Abstracts

Cady Drummonds, (BS Communication Sciences and Disorders, 2017) works in the Computerized Speech Lab to help a patient use better voicing skills

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Poster Presentation Table of Contents

Terail Clonts

Graduate Program: Technology M.S.
Sponsor: Scott Pierce, Joe Fahmy, Martin Tanaka

Controlling Stiffness Through the Milli-Structure of a Material Using Selective Laser Melting

Selective Laser Melting (SLM) is a rapid prototyping, three-dimensional printing, or additive manufacturing technique that uses a laser to fuse metallic powders by selectively melting the powder layer by layer. The technique can produce parts up to 99.9% relative density, which enables the user to create near full density functional parts (AIP Publishing, 2015). This study aims to use the SLM machine to print 316L stainless steel parts with varying internal geometries in order to manipulate the stiffness of a milli-structure material. Using this technique, parameters may be established that allow the stiffness of a part to be controlled through the milli-structure of the material. Parts with various milli-structure configurations (from solid to low density) will be created with SLM and compared. Each part will be placed under a load in order to determine the extent to which each resist deformation. Results will be compared to those found using Finite Element Analysis (FEA). The results of this study may be applicable in the creation of orthopedic implants in order to reduce stress shielding. Stress shielding can cause an implant to loosen due to loss of bone in the shielded area (Science Alert, 2007). There may also be other potential uses for these materials with milli-structure configurations.

Abstracts

Paige Coleman
Graduate Program: Chemistry M.S.
Sponsor: Channa De Silva, Jerry Miller, Scott Huffman

Detection and Removal of Chromium Metal Ions from Drinking Water

Hexavalent chromium (Cr^{6+}) contamination in drinking water poses a serious threat to human health, due to the highly carcinogenic and genotoxic nature of the fully oxidized metal. Trivalent chromium (Cr^{3+}) is the reduced form of the metal and is non-toxic and insoluble, easily precipitating out of solution. One goal of this research is to collect and analyze local well water samples for chromium metal ions using ICP-OES (inductively couple plasma optical emission spectroscopy). The sensitivity of ICP-OES will allow trace levels of chromium to be detected in the well water samples. The second goal is to develop a chromium removal method by utilizing a metal-based nanoparticle system. We will develop a synthetic method to make metal-based nanoparticles functionalized with an appropriate polymer aiding the removal of hexavalent chromium in water.

Ashley Dillard
Graduate Program: Phycology (General) M.S.
Sponsor: Ellen A. Sigler, David McCord, Christopher J. Holden

So Disgusting, but You Can't Take Your Eyes off the Screen: Do Personality Traits and Disgust Sensitivity Influence One's Liking for Horror Movies

Stephen King stated that horror movies appeal to humans' dark emotions of fear, homicidal rage, and sexual desire by allowing them to experience these emotions in an appropriate way. However, according to Zillmann's mood management theory, humans regulate their emotions by bolstering positive emotions and advoiding negative states. Therefore, we sought to examine what makes disgust pleasurable to some viewers, but repulsive to others, while accounting for individual differences across personality traits, disgust sensitivity, and preference for horror movies.
Data were collected at two different times. First, reliability for a modified version of Sparks' Enjoyment of Frightening Films (EFF) scale was determined; $\alpha = .94$. Then different participants completed the modified EFF scale, along with the HEXACO-PI-R-60, the Three-Domain Disgust Scale (TDDS), and the Brief Sensation Seeking Scale (BSSS-8). Bivariate correlations were conducted between the personality measures and the EFF scale to determine if any relationships existed. Results indicated that the EFF scores were negatively associated with sexual disgust from the TDDS and the honesty-humility factor within the HEXACO-PI-R-60 model. However, EFF scores were also shown to be positively correlated with sensation seeking.
The positive relationship between sensation seeking and EFF scores suggests that sensation seekers may be drawn to the suspense of horror movies. Furthermore, low scores on honesty-humility have been associated with high scores on the dark triad (narcissism, Machiavellianism, & psychopathy), which consists of traits that lead to a cold, manipulative interpersonal nature. While not fully measured in the current research, it stands to reason that individuals high in these traits would also find horror movies enjoyable. On the other hand, those who are higher in sexual disgust sensitivity may be deterred from horror movies due to their inherently sexual nature. Taken together, our results suggest that individual differences play a role in liking of horror movies.

Abstracts

Roslyn Gowens
Graduate Program: Higher Education Student Affairs (HESA)
Sponsor: Brandi Crawford

Expected to be Strong: Mental Health Resources and African American Women at WCU

The purpose of this study is to examine African-American students' perceptions of the mental health resources at Western Carolina University (WCU). Using a phenomenological research design, interviews were conducted with six African-American female students and professionals at WCU. Findings reveal that despite high advertisement for mental health resources on campus, African-Americans are still not prone to taking advantage of those resources. Over time, American literature has captured the different ways the black community approach mental health. That phenomenon does not only exist in the general population, but it is also observable in the mental health practices of college students. Many of the challenges that blacks face directly correlate to prejudice and discrimination in American history. Through time, blacks are continuing to overcome this issue but emotional and environmental stressors play a huge role. This explains why blacks are denying their options for mental health treatment. It was found that African-American college students are less likely than whites to feel comfortable in a college setting, and less likely to seek services for their mental health. This research also focuses on how college students need to see professionals in higher education who look like them in order to feel more comfortable. The foundations of this research stems directly from the black culture and its teachings. African American students have learned throughout their lives that strong means you cannot be vulnerable, even in a mental capacity. Vulnerability for them equates to weakness, inferiority and inadequacy. Ultimately the outcome is black students do not seek counseling services.

Carrie Hachadurian
Graduate Program: Higher Education Student Affairs (HESA)
Sponsor: April Perry

The Abyss: Helping Students Cope with Post-College Transition

Post-college transition is often a difficult time in an emerging professional's life in which one sheds a student identity and adopts a mature, professional one. It can be wrought with stress, anxiety, and depression as one engages in the job search process, addresses financial concerns and learns to budget paychecks wisely while also planning for future endeavors including marriage and starting a family. Many describe this transition as "the abyss" as most students cannot describe what their lives will entail a year after graduation. While all students go through the post-college transition process, each student will experience it in different ways. Faculty and student affairs professionals can work together to help prepare students for their post-college transition and encourage them to think about certain topics or challenges ahead of time to curtail the amount of stress they are likely to feel after graduation. Based on research, this poster presentation briefly defines post-college transition, outlines statistics of emerging professionals, including unemployment rates, describes barriers and concerns regarding post-college transition, and addresses several tangible ideas faculty can incorporate into their pedagogy while working with student affairs professionals

Weaver Haney
Graduate Program: Technology M.S.
Sponsor: Channa DeSilva, Bill Yang, Robert Adams

Measuring upconversion in NaYF4: Yb, Er Nanoparticles with varying Erbium concentrations

Hannah Hinkel
Graduate Program: Phycology General M.A
Sponsor: Jamie Vase

Mindfulness and Attentional Control in Male Inmates

Approximately 62.4% to 100% of male inmates report incidents of Adverse Childhood Experiences (ACEs) (Gibson, Holt, Fondacaro, Tang, Powell, & Turbitt, 1999; Saxon, Davis, Sloan, McKnight, McFall, & Kivlahan, 2001; Wolff, Huening, Shi, & Frueh, 2014; Scott, 2009; Wolff, Shi, Blitz, & Siegel, 2007), which are defined as are stressful or traumatic events, including abuse and neglect (Felitti et al., 1998). ACEs has been implicated in impaired ability to sustain and focus attention (Jenkins, Langlais, Delis & Cohen, 2000), and in turn, those who exhibit deficits in attention and executive functioning are more likely to engage in antisocial and criminal behavior (Ogilvie, Stewart, Chan, & Shum, 2011). One way to improve one's attention and increase executive function capabilities is through mindfulness based interventions such as yoga (Chambers, Lo, & Allen, 2008; Moore, Gruber, Derose, & Malinowski, 2012; Moore, & Malinowski, 2009; Tang et al., 2007). While the extant literature documents the utility of mindfulness-based interventions in improving the ability to sustain attention, it is unclear whether: (1) these associations generalize to incarcerated adults, and (2) yoga will improve attention and executive functioning more for those with a history of ACEs. Thus, the present study aimed to explore the effects of a yoga program on improving attentional control among an adult sample of male inmates with and without a history of ACEs who were enrolled in yoga classes at the Buncombe County Detention Center. Inmates completed a series of tasks including an interview, followed by listening to a meditational song. Then, heart rate measurements were taken both before and immediately after the completion of the D2 attention task. Preliminary findings suggest that the yoga program improves attentional control for a subset of inmates. Implications and limitations will be discussed.

MD Rakib Hasan Khan, Yajun Yan
Graduate Program: Technology M.S.
Sponsor: Bora Karayaka, Peter Tay

Slider crank power take-off system with wave prediction control methodology based on autoregressive (AR) filters

The slider-crank ocean wave energy converter (WEC) is a type of WEC that converts linear motion into rotation and the power take-off of a wave energy converter is defined as the mechanism with which the absorbed energy by the primary converter is transformed into useable electricity. This thesis will emphasize slider crank power take-off system with wave prediction control methodology based on autoregressive (AR) filters in order to efficiently convert the energy of ocean waves into electrical energy. Here, Wave energy converter (WEC) and Power take-off system (PTOS) will be modeled with an electrical analogue, then a non-parametric control strategy with the prediction algorithm will be introduced to maximize energy extraction under regular and irregular sinusoidal wave condition.[1] Simulation will be carried out under regular sinusoidal and irregular wave conditions. Energy extraction results from simulations will be compared with theoretical optimums. In order to do this, here a number of factors will be discussed that influence energy extractions.

This system features a very simple structure with a relatively high efficient energy conversion from wave energy to electricity. This system has a buoy that moves up and down with the ocean waves and the linear motion will be converted into rotation through a slider crank structure. [2] Here, we will predict the half period duration of the next cycle wave and zero crossing to calculate the excitation force with the help of autoregressive filter (AR).

Wave excitation force will be equivalent to the source voltage, Buoy force will be equivalent to the voltage across the characteristic impedance for buoy's hydrodynamics, and PTOS force will be equivalent to the voltage across the PTOS impedance. This model will help the control algorithm to detect the half period and zero crossing of wave excitation force and record real time, and then will generate an angle reference. After that the shaft angle of the generator will be compared with this reference and the angle control algorithm will calculate a speed reference for the motor according to this difference. We need to make sure that buoy's velocity is in phase with the excitation force in order to get continuous rotation of the generator.

Amanda Lafferty
Graduate Program: Biology M.S.
Sponsor: James Costa

A comparison of habitat selection and cold tolerance of the invasive fire ant, Solenopsis invicta, in piedmont and montane regions of the Carolinas

The red imported fire ant, *Solenopsis invicta*, is an invasive pest in the United States that has rapidly spread throughout the country since its first introduction to Mobile, Alabama, in the 1930s. Within the past decade, fire ant specialists have suggested that the spread of fire ants to higher-elevation areas in the southern Appalachians was unlikely. However, these ants have recently been observed in Macon and Jackson counties above 4000 feet in elevation. Indeed, working with biologists at the Highlands Biological Station and Highlands-Cashiers Land Trust, I have documented approximately 75 live fire ant colonies in the Highlands and Cashiers areas within the past several months. The presence of these invasive ants at relatively high elevations raises the question of the likelihood of their enduring persistence. For my MS thesis research at Western Carolina University, I explored possible behavioral and physiological adaptation of fire ants to high elevation environments. This project entailed a comparison of habitat selection, cold tolerance and fat content of fire ants collected along a gradient from piedmont to montane regions in the Carolinas, adapting techniques that were developed for other invasive ant species. My data suggests that *S. invicta* has a significantly higher tolerance for cold temperature extremes at higher elevations compared to their lower elevation conspecifics and this tolerance shift reflects that of the native ant *Aphaenogaster picea*. While *S. invicta* had a significantly higher tolerance for heat and a wider overall tolerance range compared to the native ant *A. picea*, both species exhibited a similar shift in thermal tolerances along an elevational gradient. Interestingly, the data show that there was no significant difference in colony lipid content on an elevational gradient, suggesting that high fat content is not the central adaptive mechanism for *S. invicta* at high elevations. Lastly, my data suggest that site selection in proximity to a thermal source may increase a colony's minimum soil temperatures in the nest during the winter.

