V. fischeri protein, LpxF, that has sequence similarity to an enzyme that removes phosphates from lipid A produced by the pathogen Francisella tularensis in order to evade the hosts immune response. To investigate the role of LpxF in association and maintenance of the squid-Vibrio association, we created a deletion mutant (ΔlpxF) in the V. fischeri strain ES114. The ΔlpxF mutant grew slower than wild type ES114 in culture over 24 hours, failed to reach the same final concentration as wild type, and was nonbioluminescent. Colonization of juvenile squid with the ΔlpxF mutant at concentrations higher than 3000 cells per ml of seawater resulted in death of the animal by 24 hours post inoculation. Future work includes purification of wild type LpxF protein in order to characterize its activity, and visualization of ΔlpxF bacteria in the juvenile light organ post-colonization. Data collected from these experiments will provide insight into the manner in which beneficial bacteria interact with their host organism to promote tolerance.
Piezoelectric Nanowire Biosensor Device for Measuring Cellular Traction Force

For this project, we constructed a vertical piezoelectric (PZT) zinc oxide nanowire array. The nanowire array was specifically designed to promote mammalian cell attachment. We chose zinc oxide for our nanowires specifically for their high piezoelectric charge contact and ordered crystalline structure. Once the cells attached to the nanowires, by cellular contractile forces, the nanowires were deformed which developed electrical charges. By using this device, we can use the electrical charges generated to measure and quantify cellular biomechanical properties. This device was created by sputtering indium tin oxide (ITO) slides with gold, which is the substrate for the nanowires to grow. The slides where then placed in a solution phase chemistry of Zn(NO$_3$)$_2$.6H$_2$O (Zinc Oxide), hexamethylenetetramine (HMTA), and NH$_4$OH (Ammonia) to fabricate the zinc oxide nanowire. To optimize this device certain conditions were varied such as the annealing temperature of the sputtering, the sputtering thickness, the temperature of the solution, and the length of time the slides were left in the solution. The nanowires were verified using scanning electron microscopy equipment. In the future, we plan to characterize a tumorigenic cancer subpopulation features and to explain during cell invasion their force generation. This PZT biosensor can function in many other applications beyond the biomedical field.
A fuel cell is most generally defined as a device using an oxidation and reduction chemical reaction to generate electricity. The most common reactants for a fuel cell are hydrogen and oxygen. The poster describes the parts that make up a fuel cell including the anode, cathode, catalyst, and electrolyte. Each fuel cell contains one positive and one negative electrode, or respectively the anode and cathode. The purpose of an electrolyte in a fuel cell is to carry electrically charged particles from one electrode to the other while the catalyst quickens the reaction. Some advantages and disadvantages to using fuel cells over other conventional methods of generating electricity are listed, along with a brief history of the technology. The poster also includes information about several different fuel cells comparing their electrolyte material, efficiency, operating temperature, and power output.
Negatively biasing performance expectations when performing a manual tracking task interacts with focus of attention effects

The purpose of this study was to investigate how negatively biasing expectations interacted with altering focus of attention. Participants were college-aged students. Using a within-participant counterbalanced design, participants completed 2 trials in each of 4 experimental conditions. The following instructions were provided in each respective condition: Control; Perform the task to the best of your abilities; Internal: Move your hand at the same speed as the rotating light; External-near: Focus on moving the handle at the same speed as the rotating light; External-far: Focus on keeping the tip of the wand in contact with the rotating light. The assigned bias was counterbalanced across all conditions to control for possible order effects. Each participant was provided negative bias for one of the conditions described above. In the bias condition, participants were told that the following condition should result in their “worst performance.” All focus of attention and biasing conditions were counterbalanced to control for possible order effects. Data were analyzed with a 4(condition) X 2(bias) ANOVA. Results indicated that negatively biasing the expectations of the participants generally had a negative impact on their visuomotor tracking ability. This finding suggest that participants likely ignored the verbal instructions and allowed their performance expectations to be negatively influenced by the provided bias. While the data are partially consistent with previous findings, additional research is needed to fully understand why negatively biasing expectations had such a profound effect on motor behavior. The results of this study have direct application to practitioners teaching motor skills that require visuomotor tracking.
Jillian Springer and Kathleen Frye, MFA
Department of Art Education

Access to Art: Art Hives

Throughout the ages, the arts have brought communities together to celebrate their culture, share artistic traditions, and express individual and communal identity. In the field of art education there is significant interest in understanding the benefits of community-based art programs and learning how to implement them in ways that are meaningful to the unique character of a community. I was interested in how to bring a community-based art program to my own home of Murphysboro, Illinois. The question was – what kind of program would work in Murphysboro? My research into different models led me to Art Hives, a program that was originally developed in Montreal and has now been adopted by many communities in the U.S. What I decided to employ from the Art Hives model were the following: guided arts instruction, open studio time, in a centralized location, and at no cost. The heart of Murphysboro is the public library, so I contacted the librarians and they enthusiastically supported my idea. Together we worked out the details for an eight-week pilot program of art instruction. I gathered resources and art materials from a variety of places and set up a team of volunteer teaching-artists. In each class, we are introducing new mediums and techniques for the participants to explore; the program will culminate with an exhibition of the participants’ artwork. Throughout the program I will collect and analyze data based on attendance and demographics as well as feedback from participants. On the basis of these results, I will determine if an Art Hive program is feasible and sustainable in the Murphysboro community.
The purpose of this project is to explore the prevalence of fatigue and its detrimental effects in the aviation-training environment. The aviation industry features 24/7 operations with shift work schedules requiring wakefulness at unnatural hours. The confluence of the constant demand on the aviation industry and its transport of valuable persons and property make it not only more susceptible to fatigue but subject to devastating loss of persons and or property due to fatigue related accidents. While there have been studies conducted on short and long haul airline and cargo pilots, air traffic controllers and aircraft mechanics, there has been little research conducted on flight instructors and flight students. The focus of this project is to assess fatigue in the Part 141 flight-training environment. The project will consist of a framework illustrating a research design. The goal is to construct a survey that will investigate the self-awareness, sleep hygiene and perceptions of fatigue on training of currently enrolled undergraduate aviation students in Southern Illinois University’s Part 141 aviation program. The survey will utilize yes/no, quantitative and Lickert-scale type questions allowing for uniform and consistent evaluation. The population will consist of randomized, voluntary participants enrolled in the program. I suspect that factors such as age, flight experience, year of study, exercise habits and credit hours enrolled are directly correlated with sleep hygiene and perceptions of fatigue. Though this initial project is localized and subject to variation in responses, it creates the foundation for further research, possibly in the form of nightly sleep monitoring or measuring alertness through psychometric vigilance tests.
Nuclear Factor Kappa light chain enhancer of activated B cells (NF-κB) promotes cell proliferation and controls apoptosis. Different types of cancers, including ovarian cancer, are found to have a misregulated NF-κB pathway. Cyclooxygenase-2 (COX-2) is regulated by NF-κB. COX-2 is an enzyme that catalyzes the conversion of arachidonic acid to prostaglandins, such as prostaglandin E2 (PGE2). PGE2 helps regulate and promote inflammation. A high level of inflammation is associated with increased cancer rates and severity of the cancer.

Docosahexaenoic acid (DHA) is a 22 carbon long-chain omega-3 fatty acid that is thought to repress the activation of COX-2 through inhibition of NF-κB and, in turn, suppresses inflammation. Eicosapentaenoic acid (EPA) is the precursor to DHA. The objective of this study is to determine if BG1 ovarian cancer cells, in tissue culture, treated with EPA inhibits COX-2 by blocking the activation of NF-κB in the cells. For this study, the NF-κB reporter plasmid is transfected into ovarian cancer cells using PEI-JET transfection protocol. Transfection efficiency has been optimized by using GFP plasmid in BG1 cells. The reporter plasmid produces luciferase that is secreted out of the cell which allows for the analysis of the media in the form of a luciferase assay. Hydrogen peroxide (H2O2), tumor necrosis factor alpha (TNF-α), Lipopolysaccharides (LPS) and cytokines are pro-inflammatory treatments that activate NF-κB. These treatments will be optimized to obtain the maximum luciferase activity. NF-κB regulates the COX-2 gene and the COX-2 gene produces PGE2, which causes inflammation. An ELISA kit from Cayman Chemicals is used to determine if PGE2 is increased in the different treatment groups. After the treatment period and dosage is optimized using the pro-inflammatory treatments, the ovarian cancer cells will be treated with DHA and EPA in an attempt to inhibit NF-κB and block COX-2 and the synthesis of PGE2.
For several years, research findings have demonstrated that instructing an individual to direct one’s attention externally rather than internally results in superior motor behavior. However, recent findings have revealed that biasing the expectations of the performer can negate the positive effects of adopting an external focus of attention (Porter et al., 2012). The purpose of the present study was to investigate how positively biasing a mover’s expectations affected the performance of a motor skill requiring visuomotor control. Using both male and female undergraduate students as participants, volunteers completed a total of 8 trials of the rotary pursuit tracking task, counterbalanced across 4 different conditions. The following instructions were provided in each respective condition: Control; Perform the task to the best or your abilities; Internal: Move your hand at the same speed as the rotating light; External-near: Focus on moving the handle at the same speed as the rotating light; External-far: Focus on keeping the tip of the wand in contact with the rotating light. To bias expectancy, participants were told that one of the conditions should result in their “best performance.” The assigned bias was counterbalanced across all conditions to control for possible order effects. Consistent with previous research (Porter et al., 2012), our findings revealed that positively biasing expectations had an enhancing effect in motor performance. The only exception was for the trials completed in the external-far condition. The results of this study are meaningful because they indicate that positively biasing a performer’s expectancy impacts the performance of visuomotor tracking tasks. Furthermore, the findings of this research have direct implications for practitioners teaching continuous skills such as those taught in physical therapy.
Interns can acquire a variety of practical knowledge and skills along with networking opportunities through internships. The National Association of Colleges and Employers (2015) reported that although employers demonstrate high interest in hiring interns as full-time employees in their organizations, only about fifty percent of eligible interns are hired as full-time employees in the organizations where they interned. One of the major reasons for such a relatively low conversion rate is due to the discrepancy between employers’ expectations and interns’ performance. The primary purpose of this study was to investigate the antecedents and consequences of internship employers’ satisfaction with their interns’ performance. Specifically, this study examined factors that influence internship employers’ satisfaction and future hiring intention. Additionally, this research attempts to provide faculty and staff in sport management valuable insights that will help create and tailor more effective internship programs. Data was collected from 171 students who completed internships in the field of sport management. The instrument for the study was a survey. The initial survey was developed through interviews with internship employers and a review of related literature. In addition, five major factors (Professional attitudes, communication skills, practical knowledge, leadership, and goal orientation) were identified through the factor analysis. The findings of this study provide valuable insights for students and faculty in sport management. Students and faculty members should be aware that employers use internships as tools to screen and recruit potential hires, and internship employers’ satisfaction with interns’ performance plays a critical role in the future hire.
Gavin Stonehouse\textsuperscript{1} and David A. Lightfoot\textsuperscript{2}

