



Britney Jo Carroll (MFA 2009) stands in front of her acrylic on wood panel creation. Since graduating from WCU, Britney has given solo and group exhibitions of her work around the Southeast. Her artwork explores gender roles and stereotypes, and her portfolio is available at britneyjocarroll.com.

Oral Presentation

ABSTRACTS

TWENTY-FIFTH ANNUAL
Graduate Student Research Symposium
March 30, 2017 | 9:30 a.m. – 6:30 p.m. | University Center

9:30 – 10:45am
UC 215 – Catamount Room

Kelsey Woodford

Graduate Program: Higher Education Student Affairs

Sponsor: April Perry, Carson Williams

The Game of Loans: Exploring the Effects of the Financial Aid System

This presentation aims to explore the history of the financial aid system, the varying effects it has had on students, as well as best practices and solutions moving forward. We aim to investigate the creation and development of the financial aid system. By understanding the history, we can further understand the present situation. We want to analyze the impact the current system has on varying types of students, such as minority, low-income, and middle-class. We will discuss the challenges students face when dealing with the financial aid system. Then, we will present research about recent college graduates struggles with their student loan debt, as well as their perceptions of their education and readiness for managing that debt after college. We will then discuss our best practices moving forward, such as financial literacy being incorporated into first-year seminars.

Jennifer Stewart, Kourtney Kirby, Brittany Cotton, Jill VanOrder

Graduate Program: Higher Education Student Affairs

Sponsor: April Perry

Transitioning From Congregate Reality to Collegiate Reality

In 2011, Unrau, Font, and Rawls reported: “over 423,000 children living in foster-care placements on any given day in the United States” (p. 76) with over 32,000 exiting the system annually. The authors also assert that “Approximately half of the youth between the ages of 18 and 24 who have aged out of foster care have high-school diplomas or general educational development (GED) diplomas in comparison to over 70% of non-foster youth” (Unrau, Font, & Rawls, 2011, p. 76). Salazar (2012) reports additional startling statistics including, “only about a third of foster care alumni attend college before the age of 25, and a fourth earn a certificate of degree by age 29, compared with over half of the general population” (p. 140). Salazar (2012) goes on to reveal that “only 3% to 11% graduate with a bachelor’s degree, compared with a fourth of the general population” (p. 140). With no family support to help navigate the transition from foster care and high school to college and independent living, these students are less likely to persist. It is imperative that student affairs practitioners are aware of the challenges this population of students face and are proactive about using proven best practices to engage and support unaccompanied youth in the university setting. This presentation seeks to provide student affairs professionals with a brief summary of the aforementioned challenges and best practices in a review of current literature, as well as a theoretical framework that will allow one to gain perspective on this particular population of college students. Finally, we will explore gaps in the literature and implications for future research.

Terry Chavis

Graduate Program: Higher Education Student Affairs

Sponsor: April Perry

What is your Position? A Study of the Intellectual Development of Minorities in STEM

This thesis research examines the intellectual development of Minority students in STEM majors using Perry's Intellectual and Ethical Development theory. The research uses a mixed method approach to analyze the difference of intellectual development in White students and Minority students. Researchers utilize theory (Chemers, Hu, & Garcia, 2001) or analyze the pre-college experiences and the environmental factors (Kao & Thompson, 2003) to study the success of minorities. These approaches cultivate research that focuses on psychological and physical barriers that minorities encounter before they enter higher education and as they begin their academic journey. The literature review explains that minority students have a higher likelihood to face more barriers than their white counterparts. These barriers include lack of mentorships, college preparation programs, self-efficacy, and the increased perception of imposter syndrome. However, the quantitative data express the exact opposite; minority students have surpassed their white classmates in rates intellectual development. When answering a question with a Duality/Multiplicity choices, White students: 30.71% chose the Duality, and 69.29% chose Multiplicity. When answering a question with the Multiplicity/Relativity choices: 35.90% chose Multiplicity, and 64.10% chose Relativity. This resulted in a likelihood to select choice of earlier development position: 29.02%-33.54%. And a likelihood to select choice of later development position: 66.47%-70.32%. When answering a question with a Duality/Multiplicity choice, Minority students: 33.07% chose Duality, and 66.93% chose Multiplicity. When answering a question with a Multiplicity/Relativity choice: 23.44% chose the Multiplicity, and 76.56% chose Relativity. Resulting in the likelihood to select choice of earlier development position: 25.02%-29.69%. And a likelihood to select choice of later development position: 70.31%-75.03%.

Rebecca Ensley

Graduate Program: Educational Leadership

Sponsor: Robert Crow

Developing Teacher-Leadership by Employing an Improvement Science Framework for Organizational Problem Solving

The origins of the role of school-level principal can be traced back to the days of the one-room schoolhouse, where an individual referred to as a 'principal teacher' held the position. Stakeholders worked alongside the teacher to make decisions that best served school and students. However, as America's schools evolved, leadership roles moved from the classroom environment to occupying office suites, often located away from the classroom. The geographic change of power locale spurred the development of a new type of leadership role having the potential to be fulfilled by classroom teachers. While those who work closest with students, America's classroom teachers, are essential in functioning as our new non-traditional leaders, they are largely ill-equipped with leadership-oriented strategies and tools from teacher preparation programs to improve organizations. This case study illustrates the type of professional scaffolding that allows for the development of evidence-based leadership practice as organizational improver by describing how the teacher-leader can instrumentally contribute to institutional quality. The narrative presents a school-wide improvement project, detailing ways

teacher-leaders learn to apply improvement science frameworks as tools of institutional improvement leadership. The case highlights the use of three approaches for describing a theory of improvement: the initial construction of a causal systems analysis, the articulation of driver diagrams for depicting change ideas, and implementing the Plan-Do-Study-Act cycle as a method to gauge improvement efforts. These exemplars allow for learning new ways to establish a culture of collaborative leadership concerned with providing evidence-based measures around a school's designated goals.

9:30 – 10:45 am
UC 212 – Dogwood Room

Matthew Stender

Program: Technology

Sponsor: Yanjun Yan

Simulating Micro-robots to Find a Point of Interest under Noise and with Limited Communication Using Particle Swarm Optimization

This research project is to optimize the behavior of a swarm of micro-robots that collaborate to find a point of interest in 2D space. Using a fitness function to evaluate the positioning, Particle Swarm Optimization (PSO) is an efficient way for multiple agents to explore the space. However, in a realistic scenario, there are practical physical constraints for micro-robots that differ from the abilities of the algorithm. Two of the most significant constraints are noise in communications and measurements, and limited communication ranges which make a global broadcasting scheme expensive. A neighborhood PSO (NPSO) algorithm has been proposed and tested to replace the global broadcasting scheme to work within the robot agent's communication range. Different applications call for different fitness functions. Three benchmark functions have been selected to represent three typical scenarios: a unimodal and symmetric scenario, a multi-modal and symmetric scenario, and a unimodal but asymmetric scenario. For each fitness function, mathematical simulations of the effects on the two previously mentioned constraints are carried out, both individually and combined. The results demonstrate that PSO is tolerant to noise up to a certain level and NPSO is a practical adaptation to implement swarm intelligence in swarm robotics. The agents chosen in this research are Kilobots, and a physical simulation framework called Kilombo is used in order to determine the effectiveness of deploying the algorithm on these robots. The mathematical algorithm is implemented into C code that will work in the simulator. The code is then directly deployable to the robots to perform experiments in

Aaron Griffin

Graduate Program: Technology

Sponsor: Michael June

An Analysis of Parameters Effecting Volumetric Airflow and Efficiency of an Ionic Air Moving Device

Ionic airflow is a phenomenon that is observed when a high electric potential is supplied to at least two electrodes classified as an emitter and a collector. The emitter has a sharp geometric profile such as a needle or thin wire. The collector has a smooth geometric profile such as a flat plate or thin ring. Air molecules are ionized between electrodes once high electric potential is supplied. As ionized molecules collide with uncharged molecules, steady air flow is generated due to their transfer of momentum. Ionic air moving devices have the potential to replace fans and blowers; however, are rarely utilized due to their low efficiency ratings. These devices are of great interest to industry for electronic cooling applications due to their lack of moving parts and silent operation. Previous research has demonstrated that device efficiency and airflow volume can be increased by varying parameters such as: the number of ionization sites, the distance between

the ionization sites and the collector, the height of the collector, and the amount of supplied electric potential. In the current study, an analysis of parameters including collector material, collector shape, and number of collectors was conducted. The ionic air moving device parameters were evaluated through the use of a DOE (Design of Experiments) to determine their statistical significance related to volumetric airflow output. Additional investigation was performed to determine device parameters effect on overall efficiency. Results indicate that collector material, and collector shape have a statistically significant effect on volumetric airflow output. It was also observed that collector material, collector shape, and number of collectors have an effect on overall device efficiency. Further research focused on ionic air moving device parameters will need to be conducted in order to justify device implementation as a practical standalone electronics cooling device. By optimizing device parameters, ionic air moving device efficiency could be increased to a level which would vindicate their utilization for practical applications.