Aaron Lipchak
Graduate Program: Chemistry M.S.
Sponsor: Channa De Silva

A microwave-enhanced green synthesis of Eu3+-doped CaF2 nanoparticles for fluorescent imaging applications

The goal of this project is to develop a green, microwave-based synthesis of europium-doped calcium fluoride nanoparticles for potential biomedical imaging applications. Calcium fluoride is relatively non-toxic and easily dispersed in water, making them useful for human applications. Microwave radiation provides a uniquely uniform heating gradient in absorbing solvents as compared to traditional heating methods, which offer many advantages for the production of nanomaterials including higher microscopic reaction temperatures and uniform crystal formation. The low energy requirements of microwave reactors, the usage of water as the solvent, and the replacement of EDTA (Ethylenediaminetetraacetic acid) as a reactant with the (S,S) isomer of EDDS (Ethylenediamine-N,N'-disuccinic acid) as a biodegradable alternative make this a relatively green synthesis when compared to previous methods.
Europium, a lanthanide series element, is important due to it's narrow emission bandwidth, allowing it to be easily distinguished amongst background noise. Lanthanide ions are naturally inefficient at fluorescing, so a chromophore must be used. Chromophores act as an intermediate medium to absorb light and efficiently transfer that energy to the ion of interest so that it may be fluoresced. The chromophore TTA (Thenoyltrifluoroacetone) will be coated on the surface of the nanoparticles, it is well known to have an efficient transition of electrical states between it and europium ions. The eventual goal is to optimize the reaction conditions to yield a product of even size distribution and shape, and to maximize the Quantum Yield (a measurement to determine the efficiency of fluorescence) by changing the doping concentrations of europium ions into the calcium fluoride matrix.

Tyler Melvin
Graduate Program: Higher Education Student Affairs (HESA)
Sponsor: Brandi Crawford, April Perry

How do you really feel: A queer campus climate assessment

Due to the queer civil rights movement of the 1990s, there was an influx of queer students on college campuses. As a result, institutional administrators recognized a need to provide more welcoming and inclusive campus environments for queer students due to increased reports of discrimination and harassment towards this population. Cramer & Ford (2011) state that there is a "continuing need for vigilance and reform" due to "vocal taunts and death threats" that were made to a queer student at Messiah College in Pennsylvania who ultimately died by suicide (p. 38). Susan Rankin, an associate professor at Pennsylvania State University, specializes in assisting educational institutions in assessing their campus climates and provides these institutions with intervention plans via the Transformational Tapestry Model. Susan (2005) defines campus climate as "the cumulative attitudes, behaviors and standards of employees and students concerning access for, the inclusion of, and level of respect for individual and group needs, abilities and potential" (p. 17). Susan's working definition of campus climate and her assessment model can be used to combat the issues of "chilly" or hostile campus climates for queer students (Brown, Clarke, Gortmaker, & Robinson-Keilig, 2004, p. 8). The problem to be addressed is not only understanding and assessing various institutional campus climates, but also to understand why different student demographics have varying opinions of their chilly campus climate and what can be done to provide a more inclusive and accepting campus for queer students.

Erik Meyers
Graduate Program: Technology M.S.
Sponsor: Tony Rizk

A Novel Valvehead Assembly Design for Four-Stroke Internal Combustion Engines

The conventional head-valve assembly of internal combustion engines consists of a rotating camshaft, poppet valves, retainers, push rods, and rocker arms. The camshaft forces the valves to operate dynamically during the intake and exhaust strokes. These strokes are used to either allow vaporized fuel and air mixture to enter the cylinder (during the intake stroke) or to allow combusted exhaust gas to exit the cylinder (during the exhaust stroke). This process has performance inhibiting characteristics in the valve train. During the intake stroke, incoming combustion gas must first pass into the valve seat area, and then around the valve head before entering the combustion chamber. The valve itself must also accelerate from a stationary position before reaching the fully open/fully closed positions, which can lead to intake or exhaust lag during high RPM operation, as well as highly turbulent fluid flow and over mixture of the combustion gas.The purpose of this thesis is to propose a novel valve head design that will simplify the four-stroke cycle and improve overall engine efficiency during operation. The proposed valve head design features an integrated camshaft/lobe (Valveshaft) assembly. Each lobe will contain an intake and exhaust port, which will align with appropriate passageways during operation to open either the intake or exhaust channels, respectively. Subsequently, the poppet valves and most accompanying hardware (such as springs, rocker arms, etc.) can be removed from the head entirely. The new port valves will act in the same manner as the poppet valves, however during intake or exhaust there will be no obstruction to fluid flow in or out of the chamber. This will allow combustion gas to flow more freely throughout the cylinder, preventing over mixing and potential deposition of partially burned fuel on the valve train due to stagnant flow. By porting the lobes appropriately, the incoming fluid can be induced into a vortex, which will also result in a more stable fuel-air mixture without compromising flow volume. Consequently, the lobes do not need to dynamically change direction, and as such will be able to attain a higher operating RPM than traditional poppet valves. The overarching goal of this thesis is to examine the performance of the proposed lobe valve system compared to the conventional valve system under various operating conditions. Using computational fluid dynamics (CFD) modeling, this thesis will construct a CFD model of the lobe valve and a conventional poppet valve systems operating on a four-stroke engine. The CFD combustion simulations will provide valuable insight to the efficiency and power delivery of the lobe valve system compared to the conventional system. The differences between the two systems will be noted and the pertinence of the lobe valve design will be assessed. The expected outcome will be that the lobe valve design offers improved combustion without sacrificing stability or consistency. The lobe valve design is also expected to increase the performance and power output of the engine when compared to the traditional poppet valve system. Finally, this thesis will conclude with a preliminary assessment of anticipated cost savings in the material, the fabrication, the fuel efficiency, and the environmental compliance of the lobe valve system.

Mary Jessamine Michaels
Graduate Program: Biology M.S.
Sponsor: Kelly Grisedale, Brittania Blintz

Identification of body fluids by mRNA analysis with MinION nanopore sequencing

The identification of body fluids present on evidence items in a criminal investigation can be vital to understanding the nature of a crime, particularly in cases of sexual assault. Although crime labs can confirm the presence of body fluids like semen and blood on a piece of evidence using traditional techniques, they cannot confirm the presence of saliva or vaginal fluid or differentiate peripheral blood from menstrual blood. Due to the unique patterns of gene expression in different cell types, different body fluids contain distinct messenger RNA (mRNA) molecules, which can be analyzed through sequencing to generate mRNA profiles for confirmatory identification of body fluids. The MinION by Oxford Nanopore Technologies (ONT) is a portable and relatively inexpensive sequencer in comparison to other next-generation sequencers. However, its ability to generate high quality sequence data from forensic type samples, which often do not contain much biological material, is not fully known. In this study, a sequencing workflow compatible with ONT's MinION was developed and examined for its reliability. DNA and RNA were co-extracted from semen, saliva, blood, menstrual blood, and vaginal fluid from 8 donors each. Dilutions of semen, saliva, and blood, as well as mixtures of semen and vaginal fluid, were also examined. A multiplex PCR targeting two genes for each body fluid along with two housekeeping genes as endogenous controls was developed. This analysis method appears specific enough to identify body fluids without occurrence of false positives or cross reactivity between body fluid targets, while also allowing for the generation of DNA profiles from the same sample, even in tenfold dilutions and mixtures. Body fluid markers amplified in this study will be subjected to sequencing by ONT's MinION and its ability to generate high quality sequence data from forensic samples will be examined.

Justin Nakhle
Graduate Program: Higher Education Student Affairs (HESA)
Sponsor: April Perry, Ellen Sigler

Targeted intervention for struggling college students

Research on student academic success has often focused on study strategies (Biggs, Kember & Leung, 2001; Kember, Biggs, & Leung, 2004). Perez, Cromley, & Kaplan (2014) indicate motivation is also a key to academic accomplishment. As motives are the affective aspects of studying and strategies are the actual skills applied to those tasks, both are essential to academic success. The Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) was a survey created to evaluate both the study strategies and motives of students (Biggs, Kember & Leung, 2001). Additionally, the R-SPQ-2F determines whether these motives and strategies reflect positive learning behaviors (deep) or ones that are less conducive to success (surface). This was used to evaluate individual characteristics. For example, a student with deep motives but surface strategies may care deeply about academics but employ poor strategies when studying. In contrast, a student with deep strategies but surface motives reflect knowledge of strategies but is not motivated in the academic environment (Hulleman, Godes, Hendricks, & Harackiewicz, 2010). The two examples demonstrate students should be advised differently based on individual needs. This study assesses the effects of a one-on-one intervention with students who have previously been dismissed from the university. Often, students in this situation are administered a one-size-fits-all model of academic advising. This study demonstrated a move from the current advising technique to a more individualized intervention. Thus, hypothesized an increase in students' chance to succeed academically. The final results exhibited 100% participants indicating an increase in motivation, and 88% increase in knowledge of study strategies. Due to the small sample size, there was no statistical significance. However, there is a positive trend among those who received the one-on-one intervention based on the student's individual academic needs.

Ariel Phillips
Graudate Program: Higher Educaton Student Affairs (HESA)
Sponsor: Brandi Crawford

Stressed? Work it Out(Side)! :Indoor, Outdoor Recreation, and Psychological benefits

There has been much research on psychological benefits of outdoor recreation, but limited research on the value of recreational programs in higher education. This study was twofold; the purpose being to examine students' participation in outdoor recreation activities and reported stress level. While, also examining reported *value* they place on such programs within higher education.
The goal of this quantitative methods study was to uncover correlations between students who participate in outdoor recreation and reported stress level, to those who may not participate in outdoor recreation. This study also examined students reported value they place on having such programs on college campuses. The survey was distributed in different locations, which allowed for comparisons among a diverse population of students. This study sought to answer the following specific questions: Is there a difference in reported stress level between students that participate in outdoor recreation and those that participate in indoor recreation activities? Is there a difference between reported stress level among those surveyed in an athletic setting and those who surveyed at random locations?
Psychological benefits of spending time in nature or participating in outdoor recreation include reduced stress, and anxiety, increased positive emotions and overall better mental and physical health. Some may think that outdoor recreation is simply a pastime for college students without realizing the benefits it can have on individuals emotional, physical, and overall health and wellbeing. While positive psychological benefits of outdoor recreation and time in nature have been discussed in previous research, it is necessary to continue research so these programs receive the necessary support and value they deserve.

Christopher Robinson
Graduate Program: Biology M.S.
Sponsor: Robert Youker

Using Differential Scanning Fluorimetry (DSF) and Molecular Dynamic modeling to measure changes in nBD1-ligand thermal stability

Cystic Fibrosis (CFTR) is an autosomal recessive disease that progressively causes lung infections that increase in severity over time. This lowers the average life expectancy below the age of 40 years. The main symptoms of patients with CFTR are thick mucus layers in the lung, pancreas, and digestive track which hinders their function. This is caused by a mutation in the 1480 amino acid long CFTR protein which regulates the chlorine across the cell membrane. The most common mutation, delta508, results in the misfolding and aggregation of the protein during synthesis. Such aggregates are marked for degradation before the protein has a chance to reach its destination.
Research has found that even with the delta508 mutation, if the proteins folds and reaches its destination, it will function. Finding pharmacological treatments to improve protein folding is an avenue scientist are investigating to improve the life expectancy of CFTR patients. Currently there is no single compound found that can dramatically increase thermal stability of the protein and thus folding of the CFTR protein. It is possible that a combination of ligand compounds may prove a more viable method. Screening studies have been performed to find small corrector molecules that would increase the thermal stability of F508del type CFTR. While several dozen molecules have been identified as CFTR correctors, little is known about specific interactions between the corrector ligand and CFTR protein. Testing every compound is extremely costly and inefficient; however, by using Molecular dynamics modeling and Differential Scanning Fluorimetry (DSF) method one can inexpensively test for thermal stability. Preliminary data of DSF experiments with the compound BIA and Hydroxytyrosol have shown potential in increasing thermal stability.

Justin Rich, Crystal Plemmons, Andew Poole
Graduate Program:
Sponsor: Sharon James McGee

The State of Writing Across the Curriculum at Western Carolina University.

