Program and Abstracts

Celebration of Student Scholarship

Showcase of Student Research, Scholarship, Creative Work, and Performance Arts

2020

Celebration of Student Scholarship 2020

Unfortunately, due to the advent of the COVID-19 pandemic and uncertainty about going forward with the 2020 Celebration of Student Scholarship in the traditional format, the event was cancelled. This book contains the abstracts for those student entries that were received before the event was cancelled.

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2020 Posters-at-the-Capitol Participants

Posters-at-the-Capitol, an annual event collaboratively hosted in Frankfort by all of Kentucky's public institutions of higher learning, enables members of the legislature and the Governor to better understand the importance of involving undergraduates in research, scholarship, and creative endeavor. The following Morehead State University students are recognized as official 2020 participants.

Brenton Anderson- *Mentor Cheng Cheng*
Johnathan Baird – *Mentor Joshua Qualls*
Megan Bailey- *Mentor Gregory Corso*
Noah Blevins- *Mentor Michael Fultz*
Hannah Brewer – *Mentors Wilson Gonzalez-Espada and Robert Boram*
Sydney Brown –*Mentor Gregory Corso*
Belinda Candra-Bekasi - *Mentor Wilson Gonzalez-Espada*
Mia Carman - *Mentor Reganne Miller*
Dorian Cook -*Mentor Lesia Lennex*
Craigory Coppola – *Mentor Heba Elgazzar*
Stacey Crose – *Mentor Mary White*
Jorden Crowe – *Mentor Gregory Corso*
Sheridan Combs – *Mentors Rachel Blackwell, Ahmad Hassan and Fatma Mohamed*
Anya Deaton- *Mentors John Farrar, Rachel Blackwell, Ahmad Hassan and Fatma Mohamed*
Lydia Deaton- *Mentors John Farrar, Rachel Blackwell, Ahmad Hassan and Fatma Mohamed*
Kathryn Gallenstein – *Mentor Wilson Gonzalez Espada*
Jessica Hamm- *Mentor Johnathan Nelson*
Vanessa Jones –*Mentor Gregory Corso*
Gabrielle Merrill – *Mentor Mary White*
Savannah Muse – *Mentor Gregory Corso*
Logan Pennington – *Mentor Wilson Gongalez Espada*
Travis Porter- *Mentor Kourousch Jenab*
Chloe Spencer- *Mentor Lola Aagaard*
Allie Skaggs. - *Mentor Cheng Cheng*
Leanna Shelton – *Mentors Rachel Blackwell, Ahmad Hassan and Fatma Mohamed*
Katlin Stumbo – *Mentor Michael Fultz*
Kaitlyn Shannon- *Mentor Mary White*
Haley Turner- *Mentors Rachel Blackwell, Ahmad Hassan and Fatma Mohamed*
Kaylee Trent- Mentor Mary White
Haylee Winters- Mentor Timothy Hare
Colby Winters- Mentors Thomas Pannuti and Shanil Virani
Brooke Young – Mentor Mary White
Sydney Young- Mentor Gregory Corso

For more information on the 2020 Posters-at-the-Capitol please go to:
http://kynsfepscor.org/event/posters-at-the-capitol-2020/

Our vision is for Morehead State University to be universally recognized for teaching and scholarship of the highest quality resulting in superior student success. To ensure the optimal environment for learning, Morehead State University has a long tradition of combining great teaching with success in scholarship and creative productions. Our academic programs provide a wealth of opportunities for students to work alongside experienced faculty in meaningful research and creative initiatives that stretch our students' intellectual horizons.

The faculty member who mentors students in research and other creative activities provides the stimulus that challenges imaginative minds often in new and innovative ways that would be impossible within the confines of the conventional classroom. Our deep commitment to a culture of undergraduate research results in a rich educational experience for our students and empowers our diverse population of scholars to reach their educational goals.

The Annual Celebration provides a welcome opportunity for everyone to see the products of these unique intellectual partnerships -- products that are remarkable in their originality, scope, and depth. As you review the Celebration of Student Scholarship program, you will discover a wide range of student accomplishments in individual and group research projects, creative efforts, and artistic performances across all academic disciplines.

When considering the accomplishments on display at this year's Celebration, I am confident that through the continued efforts of all those involved, our University will establish itself as a primary destination for students who wish to become both active partners in the process of discovery and exceptional citizens of our increasingly challenging world.

Now in its thirteenth year, our Annual Celebration of Student Scholarship is a time when we can all pause to reflect on the outstanding efforts of this community of scholars and to recognize the tremendous efforts of our students in research, scholarship and creative productions.

I encourage you to attend this showcase and provide your support and encouragement to our young scholars and artists, as well as to the members of our faculty and staff who have shared of their time and talent to help their students bring these projects to reality. Thank you for your participation!

Jay Morgan, President

I am pleased to be a part of the Celebration of Student Scholarship as we recognize the outstanding scholarly accomplishments of our students and their faculty mentors. Across the academy, the primary setting for teaching and learning centers around the curriculum and student engagement as related to structured classroom activities; however, it is the participation in research and creative production activities that provides an opportunity for students to transition from learner to scholar. Student engagement through inquiry that involves seeking answers to research questions or creative expression based on theories and principles provides the learner a different approach and perspective to learning.

"Out of class" experience provided by their faculty mentors have opened doors to new learning opportunities for students as they discover the depth of their own abilities through the application and investigation of knowledge. Partnering with their faculty mentor(s), students are challenged to seek answers to questions through inquiry or apply their creative skills and talents that stretch their base knowledge and compliment their learning opportunities.

This Annual Celebration is an excellent illustration of the integration of scholarship, teaching, and learning. A special "Thank You!" to faculty mentors for their contributions to the intellectual and creative development of our students. "Congratulations" to all of our student scholars for their continued success.

Dr. Robert Albert, Interim Provost and Vice President for Academic Affairs

The Fourteenth Annual Celebration of Student Scholarship spotlights Morehead State University as a premiere destination for all who desire a world-class education that is catalyzed by the personal mentorship of a world-class faculty. It is well accepted in academic circles that involvement in research and creative endeavor empowers students at both undergraduate and graduate levels to better analyze problems and synthesize solutions, thus helping them to better prepare for productive careers and leadership in their chosen fields, as well as to be well-informed, enthusiastic contributors to a progressive 21st century society. My congratulations and my thanks to our students and faculty for recognizing these facts and for their much-valued participation.

Dr. Michael Henson, Associate Vice President for Research and Dean of the Graduate School

The Celebration of Student Scholarship is the capstone event that recognizes the important contributions of collaborative research between faculty and student to the overall educational experience for Morehead State University students. Our students and faculty benefit tremendously from these one-on-one scholarship opportunities.

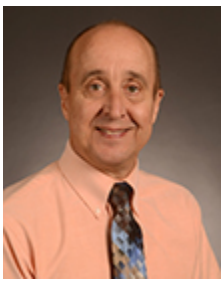
Dr. Gregory Russell, Dean, Elmer R. Smith College of Business and Technology

The annual Celebration of Student Scholarship has provided a consistent high quality experience for students to share their research related to P-12 education and helps to prepare students for better understanding of data-driven decision making. The research P-12 education students are conducting helps to better respond to local, state, and national trends related to research-based and theory-grounded practice. The scholarship these candidates are presenting demonstrate the lessons learned in the classroom and beyond as part of the skills of professional educations. The College of Education faculty and staff congratulate the students participating in the celebration as their projects showcase the high quality of inquiry vital to teaching and learning within teacher education.

Dr. Christopher Miller, Dean, College of Education

The Caudill College of Arts, Humanities and Social Sciences is committed to providing research and creative production opportunities for students in each of our disciplines. Scholarly engagement and creative endeavors bring students and faculty together as partners and provide advanced learning experiences for both. We are delighted to recognize these outstanding scholars and their mentors who make significant contributions to the campus, state and region. Morehead State University's commitment to academic excellence and the advancement of Kentucky is evidenced by the exceptional work showcased at the Celebration of Student Scholarship.

Dr. John Ernst, Dean, Caudill College of Arts, Humanities, and Social Sciences



The Celebration of Student Scholarship provides a wonderful opportunity to recognize and celebrate student scholarship and creative accomplishments. The relationship among faculty mentors and student scholars is enhanced when they work together to discover and disseminate new knowledge or express themselves through various forms of creativity. Student research and creative activity is an essential component of undergraduate education. Students working with faculty in scholarly activities not only experience the excitement of discovering new knowledge and solving challenging problems, but also learn important life skills that are necessary to thrive today's ever-changing world.

Dr. Wayne C. Miller, Dean, College of Science

Beyond Wwi: Legal And Extralegal Battles Over The German Language In The Us

Alexa Potts*. Dr. Philip Krummrich , mentor, **School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

Although they were at one time considered loyal and hardworking citizens, German Americans found themselves distrusted and ostracized during the years directly preceding, during, and after World War I. While extralegal pressures were put upon German Americans to renounce the German language and culture prior to and during the war, the years directly after the war saw an increase in legal action to eradicate the German language from the United States. Famous cases such as Meyer v. Nebraska took the battle over the German language to the courtroom. In the midst of the chaos, some German Americans chose to defend their heritage. These German Americans chose to publish books defending the German culture, and others continued to teach their children the German language. Although German Americans won the legal battles and regained their constitutional right to their German heritage, the German language and culture never fully recovered in the United States. Today, many Americans are unaware of or apathetic towards their German roots. One must wonder whether the situation with the German language can provide insight into our modern day relationship with the Spanish language.

Design Of A Virtual Reality Scenario And Scent Generator For Sensory Training

Levi Howell*. Dr. Jorge Ortega-Moody, Dr. Kouroush Jenab, mentors, **School of Engineering and Information Systems, Smith College of Business and Technology**

In the food industry, what makes the difference between a company and its competitors is the quality of its food product, and one of the components that makes quality is the flavor of a product. As trends shift to meet consumer's health and wellness desires formulas are changed with companies trying to retain the same flavoring. This shifting has led to the increased demand of sensory analysis tests. Some of the limitations for sensory analysis is the required space to have the individual booths, time consuming preparation, and material costs. But even with the previous limitations, one of the most important is the training of new users and calibration of existing users. With the development of virtual reality this problem can be more easily rectified by creating a virtual scenario that utilizes all senses and reduces cost of training. The main objective of this research is the development of a virtual scenario for sensory training. This is achieved by recreating a traditional testing environment and training program to analyze scents provided by a scent generator prototype. The methodology will include the design of the training, recreating the environment, programming the interaction with the user and finally the development of a scent generator to release scents.

Keywords—Virtual Reality, sensory training, mechatronics.

Learning The Value Of Branding Destinations For Tourism Opportunities

Karly Potts*. Dr. Janet Ratliff, mentor, **School of Business Administration, Smith College of Business and Technology**

This research study will discuss the variables that contribute to the tourism potential of a destination. Tourism has become a major economic driver for development for both a local community and a developing nation, and everything in between. Literature has been reviewed which addresses destination tourism and tourism branding. The SOAR initiative targets those counties in Kentucky identified as part of the Appalachian region and provided the original sample of 54 counties. Comparative data was also collected on those counties outside the Appalachian region. Six tourism components provided the basis for analysis on tourism potential: attractions, accessibility, accommodations, activities, amenities, and awareness. The correlation between social media marketing, otherwise identified as awareness, and the quantity of each of the other components is an aspect that will be explored. Tourism expenditures and employment related to tourism for all counties studied will also be examined.

Restoration Of Time Code Displays

Jeremiah Lowe*. Mr. Jeffrey Kruth, mentor, **Space Science Center, Space Science Center**

The project I chose for my presentation involves restoring & re-using classic technology. Specifically, I am restoring eight NASA-built rack mount time displays which were obtained years ago from NASA Marshall Space Flight center in Alabama. The project involved some unique challenges. The primary reason I have decided to pursue this project is that at the MSU 21m tracking antenna we have a need for precision digital time (accurate to the millisecond) and displaying that time is always a nice thing to do, however commercial time displays are expensive and don't have the same look or history that these older displays have. A secondary reason is that is was fun.