\textsuperscript{1}Department of Plant Biology
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_Photoextraction potential of heavy metals and rare earth metals from coal fly ash contaminated soils using Sorghum Bicolor_

Southern Illinois coal fly ash contaminated soil was used as a treatment for analysis of Sorghum bicolor’s phytoextraction potential of heavy metals and rare earth metals (REM’s). A total of 5 different germplasm lines of Sorghum bicolor was selected from the USDA to be treated with 0.5 v/v % and 1 v/v % of coal fly ash contaminated soils. The S. bicolor was allowed to grow in a greenhouse setting for 14 weeks in the coal fly ash soils, monitoring the phenotype of S. bicolor over the duration. All samples exposed to the coal fly ash exhibited a 2-3-week delay in flowering production when compared to controls and all samples exposed exhibited severe hypersensitivity responses in leaf tissue. At the end of the 14-week period, collection of leaf tissue and seed sample were taken to be analyzed for the presence of heavy metals and REM’s. Samples were weighed to 1.0 grams and dissolved in Nitric acid to be sent for biogeochemical analysis done by Acme Labs. The overall goal was to find a presence of 1-2% by dry weight of heavy metals and REM’s in leaf tissue samples and to find no presence of contaminants in the seed samples.
Stomates are integral to gas exchange in aerial plant organs. Gas exchange in plants is necessary for photosynthesis, respiration, water homeostasis and temperature control. Stomates are pairs of specialized epidermal leaf cells called guard cells that surround a central pore. Guard cells reversibly change shape to regulate the size of the pore. Environmental and physiological cues are transduced to molecular signals that dictate guard cell shape. Microtubules are linear polymers of tubulin found in all eukaryotic cells, and they have recently been identified as an cellular component required for regulation of the stomatal pore. While specific microtubule characteristics are correlated with open and closed stomatal pores, the mechanisms by which the microtubules affect pore size is unknown. In order to gain knowledge regarding the role of microtubules in stomatal function, our goal is to identify microtubule associated proteins involved in stomatal pore regulation by mutant phenotype analysis. Arabidopsis thaliana is a model organism for studies in plant development, cell and molecular biology. For our studies, we first identified several proteins that are expressed in stomates and bind microtubules. We then obtained putative insertion mutants for each gene, and verified the genetic lesions. We next performed stomatal movement assays on mutant plants to determine if the mutation alters pore size regulation. Here we present our results and continuing work on the zwichel mutant in comparison to wildtype and negative control plants. ZWICHEL is a kinesin motor protein that plays a role in plant morphogenesis and appears to bundle microtubules in other plant cells. The role of microtubule bundling in stomatal pore regulation will be discussed.
**Phylogenetic relationships of Euthamia and its placement within the subtribe Solidagininae (Asteraceae)**

The genus Euthamia of the sunflower family is endemic to North America, where it is a significant component of moist prairies and disturbed areas. Initial reports by Nuttall in 1818 unconfidently placed it under the genus Solidago, from which it is taxonomically distinct. The genus Euthamia faces several systematic impediments: the monophyly of the genus is not well established, the number of species within it have been unclear, and the phylogenetic placement within the larger context of its subtribe (Solidagininae) similarly requires further resolution. Two molecular approaches were used to address these phylogenetic uncertainties. For the monophyly of Euthamia and its relationship to close relatives, 110 taxa within the subtribe Solidagininae were sequenced to obtain complete plastid genomes using a “genome skim” approach. Two nuclear ribosomal regions (ITS and ETS) were utilized to ascertain species relationships in Euthamia as well. Phylogenetic analysis using entire plastid genomes support the monophyly of Euthamia and its close relationship to genera such as Gutierrezia. Combined with ITS & ETS data, these results support the polyphyly of Euthamia graminifolia and E. gymnospermoides as currently described. Ongoing research with molecular data will be fundamental in discovering how the North American tribe of Astereae (which includes Solidagininae) has diversified spatially and temporally.
Self-report measures are one of the more prominent methods to understand beliefs in the social sciences, but they are not without their drawbacks. Participants can be untruthful in their responses due to social desirability. Participants may underreport personal beliefs or biases that may be deemed to be less prevalent and more undesirable than other beliefs that may be more socially acceptable. Despite interest in regards to stigma against mental illness increasing, measuring bias of mental illness utilizing self-reporting indicates no significant change over the past two decades (Schomerus et al., 2012). Instruments like the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) have gained traction as a reliable tool to measure implicit biases and allow researchers to measure attitudes deeper than self-reports, but it has its limitations. To address the limitations, another instrument, the Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes et al., 2006), provides more details into biases. Utilizing the IRAP to assess implicit bias towards those with mental illness may allow researchers to understand any potential convergence or divergence between implicit and explicit bias when comparing questionnaires. One hundred fifty-eight university students were provided partial course credit for participation. The participants were randomly assigned to one of three mental illness categories (ADHD, PTSD, and Schizophrenia) and provided with two vignettes exhibiting similar characteristics of a mental disorder with only one vignette given an actual diagnosis. The intent was to compare implicit biases towards those with a diagnosis to those who are merely symptomatic. The participants were then given an IRAP and a series of self-report measures. The responses were used to determine correlation between implicit bias and explicit bias.
Student retention has a substantial influence on how educators perceive their students, how students engage in the classroom, and how colleges/universities struggle with trying to meet their academic standards every year. In the article, “What works in student retention?” ACT states, “Nationwide the percentage of students who complete a four-year degree is only 33.3% for public four year institutions and 40.7% for those that are private.” Tinto further states, “Involvement or what is increasingly being referred to as engagement, matters and it matters most during the critical first year of college (Tinto, 2001).” Researchers have found various ways to categorize/measure student’s engagement and retention rates. Miles is a useful analogy to measure the amount of retention/engagement a student puts forth in their required task(s). Using online databases to collect retention rates from students is useful, but the difficulty is, there is no specific variable that dominates student retention/persistence decision making. Tinto states, “The interaction students have on campus with individuals in academic, personal and support service centers can influence the students’ sense of connection to the college or university as well as their ability to navigate the campus culture, meet expectations and graduate(Tinto, 2011).” Students need to find a community to belong to, get to know those people and feel welcomed into a group one can claim as their own. Having a connection to others on campus may improve the retention/engagement of a student, thus leading to better concentration in/out of the classroom, better grades, and greater social interaction.
Joseph Townsend and Alessandro Catenazzi

Zoology Department

Diversity of cutaneous bacteria in 25 species of Peruvian Andean and Amazonian frogs

Batrachochytrium dendrobatidis (Bd) is a fungus known to infect the skin of amphibians, and to cause, the disease chytridiomycosis. The spread of Bd and subsequent outbreaks of chytridiomycosis has resulted in global declines in amphibian populations, and in some cases the extinction of highly susceptible species. Although South America has lost a substantial portion of its amphibian diversity to this pathogenic fungus, some populations persist or rebound in its presence. Being an infectious disease of the skin, one characteristic thought to be related to host resistance is the microbiome on the surface of the amphibians skin. Some bacteria are known to inhibit the growth of Bd and therefore aid in preventing infection. This project focuses on documenting skin bacterial diversity on frogs native to an area afflicted by Bd. Bacterial strains were isolated through agar cultures, made from skin swabs of 25 anuran species caught in the eastern slopes of the Peruvian Andes. Strains were separated by morphotype. We extracted DNA and sequenced the 16S rRNA gene. Using BLAST the bacteria samples were identified by comparing the 16S rRNA consensus sequences against the known sequences in the GenBank Database. We identified 202 unique strains belonging to 40 genera. The most common strains belonged to the genera Pseudomonas, Chryseobacterium, and Paenibacillus. 156 strains were be matched to previously identified species. Host characteristics such as breeding mode, and habitat elevation were used to analyze possible patterns in the identified bacterial genera. Our results display the heterogeneity within the microbiomes on the skin of frogs native to these regions, and identify specific strains that have the potential to affect Bd resistance.
Sara Tredway, Katie Boedecker, and Dr. Seung-Hee Lee

Department of Fashion Design and Merchandising

How is social media impacting the fashion industry?

In the past few years, social media has become a vital part of branding and marketing in the fashion industry. A brand’s social media participation is constantly in the hands of consumers (Hope, 2016). It is hard to determine one definite answer to how social media is impacting up and coming fashion brands. However, it is possible to look at already established fashion brands and how their social media involvement impacts them to figure out a marketing strategy based on social media for a new brand. The purpose of this study is to analyze how exactly three new brands can or should rely on social media to launch their brand. Through the process of analyzing established fashion brand’s social media in comparison to the success of their brand we can determine if social media usage by new brands will in turn result in establishing and expanding their brand. We will use many data bases such as articles, magazines, and newspapers for this research. We will look at fashion retailer’s websites to see if they have their social media handles linked to their websites. Also, we will look at retailer’s social media sites to see if they offer exclusive sales to consumers. Up and coming brands will benefit from this research due to the ability to apply it to their marketing strategies, and therefore the success of their business.