Nathaniel Franks

Graduate Program: Technology

Sponsor: Robert Steffen

Testing and Analysis of Glass Fiber Reinforced Polymers in Pin Loaded Connections

Composites are a combination of two or more materials that together can create more desired mechanical properties than materials have individually. Composites, particularly plastics, contain a matrix of fibers that increase the strength of the material. This matrix can either be continuous, where the fibers run throughout the material in a specific pattern, or the fibers can be discontinuous where there is no pattern in which the fibers are orientated. Because of this matrix, composite materials have a comparable tensile strength to steel while weighing much less. This makes composites very desirable for many applications where the weight of the material is important, including structural applications. The disadvantage to using a composite in structural applications is that the strength of the material greatly decreases when there is a stress concentration present such as a hole for a bolt.

In this research, the bearing strength of a Glass Fiber Reinforced Polymer (GFRP) will be measure on different test samples. Along with testing the bearing strength, the strain, bearing stiffness, and modulus of elasticity will be measured during testing. The coupons used in testing will vary based on resin which the glass fibers were cured in, how the materials are prematurely aged, and the dimensions of the test coupons themselves. Some test coupons will be placed in heated, distilled water to simulate environmental effects on the coupons. The samples will be tested using a double shear, bolted or pin connection in a tensile testing machine. The hole elongation will be measured by using an extensometer placed at the center of the bearing hole during testing.

12:30 – 1:45pm
UC 215 – Catamount Room

Angela Lewis-Myers

Graduate Program: Social Work

Sponsor: Turner Goins

Barriers, Strengths and Solutions in the Post Hospital Treatment of Babies with Neonatal Abstinence Syndrome and Their Mothers in Western North Carolina: A Delphi study

Introduction: Babies born with neonatal abstinence syndrome (NAS) is a rapidly growing epidemic. The NAS is a drug-withdrawal syndrome that most commonly occurs after in utero exposure to opioids. Nationwide, since 2000, the incidence of the NAS has nearly tripled and has grown by 240% in North Carolina.

Purpose: The purpose of our study was to obtain expert opinions with respect to the top barriers, strengths, and solutions to community-based services for babies born with NAS and their biological mothers post hospital discharge in western North Carolina.

Method: Study experts consisted of Department of Social Services (DSS) workers and Children Developmental Service Agencies (CDSA) employees in the 11 western most North Carolina counties. We used a Delphi study approach with an online survey, which consisted of three rounds of surveys over a four-month timeframe. Results: Identified barriers for treatment for both babies and their mothers were (1) primary caregiver has underlying mental health and substance abuse issues, (2) primary caregiver uninterested or too distrustful, and (3) inability for services to contact caregiver. Identified strengths were (1) mental health and substance use agencies, (2) child protective services, (3) CDSA employees, (4) hospital referrals, and (5) home health providers. Identified solutions were (1) to expand home health, (2) increase substance use and mental health services, (3) provide education for families on NAS, (4) establish methadone clinics that provide parenting and developmental training, and (5) increase treatment availability.

Conclusion: Study findings contribute to informing policy makers and service providers of aspects that can be addressed to help both babies born with NAS and their biological mothers. Identifying the main barriers, strengths, and solutions can contribute to the creation of relevant and realistic solutions for the community.

Ric Rappold

Graduate Program: Social Work

Sponsor: Amy Murphy-Nugen

Proposal for a Formative Evaluation of a Service Array for Individuals with Intellectual and Developmental Disabilities with Co-Occurring Mental Health Diagnoses

Individuals with Intellectual/Developmental Disabilities (I/DD) with co-occurring mental health diagnoses and/or severe behaviors are a unique population in need of specialized services to help them live an independent and inclusive life in the community of their choice. However, there are currently few services available for this population. This evaluation aims to gain feedback from

community stakeholders in order to inform the development of a specialized service array for this population. The services, informed by evidenced-based practices, include specialized Intensive In-Home Services, individual, group, and family therapies, and therapeutic foster care. A formative evaluation will be used to evaluate the program's design in relation to the needs of this population and the community.

The purpose of this research is to gather feedback in regards to the current service array available for this population in North Carolina, to receive feedback on the design of the proposed services, and to gauge the community's interest in this service array. Research findings will inform future policies and program development that are responsive to the needs of the I/DD population.

Patti Sparling

Graduate Program: Doctor of Nursing Practice

Sponsor: Sarah Mannle, Carol MacKusick

Improving Outcomes with Enhanced Education

Introduction: Primary care needs to meet the health care needs of a growing population seeking care. Integrating nursing services into primary care to enhance available services offers an expanded team of caregivers and improves patient self-efficacy. This project utilizes student nurses to interact with patients by presenting educational information about chronic disease.

Methods: Patients with chronic disease seeking care in a primary care clinic participated in a pilot study to evaluate changes in self-efficacy after education about their chronic disease. Thirty-nine adult patients participated. The Self-Efficacy for Managing Chronic Disease 6-Item Scale was used. Nursing students participated as patient educators, developed teaching tools and presented chronic disease teaching to patients in the study. The student experience was evaluated using the Student Evaluation of Clinical Education Environment inventory.

Results: A paired t-test was used to evaluate the pre- and post-test patient results. Findings were statistically significant with $p=0.000$, showing an improvement in patient self-efficacy following the intervention. The student survey also showed a positive learning experience for the students with $p=0.000$.

Discussion: Enhanced education empowers patients. Socializing student nurses was shown to be a valuable experience. Continued evaluation and enhancement of primary care services must be done to meet the growing health care demands of our nation.

12:30 – 1:45pm
UC 212 – Dogwood Room

Kristin Fulp, Samantha Randolph, Michele Greener

Graduate Program: English

Sponsor: Brian Gastle

A Diplomatic Transcription of Robert Venoy Reed's Personal Narrative

We created a diplomatic transcription from a personal narrative by Robert Venoy Reed, which is housed in Western Carolina University's Special Collection. The document was a record of his service in the Army during WWII, dating from the 6th of April, 1944 until January 16th, 1945. Beginning with when Reed left the US for Scotland, the narrative continues through landing on the coast of France, days after D-Day, and fighting near the front lines until shortly before he was taken captive as a POW. Reed stayed mainly within France in the entries, but did cross into Germany near the end. We wish to cover the details that Reed recorded and information that we discovered through further research relating to events, people, and places mentioned within the narrative. On a more technical level, we would share the format and structure of the document, along with its physical appearance. Also, we would like to discuss issues involved with transcribing six hand-written pages of text, including difficulties with military slang, spelling errors, and the handwriting itself, while attempting to remain true to the original text as possible.

Craig Hawley, Laura Patterson, Scott Hufham, Margaret Williams

Graduate Program: English

Sponsor: Brian Gastle

Memories from Santo Tomas: Carr Hooper's Account of Internment

This project provides a transcribed and annotated edition of "Aboard Ship on Way to States," a 24-page memoir of Jackson County NC native and Western Carolina Teachers College alumnus Carr Hooper, which he wrote in 1944-45 on his return to the States and which details his time in the Santo Tomas Internment Camp in the Philippines during WWII.

Carr Hooper and his wife, Ruth, lived in the Philippines during the rising tensions of 1942. As Japanese forces seized territory, the Hoopers witnessed firsthand the Japanese arrival and occupation of Manila. Carr and Ruth Hooper survived roughly 3 years in the Santo Tomas Internment Camp before being liberated by American forces. In addition to describing their internment, Hooper also documents his account of the first American bombing raid on the Japanese-held city of Manila, in a 4-page document titled, The Raid. These documents are part of the Hunter Library's special collections, and students used them as primary sources for a final group research and editing project in Dr. Brian Gastle's "Research Methods in English" course this past fall.