In order to update these displays first I laid out a plan to replace the original circuitry, some of which was not originally included in the displays. The displays implementation consisted of a power supply, led drive circuit, and a control board. There was no circuitry installed to actually generate the display driver signals and no clock circuits, as this was originally part of another unit, as these displays were only remote units. In order to reduce the cost and complexity of the upgrade I re-used the power supply, and modified the existing led drive circuit (to allow more control). To control the displays I replaced the existing display control board which used a parallel wired bus connector with an Arduino Nano and a custom control board of my own design.

The updated version can receive standardized IRIG-B signals. This is very useful as IRIG-B is a standard time code format that is used in all professional equipment. This signal can be generated from many types of standard equipment such as a Network Time Protocol server. Using IRIG simplifies the design as well as providing a layer of compatibility with other equipment. Since the displays now support IRIG they can be daisy-chained together, all slaves being controlled by one master. Since IRIG is designed to send the time in UTC the displays, I designed the interface with an offset knob which allows the displays to be configured for any standard timezone.

In summary, the project was a success and yielded a very useful result, currently installed in the Deep Space Network Station 17 Mission Operations Center (located on the second floor of the Space Science Center).

The Effects Of Toxic Masculinity On Transgender Men

Cat Haggard*. Dr. Bernadette Barton, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Hegemonic masculinity, more colloquially referred to as toxic masculinity, is a set of practices that promote the dominant social position of men, and the subordinate social position of women. Toxic masculinity socializes men to see masculinity itself in hierarchical terms, ranking men according to how well they embody and present as the alpha male: the toughest, strongest, and least emotional. Little research has been completed on the study of how this phenomenon affects transgender males who have a unique perspective on how toxic masculinity shapes manhood. Drawing on interviews with eight transgender males in college, this research explores toxic masculinity through the insights and experiences of transmen. We find that while toxic masculinity almost always impacts the transitioning process of transmen, the part it plays is subject to change based on a variety of factors including presentation, health, perspective, and acceptance of the preferred gender identity. When transmen play the role of the alpha male, they are more likely to be respected and received as men by cisgender men.

Transitions: Becoming Me In Appalachia

Angelique Clay *, Jacob Tackett*. Dr. Ann Andaloro, mentor, **School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

This documentary includes stories of individuals transitioning in our community. Morehead State University students share stories of their struggles and triumphs concerning discrimination, family relations and religion. The documentary includes an interview with scholar Bernadette Barton, Director of Gender Studies at Morehead State University. The Undergraduate Research Fellows who produced the documentary included artistic elements of dance, poetry and music to enhance the transitioning narrative. This work was show at the Appalachian Studies Conference in Lexington. It will also be viewed at a Spring Gender Studies Event. Sharing stories is enriching for the participants. Viewing the stories can be enriching for the audience. This work was created by students who believe that transitioning and becoming yourself in Appalachia is important. It is not only important to those who are becoming themselves, it is important to the cultural sensitivity of our community.

Current Systems, Magnetic Energy Storage, And Solar Flares Of Noaa Ar11283.

Alanna Cavins. Dr. Thomas Pannuti, mentor,* **Department of Mathematics and Physics, College of Science**

At the extreme end of the variability spectrum, powerful events we call solar flares produce orders-of-magnitude increases in the shorter-wavelength luminosity output on millisecond time-scales. Although it is generally accepted that solar flares occur through the release of energy stored in the coronal magnetic field above an active region, it is not well understood how much of the stored energy will be released in a single event. NOAA AR11283 (at central meridian on 2011.09.06) has proven to be an interesting front of research for this investigation. The objective of the ongoing research is to compare estimates of the magnetic energy stored by individual current systems with the region's flaring history. The present study focuses heavily on the apparent magnetic energy of subvolumes in the region -- as identified from spherical nonlinear force-free modeling-- to better understand the possible relationship the between flares and the visible current system evolution. Results are based on data from the maps of the photospheric magnetic field imager (HMI) on the Solar Dynamics Observatory (SDO).

Using Ngc 1566 As A Model For Changing Look Agn

Rebecca Mikula. Dr. Dirk Grupe, mentor,* **Department of Earth and Space Science, College of Science**

The Seyfert Galaxy NGC 1566 was detected in an X-ray outburst by INTEGRAL in June 2018 and triggered several observatories with follow-up observations including the Neil-Gehrels Swift Observatory. This source saw a second, smaller flare in the summer of 2019. I will report on the long and short term X-ray and UV/Optical light curves and how we can explain this outburst by an accretion disk instability. I will also discuss some spectroscopic modeling done with Cloudy. Interestingly, optically NGC 1566 is a 'changing look' AGN which changes its optical spectroscopic classification from a Seyfert 1.5 type to a Seyfert 1. In addition, strong coronal iron lines were found in the current optical spectra. High-resolution X-ray spectroscopy also suggests the presence of outflowing gas with velocities of 500 km/s.

Automated Indoor Aeroponics System (Aias)

Thomas Buteyn*. Dr. Jorge Ortega-Moody, mentor, **School of Engineering and Information Systems, Smith College of Business and Technology**

There is currently a growing demand for fresh fruits and vegetables. Organic produce is also in high demand because they are not grown with harsh synthetic pesticides. Produce labeled as Organic can cost up to 50% more than traditionally treated crops. Unfortunately, many people have little to no access to these foods because of cost or availability. Studies have shown that produce can lose up to 30% of its total nutritional value within 3 days of harvest, and the Consumer Reports website states that children found with high levels of modern pesticides in the body can double the risk of developing ADHD and other issues.

The AIAS can provide fresh, fast, and cost-effective produce to users in their own homes without the use of pesticides. Aeroponics systems grow produce up to three times faster and more uniformly than normal growing operations. They also use almost 40% less water, produce a higher yield due to more available oxygen and nutrients to the roots, and take up as little as a tenth of the space of a normal garden.

The AIAS is composed of 3D printed grow stations, nutrient pumps and holding tank, a heater, an exhaust fan, grow lights, water level and quality sensors, environmental monitoring sensors, a humidifier, and dehumidifier all inside the enclosure. An Arduino is used to monitor the environment and water quality, it also controls relays to actuate the different components. The Arduino and components are coded, wired and functioning.

The next phase is to create the Human Machine Interface (HMI) with a Raspberry Pi integrated with a touchscreen. The Raspberry Pi will handle the program selection, data interpolation, and communication. The Arduino will be sent commands from the Raspberry Pi to manipulate specific components. As AIAS is developed, form factors and component choice can be adjusted to better fit the needs of the consumer. The AIAS can fit in an unused corner of a home or apartment and provide affordable, flavorful, healthy produce to supplement and add to a current diet and lifestyle.

Providing Better Access To Local Cultural Resources: A Redesign For The Eastern Kentucky Arts Project

Abbey Williams*, Cristen Brockett*, Elizabeth Debord*, Liz Ketz*. Dr. Joy Gritton, mentor, **School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The Eastern Kentucky Arts Project (EKAP) was founded in 2007 as a way to connect and promote the communities of Eastern Kentucky through the visual and performing arts . EKAP aspired to bring Appalachian arts to a wider audience, while at the same time providing local residents--including educators--with information about the rich history and cultural resources in their area. The EKAP website was launched ten years ago, and engaging a younger generation now requires a website redesign that integrates social media to a great degree, is more interactive, and adds new features, such as Instagram. This update has also afforded an opportunity to explore better ways to serve the region by envisioning new strategies for linking website visitors with knowledge about their home (including historic architecture, oral histories, and archived music recordings). Being able to highlight current art and music initiatives and conduct new oral histories, while managing large amounts of assembled data and maintaining resource links, was part of the challenge, as well. A collective of students who have pooled their areas of expertise--history, art education, and graphic design--to accomplish this Herculean feat will discuss this work-in-progress.

Using Data Logging Sqm L Us: Promises And Pitfalls

Madison Howard*. Dr. Jennifer Birriel, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Unihedron Sky Quality Meters are small, portable devices designed to measure night-sky brightness at zenith. SQMs are becoming standard equipment for light pollution researchers. MSU has two banks of four SQMs to monitor local night sky brightness. One bank of these detectors is nearly seven years old and the other is four years old. Both banks have been used by over half a dozen students over the years. Students must update software and enter data such as device location and coordinates. Early on, we discovered that several devices were functioning incorrectly: device errors included meters not collecting data at all, collecting data at incorrect times, or collecting spurious data. We report here on the specific nature of the errors and the ste by-step process for correcting these errors. The end-product of this project is a debugged, fully functioning set of SQM banks ready for deployment and detailed trouble-shooting guide for future students.

Down The Rabbit Hole: A Graphic Novel

James Davidson*. Ms. Elizabeth Mesa-Gaido, mentor, **School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

Alice in Wonderland by Lewis Carroll is a childhood classic with many different forms of adaptation. The project provides a new contemporary take on this classic, showcasing the protagonists with antagonistic, darker undertones. With this graphic novel, many current concepts are explored relating to social, emotional, and mental health issues. An intimate and raw view of the beloved childhood characters is presented. Character depictions are more mature, crude, and unnerving. This is a multi-year project, with the 2019-2020 focus being on drafting, editing, and producing a prequel to the first issue of the series. This stage of editing is one of the final stages and requires scanning the hand-drawn illustrations to create digital images, which are color corrected and edited in Adobe Photoshop. Thorough and meticulous research in collaboration with many of the departments on campus, in combination with personal studies of other artist's graphic novels, are used to create an accurate and in-depth graphic novel incorporating concept ideas, character analysis, and storyboarding. This research project was supported by an Undergraduate Research Fellowship

Integrating Computation Into First Year, Calculus Based Physics Laboratories.

Nathan Jones*. Dr. Jennifer Birriel, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Morehead State's Physics discipline has joined the Partnership for the Integration of Computation in Undergraduate Physics (PICUP). The philosophy of PICUP is that computation should be implemented in each course in the curriculum because most real world physics and engineering problems require numerical, rather than analytical, solutions. For the first year physics courses we plan to integrate computation into the laboratory component of the courses. The lab provides a two hour period in which students can be guided through a single computational problem with immediate instructor assistance. Three labs, or 25% of the course content, will be implemented in both Physics I and Physics II. Since the student body includes a diverse group from physics, mathematics, engineering, and geosciences all with very different computer programming backgrounds, we choose MS Excel as the computational "language". The student researcher was provided a series of articles from the journal of Physics Education: he read each article and implemented the described spreadsheet labs. Based on time requirements and educational value, the student made recommendations to the faculty mentor, who then designed the computation laboratories. The student researcher then tested each lab. Here we discuss a sample of three computational lab exercises and the results of the first such lab implemented in the Spring 2020 Physics II course.

Increasing Student Engagement In Introductory Online Physics

Breanna Epperson*. Dr. Kent Price, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Today, the demand for online instruction is on the rise. While online classes may have their advantages, they have many disadvantages. In a classroom setting, research shows that student interactions are important for overcoming common misconceptions, but it is challenging to achieve the same level of engagement in an online setting. To try to improve online interactions in an introductory online physics class at Morehead State University, the students in the Fall 2018 and 2019 online classes were required to post a total of three times about a conceptual physics question in a series of assignments. They had to state their answer, explain why they chose that answer, and respond to a classmate's answer to receive full credit. Doing so increased the percentage of students who responded to another student's answer and changed their final answer. This led to an increase in the percentage of students who answered the discussion questions correctly when compared to previous classes. The previous classes were only required to state their answer and explanation.

Improvement on a national standardized conceptual understanding test was also measured. This test is given at the beginning and the end of the semester and measures the improvement, or gain, of the class. The gain from previous classes and the gain of the online class were compared to see if the changes that were made had a positive impact on the students' learning. The gain on the standardized assessment for the Fall 2019 class was 0.49 which is a significant improvement from the classes which were only required to state their answer and explanation (0.21 and 0.19).