Andrew Van Cleve, Hannah Ward, and Dr. Mark Wagner

Department of Anthropology

Investigating Fort Kaskaskia Through Ground Penetrating Radar Survey

On a bluff overlooking the Mississippi River sits Fort Kaskaskia State Historic Site. The French originally constructed Fort Kaskaskia around 1760, according to Orser and Karamanski (1977). Successive occupations of the site by both the British and American armies create confusion regarding how the fort and the landscape were utilized over time. It is unclear whether the British and Americans occupied the same fort that the French constructed or if there were several building episodes at the site. All that remains today of Fort Kaskaskia is an earthworks structure that marks the location of the walls. Earlier remote sensing surveys using Electromagnetic Induction (EMI) have detected a previously unknown anomaly to the north of the earthworks. This anomaly could be a random occurrence or it could represent another building episode. In order to determine the nature of this anomaly, we collected additional data at the site using a different remote sensing technique, Ground Penetrating Radar (GPR). In this poster, we compare and contrast the results of the EMI survey and our GPR survey to provide a clearer picture of features present at Fort Kaskaskia. We provide our interpretation of possible features present at the site and suggest a direction for future research.
Dr. Alejandro Cáceres of the Languages, Cultures, and International Trade Department has been researching three Hispanic writers: Reinaldo Arenas, Mario Benedetti, and Delmira Agustini. All of these writers contributed revolutionary works and significant ideologies to 20th century Latin American literature. Dr. Cáceres is currently working on projects to be published about each of these individuals, and the social, political, and literary effects of their works. Reinaldo Arenas’ highly acclaimed novels carry messages and themes reflective of his experiences growing up in Cuba, living through Castro’s revolution, being exiled, and being a homosexual man in his times. Mario Benedetti, a highly prolific and beloved Uruguayan writer, part of the literary “Generation of 1945”, conveyed through his writing the transformation of patriotic identity in the midst of a class struggle, and examined the thought process of individuals in revolution. Delmira Agustini, raised within the gender and status constraints of a wealthy and high class family in Uruguay, was one of the most forceful and groundbreaking female poets of her time, writing about the taboo inner thoughts of women and publishing her first volume at a mere 21 years of age. My role as a research assistant has been to familiarize myself with the authors and the historical and personal contexts of their works, in order to supplement Dr. Cáceres’ current bibliographies with any new developments, or other relevant perspectives and topics. I study and compile summaries of books, articles, and theses for him, and help review his projects by providing feedback. My objective is to help him publish synthesized analyses with new insights that truly do justice to the authors, their lives and their intentions, and to make historical voices accessible to new generations.
Stephanie Venis and Dr. Tsuchin "Philip" Chu

Department of Mechanical Engineering and Energy Processes

*Mapping of Strain in Muscle Tissue Using Digital Image Correlation*

This work validates the use of the digital image correlation (DIC) method of mapping strain within a sample of muscle tissue. The anisotropic nature of muscle tissue makes it difficult to calculate the strain within the sample. Using DIC, the strain can be mapped throughout the sample when a small load is applied. This method requires the application of a speckle pattern on the surface of the tissue which will deform with the sample. At each state of deformation, digital images are taken and the displacement can be tracked by the computer software. The strain maps are then generated from the measured displacement. In this way, the method can be applied to large or small scale samples by varying the speckle size and taking the images through a microscope if needed. If there is a defect in the muscle, there will be a concentration of strain in this part and the defected area can be identified. This method can be very useful for research of biological tissues that have been subject to factors that can affect the ways strain is distributed throughout the sample. This may provide ways of quantifying the effect of certain drugs or environmental factors on the tissues. As compared to the use of strain gauges, this method provides a more holistic understanding of the strain distribution within the sample.
William Vignovich and Dr. David Lightfoot

Department of Plant Biology

*Identification of phytoextractive potential of heavy metals and rare earth metals in Helianthus annuus*

This research aims to quantify concentrations of rare earth and heavy metals up taken by *Helianthus annuus* tissues grown in soil contaminated with coal fly ash, a byproduct of coal combustion, for industrial and bioremediative applications. A total of 5 different germ lines of *H. annuus* acquired from the USDA were identified and grown in Southern Illinois silt loam soil using varying fly ash concentrations. Experimental soil concentrations were 0.5% and 1% by volume including a control with no contaminant. *H. annuus* seedlings were germinated separately and transplanted into the contaminated soils and grown for a 14 week growth period in a greenhouse setting. Observations of developmental progress were made throughout the growth period with no significant phenotypic differences in the tissues however early flowering was observed in some germlines. Following the growth period 1 gram samples of both vegetative tissues and seed tissues were collected and dissolved in nitric acid. The resulting nitric acid solutions were sent to ACME labs for biogeochemical analysis to quantify the amount of heavy and rare earth metals present in the tissues. The goal of this analysis is to identify germlines that contain 1-2% concentrations of heavy and rare earth metals in vegetative tissues and absence of metals in seeds.
Characterization of Structural and Optoelectronic Properties of Semiconductor Materials

Any material studied in modern physics must be classified through a set of key defining features. Structural (bulk, interface, homogeneity), optical (semiconductor band gap), and electrical (resistivity, carrier mobility) properties are just a few of the many sought-after features of a material that can be translated into applicable purposes in modern society. In this presentation, structural, optical, and electronic properties of two different materials—MoS2 (Molybdenum Disulfide) and Bi2Se3 (Bismuth Selenide)—both grown using a process of magnetron sputtering, will be explored using various methods of characterization such as X-ray diffraction (XRD), X-ray reflectivity (XRR), UV-VIS-NIR Spectroscopy (Ultra Violet-visible-Near Infrared), Atomic Force Microscopy (AFM), and Microscopy. The materials were chosen due to their potential applications in the field of nanoscience and technology. These methods can be used to quantify the differences that contribute to a continued interest in the field of semiconductor physics and help to generate applications for future devices.
Kelsey Wallace and Dr. Seung-Hee Lee

Department of Fashion Design & Merchandising

How Do Celebrities and Culture Influence Young Consumers’ Acceptance and Decision of Cosmetic Surgery?

In the past several years there has been an increase in the number of young people undergoing cosmetic surgery. Cosmetic surgery refers to the maintenance, restoration, or enhancement of an individual’s physical appearance through an elective surgical procedure (Swami, 2012). The increase in cosmetic procedures is partially motivated by consumers having a more positive reception toward cosmetic surgery as a means of enhancing ones appearance. This rise among young consumers is also based on the escalation of social media as a platform for celebrities to display their unflawed self-image. These consumers may see themselves as having a poorer body image, lower physical attractiveness, lower self-esteem, or low life-satisfaction (Swami, 2009). Unlike existing research, we will examine these relationships and display the negative side of cosmetic surgery based on the influence of the celebrity. The purpose of this study is to examine the relationship between celebrities and young consumers’ perception of cosmetic surgery, what personal attributes effect their decision, and the negative side of cosmetic surgery. Some questions we will address are as follows: Why do people feel the need to follow what celebrity’s do? What is the association between acceptance of cosmetic surgery and celebrity devotion? How has social media created a rise in cosmetic surgery? What is the relation of self-esteem and the acceptance of cosmetic surgery, as well as the health risks of the surgery? To answer the proposed questions, we will use a qualitative research method consisting of in-depth data analysis of magazine and news articles, and case studies. The people who can benefit from this research are young consumers that keep up with social media and celebrities, or people who are looking into cosmetic surgery.

Reference:

Amanda Waltner and Dr. Kyle Plunkett

Organic Chemistry Department

Construction of Donor-Acceptor Polymers via Cyclopentannulation of Poly(arylene ethynylene)s

A one-step postpolymerization modification that converts three high bandgap poly(arylene ethynylene)s into low bandgap donor–acceptor copolymers is described. The strategy relies on a palladium-catalyzed cyclopentannulation reaction between the main-chain ethynylene functionality and a small molecule aryl bromide (6-bromo-1,2-dimethylaceanthrylene). The reaction installs new cyclopenta[h]aceanthrylene electron-accepting groups between the electron rich arylenes along the polymer backbone. The modified polymers include poly(9,9-didodecyl-fluorene-2,7-ethynylene), poly(9-dodecyl-carbazole-2,7-ethynylene), and poly(2,5-dioctyloxyphenylene-1,4-ethynylene). The functionalization efficiency was evaluated via isotopic $^{13}$C labeling of the polymeric ethynylene carbons and then monitoring the chemical environment of those carbons via NMR spectroscopy. Near complete conversion of the sp carbon species to sp$^2$ carbon species was observed, which demonstrates the high efficiency of the modification strategy.
Breast cancer patients often have a reduction in arm flexibility due to scar tissue and lymphedema, loss of muscular strength, and overall self-efficacy decline due to decrement resulting from surgery and treatment. The Strong Survivors program is designed to improve the quality of life and physical well-being of participants (both survivors and caregivers). The purpose of this case study is to examine the process of creating a safe and effective exercise prescription for a 72-year-old female with an invasive lobular carcinoma in the left breast (and numerous other health issues). The participant registered to take part in a 12-week fitness and nutrition course at a local community college. She was assigned to work with an SIU Department of Kinesiology student who had training in cancer rehabilitation. She submitted fitness and medical status information, as well as personal goals for her program participation. She also participated in an initial assessment that evaluated her activities of daily living performance on a variety of tasks (lift and carry, stair climbing, balance, getting out of a chair, walking short distances, etc.) and completed questionnaires that detailed her perceived fatigue, quality of life, social support, and exercise enjoyment. The participant couldn't perform the treadmill or balance test during the first assessment due to lower limb pain and took her 266 seconds to perform the lift and carry, 42 seconds for the sit to stand, and 39.8 seconds for the stair climb and descent, all of which are reasonably poor performances. She experienced high levels of fatigue daily and experienced frequent feelings of sadness. In order to meet the participants’ goals of balance and walking time performance increases and decreases in functional activity fatigue, a progressive 12-week program was individualized to her specific needs.
Functionalizing surfaces using siloxane polymers and fluorescent probes in one step thermal treatment