To determine faculty perceptions about student writing at Western Carolina University and the kinds of writing tasks that faculty assign, we utilized a survey instrument used by Addison and McGee (2007) for the National Council of Teachers of English. The survey was distributed to faculty by department chairs who agreed to do so. Results will offer beginning insight into what faculty value in "good" writing, their impressions of student writing quality, and the types of writing assignments given in undergraduate-graduate courses at WCU.

J.Clint Sawyer
Graduate Program: Biology M.S.
Sponsor: Joseph Pechmann

AMERICAN TOADS INCREASE MOVEMENT IN THE PRESENCE OF THE RED-IMPORTED FIRE ANT.

Invasive species, e.g., the red-imported fire ant (Solenopsis invicta; RIFA), may threaten native amphibians. We tested whether the American toad (Anaxyrus americanus) recognized and avoided RIFA, and if these behaviors differed between RIFA-experienced and RIFA-naïve populations. Our goal was to ascertain if toads spent less time near ants and moved more when RIFA were present compared to native Aphaenogaster ants and a blank control. Behavioral laboratory trials involved all toads undergoing three treatments within an experimental arena: no ants (control), RIFAs, and Aphaenogaster ants. Ants were randomly placed into one of two containers located at opposite ends of the arena. We recorded proportion of time spent near ants and the number of movements performed by each toad (N=50). There was no significant difference between treatments or RIFA naïve vs. experienced toads in time spent near ants. However, toad movements were 43% more frequent in trials with RIFAs than Aphaenogaster ants for toads from all areas (P=0.0086). Possible explanations include: 1) American toads, regardless of RIFA experience, recognize RIFAs as a predation threat, not as a prey item, 2) American toads lack adequate recognition of RIFAs because of a lack of shared evolutionary history, and move less in the presence of recognizable Aphaenogaster prey, or 3) American toads, regardless of RIFA experience, have evolved with similar stimuli from less prevalent native fire ant species to recognize the predation threat from RIFAs. Understanding amphibian recognition of RIFAs as predator or prey may be useful for management decisions involving this invasive species.

Riley Seyffert
Graduate Program: Technology M.S.
Sponsors: Sudhir Kaul, Wes Stone, Patrick Gardner

Fatigue Characteristics of Selective Laser Melting

Direct metal laser sintering (DMLS) or selective laser melting (SLM) is a relatively new additive manufacturing (AM) technique. This manufacturing process involves fusing powdered metal layer by layer by using a high-powered laser. This process works by laying down a thin layer of metal powder and sintering that powder to the previous layer and then repeating the process. Once the layer sinters to the prior layer, a recoating blade brings a new layer of metal powder across the build plate, and the process repeats until the building process is complete.

There are studies in the literature that indicate that the bending fatigue performance comparison between DMLS and cold-rolled shows good visual agreement between 2×10^5 and 2×10^6 cycles to failure [1]. In the same study [1], two different vendors were used when obtaining the DMLS parts for testing. Each vendor's test parts used different process parameters to build the parts, yielding different results. The process parameters (scanning strategy of the laser beam, powder deposition, etc.) must be improved to increase the density of the part and avoid imperfections [2]. AM technologies are currently being applied in product development rather than production since the build speed is too low [3]. That could possibly change with improvements in the manufacturing process.

Although AM is expected to significantly transform the manufacturing process, there are some limitations that restrict the speed at which parts can be manufactured through the SLM process. This study will focus on comprehending the influence of process parameters involved in additive manufacturing by using the EOS M290 DMLS machine located in the Center for Applied Technology. This study will investigate some of the limitations by conducting a process parameter design of experiments to find the most adequate parameters that will allow DMLS to become a viable means of manufacturing. The output variables of this design of experiments will include results from static and dynamic testing, involving tensile testing and cyclic fatigue testing. Since an existing fatigue testing setup is not readily available, a significant part of this study is expected to involve the design and fabrication of a fatigue testing machine that will perform three-point bending for a cyclic fatigue test.

This study will seek to answer the following research questions: Can DMLS be used to manufacture parts that are equivalent to other processes while expediting the manufacturing speed? What process parameters (such as layer thickness, number of scans, scan speed, etc.) can be used to minimize the build time while maintaining the static structural properties of a part? What process parameters can be used to minimize the build time while maintaining the dynamic structural properties of a part? The main goal of this study is to find the process parameters that can be used to produce parts at a much quicker pace while still maintaining adequate static and dynamic properties. The results of this study are expected to assist in understanding the use of DMLS in manufacturing complex parts.

Abstracts

Jeremy Smith
Graduate Program: Technology M.S.
Sponsor: Dr. Martin Tanaka, Dr. Patrick Gardner, Dr. Sudhir Kaul

COMPARISON OF PARTS PRODUCED BY TRADITIONAL CAD SOFTWARE AND GENERATIVE DESIGN SOFTWARE

Lamyea Sroute
Graduate Program: Chemistry M.S.
Sponsor: Scott Huffman

Mosquito Speciation using IR Spectroscopy

Mosquito control interventions are more effective when informed by routine entomologic surveillance. Thus, accurate and rapid species identification remains a critical component of operational mosquito control. Current methods to identify adult mosquitoes rely chiefly on microscopic identification by trained personnel. In some larger mosquito control programs, molecular methods may be used for species or pathogen identification and advanced techniques (e.g., age-grading by ovarian dissection) may be used to further assess the mosquito population structure. Each of these methods are labor intensive and subject to a series of operator or laboratory errors. Therefore, there is a need for rapid and non-destructive species identification techniques that can be used on a scale that is ecologically, economically, and epidemiologically meaningful. Our current research aims to develop methods of biochemical discrimination between different mosquito species using infrared spectroscopy. Infrared spectroscopy is a sensitive, information rich technique that is capable of detecting a wide range of molecular signals ranging from subtle changes in protein secondary structure to transmembrane protein-lipid interactions. The resulting spectral data, when coupled with numerical analysis (chemometrics) methods such as linear discriminant analysis and partial least squares regression may be used to classify mosquitoes by species or physiologic status. Herein, we have applied Fourier transform infrared (FT-IR) microspectroscopy to identify four container-inhabiting *Aedes* species (*Ae. aegypti*, *Ae. albopictus*, *Ae. japonicus*, and *Ae. triseriatus*) obtained from both field and laboratory conditions. At present, our FT- IR classification success rate using linear discriminant analysis, when compared to identification by a trained entomologist, is 95.4% (95% CI: 92.6- 98.2%). This method, which is rapid and easy to use, has the potential to decrease the labor costs and time associated with mosquito species identification. Further development coupled with process automation may provide operationally useful methods for rapid identification of many mosquito species and their physiologic status.

Patricia Traylor
Graduate Program: Doctor of Nursing Practice – D.N.P.
Sponsor: Shawn Collins, Karen Lewis

An Interdisciplinary Multi-Modal Resiliency Program in Medical-Surgical Nurses: Does it Decrease Burnout and Increase Quality of Life?

James Walker
Graduate Program: Technology M.S.
Sponsor: Sudhir Kaul, Wes Stone, Patrick Gardner

Structural Damage Diagnostics for Additive Manufacturing

Direct metal laser sintering (DMLS), also known as Selective laser melting (SLM), is an additive manufacturing process that is being increasingly used to manufacture parts that are difficult or impractical to produce by using traditional manufacturing methods. However, this relatively new technology does not have the same base of knowledge as other processes. This makes it challenging to design parts that need to be manufactured by using SLM since many aspects of this manufacturing process are not yet fully comprehended.

This study will investigate the way damage manifests itself in parts manufactured from DMLS by using vibrational mode shapes. Using vibration-based damage detection is a common testing technique due to the non-destructive nature of the test. Various mode-shape based approaches have been proposed in the literature for damage detection and localization (Roy & Ray-Chaudhuri, 2013). One of these damage detection methods involves the use of vibrational mode shape slopes and curvatures. The difference in mode shape curvature is expected to produce a unique pattern at the damage location (Roy, 2017). Detection of damage before it propagates or in the early stage of its development could increase the lifetime of the structure and prevent it from complete failure (Navabian, Bozorgnasab, Taghipour, & Yazdanpanah, 2016). The parts used for this study will be manufactured from the EOS M 290 machine using 316L Stainless Steel. Different notches will be introduced into the geometry of several parts and damage will be further propagated in a secondary operation. A Polytec PSV-400 Laser Doppler Vibrometer will be used to identify the vibration mode shapes. These mode shapes will then be compared to the mode shapes attributed to undamaged parts.

This study will also investigate the effects of varying parameters associated with additive manufacturing, such as part density, number of scans, etc. One issue related to DMLS is the lack of cost efficiency and productivity (Bremen, Meiners, & Diatlov, 2012). The properties of DMLS parts that increase cost efficiency and productivity, such as laser power and layer thickness, inversely affect the density of parts. Damaged parts will be printed with varying properties and the mode shapes of these damaged parts will be compared to comprehend differences, if any.

The research questions that this study aims to answer include: Can damage of DMLS parts be detected from the mode shapes measured with a laser vibrometer? Can these mode shapes be used to predict or locate damage in parts? Do mode shapes manifest differently based on parameters associated with the SLM process?

ORAL PRESENTATION ROOM SCHEDULE

9:00 – 10:00
UC Catamount Room

Oscar Gamez
Graduate Program: Technology M.S.
Sponsor: Paul Yanik, Peter Tay, Martin Tanaka, Ellen Sigler

Multi-Sensor Fusion and Integration for Assistive Robotics

Assistive robotics is an increasingly growing field that has many applications. In an assisted living setting, there may instances in which patients experience compromised mobility, and are therefore left either temporarily or permanently restricted to wheelchairs or a bed. The utilization of assistive robotics in these settings could revolutionize treatment for immobile individuals by promoting effective patient-environment interaction and increase the independence and overall morale of affected individuals.

Currently, there are two primary classes of assistive robots: rehabilitation-based service robots, and social robots. Rehabilitation-based service robots assist with tasks that individuals would normally complete themselves but are unable to complete due to impairment or temporary restriction. Assistive social robots include companion robots, which stimulate mental activity and, therefore, intellectual engagement in users. Current service robots may have depth sensors and visual recognition software all integrated into one self-contained unit. The depth sensors are used for obstacle avoidance. Vision systems may be used to recognize a user's gestures. The gestures will be used by the unit as commands to move in the indicated direction. The robots may also have arm manipulators to perform object retrieval.

Some forms of assistive mobile robots have included the use of a device such as a laser pointer or video cameras to determine a user's object of interest and where it is located. Others have used video cameras for gesture recognition as stated above. Approaches involving these devices may be difficult for individuals with impaired manual dexterity to use.

The objective of this research will be to integrate a method that will allow the user to command a robotic agent to retrieve an item by utilizing eye gaze tracking. This would allow the individual to command the robot with eyesight through the use of a head-worn gaze tracking device. Once the object is recognized, the robot will retrieve the object by utilizing multiple sensors to avoid obstacles and a robot arm to collect the item. The expected outcome of the proposed research will be a robot that will facilitate the self-efficacy of the user in a bed or wheelchair.

Kaleb Frizzell
Graduate Program: Technology M.S.
Sponsor: Dr. Robert Adams, Dr. Peter Tay, Dr. Yanjum Yan

2D and 3D Audio Sound Localization Utilizing Vector Based Amplitude Panning

Audio systems are used to create two-dimensional (2D) and three-dimensional (3D) audio effects which involve the ability to localize sound within a multi-dimensional space. Multi-dimensional audio systems could be used to imitate moving sounds in applications such as home theaters, video games or headphones. When two or more equidistant speakers produce the same sound, the observer perceives the sound to be localized at a single point. The blending of sound from equidistant speakers is called the virtual sound and is perceived to originate from a virtual source. For two speakers, the virtual source is located on a circular arc between the speakers. For three speakers, the virtual source is located on a spherical cone defined by the speakers. For the observer to perceive one sound from multiple sources, the sounds must arrive at the observer at the same time. By calculating the individual speaker gains using the method of vector-based amplitude panning (VBAP), the audio from all the speakers can be manipulated such that the observer perceives the sound to be originating from a single point. In this article, we present the results of simulating in MATLAB and testing in the lab, two-dimensional and three- dimensional audio systems with multiple speakers placed in testing positions equidistant to the observer. It is envisioned that this research will lead to a better understanding of localization of sound and to a better understanding of how accurately sound is perceived by the human ear.