Orbital Modeling For The Aerovista Cube Sat Mission

Kristen Ammons*. Dr. Benjamin Malphrus**, Dr. Mary Knapp**, mentors, **Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Haystack Observatory**, MIT**

Auroral Emission Radio Observer (AERO) is a NASA H-TIDeS-funded mission with a goal of tracking the Earth's radio aurora. AERO and its twin CubeSat— Vector Interferometry Space Technology using AERO (VISTA)— will reside in a polar orbit for the duration of its three-month mission. During this time, AEROVISTA will measure direction of arrival, frequency spectra, and radio frequency emission occurrence rates. The mission has an additional technical objective of advancing the technology readiness level of its payload, the vector sensor. AEROVISTA is a partnership between the Massachusetts Institute of Technology (M.I.T.), M.I.T. Lincoln Laboratories, M.I.T. Haystack Observatory and the Morehead State University Space Science Center. Models of spacecrafts' orbits are created for the AEROVISTA design study using AGI's Systems Tool Kit (STK), constrained to altitudes of 450 to 550 km and a noon/midnight polar orbit with a target local time of midnight. Having the nominal orbit allows for the determination of when a spacecraft will be passing through an auroral zone and if it will prove effective to take data during a given pass. Furthermore, one can determine when the spacecraft will be available for uplink and downlink over the Westford and Morehead ground stations. Finally, a decision can be made about the most effective time to perform critical housekeeping activities with as little infringement on data collection as possible. This includes determining when the two satellites can be in drag configuration to minimize the effects of drift due to differences caused by uncertainty in an along-track deployment. Further work with differential drag analysis has been done to determine differences in velocity that will ultimately result in loss of contact between the two satellites and at what point in time satellites will no longer be within the maximum allowable range in the event of loss of commanding capabilities.

Additionally, data from the orbit is incorporated into a simulation of the vector sensor. The model is used to generate position data (location and orientation) in Earth-Centered-Earth-Fixed-Coordinates (ECEF). Point sources are also plotted in this coordinate system. The coordinate system is then rotated into the frame of the spacecraft using quaternions. Once the sources are placed within the spacecraft reference frame, they can then be fed into the vector sensor simulator which ultimately outputs voltage time series data.

Making A Difference In Children Through Gardening And Agriculture

Heather Smith*. Dr. Joy Gritton, mentor, **School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

Children face many problems in school, such as bullying, keeping up with grades, and maintaining friendships. These challenges can be even harder for students in Appalachia who often face poverty, food insecurity, and in some cases, difficult home environments. Many rural children today do not have an abundant knowledge of agriculture and the region's culture. This project teaches elementary school children gardening and agriculture at the Haldeman Community Center After School Program. This project seeks to provide a welcoming and nurturing environment that emphasizes the importance of locally-grown and healthy fresh food and provides an introduction to the nutrition and care of domestic animals. The children grow their own produce in raised bed gardens that they harvest and eat as wholesome snacks. Also, the children learn about traditional agriculture-based skills. In this way the program hopes to foster pride in culture, compassion for all living things, and an improved quality of life going forward.

Correlation Between Testosterone Indicators & Advanced Percussion Skill In Females

Chloe Spencer*. Dr. Lola Aagaard, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Research suggests that many of the skill sets required of percussionists may come more naturally for high-testosterone individuals. Testosterone's role in the organization of the fetal brain in several places manifests as physiological and psychological characteristics. For example, percussionists are constantly asked to perform skills that involve ambidexterity and coordination between all of their limbs. This requires rigorous communication between the two halves of the brain, which is controlled by the Corpus Callosum, a part of the brain that testosterone aids in developing during the fetal period. Testosterone levels may also impact the way an individual self-identifies on a masculine/feminine scale. Because testosterone is not limited to males, it is possible that a trend of higher testosterone is found in female percussionists. In this study, female percussionists at the collegiate level were given two popular tests that suggest testosterone levels: BEM Sex-Role Inventory and 2D:4D (digit ratio) test , as well as a Self-Identification Survey. The students' scores were plotted and analyzed against the averages of females in other collegiate instrument fields. The data showed that female percussionists showed higher levels of testosterone indicators than their female non-percussion colleagues.

Developing Curriculum For Adjacent Learning: Cryptography And Python

Alexis Krumpelman*. Dr. Joshua Qualls, Dr. Vivian Cyrus, mentors,
Department of Mathematics, College of Science

Everyone uses cryptography whether consciously or not when communicating through technology. Programming is a valuable skill for anyone involved in STEM fields because of its numerous applications. Our goal is to develop a course to forge student proficiency in cryptography–including the mathematics behind various ciphers–and the basics of the Python programming language. In this presentation, we will elaborate on the objectives of the course and how they are to be achieved. Student learner outcomes include proficiency in Python programming, expounding on security properties in cryptographic theories, analyzing and applying cryptography in Python, and considering the corresponding limitations and applicability.

The Detection Of Radioactivity In An Outcrop Of Ohio Shale

Eddie Henderson*. Dr. Ignacio Birriel, Dr. Kevin Adkins, mentors,
Department of Physics, Earth Science and Space Systems Engineering, College of Science

Project Description: This project is concerned with measuring the amount of naturally occurring radioactivity found within the black organic shale family. This type of shale is common in Eastern Kentucky, so it is important to know the amount of radiation produced and the impacts it could have on the surrounding environment. To measure the radiation, we are using a group of Gamma-Scout detectors. The Gamma-Scouts detect alpha, beta and gamma radiation in fixed time intervals and store the results in memory for later analysis. The research site is the Ohio Shale Outcrop located within a few miles of Morehead State University. This talk will focus on the use of the Gamma-Scouts and the data collection and analysis.

The Quarterback Is Throwing Ducks: Preference Of Figurative Discourse In Both Athletes And Non Athletes.

Lindsay Anderson*. Dr. Lynn Haller, mentor, **Department of Psychology, College of Science**

Lindsay Anderson*, and Lynn M. Haller Department of Psychology, College of Science.
We have demonstrated that humans find it easy to produce metaphors when prompted. Use of metaphoric language is a common tool in sport discourse. We attribute this prevalence to the intangible nature of sport experience. The unfamiliar nature of sport concepts makes metaphoric speech a more effective way of transmitting these concepts. Metaphors are often used in sport to make abstract concepts easier to conceptualize. Coaches and players often express their understanding and expectations of sports through non-literal language and understanding how athletes communicate is essential for a professional who aims to better a team or individual performance. Our current study measured athletes' and non-athletes' preference for sport metaphoric speech. We believe that metaphors will be the preferred way to discuss sport concepts because they are easier for non-athletes to understand and provide athletes with a more effective way of memorizing key concepts for competition. Results will be discussed in the context of encouraging the use of metaphor in sports environments.

Solar Limb Darkening: Digging Deeper

Jacob Wagoner*. Dr. Jennifer Birriel, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Solar limb darkening is a prominent feature seen in white images of the sun: the brightness of the solar disk is greatest at its center and decreases moving outward to the limb. Using a solar projection method and recording an image of the sun with a cellphone camera affords students an opportunity to investigate this phenomenon with their own data. We demonstrate the use of both full color images and RGB split images to for both qualitative observations and modeling solar limb darkening. We discuss the method including instrumentation requirements, camera settings, software and analysis techniques. From our earlier studies, we conclude that white light images prove to be useful only for qualitative observations. However, splitting images into the RGB band images proves quite useful for comparison to wavelength dependent models of solar limb darkening.

Exploring Probability In Blackjack With Monte Carlo Simulations

Kamron Horton*. Dr. Joshua Qualls, mentor, **Department of Mathematics, College of Science**

This presentation explores various probabilities of winning in blackjack given multiple real-world factors and strategies. We coded our own blackjack engine and ran Monte Carlo simulations to measure winning probabilities of various play strategies (such as the basic blackjack strategy and card-counting strategies). We present results of many simulations and perform statistical analyses to compare with the results of conventional probability calculations.

A Faulty System, Or The Last True Safeguard To A Functioning Democracy

Colby Birkes*. Dr. Douglas Mock, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The founding fathers of the American experiment sought to rectify an electoral institution based on a balance between democratic and republican ideals. Their overarching fear of authoritarianism drove them to create a complex process that would produce the most fit statesmen for office. Although Hamilton describes the mode of executive selection as "the only part of the system, of any consequence, which has escaped without sever censure," it has fallen under increased scrutiny in contemporary times for its alleged lack of accurate representation, its unnecessary complexities, etc. However, the electoral college serves to protect the voice of the marginalized from the majority, fosters interregional coalitions, and maintains a federal system of government.

This paper will focus on the originalist intent of the electoral college, its main tenets and structure, its historical evolution, proposed revisions and replacements of the Electoral College, and a discussion on if it is truly the best system for the future of democracy or if it is suppressing the will of the people to the detriment of democracy. One thing is clear, the founding fathers would not recognize the modern Electoral College, for it is but a ceremonial shell of what they created.

Painting Pop Culture: Tattoos Through The 20th Century

***samantha neal*. Dr. Elizabeth Mesa-Gaido, mentor,* School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The project focuses on creating fine art pieces inspired by the different historical styles and trends of tattoos in the United States throughout the 20th century. This particular period was selected due to the quick and diverse changes in tattoo design from decade to decade, much like what occurred with 20th century fashion. Research and analysis of the progression of visual and cultural components of tattoo art and design over a hundred-year period were used to create preliminary sketches and a new series of original oil paintings. During much of the 20th century, tattoo art and design work was not necessarily respected or considered high art due to who the artists were, the medium they worked in and how it was displayed (ink on skin as opposed to oil on canvas in a gallery or museum), and who chose to be tattooed (traditionally army men and criminals). By referencing historical tattoo work in fine art painting, it gives the genre the recognition and respect it deserves. The completed paintings are an homage to different decades; some are satirical, and all include pop culture references from their time period. This research was supported by an Undergraduate Research Fellowship.

¿Porqué Aquí?/Why Here?

***Andrew Sexton*. Dr. Philip Krummrich, mentor,* School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

Completing research in the field can be difficult due to its unpredictable nature. Many variables can be considered and accounted for, but only through actually performing research can one grow accustomed to the new challenges that must be avoided or overcome. New challenges can be faced when researching specific populations or in relation to sensitive information. Attempting to study the immigration needs, habits, and realities of Latin Americans who immigrated to Eastern KY had its own array of challenges that could have changed the methodology of the present study and/or future studies. This presentation will deal with the challenges of research on immigrants while offering solutions to said challenges in an attempt to further the research and, ultimately, aid in assisting the immigrant population of Eastern KY through policy changes.

Effect On Hydrolyzed Yeast Mineral Product On Cow And Calf Performance

Brandi Banks, Johnna Scott*, McKenzie Layne*, Shannon Carey. Dr. Flint Harrelson, Dr. Patricia Harrelson, mentors, **Department of Agricultural Sciences, College of Science**

In the Southeastern part of the U.S., fescue is a common forage found in pastures. Fescue is often infected with ergot alkaloids. Cattle and horses are generally most affected by the ergot alkaloids that produce varying levels of ergovaline. The level of ergovaline can result in a wide variety of symptoms in the animals, but are generally referred to as fescue toxicosis. Symptoms include reduced intake, weight loss, and decreased milk production. There are several management tools to help alleviate the effects of fescue including a mineral supplement. Our research objective was to determine if supplementation with a hydrolyzed yeast product could alleviate some symptoms of fescue toxicosis in mature cows. Across the 3-yr study, registered Angus cow-calf pairs (n = 34 or 38) were stratified by cow age and body weight (BW) then randomly allotted to one of two treatments; control mineral (CON) or hydrolyzed yeast mineral (HYM). Cattle in both treatment groups grazed the same mixed grass pastures (n = 6 or 8; 1.21 ha each) which contained varying levels of endophyte (20 – 90%) as measured prior to each year, in a rotational pattern for 126, 133, or 140 days, depending upon year. Pastures were grazed by cattle groups for 7 days and mineral was provided at a target rate of 113.4 grams/head/day throughout the grazing period. Prior to entering a new pasture weekly, cows were weighed and assigned a body condition score (BCS) by two independent, trained personnel. Calves were weighed at the beginning, midpoint, and end of the grazing period. Data were analyzed using the MIXED procedure of SAS. Cow BW change was affected ($P < 0.01$) by a treatment×year interaction. Cow BCS change significantly increased in HYM vs. CON cows (0.34 vs. 0.06; $P < 0.01$; SEM = 0.08) across the entire trial. Calf BW was affected by sex and year, however, was similar between CON and HYM groups. We believe that a HYM could be added to the producers' management of their beef herd to help alleviate fescue toxicosis symptoms.

Americans' Declining Participation In Civic Life

Katlyn Callihan*. Dr. Douglas Mock, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Since the American founding, political participation has gradually been in decline. The framers even had differing opinions concerning who should be in politics. For instance, Alexander Hamilton had a more elitist approach to the subject believing that the more educated, affluent population should make the decisions. The argument has been ongoing since then, and political participation has fluctuated under different American conditions. Declining interest and participation in civic life has continued, and authors such as Ricci, Strauss, Putnam, and de Tocqueville give reasoning as to why this is not necessarily good for the well-being of the United States; statistical analysis of election cycles and voting patterns from various levels of American government give backing to these claims.