We have demonstrated that ultra-thin films of siloxane can be covalently bound to a variety of surfaces using a simple, one-step thermal treatment process called SOLVED referred as Siloxane-bound Layers through Vapor-Enhanced Deposition. In SOLVED, a siloxane polymer in the vapor state is reacted with the target inorganic surfaces. In the present studies, we used fluorescein, rhodamine B, aminopyrene, perylene-tetracarboxylic dianhydride, and 9,10-diphenylanthracene for further functionalizing siloxane polymers on the surfaces. The purpose of these experiments is to enhance and control the properties of the functionalized surfaces. In principle, this simple process can be used to implement surfaces with enhanced functionalities including antifouling, antibacterial, and self-cleaning surfaces. In this poster, emission and absorption spectroscopy were used for the characterization of the SOLVED treatment at three different temperatures (120°C, 150°C, and 200°C). Our spectroscopic analysis showed 150 oC yielded highest fluorophore immobilization. The concentration of covalently-bound rhodamine was 233 nM and 8.1 nM for at 120°C and 150°C treated surfaces respectively. Contact angles of slides functionalized with PDMS and F-PDMS were 71.84° and 95.52° respectively. Layered PDMS and F-PDMS were found to possess higher contact angles than PDMS or F-PDMS treated surfaces alone. Further, PDMS or F-PDMS had higher contact angles with Pyrene than with Perylenetetracarboxylic dianhydride (PTCDA). We also characterized the films with cyclic voltammetry, IR, and XPS to probe the chemical and physical characteristics of the films. Transmission electron microscopy (TEM) was used to determine the thickness of the thin layer of PDMS on alumina nanoparticles.
Chad Weaver and Royce Burnett

Department of Finance

Recycling Rates in the State of Florida Compared to the Great Recession

The purpose of this study is to assess the impact of the great recession on county recycling rates in the state of Florida when other demographic variables are considered. Using t-tests, initial analyses find county level recycling and unemployment rates differ significantly between the great and post-recession periods. The ratios of culture to physical environment expenditures and individuals within the population not in school, however, do not differ. Via multivariate regression, I find that the great recession periods have a positive and significant effect on county level recycling. This same result is observed when only counties with high levels of recycling. Finally, we find that unemployment is significantly related to county recycling levels for both high and low recycling counties, albeit in opposite directions. Specifically, for high recycling counties, the relationship is negative; for low recycling counties the relationship is negative.
Aaron Weckhorst and Tim Janello

Department of Automotive Technology

Emissions Reductions Project

We are testing the Robinson Engine Cylinder and Camshaft designed to lower pumping losses, emissions, and increase miles per gallon (MPG) of gasoline. The test vehicle is a 2013 Chevrolet Malibu equipped with a 2.5L variable valve timed (VVT) direct injected engine. To reduce pumping loss and make the engine more efficient, the design utilizes one intake valve with a short duration opening at the beginning of the compression stroke. The air fuel mixture is released into a chamber, lowering the compression pressure, cylinder heat and work energy needed to compress the air fuel mixture. By utilizing the chambers which are shared by companion cylinders, the resonance created by the gas movement allows the engine to use less energy for compression while retaining drivability and power. The camshaft design allows testing the engine at varying cylinder pressures by manually adjusting of the compression pressure. Then, using a calibration tool for the engine's control module the volumetric efficiency map is altered to allow the VVT to retard valve timing at certain engine loads to maximize the engines power and MPGs while decreasing emissions. The intake manifold runners that lead into the cylinder have been machined to allow the passages to be isolated from each other to allow the gases to move unencumbered in and out of the cylinders. One side leads to the external tanks and the other half is for the air to flow into the cylinder. The vehicle is being tested on a dynamometer following the strict federal Environmental Protection Agency’s (EPA) Inspection and Maintenance (IM) 240 test procedures to simulate real world driving conditions. The IM 240 test procedures insure consistent and repeatable results. The gasoline consumption is measured by weight and then converted to volume. This allows for temperature compensation and a very accurate and repeatable measurement. The Project has grown on to a new 3D modeling phase. We have collected and sent measurements to an engineering company that will model the design of our test engine using GT-Suite software. We will then be able to test the performance of the engine virtually.
Austin T. Weigle and Keith T. Gagnon, PhD

Department of Plant Biology

Structure-based virtual screening to identify inhibitors of DSIF and block transcription of disease-associated repeat expansions

DRB sensitivity-inducing factor (DSIF) is required for efficient transcription of large repeat expansion sequences associated with over two dozen neurological disorders. DSIF is composed of two proteins, Spt4 and Spt5. Disrupting the interaction of Spt4 and Spt5 can inhibit transcription of repeat expansions, potentially leading to a therapeutic cure for multiple diseases. To identify a starting point for small molecule drug discovery, we are performing virtual screening using a "chemogenomics" approach that couples computational methods with structural data of the Spt4-Spt5 complex and virtual libraries of expansive chemical space. Here, we employ a de novo ligand design and query pipeline to identify potential small molecule inhibitors. Binding affinities between potential drug leads and the Spt4 or Spt5 proteins are estimated in silico to guide downstream validation in an efficient and cost-effective manner. Our structure-based virtual screening provided ligand hits based on binding homology to residues contributing to the stabilization of the Spt4-Spt5 complex, while binding affinities were orthogonally verified using AUTODOCK Vina software. Initial virtual screenings will narrow down small molecule candidates for synthesis and experimental screening to determine their therapeutic potential.
Austin Weigle and Matt Geisler, PhD

Department of Plant Biology

Digitizing logic of existing experimental datasets: Can Hordeum vulgare (Barley) UGPase be predictively bioengineered through molecular docking?

Structural bioinformatics can serve as a computational mean to guide experimental design through simulations that model systems’ behaviors. But can the reverse logic also be digitized, where the results of physically performed experiments are verified computationally? What implications would such a finding hold on further downstream experimental design? To answer these questions, we performed molecular docking simulations of glucose-1-phosphate to Arabidopsis thaliana and Hordeum vulgare (Barley) homologs of UDP glucose pyrophosphorylase (UGPase), an enzyme central to a plant’s ability to biosynthesize sucrose. In silico mutations were performed on H.vulgare UGPases that corresponded to known experimentally characterized mutants determined to be critical for enzymatic activity. These dockings served as benchmarks to compare computer predicted against the known binding preferences of wild type and mutant H.vulgare UGPases. Docking was performed with Autodock Vina and mutations and modeling were performed within SWISS-PDB DeepView software, respectively. While the binding preferences and promiscuity of H.vulgare UGPase can be measured, simulated molecular docking also has the ability to verify what types of mutation obstruct function, due to differences in docking free energy calculated from the mutant screening. Alteration of amino acids in silico can additionally result in predictive modeling for bioengineering to customize enzymatic activity as experimentally desired. Exploration of UGPase binding preferences could therefore provide novel insights into substrate-level regulation and structurally-induced enzymatic activity related to carbohydrate metabolism across plants.
In one of the most significant evolutionary events in the history of life, green plants transmigrated out of water and onto land. Of the many innovations that ensured their successful radiation and survival out of water, none were more significant than the spore. Spores are single cells that are produced by meiosis and are surrounded by a highly resistant wall made of sporopollenin. They serve as desiccation tolerant vehicles for dispersal and as perennating structures during unfavorable environmental conditions. Although spore morphology is highly variable across plant groups, the cellular processes that produce spores (sporogenesis) universally involve callose, a β-1-3 glucan polysaccharide. Among early land plants, the liverwort Pellia epiphylla (L.) Corda exhibits a unique pattern of sporogenesis in which spores begin to divide immediately after they are formed, giving rise to large multicellular spores. To assess the involvement of callose in sporogenesis in Pellia, we used aniline blue staining with fluorescence microscopy and immunogold labeling in the transmission electron microscope. In September, the young spore mother cell is round and surrounded by callose. Through asymmetrical deposition of callose in conjunction with central callosic bands, the spore mother cell assumes a highly lobed tetrahedral shape. In November, when meiosis occurs in the lobed mother cell, callose is differentially laid down to form a positive template for sculpturing the outer spore wall. As spores develop, the callose is replaced by sporopollenin that characterizes the mature spore wall. Concomitantly, callose is deposited in new walls as the spore enlarges and becomes multicellular. In March when 20-30 cells are in each spore, cellulose and pectin replace the callose and spores are dispersed. This study identifies diverse occurrences of callose in the organization of the cell wall throughout sporogenesis in Pellia and points to the importance of this polysaccharide in early evolving land plants.
The impact of large earthquakes on global seismicity rates