The student editors, Margaret Williams, Laura Patterson, Scott Hufham, Craig Hawley, and Sarah Harden, transcribed the memoir and researched Santo Tomas Internment Camp to provide

supplemental data that illuminates and corroborates Hooper's account of their internment. Research verified information about the number and names of internees at Santo Tomas Internment Camp, the conditions of their horrific internment, as well as information about the Japanese officials that supervised the Camp and internees. This project is posted online alongside scans of the memoir in Hunter Library's Digital Collections initiative. This presentation will present the results of that research, discuss our historical and rhetorical findings, and (with the approval of Hunter Library) allow audience members to examine the original documents from WCU's Special Collections.

Donald Sawyer, Jr.

Graduate Program: Fine Arts

Sponsor: Erin Tapley

Evidence of Africans in the Bible

During the 2016 Summer Research Assistantship term (May 9- June 30, 2016), I submitted a project proposal titled, "Evidence of Africans, Blacks, and people of color in the Bible; how might scholarly viewpoints inform new discoveries and pictorial renditions"? This project set forth formal research ending with a final presentation in the form of a series of paintings that visually represents five viewpoints from an article written by Dr. Dan Rogers, entitled, "Evidence of Black Africans in the Bible." I was able to remain within the confines of the paradigm, schedule and proposal submitted.

Week one: Consisted of a series of interviews with clergy and scholars, with the goal of collecting voice recorded interviews and documentation of each interview, which I was able to complete.

Week two: I was able to transfer all recorded interviews to printed hard copies for future reference and backup. These references are of the five viewpoints from my chosen subjects.

Week three: Consisted of purchasing materials for sketches and paintings and also gathering research to begin the five compositions.

Week four: Produced sketches and compositions to be reproduced to five paintings on the five viewpoints.

Week five: Prepared proposals for the works to be exhibited and making a contact list for submission to galleries.

Week six: Finalize drawings and sketches to eventually be reproduced into paintings.

In conclusion, the timeline has been challenging but enjoyable. What began as a small project with the intent of smoothly moving through the proposal had many bumps in the road that consisted of scheduling conflicts, availability of chosen interviewees and the broadness of the topic also presented issues. The process of keeping the project positive and not argumentative was especially taxing and taught me how to introduce sensitive subject matter in an insightful and productive manner. Many of my chosen interviewees of white ancestry were standoffish when approached with the subject matter. The ones of color were more than ready to be interviewed and even had books, articles and other scholars for me to involve myself with. With that being said, the project is a long way from being completed. It will be the first part of 2017 before the paintings are completed. My goals at this point, is to be prepared to do a 2017 presentation to

the committee in March and also to present a contact list of galleries that may be interested in showing an exhibition titled, "Color in the Bible." Lastly, I would like to thank Dr. Vickery, from the Department of Religion at Western Carolina University, for his insightful input, theory, and positive participation. As well as, Dr. Erin Tapley, for her professional guidance, patience, and mentoring. Moreover, I would like to thank the Graduate School and Research Department of Western Carolina University for affording me this opportunity.

Andrew Robinette

Graduate Program: English

Sponsor: Jonathan Bradshaw

More Than Suggestions: The YouTube Algorithm's Impact on Digital Rhetoric

YouTube.com is one of the internet's most widely-used resources for posting visual rhetorical interventions, in addition to entertainment-oriented material. Because of its popularity, YouTube has become a household name for many users of the Internet. However, few people understand exactly how YouTube works. How does YouTube determine which videos populate a user's Recommended Videos feed? How does YouTube's recommendation algorithm affect the lives and posting habits of its most popular content creators? How does YouTube's approach to video recommendation affect the field of Digital Rhetoric as a whole?

All of the above topics are discussed in my presentation, titled "More Than Suggestions: The YouTube Algorithm's Impact on Digital Rhetoric". The thesis of my presentation is that YouTube's recommendation algorithm is somewhat flawed, and that the effects of this situation are already deeply changing the ways that users view and engage in Digital Rhetoric. This thesis is supported by research which discusses the Rhetorical Ethics of YouTube's data collection/usage methods and the site's formula for promoting content and re-circulating rhetoric. I also explain the effects which YouTube is causing in the field of Digital Rhetoric through its stance as a third-party in the rhetorical situation, creation of unnecessary competition between publics/fandoms, and the pressure placed onto rhetors through conditional compensation and strict Community Guidelines. A Rhetorical Ethics-analysis of YouTube's recommendation algorithm methods is also discussed.

YouTube.com may be the internet's premier source for Digital Rhetoric, but the site's methods and practices may be harming the future of Digital Rhetoric more than it is helping.

12:30 – 1:45pm
UC 232 – Multipurpose Room

Caitlyn Stone

Graduate Program: Psychology

Sponsor: Jamie Vaske

An Examination of Individual Stressors and their Co-Occurrence

Lauren Conder

Graduate Program: Psychology

Sponsor: Bruce Henderson

Free Play, Stress, and Depression in College Students

College students are experiencing increasing amounts of stress and internalizing psychopathology (D'Amico, Mechling, Kemppainen, Ahem & Lee, 2016). In developmental literature, play is thought to be a way for children to gain autonomy; the decline of play is linked with increasing stress and psychopathology in children. However, no present studies have examined the relationship between free play, stress, and depression in college students. This study will examine the gap in the literature. Results: There is a small, negative correlation between perceived stress and unstructured play ($r = -.202$, $n=150$, $p = .007$). There is a small negative correlation between depression score and unstructured adult play ($r = -0.167$, $n=150$, $p = .040$). While there is a significant negative correlation between perceived stress and unstructure play, the relationship between these factors is complex.

2:00 – 3:15pm
UC 215 – Catamount Room

Melisa Glatte

Graduate Program: Chemistry

Sponsor: Carmen Huffman

Biosorption of Aqueous Metal Ions onto Ground Peanut Hulls

The goal of this project is to investigate the biosorption of heavy metal ions onto ground peanut hulls. The adsorption of copper, cadmium, lead, and zinc will be assessed individually to investigate the affinity of metal ions for binding sites on the hulls. The adsorption of copper significantly increased by 590% for high density modified hulls and 51% for low density modified hulls when compared to unmodified hulls. This increase indicates a higher number of active surface carboxyl groups on modified hulls that are responsible for heavy metal binding. It is hypothesized that copper will bind at a higher capacity in solution with other metals due to its electronegativity, followed by lead, cadmium, and zinc, respectively

Holly Truluck

Graduate Program: Chemistry

Sponsor: Carmen Huffman

Chemical and Physical Properties of Natural and Modified Ground Peanut Hulls

Peanut hulls are an agriculture waste that is used for poultry litter, fillers in artificial fireplace logs, and cattle feed. Due to their lignocellulosic composition, ground peanut hulls are a good candidate for metal ion adsorption, as a study by Davis has shown for the uptake of copper. Ground peanut hulls can be separated into low density and high density hulls with the low density hulls being more effective in adsorption of metal ions than high density hulls. Also, an alkaline peroxide bleaching modification enhances the adsorption of metal ions. The enhancement is likely due to two factors: (1) The basic solution dissolves lignin, opening the fibrous structure to create a greater surface area, and (2) the peroxide oxidizes cellulose alcohol groups to carboxylates, thereby increasing the number of chemical binding sites. The goal of this research is to fully characterize the physical and chemical properties of both natural and modified ground peanut hulls. This will explain the enhancement of adsorption that takes place and will allow for the development of a more efficient and cost effective modification process to enhance adsorption. Methods to determine the chemical and physical characteristics of natural and modified ground peanut hulls have been devised. A methylene blue adsorption test will be used to quantify oxidation; a porosity test will be used to assess surface area; and FT-IR spectroscopy, Raman spectroscopy, and combustion analysis will be used to analyze the chemical composition of the hulls.