Jacob Palmer
Graduate Program: Technology M.S.
Sponsor: Wes Stone, Sudhir Kaul. Robert Adams

Trekking Poles: Analysis and Improvement

Trekking or hiking poles are devices made of various materials designed to assist a hiker or walker. Trekking poles can provide support while climbing up or down hill as well as relieve the pressure on lower limbs. While many hikers use trekking poles, it is not uncommon to find complaints when investigating literature. Often trekking poles do not meet the full needs or wants of the customer, leaving much room for improvement. The poles that are available on the market to date have a locking system that requires some time to adjust, are too weak for many scenarios. Often these downfalls will cause hikers to completely forgo the use of trekking poles. The goal of this work is to investigate the strengths and weaknesses of trekking poles as well as aid in designing and developing an alpha prototype for a trekking pole handle that is not currently on the market. The alpha prototype will have an advanced locking mechanism that will allow for on the fly adjustments to length to accommodate uphill or downhill climbing. This goal will be met by gathering data using various methods of testing to ensure a thorough investigation. The research of trekking poles will be accomplished using various written and documented sources, performing several lab tests, using multiple trekking poles to gather data, as well as various computer models. As data is gathered an enhanced pole design can be designed and developed. Hopefully bringing a high demand for the model that will be designed using the information gathered during the research of this thesis.

Pranoy Kumar Singha Roy
Graduate Program: Technology M.S.
Sponsor: Dr. H. Bora Karayaka, Dr. Yanjun Yan, Dr. Yazan Alqudah

Evaluation of Reference Generation Algorithms for Dispatching Solar PV Power

This research aims to develop a low-cost energy storage system by evaluating reference generation algorithms for dispatching solar power for 1 MW photovoltaic (PV) arrays. Based on battery state of charge (SOC), rule-based algorithms are developed to adjust the grid reference power for each one-hour dispatching period. In this study, several rule-based algorithms are used to control the SOC of the battery that plays a significant role to design cost-effective energy storage system. The price comparison is made between two kinds of energy storage system (i) Battery only (ii) Battery+ Supercapacitor (SC), where a low pass filter is used to allocate power between battery and SC. This research also presents the relationship between the actual PV cell temperature and the ambient temperature frameworks and their effects on price calculations. The most economical energy storage system is developed through extensive simulations in MATLAB/Simulink environment. The results show that the hybrid energy storage system (HESS), a combination of battery and SC, outperforms a battery-only operation regardless of the temperature framework.

Abstracts

9:00 – 10:00
UC 226 – Raleigh Room

John Falter
Graduate Program: English M.A.
Sponsor: Mae Claxton

Far East of West: Emerson, Thoreau, and the Orientalist Daydream

A survey of Emerson and Thoreau's writings reveals many references to the religions and spiritualities of Asia. But why? What accounts for their inclusion? This presentation introduces the mystery of Asian religions in Transcendentalist literature and argues three contributing factors for it: the notion of divine oneness and immanence in many Asian traditions, the supply of metaphors these religions granted, and the effect on the imagination Asia's perceived foreignness created. This presentation uses passages from the journals and essays of the conspiratorial friends, Henry David Thoreau and Ralph Waldo Emerson, as well as academic articles, to argue its thesis. It concludes in suggesting these writers believed that incorporating the religions of Asia helped them somehow to create the culture they wished to see in America; a culture that, in so many yoga mats, endures today.

Rachel Leforce- Seibert
Graduate Program: English M.A.
Sponsor: Mae Claxton

The Introduction of Blood Quantum Language in the 19th Century

The United States government introduces blood quantum language within the Treaty of 1817: Treaty of the Rapids of the Miami of Lake Erie with the Wyandot, Seneca, Delaware, Shawnee, Potawatomi, Ottawa, and Chippewa on September 29, 1817. Language such as "quarter-blood" or "half-blood" allows the government to allot a certain amount of land to the specified tribes based on how much indigenous ancestry they have. In doing so, the United States government situates itself into a position where, eventually, the government will be able to reclaim land once given to tribes in the assumption that the blood quantum of tribal members will be minimal.

In creating the blood quantum language, the United States moves closer to creating language that would eventually deny people their ancestry and right to government aid. The language also helps institute extinction among certain tribes and loss of culture to those no longer accepted as tribal members, even if they do identify with their indigenous ancestry. For several tribes, ancestry is matrilineal, and the idea of blood quantum does not exist. For instance, the child of an indigenous mother and white father would be fully indigenous. The focus is on the community rather than blood quantum.

The rhetoric that the Treaty of 1817 suggests that there are limits to what constitutes a "true" Native American. In looking at that rhetoric and how it has shaped public conception about how much blood quantum constitutes a "true" Native American and how much the government should owe someone who is only a "quarter-blood" versus a "half-blood." This paper will look at the progression of logic in using blood quantum language in selected 19th century treaties and documents.

Kellie Wilcox
Graduate Program: English M.A.
Sponsor: Annette Debo

Technical Communicators: Empowerment through Definition

Technical communicators are often seen less as people responsible for clear, truthful communication, and more as objective word processors. They work in a variety of contexts across multiple fields; their work impacts countless people, from businesses to individual consumers of technology. Why then is technical communication a relatively invisible, misunderstood field? Would its impact be greater, its members feel more empowered in their roles, if people outside the field understood it better?
While broad definitions exist for the field of technical communication, they have been contested as entirely unnecessary or inadequate, since no definition could encompass the field entirely. My research uses two debated sets of definitions: one from the Society of Technical Communicators website, and one from Henning and Bemer, who draw on the strengths and weaknesses of definitions from the *Occupational Outlook Handbook*. Both have their pros and cons, but they focus primarily on technical communicators' specific roles (their production value) and the texts they produce.
I propose a modified broad definition based off both definitions' strengths in conjunction with Carolyn Miller's humanistic rationale. It focuses on the skills of technical *communicators*—human beings with a specific skill set that can be applied to any field in which they work–instead of focusing on the field of technical communication itself. This broad definition can be paired with a smaller, flexible definition based on the communicator's context, much like the changing of a resume to meet the needs of different employers. The use of this broad definition alongside a specific definition could well increase the legitimacy of the field of technical communication, empower the individuals working in it, and help others outside of the field to come to a better understanding and position of trust.

Kelsey Woodburn
Graduate Program: English M.A.
Sponsor: Mae Claxton

Feminine Spheres

The work of the late nineteenth century American novelist Kate Chopin is known for detailing the lives of women in society who feel constrained or restricted by their male counterparts. This paper will specifically look at two women in Chopin's work: Louise, the protagonist of *The Story of an Hour,* and Edna, the focus of her novel *The Awakening.*

I will apply feminist theory to both of the female protagonists, while exploring how they are othered from the other feminine spheres. Here I use spheres as a term to describe categories, or boundaries, that are used to separate people in society. Specifically, with the women, in that they feel physically constrained by their own domestic spheres. This manifests in different ways such as the window in *The Story of an Hour*

Though they both accept feminine norms to an extent they are still different from other women in that they are forced to remain in their domestic spaces but are unhappy with what would be considered normal feminine spheres.

In the end, both women find freedom through death and escape from their restricted spheres. Both have physically escaped the men in their lives and the demands of conformity to societal norms. They achieve a freedom in death that they could never have achieved in life.

10:00 – 11:00
UC 212 Dogwood Room

Monica Reece
Undergraduate Degree: Biology

Sarah Britton
Graduate Program: Biology M.S.
Sponsor: Barbara Ballentine

Indirect effects of house wrens (Troglodytes aedon) on life history and reproductive traits of Carolina chickadees (Poecile carolinensis)

Research on life history evolution in birds has revealed both direct and indirect effects of predation. Increased levels of nest predation favor reproductive behaviors that reduce the threat of predators on offspring or allow parents to bet hedge for future reproductive attempts. In this study, we investigate whether the presence of a competitor, the house wren (*Troglodytes aedon*), results in similar indirect effects on life history and reproductive behaviors of Carolina chickadees (*Poecile carolinensis*). House wrens compete for nesting cavities and will kill Carolina chickadee eggs and nestlings. We monitored nest boxes in Western North Carolina where exposure to house wrens varies. We surveyed house wren presence at active Carolina chickadee nests and measured clutch size and mass, incubation, provisioning rates, nestling growth rates, development, and fledging success of chickadees. House wren takeover accounted for 38.77% of nesting failures, more than any other cause of failure in our study. We found that the presence of house wrens resulted in smaller Carolina chickadee clutch sizes. However, we did not detect any effects of house wren presence on chickadee egg size, incubation, provisioning, growth, or development. These results suggest that house wren presence affects a narrow range of life history traits early in the nesting period, possibly because this is when house wrens are the biggest threat. Reducing clutch size may be a strategy used by Carolina chickadees to decrease reproductive investment in an environment where early nest failure is probable, allowing adults to reserve energy for future reproduction.

Chelsea Corrigan
Graduate Program: Biology M.S.
Sponsor: Jeremy Hyman, Barbara Balletine, Thomas Martin

Are Urban Birds Born Bold? Variation in Fear Responses of Urban and Rural Eastern Bluebird Nestlings

Wendy Harmon
Graduate Program: Biology M.S.
Sponsor: Dr. Joseph Pechmann, Dr. Tom Martin, Dr. Jerry Miller

The Impossible Salamander: Aberrant Coloration as a Result of Metal Toxicity, Crypsis, or Light Exposure?

The Buck Creek Serpentine Barrens in Clay County, North Carolina is an unusual habitat comprised of a pine savannah with endemic plant species underlain by serpentinite rock. Most *Desmognathus monticola* living in the Barrens stream have bright yellow patches on their skin, although this population is genetically similar to unaffected populations of *D. monticola.* My research explored if 1) trace metals induce the observed pigmentation changes, 2) if the changes result from phenotypic plasticity for crypsis against the lightly colored serpentine rock on the stream bottom, 3) if these salamanders are histologically different than unaffected *D. monticola*, or 4) if excessive light exposure and decreased shade (to mimic the reduced canopy of the Barrens) causes the yellow skin coloration. Metals are unlikely to cause the yellow coloration, in that the metals of concern were lowly concentrated: Al (7-9)%, Ca <1-3%, Fe 10-13%, and Mg <1-3% per water sample. The metals did not likely cause color change, and also did not affect the liver weights between the two populations ($p = 0.4545$). Salamanders from both various populations also became more yellow in every crypsis lab experiment, but the Barrens salamanders did differ in the amount of epithelial pigment compared to control salamanders ($p = 0.0001$). The yellow coloration of salamanders exposed to light was impacted by salamander source, light, and calcium, ($p = 0.0304$) but luminosity of the salamanders was not impacted by any factors of this study. Understanding the environmental stimulus that induces this morphological change in these salamanders' integument, and if these morphological changes are unique to this population, will help to conserve a unique part of North Carolina's landscape diversity.

10:00 – 11:00
UC 232 – Multipurpose Room

Randi Adams
Graduate Program: English M.A.
Sponsor: Annette Debo

"What About Children?": Toxic Heteronormativity and Family in Dorothy Allison's "Don't Tell Me You Don't Know

It is certainly no secret that Dorothy Allison's literary work is largely inspired by her own life experiences as she never shies away from acknowledging the significant role her background plays in her fiction. Applying the theoretical work of Catharine Stimpson, Adrienne Rich, Monique Wittig, Michel Foucault, and Kathleen Gough, this essay explores the toxic implications of society's enforced and encoded heteronormative impulse in Dorothy Allison's "Don't Tell Me You Don't Know." While the narrator's identity as a masculinized lesbian causes tension within her familial relationships, it is her childlessness that is considered most problematic. As demonstrated in this short story, through rigid understandings of gender-roles, the reality that male power is attained through the control of female sexuality, and the inscribed preoccupation with childbearing, it is evident that the toxicity of the ingrained patriarchal and heteronormative forces acting within society negatively affect familial relationships.