Content Based Image Retrieval Using Deep Learning

Tristan Jordan*. Dr. Heba Elgazzar, mentor, **School of Engineering and Computer Science, Smith College of Business and Technology**

The problems of content-based image retrieval (CBIR) and analysis is explored in this research with a focus on the design and implementation of machine learning and image processing techniques that can be used to build a scalable application to assist with indexing large image datasets. The CBIR application will be able to search large image datasets to retrieve digital images that are like pre-defined specifications such as a given digital image, or a given image type. The search is based on the actual contents of images and not the metadata of these images. Feature extraction techniques are used in this research project to analyze images and extract important features of images. The extracted features reflect the important characteristics of images that are related to contents (such as colors, shapes, edges, and textures) that can identify the image type. Supervised Machine learning techniques are used in this project to analyze these extracted features and to retrieve similar images. The developed CBIR algorithms were able to analyze and classify images based on their contents.

Stock Market Analysis Using Text Based Machine Learning

Tristan Jordan*. Dr. Heba Elgazzar, mentor, **School of Engineering and Computer Science, Smith College of Business and Technology**

Predicting stock market price movements can be a difficult task for traditional algorithms as random events can vastly change a stock's value. The goals of this research are to predict these changes based upon communal discussion. The discussions that are being analyzed will be from forum posts of users that have varying levels of involvement with the company of focus. The posts themselves should contain information related to the current events, problems, community sentiment and other factors that would influence buyers and sellers. The proposed algorithm to make these predictions with a recurrent neural network (RNN) that will be able to analyze patterns in word use and order, placing reactions to forum posts into a category based upon expected price movement over various lengths of time. These methods show promise in predicting performance over many time frames.

Babel Note, An Automated Study Hub

Joshua Webb*, Tristan Jordan*. Dr. Heba Elgazzar, mentor, **School of Engineering and Computer Science, Smith College of Business and Technology**

BabelNote is a proposed software that combines the functionality of a traditional word processer for notetaking with tools to create active study material for a powerful all in one academic experience. This software is targeted toward the college student who often spends more time preparing study tools, instead of studying by automatically converting traditional notes into a variety of active study methods such as notecards, quizzes and diagram labeling. The student's notes will be stored in the cloud giving accessibility to notes from anywhere on any device allowing BabelNote to seamlessly integrate into the busy college students schedule.

Is There A Better Way For Insurance

Jonathen Marrero*. Dr. Michael Dobranski, mentor, **Department of Mathematics, College of Science**

The United States of America is a frequent recipient of hurricanes; one of the most devastating tools in Mother Nature's arsenals. The cost of rebuilding homes after these types of storms could be insurmountable; however, insurance offers an affordable way for people to be able to take care of their households in case their homes are damaged or destroyed. We present principles and formulas for determining the cost of providing insurance at the country, state, and city levels using a number of statistical analyses.

Design And Implementation Of An Innovative System For Automatic Recognition Of Asl Using Machine Learning

Joshua Webb*. Dr. Sherif Rashad, mentor, **School of Engineering and Computer Science, Smith College of Business and Technology**

Deaf and hearing-impaired persons learn American Sign Language (ASL) as their natural language. There is a need for a new innovative technology that will enable deaf and hearing-impaired persons to communicate without difficulty anytime and anywhere with persons who do not know ASL. We explore in this research project the problem of automatic conversion from ASL to speech using motion sensors and machine learning. The goal of this project is to design a smart system to capture and recognize hand gestures using Leap Motion sensors, Python programming language, and machine learning algorithms. The proposed system is currently showing promising results for translation of the ASL alphabet and some common words that are used in our daily lives. This system will have a wide range of applications for healthcare, education, gamification, entertainment, and many other applications.

Landslide Inventory Mapping Of Magoffin County, Kentucky

***Ashton Killen*. Mr. Hudson Koch**, Dr. Jason Dortch**, Dr. Jen O'Keefe**, Dr. Matthew Crawford**, Dr. William Haneberg**, mentors,* **Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Kentucky Geological Survey**, University of Kentucky, Kentucky Geological Survey**, University of Kentucky, Kentucky Geological Survey**, University of Kentucky, Kentucky Geological Survey**, University of Kentucky**

Landslide inventory mapping is a process used to identify existing landslide features on maps or aerial imagery and can be used as the basis for subsequent landslide susceptibility or hazard modeling. We produced a landslide inventory map for Magoffin County, Kentucky, by interpreting characteristic features such as head scarps, flanks, toes, and areas of hummocky topography visible on airborne LiDAR hillshade images. To each landslide polygon identified during the inventory, we assigned a confidence rating of low, moderate, or high. Our inventory map contains a total of 1,054 landslides within the county, of which 54.4% were categorized as high confidence, 44.2% as moderate confidence, and 1.3% as low confidence. The average landslide area was 6,397 m^2. Statistical analyses indicated that landslides most often occur on slopes of 17 degrees to 25 degrees, that there is a slightly increased likelihood of landslides on south-easterly facing slopes, and the most common total curvature and plan curvature values associated with mapped landslide locations were -0.056 and 0.05 ArcGIS curvature units, respectively. Six of eight landslides selected for field checking were accessible and confirmed. The inventory map is used to quantify landslide parameters, which are in turn utilize for landslide susceptibility modeling currently being performed by the Kentucky Geological Survey with good results. This work would not be possible without a comprehensive and accurate inventory map.

Mire Development Across A Hypsithermal Event: Organic Petrography Of Late Danian Hooper Formation Lignite From Bastrop County, Texas, Usa

***Russel Rogers*. Dr. Chris Denison**, Dr. Jennifer O'Keefe**, Mr. Nicholas Cowey**, Dr. Thomas Demchuk**, mentors,* **Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Astra Stratigraphic**, Astra Stratigraphic, Houston, TX**, RPS Group, Inc.,, Bastrop County, TX**, McKinney Roughs Nature Reserve**

Understanding Earth's responses to past climatic changes may help us to understand how the Earth will respond to our current trend of climatic warming. Hyperthermal events, and their aftermath, are often recorded in the organic matter of coals, which can be studied through palynology, organic petrography, and geochemistry. In the current study, the focus is the organic petrography of the Hooper Formation. The Hooper Formation, a basal member of the Wilcox Group in Central Texas, was deposited in the Danian Age, ca. 62 MA, as a series of nearshore sandy siltstones, tidal marsh silty mudstones, and lignite coals. In the study locality of McKinney Roughs Nature Park, Bastrop County, Texas, Hooper coals recorded local lowering of sea levels, followed by local sea level increases. These events correlated with a rapidly transient warming period, or hypsithermal, known as the Latest Danian Event (LDE), ca 62 MA. In the Hooper Coal exposed in McKinney Roughs Nature Park, the LDE is marked by a tonstein, a weathered remnant ash layer. Events leading up to the LDE were recorded below the tonstein, whereas climatic resolution was recorded above the tonstein. Investigating these coals through organic petrography illuminates the impact of the LDE on terrestrial vegetation, organic matter preservation and local mire water table levels. The Hooper Lignite coal is different from previously examined hypsithermal-associated coals, in that it contains less woody material, more detrital and wax-rich material, and upward increases in charcoals, the deposition of which coincided with hyperthermal induced wildfires. The uppermost sediments contain increases in clay content, evidence for progressively wetter environments deposited from transgressive sea levels.

Evidence For Turbidite Lobe Switching In The Borden Delta: Toolmark Directions In The Farmers Sandstone

William Grayson*. Dr. Jen O'Keefe, Dr. Steve Reid, mentors,
Department of Physics, Earth Science and Space Systems Engineering, College of Science

The Mississippian Farmers Member of the Borden Formation in northeastern Kentucky has been interpreted as turbidites. Previous work has reconstructed the paleogeography of these deposits, identified various subfans and provided a general understanding of transport pathways and provenance. Work concerning more detailed stratigraphic and geographic variations in paleocurrent directions appears limited. The purpose of the study proposed here is to test the hypothesis that turbidites in the Farmers Member display smaller scale, localized stratigraphic and geographic variations in paleocurrent directions.
Preliminary data has been collected for outcrops of the Farmers Member in and near Morehead, Kentucky. The orientation of tool marks and scour marks preserved on bedding planes of exposed siltstones at Airport Road in Farmers, KY and on KY 32 near Walmart have a mean strike of 82o (n=59) and 125o (n=122) respectively. Results suggest a significant difference in flow direction at each location. Existing data is insufficient to assess vertical variation in paleocurrent directions.

A Preliminary Report Of The Palynology Of Pleistocene Deposits In Saltville, Va.

***Maggie Stephenson Stephenson*. Dr. Chris Widga**, Dr. Jen O'Keefe**, mentors,* Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Center of Excellence in Paleontology**, East Tennessee State University**

A major goal of this year's work at the Saltville Mammal Site is to broaden the geological & paleoecological history of the region. To this effect, Maggie Stephenson with the OPaL Lab at Morehead State University has begun analyzing the palynomorphs preserved at the site. The data collected from pollen, non-pollen palynomorphs (NPPs), and charcoal will provide a window into the flora, fauna, and changing environment over time. So far abundant pine (Pinus sp.), oak (Quercus sp.), magnolia (Magnoliaceae), Hickory (Carya sp.), elm (Ulmus sp.), and alder (Alnus sp.) have been noted, suggesting that forest in the valley were similar to the present. There are also a number of NNPs present, such as fungi associated with vertebrate fecal matter (Sporormiella-type & Preussia-type) and freshwater dinoflagellates. In conjunction with the planned analyses, abundant meso-fossils have been recovered and analyzed. These mesofossils include the alga Chara and related genera as well as seeds of many plant taxa. This project explores how the plant communities, such as forest system and grass balds, compare to past findings; and changes in water salinity using algae and salt tolerant plants.

Experimental Investigation Of Acceleration Associated With Morehead State's Rotational Physics Device

Donald Matthews *. Dr. Ignacio Birriel, Dr. Kevin Adkins , mentors, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

The Physics discipline at Morehead State University possesses a device that is used in an activity that students participated in during the annual Mathematics, Physics and Avanced Technology Exploration (MAPT) day. The device can be used to rotate students and allow them to experience dynamic motion. This motion introduces the idea of inertial and noninertial reference frames and the associated forces. This project looks to describe the deflection of a dropped ball, derive the force equation that the rotational device abides by, and explain how we can experimentally observe and quantify these forces. We will also give experimentally measured results on the deflection of a ball and compare them to the theoretical values.

"A Coffin For King Charles: The Legality Of King Charles I's Trial And Execution"

Jeremy Copley*. Dr. Alana Scott, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

In January 1649, King Charles I of England was executed for crimes against his people after a special High Court of Justice convicted him of such. This High Court of Justice was an ad hoc committee formed by Parliament. During the trial, Charles refused to answer questions from the court on the grounds that it had no jurisdiction. Using letters and papers of Charles I, the trial documents, and supporting secondary sources, this presentation considers the legality of the trial and execution of Charles I.

Triumphs And Tragedies Of The Two Party System In Modern America

Emily Ball*. Dr. Douglas Mock, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Anyone who keeps up with the news can see that America's two-party system is fractured. The two dominant parties of the Republicans and Democrats have become diametrically opposed groups who have no desire to work or compromise with the other. Is America's two-party system a success, or is it broken beyond repair? Answering that question is the goal of this project. I will begin by examining why the United States has a two-party system, and why America's political system is most conducive to that type of organization. Then, I will critically analyze the successes and failures of the two-party system. A success of the system, for example, would be that having two major parties allows each party to have a broader platform, representing a larger number and more diverse group of people. Conversely, a failure of the modern two-party system would be that in a time of heightened partisanship, the two parties have become so hostile toward each other that it can be detrimental to the American people. All of this will lead to an answer of my initial question: is the modern American two-party system a success or a failure? And based on this, should the system be changed?