Tyler Cook

Graduate Program: Chemistry

Sponsor: Carmen Huffman

Adsorption of Copper(II) by Peanut Hulls in a Fixed-bed Continuous Flow Column

Heavy metal pollution is an important concern due to its adverse health and environmental effects. Biosorption is a way to remove heavy metals from aqueous systems with the use of biomaterials. There are many different types of biosorbents, such as algae, fungus, bacteria and lignocellulosic materials (wood, saw dust, peat, wheat bran, nut shells, etc.). Several studies have used peanut shells (hulls) as a heavy metal adsorption material. For instance, peanut hulls are an effective biomass for the removal of copper (II) from aqueous systems. These studies utilized equilibrium (batch) methods to quantify metal adsorption capacity as well as the rate constant of adsorption. However, these results are not comparable to industrial settings, which utilize non-equilibrium flow systems. The goal of this project is to develop a continuous flow fixed-bed method for the adsorption of copper (II) to peanut hulls, and to explore the different mathematical models used to describe continuous flow systems. Using equilibrium and kinetics data from batch studies as parameters in a mathematical sorption model, a theoretical breakthrough curve will be developed and compared to the experimental breakthrough curve. The model will then be altered to account for ion-exchange mechanisms and/or mass transport to better describe and predict the experimental breakthrough curve. These results will help determine the feasibility of using batch study data for predicting continuous flow behavior as well as the usefulness of peanut hulls as a biosorbent for copper (II).

2:00 – 3:15pm
UC 212 – Dogwood Room

Alyssa Morahan, Kait Henderson, Jade Estes

Graduate Program: Psychology

Sponsor: Winford Gordon

Effect of Attentional Focus on Cognitive Fatigue and Performance During a Golf Putting Task

Sustained attentional focus plays an important role in an athlete's level of performance. This study is a replication and extension of Bell and Hardy (2009), who tested the constrained action hypothesis of Wulf, McNevin, and Shea (2001) with an additional condition using golf chipping. The current study compares performance in internal, proximal external, and distal external conditions to see if the constrained action hypothesis predicts putting accuracy. Additionally, this study expands upon past work with the constrained action hypothesis by measuring how much attention fatigue occurs with each type of focus. During this study, participants were asked to complete an 8' putting task on a 6' x 12' piece of indoor-outdoor carpet. Performance was scored as distance from the target, measured with a yard stick, up to three-feet in any direction. There were three different focus conditions, presented in random order across participants. In the internal condition participants are asked to focus on keeping their wrists flat and use a gentle rocking motion of their shoulders to putt. In the proximal external condition participants are asked to focus on moving the putter straight back and through two markers on either side of the ball. In the distal external condition participants are asked to focus on the white circle target at the end of the carpet. In addition, a manipulation check was used after each putt to see how well the participant maintained the focus condition. The participants also completed the Reversible Figure Test (RFT) (e.g. Duck-Rabbit) 5 times as a measure of attention fatigue. Data collection is nearing completion. Preliminary analyses suggest a trend in the data consistent with past research on the constrained action hypothesis and suggests that as focus becomes more external and distal it also becomes less fatiguing. Data collection completion will allow for more clear findings.

Jacob Warszawski

Graduate Program: Psychology

Sponsor: David McCord

Associations Between the Three-Factor Model of Internalizing Dysfunction and Distress Disorders

A 2008 study by Sellbom, Ben-Porath, and Bagby revisited and extended findings by Tellegen, Watson, and Clark's (1999a,1999b) two-factor model of underlying temperament markers. The three-factor model of mood and affect in this study supported the association of three MMPI-2-RF scales with fear and distress disorders: Demoralization (RCd), Low Positive Emotions (LPE), and Dysfunctional Negative Emotions (DNE). While there is existing support for a three-factor model of internalizing disorders, replication of past research and different approaches to research design is necessary to more fully understand the nature of internalizing disorders as well as the ability of the MMPI-2-RF to reliably measure these disorders. We investigated the ability of three Minnesota Multiphasic Personality Inventory–2-Restructured Form (MMPI-2-RF) scales with clinician observations on the prediction of distress disorders. An archival dataset collected from an outpatient

mental health center was selected for statistical analyses. Distress disorders were grouped together by DSM-IV diagnoses: Major Depressive Disorder, Generalized Anxiety Disorder, and Post-Traumatic Stress Disorder. Therapist ratings highly correlated to and conceptually relevant to these diagnoses were selected for final analyses. Binary logistic regression analyses were applied to several models of combined therapist ratings and MMPI-2-RF scales RCd, LPE, DNE, and the Higher Order Scale Emotional Internalizing Dysfunction. The final model's Nagelkerke R squared was 0.28 and the regression model predicted distress disorders with 79% accuracy. Further analyses examined relative risk and odds ratios of the selected scales. Results indicate support for several clinician observations and the MMPI-2-RF Higher Order Scale Emotional Internalizing Dysfunction as reliable predictors of distress disorders.

Emily Hooker**Graduate Program:** Psychology**Sponsor:** David McCord**Relationships Between Lifestyle Factors and Internalizing Behavior**

The relationships between various internalizing behaviors such as symptoms of depression, anxiety, and stress, and lifestyle factors including nutrition, fitness levels, and aspects of sleep are gaining attention in research. Most research seems to have focused on the relationship between depression and physical activity; for example, Song, Lee, Baek, and Miller (2011) found that adults with depression spent less time in light and moderate physical activity than did adults without depression. Also, Oeland, Laessow, Olesen, and Munk-Jorgensen (2010) found implications for treatment of depression using a structured exercise program. Research is beginning to establish connections between nutrition, sleep, and depression. Akbaraly, Brunner, Ferrie, Marmot, Kivimaki, and Singh-Manoux (2009) found that people whose diets were based on whole foods were less depressed than people whose diets are mostly processed foods. Sanchez, Toledo, Irala, Ruiz-Canela, Pla-Vidal, Martinez-Gonzalez (2011) found that high levels of trans fat in one's diet led to a 48% increase in the risk of depression. Koffel and Watson (2009) found that insomnia, poor sleep quality, hypersomnia, fatigue, and sleepiness were related to symptoms of depression and anxiety. The present study examines relationships between three psychological variables: depression, anxiety, stress/worry, in comparison with three lifestyle variables: nutrition, fitness, and sleep. Understanding the relationships between these factors can lead to less invasive treatment plans and an increase in healthy living with less negative symptoms. Interim results have been computed based on the first 54 participants. These initial results show significant correlations between sleep and multiple measures of somatic and internalizing problems, including emotional/internalizing dysfunction, demoralization, low positive emotions, malaise, head pain and gastrointestinal complaints, stress and worry, anxiety, negative emotions, and introversion/low positive emotions. Fitness was correlated with malaise and personality aggressiveness. Nutrition was correlated with ideas of persecution. Correlations are expected to be altered with the final analysis.

Tari Cox

Graduate Program: Psychology

Sponsor: David McCord

Alcohol and Nightmares in Black and White Veterans

Introduction: More than 50% of combat veterans experience nightmares as a result of Post-Traumatic Stress Disorder (National Center for PTSD, 2015). In addition to psychiatric disorders, veterans have alleviated rates of alcohol misuse (Dobalian, Simon, Lanto, Yano, & Rubenstein, 2013). One study found alcohol use to be associated with nightmare frequency (Munezawa, Kaneita, Kanda, Otshu, Suzuki, Suzuki, Higuchi, Mori, & Ohida, 2011). Prior research also found that nightmare frequency in veterans is associated with ethnicity, such that Black veterans report more frequency of nightmares than White veterans (Cox & McCord, 2017). Therefore, it is important to consider ethnicity as a variable that exacerbates the nightmare frequency of veterans and alcohol use. The present analyses were conducted using archival data from a sample of veterans that responded to a self-report nightmare item and focused on differences nightmares while considering ethnicity and alcohol use.

Methods: Veterans ($N=1353$) responded to an extensive structured interview process which included one item addressing item addressing nightmares (present, absent) and history of alcohol use (increase, decrease). Logistic regression analyses were used to evaluate the significance of Black/White differences on each of these dependent variables.

Results: A significant main affect was found between ethnicity and nightmares, as well as a significant main effect for alcohol and nightmares. However, there was no significant interaction between alcohol and ethnicity.