Sarah Casto
Graduate Program: English M.A.
Sponsor: Mae Claxton

Sin Made Manifest: Exploring the Characters of the Seven Deadly Sins in Nathaniel Hawthorne's The House of the Seven Gables

Few writers of the nineteenth century had more talent for symbolism, imagery, and allegory than Nathaniel Hawthorne. In *The House of the Seven Gables,* Hawthorne weaves his Puritan views into the art of allegory, creating a story that makes a point about what it means to be evil. Although he is also known for other popular works, such as "Young Goodman Brown" and *The Scarlett Letter,* Hawthorn demonstrates a high craft and understanding of people and their negative tendencies by having characters represent the seven deadly sins in *The House of the Seven Gables.*

Critics have often recognized various themes, rhetorical devices, and interpretations when it comes to Hawthorne's works. Current conversations concerning *The House of the Seven Gables* include Carol Schoen's "The House of the Seven Deadly Sins" and Sheldon Liebman's "Point of View in the House of the Seven Gables." Schoen asserts that Hawthorne's story, although about the seven deadly sins, also encompasses the idea of redemption by contrasting the sin to an absence of sin. Liebman explains the different aspects of guilt in regard to the Pyncheons and the Maules within the story and how their sins affect their roles as characters.

Although Schoen and Liebman, along with other critics such as Francis Joseph Battaglia, recognize the themes of evil, sin, redemption, and guilt in *The House of the Seven Gables,* many neglect the individual characters themselves. Hawthorne created textual embodiments of pride, gluttony, lust, greed, wrath, sloth, and envy in order to give faces to the sins. In my essay, I will explore each sin in regard to the characters' personalities and actions, as well as focus on the sins made manifest in characters to uncover the connection Hawthorne meant to make between his created story and the real-world.

Craig Hawley
Graduate Program: English M.A.
Sponsor: Mae Claxon

Mortality and Moby Dick: An Analysis of Life, Death, and Nature in Herman Melville's American Epic

Herman Melville's epic tale about Ahab, Ishmael, and the great white whale is considered to be a classic piece of nineteenth-century American literature, and one of the great man versus beast stories. Melville's masterpiece provides a gritty and thought-provoking depiction of the whaling profession, based on the real-life story of George Pollard Jr. and his ship, the Essex. Melville chronicles the whaling voyage, accented by Ahab's descent into utter madness, as the characters pursue an end: theirs, or the great white whale's. Through his epic storytelling, Melville prompts readers to consider the awesome and brutal power, as well as the beauty and serenity of nature. Although scholars have explored various interpretations of the symbols and characters within the epic tale, surprisingly little has been written regarding the representations of life and death in Moby Dick.

Melville juxtaposes life and death by raising questions regarding the value of specific characters, the value of life itself, and the inescapable concept of one's own mortality. Specifically, Melville presents this juxtaposition through the symbolism of Queequeg's coffin, and the whales themselves. Moby Dick is a tale that couples the brutal reality of life at sea with a stern approach to the practical and intangible value of nature. In my presentation, I will analyze Herman Melville's depiction of Ahab's obsession, the whale, and the various symbols present in the epic. Through an analysis of Melville's characters and symbols, I will explore Melville's depiction of the value of life, coupled with the inevitability of death. In analyzing this depiction, I will argue that the epic Moby Dick is a tale of encouragement that we should value each day, and not waste our lives in fruitless pursuits.

Jessica Masters
Graduate Program: English M.A.
Sponsor: Mary Adams

Charming Chattering Tongues: A Close Reading of Shakespeare's Taming of the Shrew and Much Ado About Nothing

"Her silence flouts me, and I'll be reveng'd" remarks Katherina in Shakespeare's *Taming of the Shrew* (2.1.867). In two of Shakespeare's works, *Taming of the Shrew* and *Much Ado About Nothing*, Shakespeare introduces audiences to two loud women in Elizabethan England. Each of these women are in close relations to a more desirable woman of the time, a woman who is much quieter than they are, and each loud, witty woman is opposite an equally witty man. Katherina, in *Taming of the Shrew,* is the woman who has to be wooed (not an easy task) before her sister can be courted by any man impatiently waiting for her. Beatrice, in *Much Ado About Nothing,* spends much of the play dispelling any idea that she has feelings for Benedict. Both engage in banter, often proving to be strong, independent women. Each of these women seem to embody Katherina's statement, using words as weapons against the opposite sex; neither are typical Elizabethan women.
Christina Luckyj provides readers with a framework for thinking about gender in early England. In this framework, Luckyj discusses the rhetoric of silence, and how discourse is influenced by this silence. Luckyj claims that silence can take on many meanings for these women. In this paper, I argue that Shakespeare is playing with the idea of opposition to silence in each of these plays as can be evidenced by the witty banter between Katherina and Petruchio in his efforts to tame the shrew, and in Beatrice and Benedict's squabbles about their mutual distaste for one another. Shakespeare seems to question which is better to marry-- the sheep or the shrew?

11:00 – 12:00
UC 215 – Catamount Room

Haley Hickey, Hannah Mitchell
Graduate Program: Psychology M.A.
Sponsor: David McCord

Comparison of 3-point versus True-False scoring on the Minnesota Behavioral Health Screen

Hannah Hinkel
Graduate Program: Psychology M.A.
Sponsor: Jamie Vaske

Mindfulness and Attentional Control in Male Inmates

Approximately 62.4% to 100% of male inmates report incidents of Adverse Childhood Experiences (ACEs) (Gibson, Holt, Fondacaro, Tang, Powell, & Turbitt, 1999; Saxon, Davis, Sloan, McKnight, McFall, & Kivlahan, 2001; Wolff, Huening, Shi, & Frueh, 2014; Scott, 2009; Wolff, Shi, Blitz, & Siegel, 2007), which are defined as are stressful or traumatic events, including abuse and neglect (Felitti et al., 1998). ACEs has been implicated in impaired ability to sustain and focus attention (Jenkins, Langlais, Delis & Cohen, 2000), and in turn, those who exhibit deficits in attention and executive functioning are more likely to engage in antisocial and criminal behavior (Ogilvie, Stewart, Chan, & Shum, 2011). One way to improve one's attention and increase executive function capabilities is through mindfulness based interventions such as yoga (Chambers, Lo, & Allen, 2008; Moore, Gruber, Derose, & Malinowski, 2012; Moore, & Malinowski, 2009; Tang et al., 2007). While the extant literature documents the utility of mindfulness-based interventions in improving the ability to sustain attention, it is unclear whether: (1) these associations generalize to incarcerated adults, and (2) yoga will improve attention and executive functioning more for those with a history of ACEs. Thus, the present study aimed to explore the effects of a yoga program on improving attentional control among an adult sample of male inmates with and without a history of ACEs who were enrolled in yoga classes at the Buncombe County Detention Center. Inmates completed a series of tasks including an interview, followed by listening to a meditational song. Then, heart rate measurements were taken both before and immediately after the completion of the D2 attention task. Preliminary findings suggest that the yoga program improves attentional control for a subset of inmates. Implications and limitations will be discussed.

Andrew Olah, Hannah Buie, Stephanie Mason, Riley McCallus
Graduate Program: Psychology M.A.
Sponsor: Thomas Ford

Social Consequences of Political Humor

In 2017, *The Late Show with Stephen Colbert* show reportedly had an average viewership of 3.29 million people. Stephen Colbert is widely known for his biting political satire. For instance, Colbert incited uproarious laughter from a live studio audience and certainly millions watching at home when he quipped "Sir [President Trump], you attract more skinheads than free Rogaine. You have more people marching against you than cancer" (The Late Show with Stephen Colbert/CBS Television Studios: https://usat.ly/2p9Dvcs).
What are the social consequences of such politically-charged humor? Does it have a divisive and polarizing impact? Does it build solidarity amongst those who share Colbert's views? We conducted this study to address these questions.
According to Zillmann and Cantor's (1976/1996) Disposition Theory, people appreciate disparagement humor more when it targets a group they dislike than when it targets a group they like. Our research extends disposition theory by examining the *consequences* of out-group and in-group disparaging humor on people's perceptions of the in-group *and* contrasting out-group. We hypothesize that:
1. People will more strongly affiliate with their in-group upon exposure to out-group disparaging humor compared to neutral or in-group disparaging humor.
2. People will dislike a contrasting out-group more upon exposure to in-group disparaging humor.
3. People will perceive the contrasting members out-group as having less legitimacy upon exposure to out-group disparaging humor.
Participants first completed a measure of political ideology (indicating where people are on the political continuum from liberal to conservative). Next, participants watched one of three videos: a video that features a comedian mocking liberals, a video that features a comedian mocking conservatives, or a video that features a non-political, non-mocking comedy routine (control condition). Then, participants reported the degree to which they affiliate with their in-group (conservatives or liberals), as well as their attitude toward the contrasting political out-group. Results are discussed.

Jacob Warzawski
Graduate Program: Psychology M.A.
Sponsor: David McCord

Who is really psychotic? Prevalence of psychotic symptoms among DSM diagnoses

This study built upon previous research examining the prevalence of psychotic symptomology among non-psychotic disorders. A large archival sample from a Veterans Administration sample was used for data collection and both primary, secondary, and tertiary DSM-IV-TR diagnoses were used for analysis. Psychotic symptoms were assessed using clinician observation as well with the Minnesota Multiphasic Personality Inventory – 2 – Restructured Form (MMPI-2-RF). Preliminary results suggest psychotic symptoms are more prevalent among non-psychotic disorders than psychotic disorders, particularly with internalizing disorders. Psychotic disorders, which have been categorized under Thought Dysfunction in contemporary models of psychopathology, appear to be laden with affective, somatic, behavioral, and interpersonal components even more so than with psychotic symptoms.

11:00 – 12:00
UC 226 – Raleigh Room

Molly Bowman
Graduate Program: English M.A.
Sponsor: Annette Debo, Brent Kinser

"White Feminism": Rhetorical Humor in Jane Welsh Carlyle's Writings

Jane Welsh Carlyle is, arguably, the best letter writer of the nineteenth century. Welsh Carlyle lived and died before the word "feminist" was brought into English language under its current meaning of being pro-woman's rights and equality. This does not mean that Welsh Carlyle was anti-women's rights, but rather that Welsh Carlyle operated outside of any formal grouping of women. Critics describe Jane's "wit" and her "humor" in any article she is mentioned in, however that is all the description Welsh Carlyle's humor tends to ascertain. Jane Welsh Carlyle was funny and witty out of necessity; she was as intelligent, if not more, than the men around her, and humor was an affective way to get a point across to a reader or listener. Since women in the twenty-first century often use similar methods of humor, be it wit or sarcasm, these jokes still resonate today. This makes it tempting for a modern reader to read Welsh Carlyle's letters through the lens of modern day feminist theory, something that Jane Welsh Carlyle anticipates. This is by no means fair to Jane Welsh Carlyle, or the other women of the time whom began to find that the cloak of a Victorian Housewife was no longer large enough to fit their lifestyle. Furthermore, the latest technology of the day only connected so many people to one another, unlike the Internet. The issues of unfairness towards great women of the past is important to recognize because it can change not only how we see these women as a whole, but the literary cannon that the field of literature reads in modernity. To more clearly see the work of Jane Welsh Carlyle teaches scholars the importance of her humor and intellect in ways that supersede the idea of Welsh Carlyle as a Victorian Housewife.

Cyrstal Ellwood
Graduate Program: English M.A.
Sponsor: Annette Debo

This nor That: Jamaica Kincaid's "Girl" and the Postcolonial Double Bind

From the 1500s through the 1800s, the Caribbean was colonized many times over by various cultures. In the 1500s, the Spanish Empire controlled the native land. In the 1600s, British, French, and Dutch forces intruded upon the space. Through the 1800s, wars were fought between the natives and invaders for control of the land. Slavery, concentration camps, and mass casualties plagued the Caribbean until the 1900s when territories began gaining independence.

Jamaica Kincaid, from Antigua, explores the dynamic of a nation dealing with newly found independence in the aftermath of colonial rule in her short story "Girl," published in 1978. "Girl" demonstrates the psychological damage caused by the double bind of colonization. The girl lives in a state of neither this nor that, resulting in never being able to be "correct" as a human. There is no correct way to be a hybrid, resulting in an everlasting internal struggle for the colonized. The double bind creates an erasure of culture that leaves the girl in an intensely unescapable liminal space. The psychological position that the double bind imposes is one of dominance. The colonizer must feel power over the colonized. Seeing the imposition of the double bind gives the colonizer a metaphysical domination over the colonized.