Continuous Authentication Of Smartphone Users Using Machine Learning

Suhana Ambol*. Dr. Sherif Rashad, mentor, **School of Engineering and Computer Science, Smith College of Business and Technology**

Current smartphone authentication mechanisms such as personal identification numbers (PINs), graphical passwords, and fingerprint scans offer limited security. They are susceptible to guessing, side-to-side channel attacks, reflection, and video capture. Additionally, they are well-suited for one-time authentication, therefore commonly used to authenticate users at login. This renders them ineffective when the smartphone is accessed by an adversary after login. Continuous authentication addresses these challenges by frequently and unobtrusively authenticating the user via behavioral biometric signals, such as touchscreen interactions, hand movements, and orientation. The goal of this research project is to design and implement new behavior-based security monitoring and intrusion detection techniques using machine learning. A set of behavioral biometric features of smartphone users that can be used effectively for continuous authentication includes hand movement, orientation, and grasp. Additional features that are used in this project include accelerometer, gyroscope, and magnetometer readings which can be used to unobtrusively capture subtle hand micro-movements and orientation patterns when a user taps on the screen. The researchers in this project investigated large datasets of different smartphone users with different interaction sessions. Various supervised machine learning algorithms were used to detect the behavior of mobile users. The experimental results show that the proposed approach is promising and it can be used effectively for continuous authentication of smartphone users.

Lean On Me: Community Building At The Haldeman Community Center After School Program

Tiffany Justice*. Dr. Joy Gritton, mentor, **School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The Haldeman Community Center strives to provide a place for those in the community to meet for fellowship, to provide children with a safe haven away from drugs, to foster the dramatic and musical arts by providing a place for their practice and performance, and to help sustain and enhance the year-round economic, educational, recreational and social well being of the community's residents. The Haldeman After-School Program offers a safe, child-centered, nurturing after school enrichment program for elementary students Monday through Thursday. Participating children enjoy physical activities, a nutritious snack, a planned learning activity, and help with their homework and tutoring.

When children are supported, during or after trauma, what are the results? Prevention, mitigation, and healing, according to research. This presentation explains the positive benefits of community surrounding and supporting adults and children whose lives have been affected by adverse childhood experiences (ACES). Focusing in particular on the cultivation of community, Justice examines how social support fosters resilience to create healing for the individual, as well as those around them. For this project, children participated in coordinated activities related to community, giving them the opportunity to learn to work together as well as build a social network in the area in which they live. This project has given the children at Haldeman an opportunity to learn the skills necessary to navigate an environment of drugs, poverty, and other social problems, so they may emerge happy and healthy.

Go Big Red! A Mathematical Analysis Of Nebraska Football Play Calling

Braden Brown*. Dr. Christopher Schroeder, mentor, **Department of Mathematics, College of Science**

Nebraska's football offense had an up and down year in 2019. We will look at all of the play calls for the conference games and analyze which type of call in which situation gave the best chances for success. In addition, we look at the probabilities of success on a series given success on a particular down. Finally, looking at the frequency of the play calls in various situations, we attempt to model which play calls would give the best chances for success.

Learning From Ethical Failure: How Ethical Errors Can Contribute To Later Ethical Conduct

Jessica Hamm*. Dr. Johnathan Nelson, mentor, **Department of Psychology, College of Science**

High standards of ethical behavior are highly regarded in organizations. As such, a wide variety of organizational practices are implemented in an effort to support ethical conduct and prevent unethical behavior. However, despite these efforts, ethics scandals still occur. When such ethical failings occur, organizations often respond with a zero-tolerance approach in an effort to protect the reputation of the organization. However, while unethical behavior should be addressed, individuals engaging in this behavior will still remain in the workforce, even if with a different organization. Thus, it is important to help individuals learn from ethical errors; like other errors in organizations, ethical errors while problematic, can be used as a learning opportunity for offending individuals and organizations as a whole. To examine how ethical errors can contribute to ethical learning and behavior, we conducted a qualitative research study to examine how individuals can learn from ethical failure. Participants were asked to describe ethical errors that contribute to later ethical decision making, motivation, and behavior. They were asked how ethical errors could be learned from. We discuss the implications of how ethical errors can contribute to ethical learning opportunities on ethics management practices and positive organizational scholarship.

The Daughters Of Paris: Expatriate Lesbian Modernists Of Early 20th Century Paris

Elizabeth Von Mann*. Dr. Sylvia Henneberg, mentor, **School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

From 1900 to 1940, a swarm of Americans, frustrated with the conservatism and lack of creative spirit in the United States, relocated to the bohemian culture blooming in Paris. The artistic community that prospered around these writers would become the heart of Modernist literature. Scholarly attention for the Modernists is usually focused on the male figures such as Ernest Hemingway, F. Scott Fitzgerald, and James Joyce. This project seeks to instead take a closer look at a smaller group within the Parisian Modernist movement of lesbian women who came to Paris in search of social freedom. Women such as Gertrude Stein, Natalie Barney, Sylvia Beach, and Janet Flanner were core members of expatriate Modernism that both supported the artistic movement and took it into new directions through their writing, salons, and patronage. At the crux of this research is an analysis of how these women helped cultivate one of the most experimental and productive phases in modern literary history while also redefining and refashioning it to make it their own.

Synthesis And Separation Of Hydroxyfulvene Derivatives As A Precursor To Novel Cox 2 Inhibitors

Tyler Sullivan*. Dr. Mark Blankenbuehler , mentor, **Department of Biology and Chemistry, College of Science**

CELEBREX® (celecoxib) is a non-steroidal anti-inflammatory drug (NSAID) that functions by inhibiting cyclooxygenase-2 (COX-2) and the production of prostaglandins. The desired functional analog differs from celecoxib in that its central ring is a pyridazine instead of celecoxib's pyrazoline. This is attempted by the creation of hydroxyfulvene derivatives which can be oxidized into pyridazine products. Hydroxyfulvene derivatives were created by treating cyclopentadienide with acyl chlorides or a mixture of acyl chlorides. This resulted in unequal mixtures of products whose separation was attempted. Thin layer chromatography (TLC) and column chromatography results will be presented.

Infrared Spectroscopy On The Cheap?

Austin Beamon*. Dr. Jennifer Birriel, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Optical spectroscopy is a useful tool students perform optical spectroscopy in both chemistry and physics laboratory experiments. Although we often discuss infrared spectral lines of atoms, such as the Paschen lines of Hydrogen we offer no accompanying laboratory experiences. This is largely due to prohibitive costs – such instruments run $1800 and higher. Near infrared spectroscopy uses the same techniques as optical spectroscopy. We investigated the possible modification of our existing optical RSpec Explorer spectroscope to study infrared spectral emissions. This device costs only $395. We found that the device is capable of detecting infrared lines over a useful range of the near infrared. We note that quantitative measurements of infrared spectra will careful recalibration of the instrument and the use of a visible light blocking filter costing under $40.

Vascular Plant Inventory Of The Eagle Lake Watershed, Morehead, Ky.

***Kay Rothermund*. Dr. Allen Risk, mentor,* Department of Biology and Chemistry, College of Science**

A continuation of the inventory of vascular plant species for the Eagle Lake watershed was conducted from the spring of 2019 through the spring of 2020. The watershed consists of 198 hectares and is located on the north side of Morehead State University's main campus in Morehead, Kentucky. Much of the watershed is owned by the university with parts belonging to the Daniel Boone National Forest. Previous and current research based on 339 collected specimens has documented 237 species from 164 genera and 75 families. Previous research has found multiple species of conservation concern such as Stenanthium gramineum (featherbells) and Viola tripartita (threepart violet). Over 60 additional specimens have been collected from various locations in the watershed and are being added to the records of MDKY, Morehead State University's herbarium. Additionally, herbarium cabinets are being surveyed for Eagle Lake specimens that have not yet been added to the herbarium's electronic records. Future research plans include more collections from the watershed, continuing to search herbarium cabinets for undocumented specimens, and determining the number of native and non-native species in the watershed. This research was supported by a Dr. Gerald DeMoss scholarship for undergraduate research.

Providing Better Access To Local Cultural Resources: A Redesign For The Eastern Kentucky Arts Project: Part 2

***Abbey Williams*, Cristen Brockett*, Elizabeth DeBord*, Liz Ketz*. Dr. Joy Gritton, mentor,* School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The Eastern Kentucky Arts Project (EKAP) was founded in 2007 as a way to connect and promote the communities of Eastern Kentucky through the visual and performing arts. EKAP aspired to bring Appalachian arts to a wider audience, while at the same time providing local residents—including educators—with information about the rich history and cultural resources in their area. The EKAP website was launched ten years ago, and engaging a younger generation now requires a website redesign that integrates social media to a greater degree, is more interactive, and adds new features, such as Instagram. This update has also afforded an opportunity to explore better ways to serve the region by envisioning new strategies for linking website visitors with knowledge about their home (including historic architecture, oral histories, and archived music recordings). Being able to highlight current art and music initiatives and conduct new oral histories, while managing large amounts of assembled date and maintaining resource links, was part of the challenge, as well. A collective of students who have pooled their areas of expertise—history, art education, and graphic design—to accomplish this Herculean feat will discuss this work-in-Progress.

Object Recognition For Self Driving Cars Using Machine Learning

Austin Downs*. Dr. Sherif Rashad, mentor, **School of Engineering and Computer Science, Smith College of Business and Technology**

The goal of this research project is to explore the problem of object recognition for self-driving cars and design and implement machine learning algorithms to accurately detect and identify different types of objects on the road. Recent trends in the autonomous driving industry, including universities and businesses that are developing new software and hardware technologies to be used for self-driving vehicles, will be discussed in this presentation. The design and implementation of various machine learning algorithms that are used in this project will be discussed and a deep learning approach using Convolutional Neural Network (CNN) will be introduced.

Designing And Cnc Machining Valve Subplates And Quick Mounts For Pneumatic Power Training Systems

Jonathan Carper*, Kris Longo. Dr. Qingzhou Xu, mentor, **School of Engineering and Computer Science, Smith College of Business and Technology**

Fluid power is one fundamental technology widely used in industry and our daily life and the muscle to drive the modern world. It utilizes a pressurized fluid to transmit power from one location to another, converting a prime power to a more controllable, usable form. It offers distinctive advantages over other force/torque-generating technologies. This project is part of the ETM department's ongoing effort of building three pneumatic and hydraulic power student training systems. Discrete pneumatic/hydraulic direction-control valves are purchased. Subplates are designed to match the features and dimensions of the valves. The subplates are used to connect the valves to the pressurized pipes through quick plug-in/release fittings or couplings. Quick mounts are designed to fasten the valves easily and securely on a grooved profile plate. The quick mounting provides a large degree of flexibility to add and remove valves as well as maneuver them freely to develop different pneumatic/hydraulic circuits for teaching different technical knowledge and coursework. After the parts are designed, the manufacturing procedures and CNC codes are developed, and the parts are machined. In this project, the most workable solutions are implemented to solve various practical engineering challenges.

Mapping University Life Of An International Student: A Qualitative Study Of The Student Experience

Suhana Ambol*. Dr. Donell Murray, mentor, **School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

Ethnographic study of Morehead State University international students' educational and social experience exhibits the importance of studying their lives in an international country as they study abroad. The student investigated typical days of international students from different countries by exploring the whole student experience. The project focused on how internationals use university space as well as how they engage with all university students on campus. Also, the student uses mapping diaries in which students marked on the map where they went throughout the day on campus. The international students were expected to fill out blank maps on campus with their movements as well as take images of significant experiences. Inclusion of video clips with internationals discussing their involvement on campus both academically and socially enhances the ethnographic study. Ultimately, the aim is presenting an overall experience of international students on campus thereby strengthen global ties.