2:00 – 3:15pm
UC 232 – Multipurpose Room

Lamyae Sroute

Graduate Program: Chemistry

Sponsor: Scott Huffman

Age-Grading of *Aedes Triseriatus* Mosquitoes Using Infrared Spectroscopy

The mosquito species, *Aedes Triseriatus*, the primary vector of the La Crosse encephalitis virus, exists in the upper Midwestern, mid-Atlantic and southeastern states. In the United States, about 80-100 La Crosse cases are reported each year. Although many factors influence the distribution of the La Crosse virus, one of the main contributing factors is the age of the mosquito. The La Crosse virus must complete an extrinsic incubation period averaging 5-15 days in the mosquito vector before it can be transmitted to a human host. Several methods have been developed to determine the mosquito's physiological age based on morphological changes, however, these techniques involve dissections and are labor and time intensive. This research aims to development a rapid, and robust method of measurement for the age of mosquitos using an infrared spectroscopy technique. Infrared spectroscopy is a sensitive, information rich technique capable of detecting a wide range of molecular signals from subtle changes in the secondary structure of proteins to gross concentrations in total carbohydrates in a sample, and coupled with advanced machine learning algorithms should be able to accurately predict the mosquito's stage of life. Data and results will be presented showing progress toward the goal of this research.

Buddhika Liyana Pathirannahel

Graduate Program: Chemistry

Sponsor: Scott Huffman

μ PAD Based Mixture Analysis of Organic Acid Solutions

Microfluidic paper-based analytical devices (μ PADs) for the detection of organic acids in aqueous solutions have been developed. Previously, microfluidic paper-based analytical devices (μ PADs) have been developed using various techniques to inexpensively create hydrophobic barriers on paper with great reproducibility. The portable nature of the μ PADs make them well suited for both quantitative and qualitative analysis of substances in environmental settings that do not have access to a laboratory. Consequently, these devices are useful for field deployable measurements in the areas of healthcare diagnostics, environmental monitoring and forensic analysis. These devices are fabricated by wax printing on paper in patterns forming hydrophilic channels contained by hydrophobic barriers. These devices contain several regions. The first is a sample deposition region, where the sample is added to the device. The next region consists of microfluidic channels through which the sample is transported into the measurement regions. These first two hydrophilic regions are comprised of unmodified cellulose surrounded by wax hydrophobic barriers. The final region contains several measurement areas. Each measurement area is prepared by the addition of reagents that chemically react with the analytes (organic acids) to form colored complexes. These reagents all consist of transition metals, and the colorimetric

detection of the acids arises from changes in the d orbital splitting that occurs as the organic acids participate in ligand exchange with the reagents.

A commercial color CCD camera was used for the measurement of these colored regions in the μ PAD. Because each organic acid-metal complex generates a different color, the possibility of spectroscopic mixture analysis exists. Additionally, the color intensity linearly correlates with concentration as predicted by Beer's Law. Utilizing these color images, chemical concentrations are predicted.

2:45 – 4:45pm
UC 315 - Theater

Jaclyn Redman, Samantha Moore, Audrey Stokes, Emily Moore, Michael Ferguson, Justin Halstead

Graduate Program: Physical Therapy

Sponsor: Todd Watson, Jessica Graning

An Investigation into Injury Risk Factors and Epidemiology Associated with Musculoskeletal Injuries in Collegiate Dance Team Members

An investigation into injury risk factors and epidemiology associated with musculoskeletal injuries in collegiate dance team members

Background: Collegiate dance is a demanding sport that requires muscular strength, endurance, agility, and motor control to perform complex movements. High demands placed on dancers make them susceptible to a variety of musculoskeletal injuries, yet collegiate dance injury epidemiology has not been well studied.

Objective: The purpose was to examine dance injury epidemiology and to identify predictors of injuries sustained in competitive collegiate dancers. We studied injury prevalence, anatomical location, nature, and mechanism. This study hypothesized dancers with lower scores on single leg balance, maximum pirouettes, abdominal fatigue, back fatigue, and star excursion balance tests obtained in a preseason screen would report higher prevalence and incidence of injury at the point of survey and throughout the season.

Design: Retrospective survey cross sectional study and prospective, descriptive single-cohort study.

Methods: Twenty-two female members of WCU's Dance Team were recruited to complete a retrospective questionnaire regarding injury history over the previous six months. Each subject then performed various tests to obtain baseline measures of performance and physical function. Weekly injury reporting forms were used to track injury occurrence and determine potential injury predictors.

Results: Twenty-two dancers completed the pre-season injury screen and retrospective survey; 21 dancers completed the season. A total of 14 injuries were reported; 40% of dancers reported at least one injury. Of these injuries, 10 involved the lower extremity; specific locations include shoulder, spine, hip, knee, and ankle. Nine injuries were recurring, while 10 reported acute injuries.

Limitations: This study had a limited sample size due to lack of injuries, making it difficult to draw conclusions regarding injury risks. The population studied is not generalizable to a broader population.

Conclusions: Ankle and foot are most common injury sites. We recommend following the dance team for the conclusion of the season and analyzing statistics again at that point.

Emily Van Schagen, Kelly Yerkes, Taylor Kent, Taylor Gentry, Chris LeCroy, Leanna Purvis

Graduate Program: Physical Therapy

Sponsor: Lori Schrodtt

Effectiveness of Get Some Balance in Your Life on Reducing Fall Risk in Community Dwelling Older Adults

Background: Fall prevention is an essential part of care for older individuals, as more than one-third of community dwelling adults age 65 and older will fall at least once this year. Community-based programs aimed at reducing falls among community dwelling older adults are a viable solution to providing needed evidence-based interventions in a more global, accessible fashion, while ensuring the quality of these interventions are maintained.

Purpose: The aims of this study are to: 1. examine balance and mobility improvements following participation in a 12-week balance program, 2. assess whether initial level of performance influences the benefits of a 12-week balance program, 3. explore the relationship between falls self-efficacy and outcome measures assessing fall risk.

Methods: The Get Some Balance In Your Life falls prevention program specifically targets older adults with mild to moderate balance impairments. It was administered at the local Senior Center as a twelve-week falls prevention program, consisting of two one-hour classes per week. The program occurred 9 times from 2009 to 2016, with 67 participants. Screening occurred prior to the start of the program. Outcome measures assessing static and dynamic balance, strength, mobility, and cognitive function were completed. This study was structured as a quasi-experimental, pretest- posttest design.

Results and Discussion: Effectiveness of Get Some Balance in Your Life on reducing fall risk in community dwelling older adults will be discussed.

Erin Rollins, Zach Huey, Aleshia Reese, Brittany Pace

Graduate Program: Physical Therapy

Sponsor: David Hudson

Does Core Stability or Leg Strength Influence the Stability of Gait in Loaded and Unloaded Conditions?

Purpose: To determine the effect of systemic and core fatigue on the stability of a gait compared to baseline when walking with and without a loaded pack.

Materials and Methods: Preliminary data is based on four healthy subjects that completed the protocol that included core fatiguing exercises and an incline treadmill walk with a loaded backpack with 25% of the subject's body weight. Subjects performed exercises until a 19 out of 20 on Borg Scale of Perceived Exertion was reached. Gait variances were determined using a GAITRite system under 6 conditions; a baseline trial, then following fatiguing regimes of the core muscle and walking on an inclined treadmill. During each of the previous conditions subjects walked with and without loaded pack. Gait variables studied included, Velocity, Step Length, Stance Time and Base of Support. Paired t-tests were conducted to compare the difference between walking with and without a pack for each treatment condition (backpack effect). One-way ANOVA was used to compare baseline, core fatigue and systemic fatigue conditions (exertion effect).

Results: There was a backpack effect at baseline, following core fatigue and following systemic fatigue for velocity, cadence, step length, stride length, and stance time ($p < .05$). One-way ANOVA found an exertion effect under both the pack and no pack conditions ($p = .05$).

Discussion/Conclusion: These findings suggest that walking with a backpack caused changes in gait indicative of instability and walking with systemic fatigue and fatigue may magnify the changes. As more data is collected, we will explore the potential protective effect that stability/strength of core musculature has on stabilizing gait under these testing conditions.

Leah Setzer, Zia Assad, Daniel Hyatt, Linnea Hardin, Katherine Mulzer, Samantha Spencer, Allen Won,

Graduate Program: Physical Therapy

Sponsor: John Carzoli, Nadia Marconi, Karen Lunnen

A Training Program for Health Outreach Workers to Enhance Musculoskeletal Health in Migrant and Seasonal Agricultural Workers in North Carolina

Background: Migrant and seasonal agricultural workers (MSAW) are at risk for developing musculoskeletal injuries due to factors including strenuous and repetitive work movements and activities, long work hours, limited rest breaks, and limited safety training. These workers also have limited access to preventive health education and healthcare services due to low English proficiency levels, high healthcare costs with little to no insurance coverage, and limited transportation. Health outreach workers (HOW) serve an important role in providing basic health education and services for MSAW, but have limited access to quality resources related to musculoskeletal health.