Double colonization adds an additional level of struggle for the girl in the story. The girl must perform gender and sexuality in a way that pleases both sets of colonizers. Women must perform gender and sexuality as seen fit by the colonizers, both the empire and the patriarchy. The performance of gender is like the double bind. The girl is a hybrid that can never achieve the "correct" way to be a woman in a patriarchal society. Kincaid's "Girl" illustrates the cognitive deterioration caused by the double bind of colonization as well as double colonization.

Tracey Gruver
Graduate Program: English M.A.
Sponsor: Mary Adams

Ophelia: The Rest is Silence

Many scholars have discussed the way that Shakespeare's character, Ophelia, speaks in the play *Hamlet*. Denis Donoghue writes about Ophelia's speech in Act 3, Scene 1 in terms of its "expressive limitations" in his 2006 article "The Not-Quite Said." What has not been discussed so far about Ophelia is her lack of vocalization in the play.
With my research, I will build on the idea that Ophelia's will is not her own and that she is treated as a pawn by the men in the play, but I will argue that even the words said by Ophelia in the play are not her own. Using research from Bruce Smith's *The Acoustic World of Early Modern England,* I will incorporate acoustic and sound theories in my study of the words spoken by Ophelia in the play. I will show how Ophelia becomes rather like a ventriloquist dummy, inhabited by several male characters throughout the play. Her own voice is silenced and replaced by the voices of men and this appropriation of Ophelia's voice and her inability to speak and be heard leads directly to her mental instability and eventual suicide. It is my view that Shakespeare uses the character Ophelia as a way to comment on male patriarchy and its impact on women's voices.

Hope Quinn
Graduate Program: English M.A.
Sponsor: Mae Claxton

A Woman Trapped: 19th Century Class, Gender, and Family Pride

I will illuminate the confining spheres placed on the nineteenth century woman by examining Nathaniel Hawthorne's Hepzibah in *House of the Seven Gables.* By using Margaret Fuller's essay, "Woman in the Nineteenth Century," and Thoreau's essay, "Walking," as foundational texts, I will examine Hepzibah as a woman trapped by her gender, her class, and her unfailing family pride. I will also examine the effects of such entrapment on her mental well-being and whether Hepzibah has truly escaped her "sphere" by the ending of the novel.

By closely examining Pyncheon family history, Hepzibah's tumultuous relationship and running of her shop, and, finally, her "great escape" from the House of the Seven Gables with her brother, Clifford, I will attempt to champion Fuller's call for self-reliance in the nineteenth century woman. I will also attempt to measure Hepzibah's "freedom" as Thoreau defines it in "Walking" to further define Hepzibah and, consequently, *woman*, as trapped. As a counter image to Hepzibah and, for the scope of this conference-length paper, I will briefly compare Hepzibah to her cousin, Phoebe, and what accounts for those differences as they relate to their class and shared family history. I hope to illustrate how Hepzibah's class, gender, and family pride keeps her entangled in a vicious cycle of self-deprecation, dependence, and mental instability with little hope of true reform.

As I later plan to examine other nineteenth century female characters with differing classes and cross-examine them with Hawthorne's Hepzibah, for the scope of this paper, I hope to exemplify the effects of class and gender on at least two nineteenth century female characters. I believe that a close examination of these effects will garner enthusiasm and keep up the battle-cry for all women, not only to be granted, but to *demand* the "armor and the javelin".

1:00 – 2:00
UC 212 – Dogwood Room

Kristin Morris
Undergraduate Degree: Biology

Hannah Buie, Brooke Myall
Graduate Program: Psychology M.A.
Sponsor: Thomas Ford

Social Perceptions

Previous research by Ford et al. (2014) shows that sexist humor diminishes women, particularly in the eyes of men high in **hostile sexism**—antagonism toward women (Glick & Fiske, 1996). This study extends this line of research by more fully investigating the ways women are diminished by sexist humor.

According to the stereotype content model (Fiske, Cuddy, Glick, & Xu, 2002), people categorize social groups according to two dimensions: competence and warmth. **Competence** is based on perceptions of confidence, independence, intelligence, and capability; **warmth** is based on perceptions of friendliness, likability and compassion. Because sexist humor plays on negative stereotypes of women's general intelligence, and capabilities in various domains (relative to men's) we propose that it diminishes people's perceptions of women's **competence**. Women's likeability should not suffer the same negative effects because messages associated with sexist humor do not generally undermine warmth. Thus, we propose that to the extent that men are higher in hostile sexism they will perceive women as less competent (but not less likeable) after exposure to sexist humor.

Stereotyping literature reveals that such expectancies can bias memory in favor of confirming instances (Howard & Rothbart, 1980; Rothbart, Evans & Fulero, 1979). Thus, if sexist humor diminishes men's perceived competence of women, and activates a negative expectation about women's competence among men high in hostile sexism, it follows that those same men would report better memory for behaviors that confirm their expectations. Accordingly, our experiment tested the following hypothesis:

Insofar as men are high in hostile sexism, they will exhibit better memory for women's behaviors that communicate intellectual incompetence (but not unfriendliness) after exposure to sexist versus neutral humor.

Our results provide an important contribution to the existing knowledge base of sexist humor and the relationship between disparagement humor and memory of behaviors and traits.

Justin Nahkle, Jess Whiteman
Graduate Program: Higher Education Student Affairs
Sponsor: April Perry, Ellen Sigler

Targeted intervention for struggling college students

Research on student academic success has often focused on study strategies (Biggs, Kember & Leung, 2001; Kember, Biggs, & Leung, 2004). Perez, Cromley, & Kaplan (2014) indicate motivation is also a key to academic accomplishment. As motives are the affective aspects of studying and strategies are the actual skills applied to those tasks, both are essential to academic success. The Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) was a survey created to evaluate both the study strategies and motives of students (Biggs, Kember & Leung, 2001). Additionally, the R-SPQ-2F determines whether these motives and strategies reflect positive learning behaviors (deep) or ones that are less conducive to success (surface). This was used to evaluate individual characteristics. For example, a student with deep motives but surface strategies may care deeply about academics but employ poor strategies when studying. In contrast, a student with deep strategies but surface motives reflect knowledge of strategies but is not motivated in the academic environment (Hulleman, Godes, Hendricks, & Harackiewicz, 2010). The two examples demonstrate students should be advised differently based on individual needs. This study assesses the effects of a one-on-one intervention with students who have previously been dismissed from the university. Often, students in this situation are administered a one-size-fits-all model of academic advising. This study demonstrated a move from the current advising technique to a more individualized intervention. Thus, hypothesized an increase in students' chance to succeed academically. The final results exhibited 100% participants indicating an increase in motivation, and 88% increase in knowledge of study strategies. Due to the small sample size, there was no statistical significance. However, there is a positive trend among those who received the one-on-one intervention based on the student's individual academic needs.

Rebecca Ensley, Christopher English
Graduate Program: Educational Leadership Ed.D.
Sponsor: Robert Crow

Fostering Powerful Partnerships: Getting to the Core of Collaboration Between Educational Counterparts

The current relationship between early college high school and community college faculty reflects a lack of communication and collaboration in common content areas. In this disquisition, we examined the partnership of public high school and community college faculty, and how increasing opportunities for collegial feedback and focused collaborative practices positively impacted instruction and weekly classroom tasks. Through organized communities of practice within common instructional content areas, early college high school and community college faculty focused on increased opportunities to meet face-to-face and virtually, to share best practices in the classroom. These designated meetings spaces allowed instructors the opportunity to discuss classroom experiences and gain knowledge that shaped classroom instruction. Through the use of improvement science methods, one team of Humanities faculty from early college high school and community college, and one team of STEM faculty from early college high school and community college underwent a series of evaluations through the use of a Plan, Do, Study, Act cycle to determine if the methods researched held true that a collaborative partnership would increase communication between the two entities.

1:00 – 2:00
UC 232 – Multipurpose Room

Andrew Robinette
Graduate Program: English M.A.
Sponsor: Mary Adams

Memory In Memoriam: Paranoia and Forgetfulness in Shakespeare's Hamlet

In the past, Shakespeare scholars have had a lot to say regarding the role of memory and forgetfulness in Shakespeare's play *Hamlet*. Michael Cameron Andrews' ""Remember Me": Memory and Action in Hamlet" discusses how Hamlet's paranoia causes Hamlet's memory to become spotty (he recognizes the Ghost that represents his father, but is forgetful about Polonius). Stephen Greenblatt's book *Hamlet in Purgatory* analyzes the role of spirituality in Hamlet's identification of the Ghost, as well as Hamlet's attempt to remember teachings of a religion (Catholicism) which he has been trained to forget.

In my essay, I will take this research a step further by analyzing Hamlet's interactions with the Ghost character, focusing on how the cross-section of memory and religion leads Hamlet to be susceptible to triggers of place. I will show how paranoia causes Hamlet to become open to triggered manipulation, by looking at the place-related details which Hamlet recalls in his judgment of the Ghost's legitimacy. I will also connect Hamlet's paranoiac identification of the Ghost as Father with contemporary research on how Place-related triggers can affect the mind, leading to crippling paranoia and a replacement of accurate memory with inaccurate details.

The most tragic element of *Hamlet* is perhaps not Hamlet's paranoia and rash actions, but rather the adverse effects which befall Hamlet's memory and perception as a result of fear and vulnerability. I aim to show that Hamlet's struggles are representative of psychological trauma, which is a very relevant topic for this generation.

Jessica Masters
Graduate Program: English M.A.
Sponsor: Mae Claxton

Capturing the 19th Century Through the Lens of Nathaniel Hawthorne

In 1841 Melville wrote a letter to Nathaniel Hawthorne praising his novel *The House of the Seven Gables* for his concern with modernity ("Letter to Nathaniel Hawthorne, April 1851"). Modernity, in Hawthorne's case, refers to the new inventions of his century. Melville further praises Hawthorne for presenting a "visable truth" in his novel. The United States saw rapid change in the nineteenth century. The advancement of technology was rampant, changing the perceptions that society had of middle class mores and status. The invention of photography in the early nineteenth century, in particular, the invention of the daguerreotype, helped to change this perception. The daguerreotype made portraits more affordable for the common man so that they could have a photograph to send to friends and loved ones. No longer were portraits only for the elite.

Literature is often a commentary on societal mores. I argue Nathaniel Hawthorne is commenting on nineteenth century societal mores in his novel *The House of the Seven Gables*. In his novel, Hawthorne has a character named Holgrave who is a daguerreotypist by trade, after having multiple jobs, and rents a room from the protagonist. At the end of the novel, readers discover that Holgrave is connected to the family curse. I want to explore how Hawthorne examines his changing, "modern" society with this new technology in his novel. I question what Hawthorne may be suggesting by having his character Holgrave be a daguerreotypist in the 1850s when this type of photography was transitioning to a more proficient form of photography and what this might say about society. What is the visable truth for which Melville praises him?

Diana New (Evolutional)
Graduate Program: English M.A.
Sponsor: Brett Kinser, Annette Debo

Evolutional Theory that Transcends Science: The Evolutional Theory of T.H. Huxley and its Presence of Thomas Carlyle

While Charles Darwin's theory of evolution continued to receive backlash from religious opponents upon its introduction, his advocate, T.H. Huxley offered philosophical interpretations of evolutionary theory that created a link between tradition and science. Huxley's "Evolution and Ethics" (1893) draws on a number of transcendental ideas that can be found in Thomas Carlyle's *Sartor Resartus* (1833-34), itself a source for transcendental writers. Critic Joseph Beach, for example, notes that transcendentalism provides a necessary step in the transition from a belief in religion to a belief in scientific reasoning.

While Beach and other scholars have explored science's significance on Transcendental thought, there has been little exploration in Transcendentalism's significance on science. James Paradis recognizes a connection between Huxley and Carlyle, Huxley's science sought to penetrate the secrets of nature, much like Carlyle's metaphysics.