Autonomous Vehicles: Distractor Type Effects On Tracking Task Performance

Mia Carman, Reganne Miller, Vanessa Jones. Dr. Gregory Corso, mentor,* **Department of Psychology, College of Science**

Dual-tasks and attentional resources have been the subject of previous research studies (Merat, N., 2012). Theories of dual-task decrements involve task switching, speed-accuracy tradeoff, and limited attentional resources (Wickens, C.D., 1984/2008). We investigated the effects of secondary task attentional resources on primary task performance changes. Our experimental design emulated real-world situations of visual task monitoring and then, if necessary, correcting the task while performing either a similar (visual) or dissimilar (auditory) secondary task. We sought to identify not only the effects of similar or dissimilar resources used in secondary tasks on primary task performance but to identify other dual-task performance effects. We used the tracking portion of the NASA Multi-Attribute Task (NASA MATB-II) as the primary task. Participants (n=39; f=39) were responsible for monitoring the cursor location in the tracking task. In automated mode, the cursor remained within a restricted area. If the automation failed, the cursor moved outside the restricted area, and the participant was responsible for returning the cursor to the restricted area. Moving the cursor was accomplished with a joystick. For the secondary tasks, 24 math problems and solutions were presented either auditorily, using a text to speech converter, or visually on a screen adjacent to and to the right of the tracking display. Participants were presented with a random assortment of 2-4-digit problems with answers. An equal number of addition and subtraction problems, with correct and incorrect answers, in random and counterbalanced order was presented. Responses were made by pressing a key on the keyboard indicating correct or incorrect answers. For training and for collecting baseline data, participants were presented with single-task trials of the tracking and the secondary (auditory or visual) tasks followed by a counterbalanced presentation of the single-task tracking and secondary (auditory or visual) tasks, and dual-task combinations of the tracking and secondary tasks. The effects of the secondary task on tracking performance were evaluated by calculating the mean RMSE over 8-time blocks for each participant. For RMSE, the visual task was more disruptive than the auditory task. The time to move the cursor to the restricted area improved over the 2-minute segment, and the auditory secondary task resulted in the smallest RMSE. Implications for further research are discussed.

Canadian Health Care Accessibility In The Indigenous Community

***Abigail Staab*. Dr. William Green, mentor,* School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Canada created a national health care program to provide all of its citizens with adequate and affordable health care services. This research found, however, that Indigenous people lack access to health care services offered to other Canadians. This lack of access is based on a history of underfunding for health care services for Indigenous people, who often live in the remote North where there is a decreased accessibility to health care services, but who have a greater demand for these services, because of their poverty, inadequate nutrition, poor housing and sanitation, and high rates of substance abuse. Greater funding, the relocation of health facilities closer to Indigenous communities, health care coverage for pharmaceutical drugs, and transportation to health care facilities are among the changes that would improve the health of Indigenous people. The research for this presentation was conducted in Ottawa, Canada during my participation in the 2019 Canadian Parliamentary Internship Program.

Canada And The United States: Two Approaches To Health Care

***Zachary Rice*. Dr. William Green, mentor,* School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Canada and the United States share a common border, but have two very different approaches to health care. This research explores the Canadian health care system, based on the Medical Care Act of 1966, and finds that it is a popular and efficient system where health care is a right. The United States, by contrast, takes a fragmented approach to health care with one system for the elderly, one for the poor, one for veterans, and one for many, but not all, employed. In the U.S., health care is viewed as product and is plagued high administrative and drug costs with millions of still uninsured, in spite of the Affordable Act of 2010. To remedy these problems, the U.S. needs to look to the successful health care systems of other nations, such as Canada's. The research for this presentation was conducted in Ottawa, Canada during my participation in the 2019 Canadian Parliamentary Internship Program.

Streaks In Sports: Which Was The Most Impressive?

***Noah Patton*. Dr. Christopher Schroeder, mentor,* Department of Mathematics, College of Science**

Joe DiMaggio got a hit in 56 straight baseball games. Steph Curry hit five three pointers in 5 straight games. Johnny Vander Meer pitched two no-hitters in a row. Which of these streaks is most impressive? Which is least likely to occur? In this talk, we will look at some of the most well known streaks in all of sports history and use mathematical methods to calculate their probability of occurring. The streak probability will be calculated using both recursive and non recursive formulas, and we will show that both methods produce essentially the same result.

Representational Decoration In Low Fire Ceramics

***Abby Caines*. Mr. Adam Yungbluth , mentor,* School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

This Research project examines the ways in which glazes, underglazes, slips and colorants can be implemented in the surface decoration of low-fire ceramics. In particular, I studied The use of them to create representational portraits, using both ready-made materials, and those I have made from materials in the ceramics lab. This research project was supported by the MSU Undergraduate Research Fellowship.

Health Challenges In Post Weaning Piglets

***Autumn Daniel, Jordan Hensley*. Dr. Geoffery Gearner, Dr. Patricia Harrelson, Dr. Philip Prater, mentors,* Department of Agricultural Sciences, College of Science**

The period of weaning is stressful to the animal and typically compounds health issues. One typically outbreak is scours which results in weight loss and often comprises their immune system. These outbreaks often occur around two weeks post-weaning. Eight nursery groups with approximately 600 piglets were examined to better understand the prevalence of scours. Prior to the prevalence of the diseases, pigs weighed an average of 15 pounds and after leaving the nursery would weigh approximately 30 pounds. Once the isolates became contaminated those who became sick would leave the nursery at an average of 20 lbs. Based on our observations and necropsies, causative agents were identified as Escherichia Coli and Klebsiella Pneumoniae. After further examination, it was determined that the origin of the microbial agent was coming from the water source. Comparison of the E. Coli and Klebsiella populations were obtained from five different water delivery systems within the swine unit. Following collection, samples were sent to the Morehead State Water Testing Laboratory for analysis. The variabilities of the total coliforms and microbial populations suggested that the source of contamination was water nipples located in the nursery. As an attempt to rectify the scours outbreak, antimicrobials were given to batches of nursery piglets. The end result however, was the promotion of Extended-Spectrum Beta Lactamase producing E. Coli strain, thus in return generating antimicrobial resistance. In conclusion, we found microbial resistance to a frequently used antibiotic and were able to develop protocols to prevent continued antibiotic resistance. New cleaning techniques and treatment initiatives are now in place to combat the health challenges that piglets face during two week post-weaning period.

¿Por Qué Aquí? /Why Here?

***Karina González *. Dr. Philip Krummrich, mentor,* School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

While most are aware of the reasons that Hispanics/Latinos chose to leave their home country behind, some are unaware of why they choose specific locations to settle in. Eastern Kentucky is known, for the most part, to be a rural area without a very prominent Latino/Hispanic community. Through surveys and interviews, we attempted to find answers as to why Latinos/Hispanics chose to settle in eastern Kentucky when other areas have a greater Latino/Hispanic population. Hispanic/Latino immigrants have built a life in eastern Kentucky, and with the information of the surveys, we hope to change immigration policies to facilitate and improve the lives of Latino/Hispanic immigrants in the United States.

Presence And Distribution Of Antibiotic Resistance Genes In The Triplett Creek Watershed

Minh Tran, Sydney Blanton*. Dr. Geoff Gearner, mentor, **Department of Biology and Chemistry, College of Science**

The purpose of this study was to identify the presence and distribution of antibiotic resistant genes (ARG) in the Triplett Creek Watershed (TCW) in Rowan County, Kentucky. Bacteria was collected from 12 well-established sampling sites in the TCW. DNA was extracted from enriched cultures of the bacteria and used as a target for polymerase chain reaction. Nine PCR primer sets of antibiotic resistant genes: TetW, TetO, SulI, SulII, ereA, msrA/B, blaTEM, blaSHV, and blaCMY. Primers for the bacterium Escherichia coli, uidA, were also used. PCR products were assessed by agarose gel electrophoresis. We found a total of 43 amplified products with 11/12 sites detected for msrA/B, 10/12 sites detected for uidA, 7/12 sites detected for sulII, 6/12 sites detected for blaTEM, 5/12 sites detected for ereA and sulI, 3/12 sites detected for blaSHV, and 2/12 sites detected for blaCMY. There were no PCR products for antibiotic-resistant genes tetO, tetW, and blaTEM detected. To confirm the identity of the ARGs, PCR was repeated using M13-modified sequencing primers, and PCR products were sequenced by GeneWiz. DNA sequences were analyzed by BLAST to confirm the identity of the ARGs.

Ait Implementation For Lunar Ice Cube Ground Data System And Spacecraft Operation

Emily Newsome*. Dr. Benjamin Malphrus, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

As interest grows in space exploration and space science, one of the greatest inhibitors to further advancement is the exorbitant overhead and costs that are associated with the launch and operation of satellites. One of the major costs of satellite programs is the ground data systems development and implementation that must be accomplished to facilitate communications between the ground and the satellite. In order to drive down costs and development effort, factors that are especially important for small sat and CubeSat missions, NASA-JPL has created AIT, the AMMOS Instrument Toolkit. AMMOS (Advanced Multi-Mission Operations System) and by extension AIT is software composed of suites that allow for reusable infrastructures that simplify the development of ground data systems for NASA satellite projects. For the Lunar IceCube project, AIT is a major part of the ground data system and its development and implementation via configuration files known as “YAMLs” is vital for the success of the project. Through this pseudo-markup language, data structures for both telemetry (data coming down from the satellite) and commands are parsed so that information can fluidly be taken from a human readable form to a form understood by the spacecraft in orbit. This effective translation from human language to computer language is the crux of the project and the AIT implementation is critical to the Lunar IceCube project.

Riot Or Response: The Causes Of The 1929 Aba Women's Riot

Victoria Nash*. Dr. Alana Scott, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

In 1914, the English asserted imperial power in Nigeria by establishing an indirect political system. This transformation from direct government participation to rule by an appointed Warrant Chief created tension between colonial officials and native people. Following this change, Igbo culture conformed to the elitist ideals of its colonizer and abandoned its equitable village roles. Appointed Warrant Chiefs and their families were viewed as elites in society while non-elites were devalued and deprived of the right to vote. Further altering the established order, colonial officials started to tax Nigerian men in 1928. This prompted over ten thousand women to gather in protest a year later when men, women, children, and livestock were enumerated, allegedly for tax purposes. This demonstration and the events following were labeled as the Women's Riot of 1929 in British imperial records. While causes of the Riot are diverse and disputed, the political reorganization imposed by British colonial rule in Nigeria contributed to the Women's Riot of 1929 by disrupting governmental gender roles, taxation practices, and religious rituals among the Igbo people.

Rape Of The Sabine Women

Nancy Lewis*. Dr. Julia Finch, mentor, **School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

This paper focuses on the interpretation of works of art narrating the rape of the Sabine women. According to the myth, the rape of the Sabine women occurred shortly after the establishment of Rome. In need of women for establishing families to populate the new city, Romans negotiated unsuccessfully with the Sabines, resulting in the abduction of the Sabine women. Visual interpretations of this myth were a popular theme for seventeenth century artists such as Giambologna, Peter Paul Reubens, Nicolas Poussin, and Pierto da Cortona. Through visual analysis and research, this paper seeks to address the basis of heroic rape in the vizualization of the abduction and rape of the Sabine women by Roman soldiers.

Multi Wavelength Observations Of High Magnetic Field Pulsars J1809 1943, J1847 0130, And J1821 1419

Colby Winters*. Dr. Shanil Virani, Dr. Thomas Pannuti, mentors, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Pulsars are the result of massive stars ending their lives in supernova explosions. These explosions produce expanding shells of material (known as supernova remnants -- SNRs) along with a possible central newborn neutron star. Depending on the conditions within the SNR and the formation of the neutron star, either a high magnetic field radio pulsar or a high-energy anomalous X-ray Pulsar (AXP) may form. We investigate three high magnetic field radio pulsars -- J1809-1943, J1847-0130, and J1821-1419 -- with the intent of exploring the relationships between these sources and their local environments. These pulsars were chosen because they had similar cataloged features as known radio-emitting AXPs, including long periods (from 1 to 8 seconds) and high period derivatives (from 5x10E-13 to 5x10E-11). The Green Bank 20-Meter telescope was used to gather timing parameters and pulse profiles on each pulsar at 1.395 GHz. In addition, archival X-ray data from observatories such as Chandra and XMM-Newton were searched for possible X-ray counterparts for these sources. We found that it is unlikely these pulsars fit the expected models of AXPs even though they have extremely high magnetic fields. Ultimately, this research could help extend knowledge about pulsar properties and add to the current understanding of high energy neutron stars.

Mathematical Mandolin Mayhem

Baylee Henderson*. Dr. Chris Schroeder, mentor, **Department of Mathematics, College of Science**

We have a solution. With fretted instruments, we use a mathematical formula to find the placements of the 1st to the 12th frets or, in other words, to find the placement from one note to the note an octave above. Although, when taking into account the string tension, the notes aren't precisely in tune. But don't fret! We will look at some possible solutions to this problem that were implemented on a mandolin that was built by the presenter for this project.