Purpose: The purpose of this project was to assess the influence of an online video learning series on enhancing musculoskeletal health and reducing injury risks in MSAW intended for HOW associated with the North Carolina Farmworker Health Program (NCFHP).

Methods: A background literature review and on-site observation of agriculture worker task performance were completed to inform the educational learning series used to educate HOW. The series was reviewed by various HOW at multiple points who provided feedback for further development. The final product was provided to NCFHP for distribution to HOW.

A pre-test and post-test will be used to assess information retention, self-confidence regarding the application of information presented, and overall impression of the learning series. Data from pre/post tests will be assessed for the efficacy of the learning series.

Results: Pre- and post-test results will be used to calculate change scores in order to assess participant knowledge retention and self-efficacy.

Conclusion: The findings of this study will demonstrate the effectiveness of this learning series in educating HOW on how to promote musculoskeletal health in MSAW. Future studies should consider HOW knowledge retention and application of educational material, expanding the target population, and investigating the efficacy of online educational delivery models compared to more traditional methods.

Eric Kao, Hannah Bowen, Rebecca Foil, Vivian Franco, Travis Linton

Graduate Program: Physical Therapy

Sponsor: Sue McPherson, Ashley Hyatt

Do Focus of Attention Strategies Impact Learning in Adults Post-stroke and Healthy Age-matched Controls During a Seated Trunk Control Task?

Purpose: This randomized clinical trial was designed to examine task retention, weight shifting technique, and movement using internal (IF) and external (EF) focus of attention instruction in adults with chronic stroke and healthy adults.

Participants: 6 adults with chronic stroke and 6 age-matched healthy adults (mean age 61.4 + 13.8) were randomized to receive IF or EF instructions. Patients with chronic stroke were 6 months-13 years post-unilateral stroke with good trunk control (FIST mean score 51+2.9).

Methods: Baseline trials of lateral weight shifting to each side were performed. Then an instructional video of proper technique was viewed. Next, each group performed 3 trials to each side per experimental phase: acquisition, short-term retention (STR, 5 minutes later), and long-term retention (LTR, 7 days later). IF participants were told to shift their body weight towards their right or left hip. EF were told to move their shoulders toward shoulder-height targets. During STR and LTR participants received no cuing. Center of pressure was measured via a pressure mat. A mean lateral and anterior-posterior excursion was calculated for each of the 3 trials. Data were analyzed using 2x3 repeated measures ANOVA.

Results: Healthy adults showed a significant main effect for type of weight-shift instruction to the left ($F=6.473$, $P=.029$, $\eta^2=.393$) and right ($F=5.122$, $P=.047$, $\eta^2=.339$), with EF group exhibiting a higher mean lateral excursion ($M=13.95$ [$SE=.846$] and $M=13.39$ [$SE=.739$], respectively) than IF group ($M=10.90$ [$SE=.846$] and $M=11.03$ [$SE=.739$], respectively; $P<.05$). There was no significant main effect for type of instruction for adults post-stroke to either side.

Conclusions: Preliminary analysis indicates that EF instructional cues improved performance of lateral weight shifting over IF cues in healthy adults but not in adults post-stroke.

3:30 – 4:45pm
UC 215 – Catamount Room

Traci Ballance

Graduate Program: Biology

Sponsor: Barbara Ballentine

**Effects Of Nest Building Behavior On Incubation And Reproductive Success In Carolina Chickadees
(*Poecile Carolinensis*)**

Nest building is a vital part of parental care, but the impacts of the variation in nest building behavior on reproductive success in birds is not well understood. We address the effects of nest quality on incubation behavior and reproductive success in Carolina chickadee (*Poecile carolinensis*) females. In Carolina chickadees, only females build nests, incubate eggs, and brood young nestlings. Well-constructed nests can reduce the negative effects of cooling on eggs and nestlings. Extensive cooling can result in delayed embryonic development, hatching asynchrony, or hatching failure. Very young nestlings also depend on brooding for proper thermoregulation. However, females face tradeoffs between self-maintenance and incubation. We test the hypothesis that investment in high quality nests will result in higher reproductive success. Throughout spring and summer 2016, we monitored nest boxes in Jackson and Macon counties, N.C. for reproductive activity. For completed nests, we recorded nest dimensions and installed two iButtons (thermal data logger) inside each nest box to record nest and ambient temperatures. Comparisons between changes in nest temperature relative to ambient temperature allow us to estimate the time females spent incubating. Nestlings were weighed every-other-day between days 2- 12 and monitored for evidence of fledging. We will use growth rates of nestlings and fledging success as estimates of reproductive success. Faster growth rates indicate higher probability of post fledging success. Upon fledging, all nests were collected and air dried. Nest quality is estimated by dry mass and dimensions. We predict that higher quality nests require shorter periods of incubation but yield higher reproductive success.

Tori Carlson

Graduate Program: Biology

Sponsor: Sean O'Connell

The Discovery of a Novel Bacterial Species Found in Great Smoky Mountains National Park

The All Taxa Biodiversity Inventory (ATBI) is attempting to record all species within Great Smoky Mountains National Park (GSMNP). The purpose of this project was to fully characterize and provide an identification to species for a unique bacterium cultured from soil from the Kephart Prong area of GSMNP. Previous work showed that the isolate being studied aligned to the genus *Paenibacillus* based on 16S rDNA analyses but was not closely related to any known species. The isolate was cultured and tested for growth against various parameters including salt concentrations, pH levels, temperature ranges, and oxygen requirements as well as ability to hydrolyze lipids, reduce nitrates, and

resistance against a panel of antibiotics. Microscopic methods included Gram staining, flagella staining, endospore staining, and transmission electron microscope imaging. Finally, whole genome sequencing was performed on the isolate to better differentiate it from its closest relatives. Based on parameter testing, the isolate is a Gram-positive, spore-forming rod that grows best at a pH from 7-9, NaCl concentration of 1%, and temperatures from 25-30°C. The electron micrograph revealed rod cells sized 0.8µm x 2.8-3.2µm with flagella-like structures associated with the cells. The 16S rDNA sequence of the isolate, when compared to other sequences located in RDP, returned *Paenibacillus castaneae* with an 84.6% similarity. Analysis of the whole genome showed the closest match to *Paenibacillus harenae*, but major DNA sequence differences exist between the two species. With the information obtained from the 16S rDNA sequence, whole genome, as well as the growth-based tests, this isolate is likely a novel species within the genus *Paenibacillus*. The goal of this research project is to assist the ATBI in understanding this *Paenibacillus* species and its role, which may include plant and insect degradation due to the production of genes for an enzyme known as chitinase.

Rob McKinnon

Graduate Program: Biology

Sponsor: Sean O'Connell

Classification of a Novel *Erwinia* Species from the Oconaluftee River, Great Smoky Mountains National Park

As part of the All Taxa Biodiversity Inventory (ATBI) project from Great Smoky Mountains National Park (GSMNP), stream water was collected from near the Oconaluftee Visitor Center, and bacteria were cultured from it. A bacterial isolate, designated strain WCUUk-1 was then subjected to a taxonomic investigation using a polyphasic approach of growth-based and DNA-based methods. Strain WCUUk-1 was found to be a facultative anaerobe, Gram-negative, rod-shaped in cell morphology, and motile. The species showed a temperature preference from 4°C-30°C, pH range of 4-7, and salinity tolerance of 0 to 4%. Metabolic analysis of strain WCUUk-1 indicated the strain to be catalase positive, oxidase negative, and had the ability to ferment glucose and arabinose. Analyses using the Ribosomal Database Project (RDP) showed strain WCUUk-1 to have the highest 16S rDNA gene sequence similarity with *Erwinia aphidicola* at 92.7%. Maximum likelihood and parsimony models using 16S rDNA were used for phylogenetic analysis of strain WCUUk-1 and its closely related species in the genera *Pantoea* and *Erwinia*. Results indicated that strain WCUUk-1 is in a sister clade with *Erwinia billingiae*, which was corroborated via sequencing of the full genome. *E. billingiae* was originally isolated from stem cankers, diseased blossoms, and immature fruits mainly from rosaceous trees from the United Kingdom, indicating strain WCUUk-1 as a potential plant pathogen. Identification and classification of microbial species in GSMNP provides greater insight in the micro- and macro- ecological processes influencing and occurring within GSMNP.