Earthquakes magnitudes are determined based on the amount of energy that is released during a seismic event. With each whole number increase in magnitude, the amount of energy expended by the quake increases by a factor of thirty-two. It is well known that for every large event there are many more smaller ones. The scaling of this magnitude-frequency relationship has been termed the $b$-value. The $b$-value is the slope found from a regression of the log of the number of events at each magnitude that occurred over a given time. The $b$-value for most regions is typically close to one, meaning that there are roughly ten times as many events for every one unit smaller in magnitude. A higher $b$-value means more smaller events for each large event and a smaller value means fewer. Recent work shows that large earthquakes may trigger other earthquakes at large distances. The purpose of this study is to investigate if large seismic events can affect the overall seismic output across the globe such as is seen in the $b$-values in regions other than those nearby the origin of the earthquake. To do so, earthquake data above a 4.5 magnitude was collected for the past 16 years and organized into tectonically coherent regions, termed Finn-Engdhal regions. Using the magnitudes of earthquakes in each region $b$-values are calculated for that region in a given time. The standard deviations of the $b$-values were found by bootstrapping the data. Variations in $b$-values across time were then compared to find shifts in $b$-value for a region and to determine if which differences were statistically significant and whether these jumps correlate with the occurrence of large earthquakes.
FOXO1 is a forkhead box transcription factor found in various places within the body, one of which is the pituitary gland. FOXO1 is vital for the organism’s survival; embryos without FOXO1 do not develop vasculature and die before birth. FOXO1 has been linked to cell specification and various other cellular processes. The pituitary gland, which controls the body’s hormones, contains five different types of endocrine cells that secrete hormones. Somatotropes are one of these cell types. Somatotropes produce growth hormone, which regulates growth and metabolism. In order for the pituitary to get these five cell types the cells must differentiate from stem cells. FOXO1 plays a vital role in cell differentiation and proliferation in many tissues. Consistent with this, somatotrope numbers are decreased in mouse embryos lacking Foxo1 in the pituitary gland. However, as the mouse continues to develop there is a rebound in growth hormone- the hormone associated with somatotropes. This leads us to believe there is a compensatory mechanism that allows the organism to produce the growth hormone necessary to prevent the mouse from having a dwarf phenotype. With a proposed FOXO1 inhibitor, we would not only be able to compare and contrast the differences between a conditional knockout mouse and an inhibitor treated mouse, but we would also be able to study the effects of FOXO1 without any mechanism to compensate for its loss. As my study comes to a conclusion, I am currently investigating these questions using RT-qPCR and including an adequate number of specimens to make my preliminary data significant. Through these experiments, the role of FOXO1 in the pituitary becomes increasingly clear allowing us to apply potential findings to human pituitary deficiencies.
Bisphenol A (BPA) has been well-known as one of the hazardous endocrine-disrupting chemicals that affects development and function of the reproductive system. Due to its toxic effects in humans, structurally similar analogs such as bisphenol S (BPS) have been used as alternatives for BPA. While there are few mammalian studies for the effects of BPS on reproductive functions, it has already been detected in human urine. In this study, we examined whether BPS causes negative impacts on reproductive functions using mice as a model. CD-1 mice were exposed to a control (corn oil), BPS, and BPA (as a positive control) at gestational day 11-birth to pregnant females (F0) orally once a day. Then, F1 males were euthanized on postnatal day 60, and sperm quality was examined immediately from the caudal epididymis. Fetal exposure to BPS and BPA at doses of both 0.5 and 20 µg/kg b.w. significantly reduced sperm counts. Sperm motility was decreased by BPS (0.5 µg/kg b.w.). Testicular weights were decreased by BPA, but not significantly by BPS. Postnatal day 12 mice exposed to BPA displayed a significant increase in apoptosis in testis. Furthermore, exposure of BPS and BPA disrupts the progression of germ cell development by disrupting the distribution of the 12-stages of spermatogenesis. In females, fetal exposure of BPS and BPA at a dose of 0.5 µg/kg b.w. altered estrous cyclicity. These results suggest that BPS disrupts male and female reproductive functions in mice.
The Vibration Lab in the Department of Mechanical Engineering and Energy Processes is equipped to perform a wide range of sound and vibration tests. The objective of this project is to develop software in LabVIEW that are suitable for versatile vibration measurements and validate the software by conducting modal testing and finite element analysis. First, the fundamentals of National Instrument data acquisition system, LabVIEW system design software, and vibration testing equipment are studied. This entails familiarization with the LabVIEW interface and its associated functions, and how the interface interacts with incoming data. With this basis of understanding, a LabVIEW program is then developed to obtain measured data from different transducers and equipment, such as accelerometers, microphones, load cells, and shakers. To validate the developed software, modal analysis is conducted on a beam structure using impact tests and a shaker system. The impact test results are converted into usable data by use of a pre-existing LabVIEW program, while the developed program is used for the shaker test results. Computational modal analysis is then performed using finite element analysis software such as ANSYS Workbench and Autodesk Inventor. The software developed in LabVIEW is thus validated by comparing experimental measurements with the computational results. Future work includes modal testing and analysis on more complex structures, such as two beams connected by elastic joints.
Amount of engineered nanomaterials (ENMs) in the environment is increasing due to their industrial and commercial applications. Different types of metallic nanoparticles have been detected in the effluent and dry sludge (i.e. biosolids) from wastewater treatment plants (WWTPs). Biosolids from WWTPs are often used to enrich soil for agricultural purposes. Reclaiming effluent from WWTPs for crop irrigation has also been practiced in dry areas with the decrease in freshwater sources. Therefore biosolids and effluents from WWTPs could easily bring ENMs into soil ecosystems. It is worthy to study the impact of the ENMs from these sources to the biological activities in the ecosystem. In this study, a soil micro-ecosystem was simulated to study the impact of the ENMs, specifically metallic nanoparticles on the plant Arabidopsis thaliana, the soil microorganism community, and a type of earthworm. The plants were irrigated with deionized (DI) water for the control and compared to wastewater effluent irrigation. Different percentages of biosolids (i.e., 0.5% and 5%) were applied to the soil and compared to the soil without addition of the biosolids. The effluent and biosolids were taken from a local WWTP. Results showed that after irrigation with wastewater or amendment with biosolids, the pH of the soil was slightly reduced, microbial quantity expressed as microbial biomass carbon and microbial biomass nitrogen was also reduced, and the microbial communities were shifted in the soil in both cases by 16S rRNA sequencing analysis. The weight of the earthworm reduced, while the weight of the plants increased but the lifespan of the plants were shortened. The level of reactive oxygen species in these plants were also higher compared to the control. These results indicted the potential toxicity of the ENMs to the environment.
Grassroots Undergraduate Literary and Arts Magazine

Grassroots Undergraduate Literary & Arts Magazine is the undergraduate publication for Southern Illinois University–Carbondale. It also hosts an annual literary festival, The Devil’s Kitchen Fall Literary Festival. The staff is comprised solely of undergraduate editors, interns, and volunteers. These students learn through the opportunities of editing and publishing, networking with well-known writers and faculty members, and planning the literary festival. Grassroots provides the opportunity for undergraduate students across campus to have their original literary and artistic work published. Grassroots publishes poetry, short stories, novel excerpts, screenplays, comics, graphic novel excerpts, photography, paintings, drawings, sheet music, and more. Submissions are accepted year-round for publication in the magazine. Grassroots staff call for submissions through social media, fliers, and other outlets in order to spread awareness on campus. The submission deadline for each new edition is in the Fall semester. After all submissions have been carefully reviewed, accepted pieces go through an editing process in which the Grassroots editors work firsthand with the students who have been chosen for publication of their work. Each Spring semester, Grassroots releases a magazine created by the Grassroots staff itself. All pieces published in the magazine are eligible for the SIU Literary & Art Award, which is a cash prize sponsored by CURCA. The categories for this prize are prose, poetry, and visual art. In addition to publication and the possible award, the annual festival is a great opportunity for students to get involved. The festival is a three-day event that includes readings from selected authors from around the country, Q&A panels, a reception, and a book signing. These events and the Grassroots magazine are funded in part by CURCA, the Fine Arts Activity Fee, and the English Department.
Once you sustain a femoral fracture, you may have to undergo Internal Fixation of the femoral fracture. This procedure involves drilling a hole into the cortical bone of the femur, specifically the shaft of the bone, and inserting a stainless steel or titanium plate into the bone for repair. When the plate is removed, it leaves behind a hole in the bone that could degrade the strength of the bone and potentially create fractures if too much force is applied. To address this medical concern, we will first get a three-dimensional model of a human femur bone and then drill holes in a zig zag formation. The bones will be subjected to a series of test that include the three point bending test, a compression test, and a torsion test. In this way, we will assess which part of the bone underwent the least amount of stress and from there be able to find more efficient ways to drill holes to lessen the risk of injury following Internal Fixation.
Jackson Wood and Mary Kinsel

Department of Chemistry and Biochemistry

*Headspace Solid Phase Micro-Extraction (HS-SPME) of Volatiles Encapsulated in Flash Frozen Coffee Extracts*

Introduction: Coffee is one of the world’s largest commodity products. Great interest revolves around the characterization and understanding of volatile compounds responsible for the distinct flavor and aromas of coffee. Processing and storage greatly affects the makeup of these volatile compounds. This research characterizes volatile profiles obtained from frozen espresso-style coffee extracts processed and stored frozen at a variety of temperatures. Freshly brewed coffee extracts were either flash frozen using liquid nitrogen prior to storage or placed directly into storage at the final temperature. Volatile profiles of the frozen coffee extracts were then compared to that obtained from freshly brewed espresso-style coffee. Studies using headspace solid phase micro-extraction (HS-SPME) and gas chromatography mass spectrometry (GCMS) will be presented and discussed.