Chandra X Ray Observations Of The Nearby Spiral Galaxy Ngc 3184

Tyler Thomas*. Dr. Thomas Pannuti, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Located at a distance of 9 Megaparsecs and with a face-on orientation, the nearby spiral galaxy NGC 3184 is an attractive target for the study
of the discrete X-ray source population (specifically supernova remnants) in galaxies. As evidenced by the six historical supernovae
in this galaxy (namely SN 1921B, SN 1921C, SN 1937F, SN 1999gi, SN 2010dn and SN 2016bkv), the star formation rate in this galaxy is robust
and therefore the expected number of discrete X-ray sources associated with the galaxy (specifically X-ray binaries and supernova remnants)
is expected to be large. In this work, we have analyzed three archival observations made of NGC 3184 with the Chandra X-ray Observatory with
a total effective exposure time of approximately 80 kilo seconds. With its unsurpassed angular resolution capabilities of 1 arc second and its moderate
flux sensitivity, the Chandra X-ray Observatory is the best observatory for detecting discrete X-ray sources in nearby galaxies and resolving emission
in confused regions. We have concentrated our analysis on the search for X-ray counterparts to the historical supernovae and supernova remnants
in the galaxy: initial results will be presented and discussed.

Implementation Of Virtual Reality And Mixed Reality Technology With Object Tracking On A Manufacturing Scenario For Teaching Purposes.

Andres Salinas-Hernandez*. Dr. Jorge Alberto Ortega-Moody, Dr. Kouroush Jenab, mentors, **School of Engineering and Computer Science, Smith College of Business and Technology**

The manufacturing sector in the United Stated has greatly benefited from the usage of virtual reality technologies mostly for the last 10 years, by allowing an easier integration between the already developed operations and designs by manufacturers and the virtual reality (VR) systems, making the resulting simulations' performance much more fluid and realistic. The effects of implementing newer and more advanced VR systems in manufacturing have been seen thus far in costs reduction by reducing unnecessary company resources in products and machining redesign and a better logistics planning for employees' training, by creating multiple scenarios according to the company's requirements. It is important to take notice on how quickly these VR systems are upgraded, by constantly changing interface standards and upgrading their device's specifications and adding more and more features that improve the user's immersion experience; for this reason, the already-settled VR industry needs to adapt as fast as possible to these changes. One of the newest subcategories in VR technology, called Mixed Reality (MR), incorporates devices like 3D depth cameras and green screen video captures to stream the user's VR stream around him, as this can be seen by third party observers, which allows for a more compelling experience. This paper examines the implementation of both VR and MR platforms of a flexible manufacturing prototype scenario for teaching purposes. The purpose of this project is to present the pros and cons of using each platform, as the user manipulates its surroundings and interacts with tracking devices that are modelled into objects inside of the scenario.

Catherine De' Medici And Her Patronage Of Jean And Francois Coulet

Adam Abdel-Rahman*. Dr. Julia Finch, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

From 1559 until 1563, Catherine de' Medici, the Italian-born noblewoman who became the queen of France, served as regent over the reign of two sons, and she remained the influential queen mother during the reign of a third. As queen consort, regent, and mother, Queen Catherine became an important female figure entrenched in male-dominated France. Descended from a renowned family of patrons (her father Lorenzo is particularly noteworthy for his influence in the Renaissance,) Catherine was known to have respected and enjoyed the arts, including painting, sculpture, architecture, and the culinary arts. Queen Catherine is noted for spending incredibly vast (and bankrupting) sums on patronizing both local French and foreign European artists throughout her reign. Though the lasting impact of these investments is almost universally considered minimal, some artists of note arose from her patronage, two of whom were the father and son pair of Jean and Francois Coulet. The Coulets were both painters, and I will elaborate on their personal relationships with Catherine and some of their major works.

Key words: Renaissance, patronage, influence, Catherine de' Medici, impact

The Purpose And Proceedings Of The Impeachment Process Within U.S. Political Systems

Abigail Staab*. Dr. Douglas Mock, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The impeachment process and the removal of government officials from office within the United States political system raises many ethical and political questions. Although there have been several Presidents of the United States to have faced formal impeachment proceedings, only 3 have actually been impeached, and none have been removed from office. Of the 3, Johnson, Clinton, and Trump, the past 2 proceedings have taken place within the past 25 years of presidencies. To better understand the impeachment process, it is vital to examine the historical significance and impact on current affairs, as well as the uses and abuses of the impeachment power. My research will provide an overview of governmental impeachments, with an emphasis on Presidential impeachment. By reviewing the original intentions of the Framers' of the Constitution, while comparing past impeachment proceedings to the most current one, a deeper understanding of the role that the Impeachment power has on the U.S. political system will be revealed. Light will be shed on the importance of impeachment proceedings and how it has been used to remove presidents and other governmental officials who abuse power. Through these discoveries, one may be able to better grasp the purpose of such power and apply this research to affairs within current events leading into this new decade of politics.

Welding Training For Industry Using Mixed Reality

Ritesh Chakradhar. Dr. Jorge Alberto Ortega-Moody, Dr. Kouroush Jenab, mentors, **School of Engineering and Computer Science, Smith College of Business and Technology**

The selection and recruitment of certified welders are in high demand. On May 8, 2018 "the U.S. Bureau of Labor Statistics reports that the need for welders is expected to grow by 26 percent by 2020". "The National Association of Manufactures reports that 60% of manufacturers typically turn away half of all applicants" due to a lack of proper knowledge and training in the welding industry. With an increasing need for welders, it is necessary to have efficient welding training practices. To make this happen, the training can be made individually but the cost will be expensive because it requires many materials, tools and equipment. Also, during training at the welding workshop there are many possibilities of having an accident caused by the lack of ability and caution. This project is initiated to train welders by introducing the training environment in a mixed reality where they will learn and practice different welding operations. The goal of this project is to reduce the training costs and increase the hand on performance so that they can master the hand skills. Moreover, this training scenario will enhance the safety of the welders with the elimination of risk, liability, injury and boost their confidence to perform professionally. This mixed reality allows users to train better and master procedures, so, when the time comes, they are ready for industrial work.

A Patient Education Protocol To Decrease Antibiotic Resistance: A Quality Improvement Project

Andrea Martinez*, Michelle McBride *, Payton Callihan*. Dr. Suzi White, mentor, **Department of Nursing, College of Science**

Annually in the United States more than 2.8 million people get an antibiotic resistant infection and more than 35,000 people die as a result. The Center for Disease Control and Prevention (CDC, 2019) states that the new guidance, published in the Annals of Internal Medicine, said doctors prescribe antibiotics at more than 100 million adult clinic visits each year, 41% written for acute respiratory tract infections (ARTIs), making the practice a key contributor to the antibiotic resistance threat (CDC, 2016). Antibiotic resistance is the ability of a microbe to resist the effects of medication that once could successfully treat the microbe. The growing rate of antibiotic resistance in respiratory infections is a problem even with extensive research and treatment protocols in place. Recommendations from the CDC include guidelines for each respiratory tract infection such as the common cold, bronchitis, pneumonia, and sinus infections. However, in context, recommendations for prescribing antibiotics should be reserved for patients who have symptoms lasting longer than 10 days, with the onset of severe symptoms and high fever, nasal discharge, or facial pain lasting longer than 3 consecutive days, or when symptoms worsen after a typical viral illness lasting 5 days seemed to be resolving (CDC, 2016). After reviewing twenty literature studies, similarities of problems, concepts, findings, and outlooks associated with antibiotic resistance were consistent. The purpose of this Quality Improvement Project was to develop a nursing driven protocol to educate patients about current antibiotic guidelines for respiratory tract infections. Implementation of this protocol would include educating patients on antibiotic treatment, what they can do to feel better, when antibiotics are or are not needed, antibiotic side effects, and the difference between bacterial and viral respiratory infections.

Evidence Based Guidelines For Reducing Noise In The Hospital Environment: A Quality Improvement Project

Karlie Tussey*, Miranda Robinson*, Samantha Spence*, Shelby Adkins*. Dr. Suzi White, mentor, **Department of Nursing, College of Science**

Florence Nightingale said, “Unnecessary noise is the cruelest abuse of care which can be inflicted on either the sick or the well” (Goeren). Hospital environments that are conducive to healing can have a major effect on patient outcomes. There are many factors that affect the quality of hospital environment such as noise level, lighting, cleanliness of patient rooms, and timing of care. Despite increases in efforts to increase patient satisfaction with interventions such as hourly rounding and post discharge surveys, patient perception of hospital environment remains low (Fillary). During clinical rotation at a large urban teaching hospital, environment was noted to negatively impact patient outcomes.

Nurse To Nurse Bullying

Dare Bellini, Isabella Hayes*, Jacob Daniel*. Dr. Suzi White, mentor,*
Department of Nursing, College of Science

"Forty-four percent of nurses reported experiencing one or more types of bullying in previous 12 months, compared to 35 percent of other staff."
"Fifty percent of nurses witnessed the bullying of others.
Nurses who are bullied report significantly lower levels of job satisfaction and significantly higher levels of anxiety, depression and propensity to leave."
"Numerous studies conclude that work group teamwork leads to higher staff job satisfaction, increased patient safety, improved quality of care, and greater patient satisfaction."
During nursing clinical educational experiences at a large urban teaching hospital in Kentucky, nurse-to-nurse bullying was observed.

The purpose of this QI project was to utilize available data to develop evidence based guidelines to increase awareness of and prevent nurse-to-nurse bullying.

Prevention Of Health Care Acquired Infections Related To Environmental Factors

Aaron Nichols, Amanda Mapes*, Jordan Mauk*, Kerrigan Murphy*, Maggie Kiper*, Olivia Chapman*, Sarah McCoart*. Dr. Suzi White, mentor,* **Department of Nursing, College of Science**

According to the CDC an estimated 1.7 million patients contract hospital acquired infections during hospital stay for other health issues. The purpose of this quality improvement project is to develop a set of guidelines for nurses to follow to decrease the incidence of hospital acquired infections related to health care environment. The guidelines developed upon research will be shared with nurses at a large teaching hospital.

Prevention Of Peripheral And Central Line Infections Based On Catheter Insertion Life: A Quality Improvement Project

Casey Coomer*, Emerson Bosley*, Emma Cordle*, Haley Botkins*, Kassey Arnett*, Savannah Perkins*, Tia Booker*. Dr. Suzi White, mentor, **Department of Nursing, College of Science**

An estimated 30,000 central line- associated bloodstream infections (CLABSIs) occur in hospital wards of U.S acute care facilities each year. There are an average of 400,000 peripheral intravenous infections in adult patients in the U.S every year as well. The purpose of this quality improvement project is to review the relevant literature and upon finding a gap in the research, revise the policy and procedure guidelines related to central and peripheral line insertion and care at a local teaching hospital facility. The focus will be on a variety of measures that need to be taken to prevent hospital associated infections. These measures will include central line-associated bloodstream infections, peripheral intravenous infections, the under-staffing of nurses related to invasive care, extended patient stay with invasive care measures, aseptic and sterile technique, medication interaction safety, and patient outcomes related to infection rates.

Children Understanding Of Analog Time Keeping Using Numbered Ideal Clocks.

Logan Pennington*. Dr. Wilson Gonzalez-Espada, mentor, **Department of Earth and Space Science, College of Science**

Mathematics educators in KY teach how to read analog clocks in elementary school. However, the increased use of digital clocks may be causing students to forget this important skill. About 2,000 students from Rowan County Schools were asked to read nine numbered ideal analog clocks. Results were analyzed by grade level, gender, and interaction with analog time devices. It was found that student proficiency in reading clocks increased from 68% in 3th grade to 88% in 11th grade. Common time reading misconceptions are discussed.

Effect Of Nitrogen Application Rates On Industrial Hemp Biomass And Cannabinoid Production

Brock Dean*, R. Todd Smith. Dr. C Brent Rogers, Dr. Vijay Subramaniam, mentors,
Department of Agricultural Sciences, College of Science

In the last few years the production of industrial hemp has become an important development in Kentucky agriculture. The production of CBD products is a high priority, so it is of great importance to recognize what the plants require for proper production. It is known that industrial hemp plants need nitrogen for appropriate germination and growth, but the specific amount has yet to be accurately determined. This project was undertaken to investigate rates of nitrogen needed for field production of CBD industrial hemp. A study was conducted at Morehead State University Derrickson Agricultural Complex in 2018 and 2019 with plants and chemical analysis provided by GenCanna Global. The field was arranged in a randomized complete block design with four treatments and three replications. Treatments consisted of 0, 50, 100, and 150 pounds per acre of nitrogen that was split into three applications. The hemp plots were established in a field that was prepared by conventional tillage. Hemp plants were grown on plastic on raised beds in rows 8ft by 200ft. Plants were spaced at 30 inches in the row. Drip irrigation was placed under the plastic and plants were transplanted by hand into the field on June 15, 2018 and June 3, 2019. Plants were maintained by appropriate cultural methods and nitrogen was applied through the irrigation system three times during the growing season. At the end of the growing season plants were harvested and data was collected. Results off the data collected indicate a trend toward increased plant dry weight as nitrogen rates increased. CBD production was greater at the highest nitrogen rate.