Kacie Fraser

Graduate Program: Biology

Sponsor: Sean O'Connell

A New Genus of *Enterobacteriaceae* Isolated from Kephart Prong, Great Smoky Mountains National Park

A bacterium was isolated from a water sample collected from the Kephart Prong in Great Smoky Mountains National Park. This isolate did not have a conclusive match to any known bacteria in the Ribosomal Database Project (RDP); therefore, it is being tested to verify it as a novel species. The full 16S rRNA gene of the newly discovered bacterium was sequenced and results showed there to be a 100% confidence that it belonged in the Enterobacteriaceae family but only a 47% confidence that it belonged in the genus *Serratia* suggesting that this bacterium could represent a new genus in the Enterobacteriaceae family. The bacterium was characterized by its preferences and tolerance to temperature, pH, and salinity as well as for metabolic capabilities of the isolate such as oxidase activity, ability to hydrolyze gelatin, ability to convert tryptophan into indole, and the ability to hydrolyze casein. Antibiotic resistance was also tested against penicillin, tetracycline, chloramphenicol, clindamycin, nalidixic acid, nitrofurantoin, and colistin. Preliminary results from these phenotypic tests suggest that the isolate is not closely related to any known enterobacter species. Based on the limitations of the above methods, the full genome was sequenced to better place it in the family Enterobacteriaceae. Results of whole genome comparisons to its most closely related relatives indicate that this species is quite novel. Further analyses of the isolate will be undertaken, including phylogenetics, to demonstrate that a new genus and species of bacteria has been cultured. This work will aid in understanding the biodiversity found in Great Smoky Mountains National Park as well as the contribution this bacterium provides the ecosystem.

Hannah Meeler

Graduate Program:

Sponsor: Katherine Mathews

Taxonomy and Phylogeny of the Genus *Diervilla* (*Diervillaceae*)

My research consists of a taxonomic and phylogenetic analysis of the genus *Diervilla* (Bush honeysuckle), containing three eastern North American species, *Diervilla lonicera*, *Diervilla rivularis*, and *Diervilla sessilifolia* (*Diervillaceae*). Because there is a large amount of morphological variation found within each species, taxonomic boundaries are unclear. *Diervilla lonicera* has the largest coarse geographic range, which spans from the southern Appalachians to northeastern Canada. *Diervilla sessilifolia* and *Diervilla rivularis* are endemic to a few states in the southern Appalachians. My research has three main components: 1) a study of morphological variation, historical range information, and phenological data using herbarium specimens; 2) a multivariate ecological field study of all three species in the locations where their coarse ranges overlap in the southeastern United States to determine the degree of sympatry and habitat preferences and to collect samples for DNA analysis; and 3) a molecular and morphological phylogenetic analysis of multiple populations of the three species and their outgroup. My goals are to understand how morphological variation is structured among populations of all three taxa, if morphological variation it is useful to determine species boundaries, and to determine the phylogenetic relationships among the three taxa of *Diervilla*.

3:30 – 4:45pm
UC 212 – Dogwood Room

Margaret Williams

Graduate Program: English

Sponsor: Jonathan Bradshaw

The Schoolteacher's Rebellion: Victor Montejo's *Testimony* and the Literature of Survival

In this essay, Margaret Williams explores how the author's 1987 work operates on the surface as Latin American testimonio but more substantively as transnational literature. Drawing from the ideas of such theorists as Louis Althusser, Benjamin Anderson, and Ernest Gellner, Williams argues that *Testimony: Death of a Guatemalan Village* embodies Montejo's rebellion against the "nation," its state apparatus, its national identity, even its culture and literature. Montejo's work also functions as testimonio, a genre of social action/justice, as John Beverly defines it, as well as the literature of trauma (Kathleen Nance). Montejo speaks for the subaltern, as a subaltern; except in his case, such distinctions remain fluid, at times disingenuous and at others, direct. With *Testimony*, three key patterns reveal its subtext: Montejo's repeated playing of the schoolteacher card, his overt Christian pleas/references, and the complexity with which he identifies villagers and soldiers (and places himself in relationship to them). Montejo's *Testimony*, as a work of transnational literature, suggests that we may be other than or more than our "national" identities.

Matthew Buchanan

Graduate Program: History

Sponsor: Alexander Macaulay

Knowing the Enemy: Miscalculations in American Counterinsurgency

The research focuses on the US approach to the Surge in 2007 in Iraq. The use of the British in Kenya and French in Algeria allow for tactical counterinsurgency comparisons. A rubric for measuring success is based on two main factors. First, the correct identification of the enemy in question. Secondly, employing effective tactics that offer the best chance for success. Counterinsurgency has to effectively combat several avenues of resistance. The British sought to eliminate these threats through two distinct practices. First, they used local groups that were already established, such as the Kenyan Police and the Home Guard. Next, the British attempted to win the hearts and minds of the local populace to help stop the enemy forces. The French approach was more of a pacification. They attempted to stop the insurgency by administrative policy and economic offerings. By examining these two approaches, we gain insight into previous COIN strategies. In addition, the style of guerrilla warfare being fought is equally important to the tactics used by the party in power. The correct identification is imperative to combating the enemy properly. The two styles of guerilla warfare explored in this research are the Maoist and the Urban. Often, these two types are combined and no attempt to distinguish them lead to misunderstanding the objectives of the enemy. Urban focuses on a war of attrition, while the Maoist has a long-term goal of winning in a traditional battle. Other differences are targets

attacked, terrain preferred, and logistical capabilities. All of these factors are taken into account to observe the operations in Iraq during the Surge.

Kyle Dreher

Graduate Program: History

Sponsor: Alexander Macaulay

U.S. Diplomacy during the Civil War and Reconstruction: The Stretch Towards the Caribbean, 1860-1877

The U.S. Civil War as a domestic conflict, confined within the borders of the United States, has been exhaustively studied. Studies focusing on generals, specific battles, actions of militias, and politicians have all been the focus of historians of the Civil War. Studies of foreign affairs and diplomacy during the Civil War and Reconstruction periods have gained less interest from historians than their domestic counterparts. This thesis will explore U.S. foreign policy developments with the Dominican Republic during these periods. By studying foreign relations between the U.S. and the Dominican Republic during the Civil War and Reconstruction periods, this thesis will track the influence of emancipatory thought and imperialist impulses in U.S. foreign diplomacy.

In order to delve into the foreign diplomacy of the U.S. during this period, the following question will be central to my analysis: how did imperialist ideology and emancipation fundamentally influence U.S. foreign affairs with Santo Domingo? This main question will allow me to address several secondary questions that further illuminate United States foreign relations with Santo Domingo during this period. How did the Civil War influence Santo Domingo and what caused the perceived need for U.S. intervention into the Caribbean? Why did the United States try to annex Santo Domingo during the Reconstruction period? Why did President Grant prefer a diplomatic route to acquiring the Dominican Republic rather than using military force? By answering these questions, this thesis will hope to prove that there is a connection between emancipatory thought and imperialism in regards to U.S. diplomacy. Finally, the thesis will demonstrate that the events that transpired with the Dominican Republic show a distinct shift in U.S. diplomatic actions in this period.

Aramis Martinez

Graduate Program: English

Sponsor: Jonathan Bradshaw

Transgender Representations in Comics: How Circulatory Constraints Allow Comic Books to Respond to Rhetorical Situations.

The comic book industry is an enormous and growing business. This uptick in business has coincided with the growth of progressivism in some of today's comics. This progressive movement has made the comic book an important rhetorical response to the need for powerful and compelling depictions of transgender individuals. While the comics released prior to the 1954 Comics Code Authority pushed the limits of what was socially acceptable, this new social progressivism has become enhanced today with comics starring transgender main characters such as *Batgirl* and *The Wicked + the Divine*. This leads to two questions;

why do comics create transgender representations and why are they so progressive. I believe these are questions that can be addressed by examining the specific circulatory constraints that the comic book inhabits. This presentation will analyze how the limits created by comic book's history can help us understand the content contained inside. I will also showcase how generic constraints can help us see patterns that have existed since its origin and continue to guide its content today. Finally, by looking at the delivery constraints of the comic book, this presentation will provide context as to why it has been able to be at the cusp of an issue that other media formats have largely either ignored or misrepresented.