Methods: Fresh espresso-style coffee was brewed. Coffee extracts were frozen drop-wise in liquid nitrogen and then stored at -15°C, -40°C or -80°C, respectively. Additional coffee extracts were frozen (no liquid nitrogen) and stored at the same temperatures. The volatile compounds of the freshly brewed espresso-style coffee and the frozen extracts were obtained by HS-SPME and analyzed by GCMS. The volatile compounds were collected on a DVD/PDMS fiber and then directly injected into the gas chromatograph operated in splitless mode. Equilibration temperature and SPME fiber exposure time were optimized to yield reproducible volatile profiles. Assignments were made by comparing electron impact mass spectra with commercial mass spectral databases and published data.
Katelyn Workman and Dr. Kimberly A Crossman

Department of Psychology

Effects of Parental Divorce on Children’s Adult Relationships

Divorce can have a long-term effect on both the couple and the children involved (Amato, 1988). We are interested in finding the relationship between relationship views and a person’s parental relationship. Relationship outlooks for adult children with either divorced or non-divorced parents were examined through multiple questionnaires including Beck’s Depression inventory (Beck, Steer, & Brown, 1996), the Attitudes Towards Marriage Scale (Kinnard & Gerrard, 1986), and an intent to marry scale. The results to this study are expected to be completed by March 20th. We expect to find that adult children who have experienced parental divorce within the last two years scored higher on the depression measure. We also believe that we will see adult children of non-divorced families displaying more positive attitudes towards marriage. Adult children with divorced parents are expected to express lower intent to marry. These findings may suggest that either: divorce may/ may not have a strong short term effect on depression ratings; attitudes towards marriage may/may not change due to parental divorce; intent to marry is/ is not affected by parents’ marriage.
Kimberly Woudenberg and Karla Fehr Ph.D
Department of Psychology

The Effects of Pretend Play on Preschoolers’ Emotional Regulation

The ability to regulate emotion is a vital skill of a happy healthy adult capable of forming good relationships. The importance of gaining these skills in early childhood is quickly becoming clear. This study investigates two skills that are peaking at the same time during early childhood to determine if they are related. Pretend play, or the ability to use fantasy in play, helps develop positive attributes that help children mange emotional situations and learn to adjust to handle them (Butcher & Niec, 2005). This study is part of a larger study examining coping abilities of preschoolers. Scores from the delayed gratification task (Cole, Dennis, Smith-Simon, & Cohen, 2009), Behavior Assessment System for Children, second edition (Reynolds & Kamphaus, 2010), Expressive Vocabulary Test, second edition (Williams, 2007), and the average daily activities list will be analyzed to determine the relationship between the amount of pretend play a child engages in and his or her ability to regulate emotions. The proposed study has one main purpose, to explore the relationship between the ability of preschoolers to regulate their emotions and the amount of pretend play they participate in in an average week, in doing so we hope to be able to support and highlight the importance of unstructured play for children.
Bullying refers to repeated, intentional, and aggressive actions committed by one or several students towards another, less powerful student. Prior research has indicated that males were significantly more likely to experience physical bullying than girls. Conversely, females reportedly experience more emotional and social bullying than males. Limited research, however, has explored bullying in rural schools. The purpose of this study was to examine the differences in physical, verbal and social bullying in adolescents based on gender in Southern Illinois. It was hypothesized that males would report experiencing significantly more physical bullying than females, and females will endorse experiencing significantly more verbal and social bullying than males. Participants were 3046 students in grades 7-12 from middle and high schools across Southern Illinois who completed a survey as part of a project funded by the National Institute of Justice (NIJ). The survey assessed their opinions on school climate, bullying and harassment and their personal experiences. The results based on chi-square analyses were significant and indicated that 22% of males, compared to 12.3% of females reported that they had experienced physical bullying. Forty-six percent of females responded that they had been bullied verbally, compared to 41.2% of males. Furthermore, 36.7% of females disclosed that they had been bullied socially, while 26% of males said the same. It can be concluded that while most students report that they have not experienced bullying, significant percentages had, comparable to urban areas. The numbers are high enough to indicate the need for intervention and further research on prevention.
Shelby E. Yañez, Keith P. Klein, and Benjamin F. Rodriguez, Ph.D.

Department of Psychology

The Efficacy of Mindfulness Interventions for Men and Women

The objective of the current study was to examine sex differences in the differential efficacy of a Mindful of Breathing Task and a Body Scan Meditation Task. A sample of undergraduate students (N = ?; % women; % men; % unspecified) served as participants and were randomly assigned to a mindful of breathing task or body scan meditation task. Each participant completed a multi component questionnaire, as well as an audio instructed anxiety induction to complete with their assigned task. Based on past research examining differences between men and women’s rates of state anxiety (Villa & Hilt, 2014; Lancaster, Klein, & Knightly, 2016), a greater reduction of symptoms associated with state anxiety in the body scan meditation task was expected for women; men were expected to show greater reductions on the mindful of breathing task. Moreover, it was expected women would exhibit lower levels of cognitive and somatic state anxiety during the body scan meditation task, while men would exhibit lower levels in the mindfulness of breathing task. Additional research is needed to further develop these preliminary findings to understand how individual factors in college aged samples, such as sex, can impact intervention effectiveness in clinical, as well as non-clinical settings.
Nowadays, we all live in a big data world. The data science and knowledge discovery from massive data are emerging in concurrent world and research files. The use of the relevant data science techniques has been immersing into every fiber of the society, and thus the acquired skills of data mining will be generally applicable to a broad variety of fields. Especially, the amounts of social networks and social media data is huge and is still explosively increasing. How to effectively extract useful information from these data is a pending challenge. The purpose of our research project is to achieve better understanding and more effective ways of identifying patterns, to glean insight, and to discover meaning or knowledge from such complex data. Our research project will focus on building better recommender systems through exploiting readily-available social media and networks data. A series of research questions arise regarding how to extract the most relevant information from the huge amount of social media data and how to integrate such information into recommendation models to enhance their accuracy.
Kailey Zalucha and Susan Rimmer, PhD

Department of Geology

Changes in Vitrinite Reflectance and Liptinite Fluorescence with Increasing Rank in Coals and Dispersed Organics

The purpose of this study was to compare vitrinite reflectance and spectral fluorescence of liptinites in coals and shales with increasing rank. Vitrinite represents preserved woody tissue, whereas liptinites are preserved remains of spores, pollen, algae, and resins. One aspect of the study was to determine how well these rank parameters could be used in conjunction with one another and how the changes in rank could be recognized visually. In dispersed organics, vitrinite reflectance is a commonly used rank parameter, but it can be difficult to obtain data due to its scarcity in certain source rock types. For example, measurement of vitrinite reflectance to determine oil and gas potential of the Ohio Shale in southeastern Kentucky was found to be difficult. However, a correlation between vitrinite reflectance and fluorescence (using $\lambda_{\text{max}}$ wavelength and Red/Green quotient (Q)) was found; therefore, fluorescence could be used as an alternative rank parameter. The establishment of the correlation between vitrinite reflectance and fluorescence of liptinites, and provision of a visual guide to demonstrate changes over rank would benefit those in the industry tasked with determining oil and gas potential in these source rocks. For a known coal rank suite from various locations, vitrinite reflectance ranges from 0.25% to 1.56% and the fluorescence ranges from yellow/green to orange/red until it fades (at ~1.35% vitrinite reflectance) as the rank increases. The relationships between vitrinite reflectance and spectral fluorescence in the coal and the shale rank suite will be discussed.
Runyu Zhang and Tsuchin (Philip) Chu

Department of Mechanical Engineering and Energy Processes

*Using Digital Image Correlation Method (DIC) for Adhesive Joints Evaluation*

The use of adhesive joints in the industrial fields is prevalent. This method uses adhesive to connect joints together, which is primarily used in composite materials, rather than conventional alloys. Compared to the traditional fastening of mechanical parts, like riveting or bolting, it has the advantages of uniform stress distribution, reduced component weights, etc. But one restraint limiting the usage of adhesive to connect joints is the fact that there is in lack of evaluation method to detect defects of the joints. One effective Nondestructive evaluation method is called digital image correlation (DIC), which is pioneered by Dr. Tsuchin Chu. DIC uses patterned particles as media. Small particles are embedded into adhesive bondlines. And then images are taken before and after the sample was moved for amount of distance. After running software Ncorr analysis on these pictures, results are obtained regarding the movement distance and strength analysis. In this research, two DIC methods are used, which are Fine Iron Particle Resin and Laser particle. Aluminum fixture platform is designed and manufactured to conduct experiments using these two methods. The first method uses fine iron particle as the embedded patterns with different grind size, while the second one uses laser as the patterned particles. Also the parameters setup of the Ncorr software is studied.
Stephania Zneimer\textsuperscript{1}, Liliana Lefticariu\textsuperscript{1}, Trenton Ford\textsuperscript{2}, and Mihai Lefticariu\textsuperscript{3}

\textsuperscript{1}Department of Geology
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\textsuperscript{3}Mass Spectrometry Facility

\textit{Modeling local water cycle dynamics by integrating stable isotopes of precipitation and climate parameters}

This study pertains to better understanding the water cycle in Southern Illinois by quantifying the temporal variations in the contribution of different moisture sources to local precipitation. Here we report stable isotope values (\(\delta^{18}\text{O}\) and \(\delta\text{D}\)) of individual precipitation events collected from November 2012 to February 2016 in Carbondale, Illinois. The isotope data was integrated with climate parameters as well as HYSPLIT modeling. We identified five distant advective moisture sources, namely: (a) the Pacific Ocean, (b) the Arctic Jet Stream and the upper continent of the Northern Rockies and Plains, (c) the lower continent in the South and Southwest, (d) the Gulf of Mexico, and (e) the Atlantic Ocean. Convective moisture sources are regarded as occurring locally. Precipitation events with major moisture contribution from the Gulf of Mexico represented \textasciitilde44\% of total events and had distinct ranges for \(\delta^{18}\text{O}\) (0 to 10\%) and d-excess (5 to 25\%) as compared to those that incorporated the other four previously mentioned moisture sources which had \(\delta^{18}\text{O}\) ranging from 0 to 20\% and d-excess from -5 to 15\%. Overall, moisture originating from the Gulf of Mexico is an important component to most precipitation events, particularly around the months of April, May and June. The colder months saw precipitation events [a total of forty storm events] from the other four advective moisture sources, however a total of thirty-two storm events had precipitation from the Gulf of Mexico alone. In the Midwestern portion of the United States most of the surface water is stored in soil and vegetation, changes in the amount as well as transfer rates among these reservoirs can have a significant effect on the regional land-atmosphere water fluxes with direct implications on economic activities.
Creative and Scholarly Saluki Rookies
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Department of Chemistry and Biochemistry

*Studying mechanism of covalent binding of the fluorescent probes in ultra-thin poly(dimethylsiloxane) films on inorganic surfaces a thermal treatment*