If, as Beach indicates, supernaturalism and naturalism are connected in intrinsic ways, it is through Carlyle and his notion of natural and supernaturalism that Huxley is able to combine the world as he views it, through a Darwinian lens, and the world as he wishes it to be from a spiritual perspective. As Beach has suggested, transcendentalism acted as a cover for studies in naturalism allowing scientific theorists to make great advances, but transcendentalism may also be seen as a foundation for the theories presented by Darwin's Bulldog. My aim is to identify philosophical ideas in Carlyle's *Sartor Resartus,* most particularly in his Philosophy of Clothing, that laid the foundations for Transcendentalism and took part in the construction of Huxley's "Evolution and Ethics." Huxley's ability to transcend the cosmic nature of the scientist and clothe himself in philosophy pointed at in *Sartor Resartus* allowed him the opportunity to build into Darwin's theory of Evolution and furnish a means for society's progression through his emphasis on morality.

Jarred Worley
Graduate Program: English M.A.
Sponsor: Annette Debo

The Fruit of Fulfillment: Imagination, Inner Being, and Journeys Between the Binary in Jeanette Winterson's Sexing the Cherry

There is little literature clean and free of binaries, productive opposites that generate wellsprings of meaning. Binaries are and produce sites of oppression, criticism, and resistance, useful in their fundamental position in human language and for how slippery they can become. Jeanette Winterson's *Sexing the Cherry* overflows with such binaries, exploring the inner folds and facets of identity, the search for identity, and the fluid, unfixable qualities of identity. These she uses in criticizing the male/female divide, the comfortable location between self/Other, and the limiting patriarchal institutions prominent in the West. All this she accomplishes while spinning a violent fairy tale that transfigures time, space, place, and sense into a multi-dimensional matrix of experience.

In this paper, I explore a handful of the binaries Winterson uses, including Home/Other, Cities/Journeying, Linear Experience/Multiply Experiential, and Freshness and Fruit/Disease and Decay. I argue that Winterson, through these binaries and others, depicts the analogical relationships of static, hypocritical identities to spiritual (and often literal) death and fluid, self-reflexive identities to life, or, the possibility of fulfillment. I also examine how these binaries play out in stark male/female, heterosexual/homosexual contexts and how Winterson positions these sites of conflict so as to critique patriarchal institutions (the government, the military, marriage, and religion) often used to structure and control social and personal identities and relationships. In so doing, I argue that for Winterson the most valid site of individual identity remains in and arises from the individual and that, whatever influences from outside bodies occur, the core of identity is formed by and through the decisions and concessions made by the individual,

2:00 – 4:45
UC 232 – Multipurpose Room

Marija Zaruba
Graduate Program: Physical Therapy D.P.T.
Sponsor:

Marisa White, Brian Allen, Kaitlyn Dale, Helen Kirk, Whitney Ward, and Elizabeth Webber
Graduate Program: Physical Therapy D.P.T.
Sponsor: Jessica Graning, Todd Watson

Implementation of a core stabilization training program for prevention of lower extremity injury in collegiate dancers.

Background:
Dancers have a high prevalence of chronic lower extremity injury, often attributed to overuse and repetitive nature of the sport. Theories surrounding dance injury suggest a link between core muscle performance and lower extremity injury. We examined the effects of a core stabilization program on injury rates of a collegiate dance team over the course of a fall dance season.
Hypothesis:
The implementation of a 10-week core stabilization training program for a collegiate women's dance team would decrease dance related injuries.
Design:
Within-subject repeated measures
Methods:
A convenience sample of 13 female collegiate dance team members (age = 19.15 + 1.068 years, height = 64.31 + 4.68 in, weight 123.85 + 19.61 lbs, BMI = 21.80 + 3.77) participated. Abdominal fatigue, back fatigue, single leg hop, side-plank, SEBT, heel-raise to fatigue, and hip abduction strength measures were tested pre and post intervention. In addition to routine dance practice, dancers performed a supervised core training program 3x/week for 10 weeks. Throughout the season, participants completed an online questionnaire (nature, mechanism and body part location) within 24 hours after sustaining a dance-related injury. Total injuries and practice and performance hours were compiled. Alpha was set at 0.05 for all analysis.
Results:
By the end of the third quartile, 4,600 hrs of dance participation equated to 5 injuries (1.09/1000 hours). Paired t-test revealed improvements (<0.04) in all measures except SEBT left anterior direction (0.215) and back fatigue scores (0.221).
Conclusion:
After the core stabilization program, improvements were found in all measures, except SEBT left anterior and back fatigue. Additionally, the injury rate was found to be

1.09/1,000 dance hours. Overall increased stability in core musculature may help prevent lower extremity injuries in collegiate dance team populations.

Alexa Eure, Michael Moore
Graduate Program: Physical Therapy D.P.T.
Sponsor: David Hudson

The effects of strength and endurance on gait stability

Purpose: To determine the effects of anatomical differences, core strength, and cardiovascular strength and endurance on gait.
Materials and Methods: This is an ongoing project where eight to twelve participants will participate in core fatigue exercises, and inclined treadmill ambulation with a 25% of the subject's body weight backpack until a 19 out of 20 on Borg Scale of Perceived Exertion is reached. The participants' temporal-spatial gait descriptors are determined using the GAITRite system at baseline, post-core fatigue, and post-inclined treadmill ambulation. Each time the participants ambulate on the GAITRite, they ambulate with and without the backpack. Data to be collected on the gait trials include velocity, cadence, bilateral step length, bilateral stride length, bilateral stance time, and bilateral support base. Once all data is collected, paired t-tests will be used to compare the difference between walking with and without a pack for each treatment condition (baseline, post core fatigue, post treadmill). One way ANOVA with repeated measures will compare across activity conditions (baseline, post treadmill, post core fatigue)
Results: Pilot data has found significant differences for a variety of gait characteristics across all conditions. Post-treadmill with pack versus post treadmill without a pack found significant differences between left step length (0.030), left stride length (0.037), and right stride length. One way repeated measure testing found significant differences between the baseline, post treadmill, and post core fatigue conditions for velocity (0.035), step length (0.032), and stride length (0.044).
Conclusion: Pilot data is has found significant effects of fatiguing exercises and wearing a pack. The results of this study will be important for populations that carry heavy backpacks under fatigued conditions such as the military.

Cameron Overstreet, Ryan DeBerry, Audrey Jordan, Carly Pippin, Victoria Shelton, David Stroup
Graduate Program: Physical Therapy D.P.T.
Sponsor: Lori Schrodt

Feasibilty and Effectiveness of a Modified Otago Program for Community-Dwelling Older Adults

Purpose: Evidence-based programs (EBP) are a common effective, efficient way to reduce falls in older adults. The Otago Exercise Program (Otago) is an EBP originally designed for individualized, home-based improvements in strength and balance. Much is unknown about benefits of Otago alternative delivery-models. The aim of this study was to determine the success and feasibility of a community-based group exercise Otago program.
Methods: A modified Otago Program was offered once weekly for 8-weeks at the Jackson County Senior Center. Participants were instructed in a core set of standardized Otago exercises and provided with a progressive home exercise program. Participants were asked to attend the program a minimum of 4 times. At return sessions, new exercises (Otago-based and non-Otago) were performed. Standardized measures assessed balance, strength, and mobility (Timed Up and Go, 30 Second Chair Rise, and 4-Stage Balance Test). Participant compliance was assessed via weekly log sheets and program attendance.
Results: Ten participants enrolled and 4 completed at least 4 sessions (mean age 73.5 years, 4 females). Participants reported 4-8 co-morbidities, 2 used assistive devices for walking, and 1 participant reported a fall in the past year. Only 1 participant reported regularly exercising. No improvements were noted in balance, strength, and mobility. Two participants scored at or near maximum for their age and gender on one or more of the measures. Six participants who attended at least 2 sessions reported an increase in balance and strength, and 5 reported feeling safer and more confident with mobility.
Conclusion: Participation in a community-based modified Otago program was feasible and well-received by community-dwelling older adults. No improvements were demonstrated through the standard Otago outcome measures, though participants reported improvements with balance and confidence for mobility. Future research should explore use of more challenging outcome measures to adequately assess possible program benefits.

Natalie Tresslar, Emily Wilson, Hannah Pollard, Evan Kirkland, Heather Puchel, and Whittney Correll
Graduate Program: Physical Therapy D.P.T.
Sponsor: Ashley Hyatt, Sue McPherson

Seated Trunk Control Training in Adults Post Acute Stroke: Do Focus of Attention Strategies Impact Lateral Excursion Performance and Learning?

Purpose
This study examined seated balance training in an acute stroke population using a motor learning paradigm. Training included video demonstration and verbal instruction and feedback under external focus (EF) or internal focus (IF) of attention instructions.
Subjects
Patients (N=16) (M age = 61.25±15.26; M months post stroke = 1.05±0.80; M FIST score = 51.88±4.18) were randomly assigned to EF or IF groups. Exclusion criteria was severe hemineglect (<44/54 on star cancellation test) and inability to follow multi-step commands.
Methods
Patients performed seated lateral weight shifts during baseline, acquisition, short term (5 min later), and long-term retention (5-7 days later) trials. 3 trials were performed in each direction with the exception of acquisition in which 6 trial were performed in each direction. Lateral excursion was captured via a pressure mat. After baseline trials, a video of a physical therapist demonstrating proper lateral weight shifting technique was viewed. During acquisition, IF participants were asked to shift body weight as much as possible towards the right or left hip without using arms, while those in the EF group were asked to lean their shoulder as close as possible to a target placed laterally. Feedback was only during acquisition.
Results
Patient's characteristics showed no significant differences per group. Separate 2 (IF/EF) x 4 (phases) ANOVAs will be conducted on mean lateral excursion scores per side (affected/unaffected).
Conclusion
Determining the best way to instruct patients post stroke will guide physical therapists on the most appropriate cues and feedback to provide, which may have a significant effect on patient's prognosis. Findings will be examined in lieu of current practice in stroke rehabilitation regarding seated balance training.

3:45 – 4:45
UC 212 – Dogwood Room

Katie Spaulding
Undergraduate Degree: Biology

Ethan Fite:
Graduate Program: Biology M.S.
Sponsor: Thomas Martin

Population Assessment of Redhorse (Moxostoma Spp.) in the Upper Oconaluftee River, Qualla Boundary, NC

The Oconaluftee River is a moderate to large sized stream located in the Little Tennessee River basin of the southern Appalachian Mountains. Three species of Redhorse, Black (*M. duquesnii*), Golden (*M. erythrurum*), and Sicklefin (*M. sp.*), are thought to have historically occurred in the Oconaluftee River above Bryson Dam. Despite propagation efforts of the extirpated Sicklefin Redhorse population, there has been no sign of success. Understanding of rare species such as the Sicklefin Redhorse have been a priority for researchers, however, little research has been focused on other Redhorse species in the southern Appalachian Mountain region. Fyke netting, mark-recapture electrofishing, and larval sampling surveys were conducted from April to September 2018 to assess population abundance, demographics, and reproduction. Over the sampling period, 624 Black Redhorse aged 1-12 and 138 Golden Redhorse aged 1-10 were captured. No Sicklefin Redhorse were captured. Population abundance for Black Redhorse was estimated at n=2101 (Schumacher-Eschmeyer) or n =1357 (Cormack-Jolly-Seber) and Golden Redhorse was estimated at n = 1084 (Schumacher-Eschmeyer) and too few recaptures occurred to estimate using Cormack-Jolly-Seber model. Two distinctive size classes were found for both species of Redhorse, which were grouped largely by age. Using simple life table modeling, the Black Redhorse population was estimated to be slightly increasing. Larval catostomids were captured throughout the system with the majority (>70%) being identified as *Moxostoma*. Use of a fyke net was deemed not feasible for sampling a system this large due to high flows and mammal predation. This assessment shows evidence that there are reproducing Redhorse populations throughout the entire upper Oconaluftee system. Sampling in areas closer to the headwaters of the Oconaluftee River over multiple years may provide further evidence of the upstream extremes for Redhorse spawning and provide information needed to analyze population sensitivity.