Crystal Plemmons

Graduate Program: English

Sponsor: Paul Worley

Nationalism as Disability: Disappearance of the Body and the Self in Hector Tobar's *The Tattooed Soldier*

The culture of the United States is solidly built around nationalism. Events such as the Olympics and the universal presence of the flag after September 11, 2001 are examples of national pride and each show how nationalism works to create a sense of belonging. However, nationalism also has negative aspects including racism and war that effectively create a disability on the level of the individual. War is the most serious product of nationalism, and neither war nor nationalism would exist without the other. Racism is not directly caused by nationalism, but the individual sense of national belonging tends to exclude people who are not considered to belong. War creates physical and mental disabilities while racism causes a cultural disability. In this essay, I argue that Nationalism plays a large role in *The Tattooed Soldier* by Hector Tobar because Antonio and Longoria cannot escape their past in a racist and war-torn Guatemala and they cannot truly assimilate into a racist and war-torn Los Angeles, effectively creating a disappearance of their physical bodies as well as their personal identities that is comparable to having a disability. Drawing on research from vastly different areas, including Spivack, Anderson, and Gellner from nationalist theory as well as Foucault, Davis, and Seibers from disability theory, this paper weaves together a theory that explains how nationalism creates a condition in which individual identities are trapped within a constructed system that limits their ability to function in society in much the same way that a person with a physical or mental disability is limited. Nationalism is a disability, and it creates a situation of disability for fictional characters in *The Tattooed Soldier* that represents a condition experienced by many people in the real world.

3:30 – 4:45pm
UC 232 – Multipurpose Room

Elizabeth Combs

Graduate Program: Psychology

Sponsor: Kia Asberg, Alyssa Raggio

Correlate Substance Use Problems in College Students

Binge Drinking is defined as consuming four or more drinks in a short amount of time, resulting in a blood alcohol content (BAC) level of 0.08 or greater (National Institute on Alcohol Abuse and Alcoholism, 2004). This phenomenon is common in college populations. One study found that 24.2% of 19 and 20-year-old's respondents reported a recent binge drinking episode (Patrick, & Terry-McElrath, 2016). Binge drinking is associated with a variety of risky behaviors (e.g. excessive drinking games, "pregaming," etc.), (Read, Haas, Radomski, Wickham, & Borish, 2016). These behaviors often result in negative outcomes, such as drunk driving, alcohol poisoning, risky sexual behavior, and so on, (Pascarella, Goodman, Seifert, Tagliapietra-Nicoli, Park, & Whitt, 2007). Male college students are more likely to engage in binge drinking and risky drinking behaviors (Read, 2016; Sharma, & Reinhard, 2016). Other predictors of binge drinking are poor academic performance and stress (Chen, & Feely, 2016; Pascarella, et al., 2007). Although it is well established that academic stress is predictive of problematic substance use, more research is needed to identify protective factors, including coping. The present study utilized data from 160 college students at Western Carolina University to examine the interplay among academic distress, coping strategies, and substance use problems. Gender differences were also explored. Results indicate that substance use was positively correlated with academic distress (0.17), hostility (0.18), behavioral disengagement (0.17), and humor (0.19). The model accounted for 8% of the variance in this sample. After comparing all factors, there was only one predictor that approached significance: behavioral disengagement at 0.8. In addition, gender groups were compared and a significant difference was found. As expected, the male group's reported substance use was higher than the female group. Implications of findings and limitations will be discussed.

Jennifer Miller

Graduate Program: Psychology

Sponsor: Bruce Henderson

Textbook Reading Behaviors and Learning Beliefs Among Undergraduate Students

There are many possible reasons behind why students are choosing not to read their textbooks. Clump, Bauer, and Bradley (2004) suggest that very low numbers of students are actually reading their textbooks. When they studied students in different psychology courses, they found that students read about 27.46% of the assigned class readings before class and only 69.98% before an exam. Many students now also heavily rely on PowerPoint slides provided by their professors (Juban & Lopez, 2013). Baier et al. (2011) suggest another reason behind the lack of textbook reading. Of the students they studied, 89% stated that they believed they could make a grade of

a C or higher without completing any of the assigned readings. They were satisfied with putting in the minimal amount of effort possible to receive a passing grade, but in doing so they overlooked a great deal of information. When students choose not to read their textbooks, they miss a chance at a deeper understanding of the subject matter and reduce their opportunity to expand their thinking past the surface. A great deal of knowledge can be lost within the bounds of a textbook. Using surveys on textbook reading and learning beliefs, this study investigated textbook reading behaviors and beliefs about the learning process. Findings from this study indicate that textbooks are infrequently used in college level courses and students engage in alternate activities while reading textbook materials. Students primarily reported infrequent textbook use because course PowerPoint slides were sufficient, notes from class were sufficient, or the course was structured in a way that textbook use was unnecessary. In addition, students possess misconceptions about learning processes which may contribute to the infrequent textbook reading behaviors. The findings of this study suggest a need for future research evaluating textbook use and textbook reading behaviors.

Oceann Stanley

Graduate Program: Psychology

Sponsor: Ellen Sigler, Taylor Broadway

Coloring in the Classroom: Long-Term Memory Recall

It has been estimated that 30-50% of thoughts are off-task (Giambra, 1995). This mind-wandering is related to decreased attention and reduced performance at school (Pekrun et al., 2010). One of the tools shown to combat this shift of attention is doodling. Doodling has been reported to help people manage distractions and improve performance on memory tasks (Andrade, 2009). Andrade had participants shade in various shapes during a mock telephone message and found that participants in the doodling condition had increased task performance; where the “doodlers” recalled 29% more information than the control group. Stanley, Sigler, and Jimison (2016) replicated this study using a different kind of activity, coloring. They proposed that coloring was similar to doodling, in that it would increase task performance. Stanley et. al. (2016) had participants listen to the same audio message under three different conditions: a note-taking (N=39), a simple coloring (N=40), and a complex coloring condition (N=34); with the latter two coloring a simple and more complex image, respectively. They were asked to listen to and write down certain names heard in the clip. Immediately after the clip was over, they were asked to recall names and any places stated in the clip. A One-Way ANOVA showed that there was a significant difference between the groups in the number of accurate names they wrote down during the task, $F(2, 110)=11.055, p<.001$ and names recalled afterwards, $F(2, 110)=6.079, p=.003$, but not for places recalled, $F(2, 110)=1.866, p=.16$. The control group wrote down more accurate names than both coloring groups during the task, but the simple coloring group did just as well in the name recall. This study plans to replicate Stanley et. al. (2016) while lengthening the latency period. We hypothesize that participants in both coloring conditions will outperform the control group in a long-term recall.

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Exploring Social-Emotional Competence and Personality in Preschoolers

The applicability of the five factor model of personality for children, rather than traditional temperamental measures, has been supported by various studies (Angleitner & Ostendorf, 1994; Digman, 1994). Numerous studies (De Pauw, Mervielde, & Van Leeuwen, 2009; Grist & McCord, 2010; Kavcic, Podlesek, & Zupancic, 2012) have also found the five factor model to be useful for children as young as preschoolers; research by Sroufe, Egeland, Carlson, and Collins (2005) supports the existence of "coherent personalities" in preschool-aged children at 5 years old. This is relevant because research by Abe (2005) has demonstrated that personality in early childhood is coherent with, and predictive of, behavior and mental health functioning throughout childhood and into adolescence. In this study, personality was measured using the M5-PS-35 (Grist, Socha, McCord, 2012). The idea that preschool is a potentially significant period in the development of future social-emotional competence due to the various developmental milestones present during this time frame is suggested by McCabe and Altamura (2011). Wood, Davis, Swindle, and Quirk (1996) describe social-emotional competence as the ability to maintain social relationships and personal needs. In this study, social-emotional competence was measured using the Social Competence in Preschool-Scale for Teachers (adapted from the Social-Competence-Teacher scale; Conduct Problems Prevention Research Group, 1990). This study will compare the findings from the M5-PS-35 and the Social-Competence in Preschool-Scale for Teachers to determine if correlations exist between personality traits and level of social-emotional competency in preschool-aged children. Data collection for this study was recently completed and analysis of the data will occur presently.