Glass modification and functionalization with covalently attach monolayers (6 nm) of functionalized poly(dimethylsiloxane) including polydimethylsiloxane, fluoro-polysiloxane and amino-polysiloxane have been demonstrated. We had also incorporated a variety of fluorescent probes such as fluorescein, rhodamine B, amino-pyrene, 1,9-diphenylanthracene and perylene-3,4,9,10-tetracarboxylic acid via SOLVED process. In this work, we intend to study the mechanism of fluorescent probe binding within hydrophobic siloxane thin films using a spectroscopic and microscopic analysis. Carboxylic, amino, and hydroxyl groups present in Nile red, Nile blue, Rhodamine 110 will be used to determine to see the influence of the functional groups on the amount of deposited dye within the siloxane matrix. Rubrene and Pyrene molecules will be used as well to find out if the shape of the molecule play any role in the dye incorporation. We will test the monolayer through contact angle for hydrophobicity, cyclic voltammetry (CV) for monolayer coverage, Infrared spectroscopy (IR) to test the presence of the selected functional groups of the dyes, and x-ray photoelectron spectroscopy (XPS) to determine the formation of chemical bonds between fluorescent probes and substrate or siloxane. In addition absorption and emission spectroscopies will be used to quantify the amount of fluorescent probe present in the monolayer. Finally, we intend to utilize transient lifetime data to study the local orientation of the fluorophore probes in the bound state. These extensions onto a glass surface can, in principle, lead to enhanced functional inorganic surfaces.
The Reproductive Homeobox X-linked, Rhox, genes encode transcription factors that are expressed in male and female reproductive tissues. Rhox5 and Rhox8 are the only members expressed in Sertoli cells of male gonads suggesting that they have a key role in germ cell development. Previous study shows that Rhox5-null mice exhibit excessive germ-cell apoptosis and poor sperm motility and hence are subfertile. We hypothesized that the continuous expression of Rhox8 in Rhox5 null mice was preventing the animals from being infertile. Rhox8 was knocked down in the postnatal Sertoli cells by using Rhox5 driven tissue specific RNAi approach. Interestingly, male RHOX8-knockdown animals showed significantly reduced spermatogenic output, increased germ cell apoptosis and compromised sperm motility which suggest that these animals have impaired fertility. While we have not yet characterized the mechanism of RHOX8 action, it is significant to note that both Sox8 and Sox9 were downregulated in Rhox8-knockdown testes. Our lab has also begun to characterize Rhox8/Rhox5 double mutants. These animals have abnormal distribution of male germ cells. Stra8 positive spermatocytes align along the periphery of testis tubules in Rhox8 ablated animals just like in control animals. Whereas, RHOX5/RHOX8 double knockouts do not have this characteristic ring-like STRA8 expression and appears to be diffused in the Sertoli cytoplasm which suggests that the germ cells are being phagocytized. In addition to that these animals, at the age of 2 months, have reduced sperm count, poor sperm motility and they breed poorly as compared to the single knockouts suggesting that the functions of these proteins are at least partially redundant in postnatal testes. Our study is currently focusing on characterizing the mechanism of action of RHOX8 gene for causing subfertility in male mice and identifying how Rhox genes along with their transcriptional networks contribute in promoting germ cell differentiation, gonadal development and fertility.
Amelogenesis, the creation of tooth enamel, is initiated about four months into embryonic development. Tooth enamel is the tissue that covers the crown of teeth. The protein Amelogenin is a vital part of enamel creation, being the predominant protein of tooth enamel tissue. In this project, we express amelogenin in E. coli, and purify it for in vitro enamel formation experiments. Amelogenin regulates apatitic crystallites that form an intricate three-dimensional microstructure that makes up enamel. Little is known about how the protein structure changes as it is encapsulated in calcium phosphate crystals during the process of amelogenesis. After purification of the amelogenin, we will use Fourier transform infrared (FTIR) spectroscopy to observe the structural features of amelogenin before, during, and after amelogenesis. We will interpret the FTIR spectra to evaluate the amount of alpha helices, beta sheets, and random coil in the protein as amelogenesis progresses. By varying conditions such as salt concentration, temperature, and pH, we will examine the optimal enamel formation conditions. These experiments will provide important information about the formation of biomineral structures in tooth enamel and related structures such as bones.
Validation of Anti-Chicken p53 Antibody and the Detection of p53 in Hen Epithelial Ovarian Cancer Through Immunohistochemistry

The laying hen model is the only model of spontaneous epithelial ovarian cancer (EOC). By the age of 6 years 40% of hens have ovarian cancer and it closely resembles the human disease and the histopathological presentation. Over 50% of human ovarian tumors have a mutated p53 gene. The wildtype of p53 is anti-oncogenic, pro-apoptotic, and key to ensuring cancer does not occur in tissues of cells. Little is known about the role of p53 in chicken EOC. It has been reported that 50% of the tumors in chickens had mutated p53 genes, which is similar to the numbers reported for human ovarian tumors. We have obtained a new antibody raised against chicken p53 and are screening hen EOC specimens for the expression of p53. The technique we are using is immunohistochemistry on formalin-fixed, paraffin-imbedded chicken tissues. Initially, we are using the apoptotic, post-ovulatory follicle (POF) as a positive control. Preliminary results suggest the antibody does recognize nuclear p53 in the POFs. Once staining is optimized in the POFs, then a variety of tumors will be observed for potential positive p53 expression.
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Comparison of Leadership Ratings between Children with Dyslexia and The Typically Developing Children

While we are aware that individuals with dyslexia struggle with academic tasks, less research has been conducted to look at possible strengths these individuals may have. Some research has suggested that skills developed by adults with dyslexia in response to the difficulties they face may lead to stronger leadership skills and more effective management of entrepreneurial businesses (Logan). Since past research in this area has been conducted on adults, we were interested in comparing leadership skills of children with and without dyslexia. Our participants were 280 children, ages from 8 to 12 years, who were tested as part of NIH-funded studies. These children were separated into five groups: typically developing, children with a reading disorder (RD), children with attention deficit hyperactivity disorder (ADHD), children with both dyslexia and ADHD (RD/ADHD), and children with other disorders that may affect their academic performance. Results of the analysis indicated that there was a significant difference between groups (F = 13.10, p < .001). All clinical groups performed worse than controls (ps < .001), except those with RD who performed comparably to controls (p = .11). The RD group also performed better than the ADHD group (p = .01). While these results do not support the hypothesis that children with dyslexia have differing levels of leadership compared to typically developing peers, they do indicate that children with dyslexia may have stronger leadership skills than children with ADHD and that having dyslexia does not substantially harm ones leadership skills at this age. Further work is needed with adolescents to determine whether leadership skills become stronger once children with dyslexia have conquered many of their struggles with reading, either via remediation or compensation.
Absorption of Excess Nitrogen in the Soil by Ryegrass

Across the United States, nitrogen (N) fertilizers are used to increase the yield potential of most non-legume crops. However, some of the applied N remains at the field after harvest, leading to leaching into streams, lakes, rivers, and eventually the ocean. Many cover crops, including ryegrass, use the excess N in the soil and thus, decrease the runoff. The objective of this study was to determine the effectiveness of ryegrass to absorb excess soil N. To this end, a field study was conducted to test the levels of N in ryegrass that planted following the common farm conditions. The amount of N will be estimated by measuring the chlorophyll content in the leaves using a SPAD meter. Chlorophyll is an indicator of N, since its amount increases with the increasing soil N. Overall, our data will provide useful information regarding the use of ryegrass as a cover crop and its usefulness in reducing N runoff.
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Department of Physics

Packing Granular Polymers

The properties of materials are largely determined by the structural arrangement of the atoms or molecules that constitute the system and their mutual interactions. Many familiar solids are composed of atoms or molecules arranged into ordered, crystalline arrays with well-defined densities and readily calculable mechanical properties. In contrast, disordered, or amorphous, solids pose challenges in relating their structure to their material properties. Physics-based models focusing on dense packings of spheres in three dimensions (3D), and disks in 2D, have made progress in identifying key physical parameters that control packing structure and mechanical properties (Chakraborty, 2005). Here, we present a novel extension of such previous works to investigate how complex, non-spherical particle shapes influence packing behavior and mechanical robustness. Specifically, we introduce a model for granular polymers. These particle structures are composed of monomers in the shape of spheres or disks connected by flexible bonds to form a structure similar to beads on a string (L. M. Lopatina, 2011). This model presents as a macroscopic analog of more familiar chain molecules, such as biological polymers. For example, during cell mitosis, the DNA molecules tightly wrap around histone cores and become densely-packed within cell nuclei to exhibit a “beads-on-a-string” phase that is structurally similar to the systems studied here (Boundless, 2016). Using large-scale, multi-processor, parallelized computer simulations, performed on the SIU institutional computer cluster BigDog, we show that packings of 2D granular polymers are quite distinct from disk packings. Furthermore, we explore how varying polymer interactions influence the mechanically stable end-states through various measures that characterize local and bulk structure.