Mary Jessamine Michaels
Graduate Program: Biology M.S.
Sponsor: Kelly Grisedale, Brittania Blintz

Identification of body fluids by mRNA analysis with MinION nanopore sequencing

The identification of body fluids present on evidence items in a criminal investigation can be vital to understanding the nature of a crime, particularly in cases of sexual assault. Although crime labs can confirm the presence of body fluids like semen and blood on a piece of evidence using traditional techniques, they cannot confirm the presence of saliva or vaginal fluid or differentiate peripheral blood from menstrual blood. Due to the unique patterns of gene expression in different cell types, different body fluids contain distinct messenger RNA (mRNA) molecules, which can be analyzed through sequencing to generate mRNA profiles for confirmatory identification of body fluids. The MinION by Oxford Nanopore Technologies (ONT) is a portable and relatively inexpensive sequencer in comparison to other next-generation sequencers. However, its ability to generate high quality sequence data from forensic type samples, which often do not contain much biological material, is not fully known. In this study, a sequencing workflow compatible with ONT's MinION was developed and examined for its reliability. DNA and RNA were co-extracted from semen, saliva, blood, menstrual blood, and vaginal fluid from 8 donors each. Dilutions of semen, saliva, and blood, as well as mixtures of semen and vaginal fluid, were also examined. A multiplex PCR targeting two genes for each body fluid along with two housekeeping genes as endogenous controls was developed. This analysis method appears specific enough to identify body fluids without occurrence of false positives or cross reactivity between body fluid targets, while also allowing for the generation of DNA profiles from the same sample, even in tenfold dilutions and mixtures. Body fluid markers amplified in this study will be subjected to sequencing by ONT's MinION and its ability to generate high quality sequence data from forensic samples will be examined.

Kenley Pantanella
Graduate Program: Biology M.S.
Sponsor: Jeremy Hyman

Feathers as an Indicator of Quality in Urban versus Rural Eastern Bluebirds

Urban and rural populations of songbirds face different challenges in their habitats, including changes in predator types and food availability, disturbances, and environmental cues. These differences could affect the birds' lifestyle, including the speed and quality of feather production. Feathers are an integral characteristic of bird anatomy and aid in functions such as flight, insulation, and display. Using Eastern bluebird feathers collected from 4 sites (2 urban and 2 rural), I measured the microstructure (barbule density), growth rate (via dark and light bands across a feather called growth bars), and weight of tail feathers to determine the quality and body condition of the birds. There was also data on the individuals' body weight and wing, tail, and tarsus lengths that I used for further comparisons. I found a significant difference in the barbule density of feathers and body weight across the four locations; however, the two urban sites had the best and worst conditions for these measurements. This suggests that urbanization could result in more inconsistent, variable habitat qualities. I also found a difference in wing length with urban birds, and more specifically urban females, having longer wings to their rural counterparts. In looking at differences between sexes, I found that males' feathers weighed more. In no comparisons were there significant differences in the other measurements, such as growth rate or tarsus length. My research demonstrates that the study of urbanization is a complex matter, and that despite most people's initial assumptions, urban habitats are not necessarily worse; given the right circumstances, some can even be better than the rural ones.

3:45 – 4:45
UC 214 – Cardinal Room

William Benson
Undergraduate Degree: Engineering

Andrew Fowler
Graduate Program: Technology M.S.
Sponsor: Sudhir Kaul, Bora Karayaka, Wes Stone

Slider Crank Mechanism for Wave Energy Conversion (WEC): An Experimental Study

As more and more sources of renewable energy are being actively explored, there is a need for finding efficient means of converting energy into usable forms. Wave energy is one significant source of renewable energy that harnesses the movement of ocean waves to create energy. One of the possible means of tapping wave energy is the conversion of wave motion into rotational motion by using a wave energy conversion (WEC) mechanism called as the slider-crank. Currently, there are numerous methods that are being used to convert wave energy into electrical power. A slider-crank power take-off (PTO) system is one such method that uses a large buoy to drive a piston that is connected to the crank shaft through a connecting rod. This study will focus on testing a slider-crank mechanism in conjunction with a flywheel and a gearbox, using a buoy in a wave generation tank as the driving mechanism. The research questions that this study aims to answer are as follows: Can the slider-crank mechanism be successfully used for wave energy conversion and does the mechanism show results that are comparable to the simulations? What is the appropriate size of various components that is suitable to the wave table and at the same time maximizes the energy conversion? What type of gearbox should be used to maximize the efficiency of this system? The main goal of this study is to answer the research questions through the design and testing of the slider-crank mechanism by using a wave table as the source of excitation.

Jairo Nevarez
Graduate Program: Technology M.S.
Sponsor: Bora Karayaka, Martin Tanaka, Peter Tay

Linear Thermal Power Controller Design and Implementation for Efficient Electric Heating

A prototype enclosure that is built for space heating was equipped with a resistive heater element and two temperature sensors. During a one-hour temperature regulation experiment, a Bang-Bang controller like those commonly used for residential heating control was used and the results were compared to a novel linear controller developed for the same purpose. The variables of comparison include temperatures and electrical power data. The study focuses on the linearization of the control system using a power electronics converter. The input of the converter must have linear relationship with the output power provided to the thermal system. Linearization was achieved by identifying a mathematical relationship that eliminates quadratic power function as well as converter's nonlinearity. This relationship was further implemented in the microcontroller. A second order linear mathematical model was later developed to identify and estimate the thermal circuit parameters utilizing a one-hour test facilitated through this new controller. Comparative results between simulation and experimental work validated the linearity of power control. Temperature disparity and input power characteristics were also improved using this new converter for controlling the space heater. The system developed is an important step toward energy savings, temperature improvements and demand side management for reducing peak demand.

Trevor Parrish
Graduate Program: Technology M.S.
Sponsor: Weiguo Yang

Detecting Induced Surface Currents in Plasmon Excitation Fields

This thesis sought to help prove an existing theory in the field of surface plasmonics. In their paper "Surface Plasmon Excitation and Non-Zero Induced Surface Current Density," Dr. Weiguo Yang of Western Carolina University and Dr. Michael Fiddy of the University of North Carolina at Charlotte showed that, contrary to conventional understanding, there exists a non-zero electric current on the surface of a metal (or other media) while a plasmon charge-inducing electromagnetic field is present. This current is also not present when the field is removed, even though the plasmon wave is self-sustained. Following the publication of the work of Dr. Yang and Dr. Fiddy on the presence of these surface current densities in plasmon fields, an experiment will be conducted to detect and measure this current. These surface current densities have not yet been measured, as their existence has only been shown mathematically. If the current can be shown to exist, Dr. Yang and Dr. Fiddy's theory will be validated and will open the door to new areas of research in the existing field of Surface Plasmonics and in the general study of electromagnetic waves. This project consisted of the construction of an experiment setup to measure an induced surface current in the presence of a plasmon excitation field. The current-detecting apparatus was also explored as a possible new type of electronic sensor. This type of sensor could be applied to contemporary and developing solar energy technology as a way to optimize the angle and exposure of a solar panel. Other possible applications of this sensor were also explored.

3:45 – 4:45
UC 226 – Raleigh Room

Kristin Fulp
Graduate Program: English M.A.
Sponsor: Mary Adams

"With Flowers of Winter" : The Existence of Parallel Ecologies within Shakespeare's Winter's Tale and Hamlet

Tale and *Hamlet*

*"*Here's flowers for you;
Hot lavender, mints, savoury, marjoram;
The marigold, that goes to bed wi' the sun
And with him rises weeping: these are flowers
Of middle summer, and I think they are given
To men of middle age." – Shakespeare,Winter's Tale

While many scholars have written about William Shakespeare's use of "double-time," (that is, the existence of multiple time schemes in the same scenic space) the existence of parallel ecologies needs further exploration. Parallel ecologies is my term for contrasting landscapes that seem to co-exist—impossibly—in the space and to signify and co-exist with the characters who inhabit them. The sacrificial female characters of Ophelia in *Hamlet* and Perdita in *Winter's Tale* exist within verdant landscapes, while the male characters, in particular, dwell and perform in dark and hostile environments. The sacrificial nature of Ophelia and Perdita allow for these two characters to enter a detached existence inaccessible to other characters of the plays. What does it mean for Ophelia and Perdita to inhabit isolated areas, and how can the characters interact from inside these separate realities? I will suggest that for Ophelia and for Perdita, these flower-strewn landscapes inside the cold and relentless winters of Denmark and Bohemia reflect separate cognitive realities.

Diana New (Poor Player)
Graduate Program: English M.A.
Sponsor: Mary Adams

A Poor Player Upon the Stage of Fear: Terror Management Theory and its Ecogothic Shadow Over Macbeth's Life

Recent ecocritical studies have examined the connection between the natural and supernatural themes surrounding *Macbeth* and the corruption of the play's protagonist. As Macbeth allows himself to believe in prophesy, he transcends from belief in the natural world to belief in the supernatural; as a result, the natural world is thrown off balance and nature's destructive forces align with Macbeth's deviance. Critic Randal Martin infers Shakespeare was writing during a time when capitalism, globalized trade, and colonialism were beginning to extend ideals of conquering nature around the world and that Shakespeare was thinking ecologically in ways that reflect current perceptions of environmental challenges.

While Martin and other scholars have examined humanity's corruption in *Macbeth* through an ecocritical lens, there has been little exploration of how fear might add to an ecocritical connection of motivation and corruption within the play. Terror Management Theory proposes a psychological conflict that results from a basic self-preservation instinct. Arnaud Wiseman notes that reminders of mortality may increase an individual's willingness to engage in risky behaviors and increase self-esteem. Macbeth is surrounded by constant reminders of mortality—in nature, and in humanity—as he seeks the empowerment of the throne.

If, as Martin indicates, Shakespeare's plays reflect modern ecocriticism, it is reflected through gothic ecology, which suggests nature will reign over humanity if humans do not learn to live with it in harmony. As Macbeth becomes disconnected from nature, nature's violence echoes his own deviance and reminds Macbeth of life's impermanence. By examining *Macbeth* through ecogothic criticism and Terror Management Theory, I will explore the ways in which fear leads to Macbeth's corruption and demise.

Michael Redman
Graduate Program: English M.A.
Sponsor: Mary Adams

A Thing Most Brutish: A Study of Ariel, Caliban, and the Language of Slavery in William Shakespeare's The Tempest

Abhorred slave,Which any print of goodness wilt not take,Being capable of all ill. I pitied thee,Took pains to make thee speak, taught thee each hourOne thing or other: when thou didst not, savage,Know thine own meaning, but wouldst gabble likeA thing most brutish, I endowed thy purposesWith words that made them known." The Tempest (1.2.411-18)While many scholars have considered William Shakespeare's The Tempest in a postcolonial context, few have considered the role of the British and Barbary slave trades in the creation of the play. The generally accepted date of The Tempest's composition—from 1610 to 1611—falls directly between the end of the Barbary pirate slave trade in the late sixteenth century and the transatlantic British slave trade of the seventeenth century. Recent work by Marcus Hartner and others has offered new ways to read and consider the slave narratives from these periods. This presentation will draw on this work, along with primary documents, to look at the way slave narratives informed and influenced Shakespeare's language in the play. Since slavery has devastating power to efface and silence the human voice, special attention will be paid to the characters of Ariel and Caliban and how they perform and articulate their roles within the historical context of the British slave trade. The language used to portray Ariel and Caliban's social status as slaves will also be compared to language in slave narratives.

Yustin Riopko
Graduate Program: English M.A.
Sponsor: Mary Adams

Had she a tongue to speak: Disability in "Titus Andronicus"

"She hath no tongue to call, nor hands to wash;
And so let's leave her to her silent walks."
Titus Andronicus, 2.4.7-8

Recent disability studies have sparked discourse on Shakespeare's portrayal of what it means to be disenfranchised physically, cognitively, or socially, but few have focused on the mutilation of Lavinia in *Titus Andronicus*. Caroline Lamb has discussed the effects on Lavinia's social and political agency, as well as her ability to adapt to her injuries while she continues to exhibit influence; however, she has left the topic of Lavinia's psychological state more untouched. I will elaborate on the characters' emotional responses to the character's new deformation and her and others' ability to adapt emotionally. What impact do Lavinia's sustained injuries have on her disposition, and how do peripheral characters treat her differently as a result? Shakespeare's world mirrors modern culture again, and exemplifies one way real people still act today.

3:45 – 4:45
UC 315 – Theatre

Natalia Weindel
Undergraduate Degree: Chemistry

Bo Wiseman
Undergraduate Degree: Chemistry

Lindsey Farris
Undergraduate Degree: Biology

Austin Curto
Graduate Program:
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