Works Cited
Oghenetekevwe Ogbebor, Janice Cox, Conrad Williams, and Dr. Kamal Ibrahim

Department of Zoology

Species level identification of unknown Macrotermes specimens collected in Ethiopia

In Ethiopia, located in the Horn of Africa, only two Macrotermes species, M. subhyalinus and M. herus have been reported. In our study, termite samples collected in Ethiopia and morphologically identified as Macrotermes were sent to our lab for further taxonomic assessment. To identify our specimens, we sequenced mitochondrial loci COI and COII and used BLAST to search the GenBank nucleotide database for similar sequences. We used the BLAST hits for each locus and Bayesian tree inference to tentatively assign our specimens to known species. Our results show that one specimen from southern Ethiopia might represent a species not previously recorded in Ethiopia: M. falciger. The remaining five specimens seem to represent species previously recorded in Ethiopia, but architectural characteristics of the mounds from which some of these specimens were collected seem to conflict with our DNA-sequence-based species assignment. Further work is ongoing to increase our understanding of termite diversity in this region and the distribution of termites in Africa. Funding: Adama Science and Technology University in Ethiopia and Ibrahimâ€™s Laboratory at SIUC supported this research.
Aspergillus flavus is a host that thrives in the moist conditions associated with storage of Zea mays. This infection process can majorly damage the crop yield from year to year. The purpose of this analysis is to find out what genes play an important role in the infection process therefore making it possible to make Zea mays immune to A. flavus, which could save future crops. The analysis began with creating correlation scatter plots between m-values (\(\log_2(\frac{\text{infected}}{\text{uninfected}})\)) of genes at different time points post infection. These graphs, roughly 250 in total, all held strange linear striations in the third quadrant. The graphs also hosted strange correlation values. In order to check the data, the genes between Z. mays and A. flavus were split, and it was determined that the striations occur in only Z. mays. The m-values are based upon reads per kilo base per million (RPKM) and since the values in that quadrant are so small, there are not many possible values that the m-values can take. As a result, when a large quantity of data is put together, these small m-values form linear striations in that portion of the graph. To continue the analysis, the data will be transformed to (\(-\log(p - \text{value})\)) and then put through the computer program HCC-CLINDE. This program outputs the target, source, delay, coefficient, and scores of a Gene Regulatory Network (GRN). This GRN data will then be put through Cytoscape, which will transform those numbers into a graph with nodes representing the genes and edges representing the delay, coefficient, and score. In test cases, the program runs effectively, although the program does require a minimum of 12-15 time points to give the full GRN. The final GRN will aid in the search for important genes within the two organisms.
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Comparing the Efficacy of Instructional Methods on Learning a New Motor Skill

When teaching a motor skill to a beginner it is important to deliver instructions in a way that conveys important information so the key components of the skill can be acquired quickly. The Direct Instruction method is considered the best model to teach motor skills to students with varied abilities (Rink, 1996). Direct Instruction is considered a passive learning approach, with a clear curriculum for the instructor and expectations for the learner. Methods under Direct Instruction can include lectures, tutorials, discussions, or observations. The purpose of this experiment is to find the most effective instructional method within Direct Instruction to teach a novel motor skill. In this experiment a Podello is used to measure how well participants learn a new motor skill based on different instructional methods. While Direct Instruction may be the preferred way to teach, students vary in the way that they best learn information. For example, the VARK system categorizes students as Visual, Aural, Reading/Writing, or Kinesthetic learners. This system is adopted by educators around the world. Following these categories of learning styles, this experiment looks to compare performance after learning a motor skill from written instruction, verbal instruction, or a video tutorial. Participants completed all three conditions, and the order they received these instructions varied to reduce order effects. After receiving instruction, the participants were then tested on how quickly they were able to cross a specified distance using the Podello, which reflects how effectively the new motor skill was acquired. The hypothesis is that the video tutorial condition will have the fastest movement time. Participants are expected to learn to use the Podello faster with the video tutorial because of its audio-visual nature, compared to the visual or reading based written instructions or aural verbal instructions.
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Department of Zoology

*Phylogenetic position of the enigmatic snake Erythrolamprus problematicus (Xenodontinae, Colubridae)*

Systematics of Xenodontinae snakes (Colubridae) has been a subject of debate and change with developments in gene sequencing and molecular analyses, generating improved phylogenies. Originally, phylogeny of this subfamily was primarily based on morphological and anatomical characteristics, such as similarities in hemipenal morphology. With increased availability of molecular data, improved phylogenies have increased our understanding of evolution in this group. For our project, a second specimen of the New World snake, *Erythrolamprus problematicus*, described on the basis of morphology from a single specimen, was found in the Peruvian Andes. Our objective is to examine the phylogenetic relationships of this taxon with other Xenodontinae, and to assign the snake to the correct genus. From morphological characteristics, it was originally placed in the genus *Liophis*, which was later synonymized with *Erythrolamprus*. Due to the cryptic nature of this species, and after our comparison to the holotype, we believe neither placement is correct for the snake. We sequenced four nuclear and mitochondrial genes (12S, 16S, cytochrome b, and BDNF) of *E. problematicus* and joined them with corresponding sequences downloaded from GenBank, representing multiple Xenodontinae genera. Our analyses support the placement of *E. problematicus* in a new genus. The new placement has potential to open additional perspectives on the evolutionary history of Xenodontinae snakes, as the snake is basal to all other Xenodontinae clades, and ecologically different, providing insights into the loss and gain of certain traits in this group.
Code review is a software development practice, where a developer sends written/modified code to one of his/her peer to look for mistakes or improvements. Many open source projects (e.g., Mozilla, Chromium, and Android) as well as commercial organizations (e.g., Google, Facebook, and Microsoft) have adopted code review practice as a quality assurance gateway. Developers spend time to look over these code reviews and question or suggest changes. Project managements often wonder if they are doing code reviews correctly or whether code reviews are useful. However, no automated solution exists that is able to monitor the effectiveness of code review process. This research aims to build an automated tool to evaluate the usefulness of code reviews. The primary building blocks of code reviews are comments that may indicate a better solution or a question regarding the functionality of a code segment. If a comment is useful, an author is likely to change the code segment and upload a new version. Therefore, by tracking these code segments in subsequent versions, we can find out whether a comment triggered a change or not (i.e., useful). In this research, I have developed a tool that connects with the API provided by Gerrit, the most popular code review. look at differences between the file containing the comment and versions of the file submitted in subsequent iterations to see if a comment triggered a change. If there was a change in any later iteration, in close proximity, then the comment is considered useful. My tool can automatically identify usefulness of individual comments. I am working towards automating the analysis of an entire project repository which will be able to key insights regarding factors influencing code reviews in open source projects.
Undergraduate Research Opportunities at SIU

REACH (Research-Enriched Academic Challenge)

This competitive program is open to SIU Carbondale undergraduate students in all disciplines, and offers approximately 20 grant awards each year to students working on independent research or creative activities with a faculty mentor. Awards consist of one-year grants of up to $1,500. Students present project results at the Undergraduate Creative Activities and Research Forum held each spring semester on the SIU Carbondale campus. For more information about the program, visit reach.siu.edu, or contact staff in the Center for Undergraduate Research and Creative Activities office in the Student Services building, room 126, at 618/453-4433, or via email at reach@siu.edu.

Creative and Scholarly Saluki Rookies Program

This competitive program offers SIU Carbondale freshmen and sophomores the opportunity to engage in faculty-mentored, hands-on research or creative activities. Students explore their intended majors, develop relationships with faculty in their field, and gain valuable research and critical thinking skills. For more information, you may contact staff at the Center for Undergraduate Research and Creative Activities office in the Student Services building, room 126, at 618/453-4433, or via email at curca@siu.edu.

McNair Scholars Program

This federally funded program offers SIU Carbondale undergraduate students hailing from underrepresented groups, including minority and first-generation/low-income students, preparation for graduate school. It provides mentoring, GRE preparation, and academic support. McNair Scholars take part in a summer research institute and present research results at a campus symposium and at conferences in their discipline. For more information, you may visit mcnair.siu.edu, or contact staff in Woody Hall B139-B145, or at 618/453-4585.
Louis Stokes Alliance for Minority Participation

SIU Carbondale is a member of the Illinois Louis Stokes Alliance for Minority Participation, a statewide coalition dedicated to increasing the number of underrepresented minority students in science, mathematics, and engineering. Funded by the National Science Foundation, this program provides paid, mentored research experiences for SIU Carbondale undergraduates. For more information, visit ilsamp.siu.edu, or contact staff in the Center for Undergraduate Research and Creative Activities office in the Student Services building, room 126, at 618/453-4433, or via email at curca@siu.edu.

Undergraduate Assistantship program

The Undergraduate Assistantship program provides a unique opportunity for SIU Carbondale undergraduate students. The program offers on-campus research and/or creative activity opportunities for full-time SIU Carbondale undergraduate students. Students selected for an Undergraduate Assistantship work directly with a faculty member or professional level staff member in a project that leads to a poster or oral presentation at the Undergraduate Creative Activities and Research Forum held each spring semester on the SIU Carbondale campus. Selected students spend 5, 10, 15, or 20 hours per week working on the project and are paid $10/per hour. The UGA program, one of the programs in the Center for Undergraduate Research and Creative Activities, a unit of the Office of the Vice Chancellor for Research, has cooperating support from Human Resources, Payroll, Office of Sponsored Projects Administration, University Honors, and the University hiring departments. For more information and eligibility requirements, visit undergraduateassistantship.siu.edu, or contact staff in the Center for Undergraduate Research and Creative Activities office in the Student Services building, room 126, at 618/453-4433, or via email at ugrada@siu.edu.
The Center for Undergraduate Research and Creative Activities (CURCA) is one of the offices at SIUC that supports Grassroots and its events. CURCA provides Undergraduate Assistantships (UGA) for undergraduate students in Grassroots. In the 2014-2015 academic year, UGA positions were awarded for the editors. CURCA also finances the monetary award for the SIU Carbondale Literary and Art Awards.

All of the creative submissions accepted to be published in this magazine, *the Grassroots Undergraduate Literary and Arts Magazine*, are eligible for the SIU Carbondale Literary & Art Awards. Judges are chosen by the faculty advisors of Grassroots, will judge each student’s work in three categories: prose, poetry, and art/photography.

CURCA is a unit of the Office of the Vice Chancellor for Research and is a unique resource for students ready to expand their education beyond the classroom. There are different programs available designed to provide students with opportunities to discover through various hands on experiences. CURCA offers students the opportunity to cooperate with a faculty mentor on independent creative activities or research.

The greatly widespread opportunities available in CURCA have produced past grant-funded undergraduate creative activities and research.

CURCA is proud to be involved in the Devil’s Kitchen Literary Festival held in October of each year organized by Grassroots. The Devil's Kitchen Fall Literary Festival is an annual three-day festival featuring readings, panels, and book signings by writers from across the nation. The festival is held on the campus of Southern Illinois University Carbondale. The Devil’s Kitchen awards recognize one poet, one prose writer fiction and one literary nonfiction for a collection of work, a novel, or memoir published in the preceding year.

For more information visit http://grassroots.siu.edu/.