Optimizing Mental Health Through Continual Assessment Of Inpatients In Kentucky Hospitals: A Quality Improvement Project

Brooklyn Young*, Gabrielle Merrill*, Kaitlyn Shannon*, Kaylee Trent *, Stacey Crose*. Dr. Mary "Suzi" White, mentor, **Department of Nursing, College of Science**

A lack of mental health accessibility is among the top health disparities plaguing the Commonwealth. Data derived from the 2018 America's Health Ranking Report states that Kentucky is currently ranked 49th in the nation for mental health well-being, tagged with the second highest rates of depression. A study conducted in a rural Texas community from 2006 to 2014 concluded that 30 community members committed suicide within 72 hours following hospital discharge, 24 of which were committed within just 24 hours. Texas is currently ranked 39th for mental health well-being of citizens, 10 rankings better than that of Kentucky. Why were risk factors associated with the mental distress of these patients not recognized? A literature review, comprised of 25 studies on the topic of mental health assessment of healthcare patients, revealed a shocking truth that was also observed first-hand through clinical experiences in a local facility…continual mental health assessments during hospitalizations is not occurring.

The US Preventative Services Task Force recommends an initial mental health assessment upon admission, however, no guidelines are currently set into practice that suggest a continual assessment. Hospitalization periods are unrecognized opportunities to identify risk factors related to mental distress. The proposed intervention to this gap in the literature is the development of a comprehensive and time effective mental health screening tool to be utilized during routine shift assessments. The screening tool developed was based upon research conducted on the efficiency, specificity, and ease of administration of established screening tools related to mental distress and associated risk factors. This intervention was then piloted for effectiveness amongst registered-nurses of a Medical Surgical unit in a Central Kentucky teaching hospital. It is anticipated that this quality improvement intervention will increase recognition of mental distress risk factors and treatment prior to discharge, elevating the mental well-being of the Commonwealth.

Children Understanding Of Analog Time Keeping Using Numberless Ideal Clocks.

Belinda Candra*. Dr. Wilson J. González-Espada, mentor, **Department of Biology and Chemistry, College of Science**

In Kentucky, school math standards include how to read analog clocks. However, recent reports suggest that children may struggle with this task. About 2,000 students from Rowan County Schools were asked to read nine numberless ideal analog clocks. Results were analyzed by grade level, gender, and interaction with analog time devices. It was found that student proficiency in reading clocks increased from 69% in 4th grade to 92% in 12th grade. Common time reading misconceptions are discussed.

Flexible Manufacturing Systems For Training In Automation

Victoria Russ. Dr. Jorge Ortega-Moody, Dr. Kouroush Jenab, mentors, **School of Engineering and Information Systems, Smith College of Business and Technology**

In 2019 The Bureau of Labor Statistics estimated around 12.85 million manufacturing jobs were available. Within this job market 8.5% of the workforce is employed, while 89% of the jobs are left unfilled because manufactures are having trouble finding qualified applicants. Many of these jobs are related to the automation and manufacturing areas. This creates the need for an environment to be built that will increase students' knowledge in these programs and systems. The aim of this project is to build an environment that will be used to train workforce for automated manufacturing systems. This environment will implement the seamless connection of older technology with leading industry PLC's; HMI's; Vision Systems; and Robotic Controls with high-level coding. Beginning in Fall 2019, the pilot environment has been upgraded to implement a Siemens' PLC; robotic arm system; Vision systems; conveyors; and CNC machines, then drawn and uploaded into Virtual Reality. Currently the project has been moving forward with rewiring all the systems into a PLC. The project is expected to be completed by setting up the vision systems, another robot, and integrate CNC machines. This platform would be used for training workforce for advanced manufacturing using Virtual Reality.

A Feasibility Study Of A Comprehensive Athletic Website And Online Streaming Service For Kentucky High Schools

Adrienne Hall. Dr. Lydia Njoroge, Dr. Steve Chen, mentors,* **School of Business Administration, Smith College of Business and Technology**

The increase of student participation, fan attendance, media exposure, and revenue generation have all created an irrefutable reality that high school (HS) athletics is indeed a lucrative business. Sport marketers have strongly advocated use of website, social media, and streaming services to promote sporting events and attract sponsorships at all levels. However, existing studies rarely focus on the trends and practices for promoting interscholastic sports. This study examined the benefits and marketing potential for establishing an interactive website and online streaming service to promote interscholastic sports. By evaluating more than 100 existing high school athletic websites, the authors concluded many of the schools were in urgent need to improve outdated and insufficient contents. The interview responses of 20 in-state HS athletic directors (ADs) provided the information for establishing an ideal comprehensive athletic website by featuring players' biographies, statistics, photo galleries, archives, records, video highlights, advertisement, and sponsorship opportunities. However, the overall comments on the development of a live-streaming platform and charge of such services were still inconclusive. Nevertheless, the ADs agreed having the streaming service and a comprehensive athletic website would benefit various stakeholders (i.e., parents, students, sponsors, administrators, and collegiate coaches/recruiters), attract local businesses and sponsors, and showcase schools' athletic talents. Strategies and recommendations for obtaining potential revenue from subscription fees and future sponsorships were further discussed and made.

Safety Engineering For Lunar Ice Cube

Akira King*. Dr. Benjamin Malphrus, Mr. Nathan Fite, mentors, **Space Science Center, Space Science Center**

Morehead State University's Space Systems Engineering Program is developing Lunar IceCube (L-IC) – a 6U CubeSat (or small satellite) about the size of a large shoebox. L-IC will be launched alongside 12 other secondary payloads aboard NASA's Artemis I rocket as part of NASA's Next Space Technologies for Exploration Partnerships (Next STEP) initiative. L-IC is a science mission designed to prospect water ice deposits on the surface of the Moon for future exploration. When developing a small satellite, it is important to adhere to both NASA-defined and engineering best practices standards when designing the spacecraft to ensure that L-IC can carry out its mission without harming itself, the other payloads, or – most importantly – the rocket. Informed decisions in safety, systems, and quality engineering insure that the satellite meets all requirements for launch. This includes choosing and implementing the best materials for the spacecraft and enacting strenuous test procedures for those materials. The Morehead State L-IC Safety Engineering Team – one graduate and three undergraduate space systems engineering students – is responsible for assuring that all elements of the Lunar IceCube spacecraft meet the safety requirements mandated by NASA mission assurance. This work utilizes government databases, NASA documents, data processing tools, testing equipment and procedures, and working with materials and systems engineers from NASA's Jet Propulsion Laboratory (JPL), Goddard Space Flight Center (GSFC), Marshall Space Flight Center (MSFC), and private companies such as Busek and Blue Canyon Technologies. The processes associated with verification and validation for mission assurance and compliance with NASA standards will be described.

Comparison Of Infrared Structured Light And Li Dar Terrestrial Scanners For Mapping Caves

Jayde Holbrook*, Sydney Winters*. Dr. Timothy Hare, mentor, **Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics**

This project tests the characteristics of two terrestrial mapping and modeling technologies for recording cave and rock shelter environments. Archaeologists and speleologists must record subterranean environments with high levels of accuracy and precision to enable their scientific investigations. However, mapping such areas is difficult, time-consuming, and often produces inaccurate results. Light detection and ranging (LiDAR) uses lasers to collect data points and create 3D point clouds that can be transformed into accurate virtual models of the areas mapped. An infrared structured light (IR) scanner projects an invisible grid of lines across surfaces that allow visible light cameras to capture three-dimensional forms and textures that can be combined to create accurate 3D models. Each modeling technique has advantages and disadvantages. The LiDAR scanner can collect more detail within the point cloud and the IR scanner can collect photos to overlay a texture on a model. We use a custom-built LiDAR scanner and an IR scanner to create maps and 3D models of sample areas representative of cave and rock shelter features. The results are compared to determine the most appropriate tools for capturing these types of environments and if the tools can enhance current techniques.

Stem Majors' Views Of The Teaching Profession: Implications For The Recruitment Of Secondary Teachers.

Hannah Brewer*. Dr. Robert Boram, Dr. Wilson González-Espada, mentors, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

As retirements reduce the rank of mathematics and science (STEM) school teachers, attracting college students to this profession is critical. However, demographic, economic, and social changes make the recruitment of high quality prospective teachers and the retention of trained teachers quite difficult. The purpose of this study was to document the perception of STEM majors about teaching as a career using survey data and interviews. Participants reported a positive view of their own teachers and their contribution to society. However, the perceptions that teaching involves, very low salary, high workload, and excessive workload and emotional demands, prevent participants from thinking of teaching as a personal career path. Differences by gender and college major (physical science/mathematics or life sciences) are discussed.

Development Of An Ac Electrokinetics Capacitive Sensing Platform For Rapid And Sensitive Bioparticles Detection

Allie Skaggs*. Dr. Cheng Cheng, mentor, **School of Engineering and Information Systems, Smith College of Business and Technology**

Capacitive bioaffinity detection using microelectrodes is considered as a promising label-free method for point-of-care (POC) diagnosis, though with challenges in sensitivity and the time "from sample to result." It has a wide range of applications in areas such as medical science, diagnostics, and pharmacology. Quantitative detection of protein biomarkers in biological media is critically important in detecting disease or physiological malfunction, or tracking disease progression. Among various detection methods, electrical detection is particularly well suited for POC specific protein detection, being of low cost, light weight and small form factor. With recent development in AC electrokinetics (ACEK), especially in dielectrophoresis (DEP), we are able to develop an ACEK enhanced capacitive bioaffinity sensing method to realize simple, fast and sensitive diagnosis from biological samples. In this work, a low cost and portable sensing platform with good accuracy is developed to use with ACEK capacitive sensing to produce a true POC technology. The development of a board-level capacitance readout system is presented, as well as the adaption of the protocol for use with ACEK capacitive sensing. Further, the sensing platform can be readily expanded for multichannel monitoring and telecommunication capabilities.

Science With Digital Single Lens Reflex (Dslr) Cameras

Laura Cadwallader. Dr. Jennifer Birriel, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

Scientific cameras use expensive imaging chips called CCDs. Commercial cameras are equipped with CMOS chips that are similar in nature but not nearly as sensitive and have higher noise values. Nonetheless, the price per pixel for a CMOS is so much lower that many research groups have begun to explore scientific uses of CMOS chips found in digital single lens reflex cameras. DSLRs have recently been used in variety of scientific studies suitable for student participation, including bright variable star studies and all-sky imaging for light pollution research. This project explores the scientific potential of a 2010 Canon Digital Rebel XTi DSLR camera. Our initial study is an examination of the Sun and the so-called limb-darkening effect using projected images of the sun and SalsaJ, we compare our data to models. We discuss future project amenable to the characteristics of this DSLR camera.

The Young & The Anxious: Analyzing Test Anxiety And Its Effects On Student Success

Laura Von Mann*. Dr. Christopher Beckham, mentor, **Department of Early Childhood, Elementary and Special Education, College of Education**

Test anxiety is defined by the American Psychological Association (APA) as "tension or apprehension associated with taking a test, frequently resulting in a decrease in test performance". Test anxiety affects students throughout all grade levels, higher education, and even into adult life, at various levels of severity. With standardized testing becoming increasingly more present in the American school system, the condition known as test anxiety has increased as well, threatening the mental health and future educational success of students. This research aims to better understand test anxiety, its symptoms, causes, and possible treatments in order to ensure student success.

The Connection Between Origami And Mathematics

Rebecca Angell*. Dr. Kathryn Lewis, mentor, **Department of Mathematics, College of Science**

Origami is a Japanese art form that involves paper folding. It is also a mathematical tool used for geometric constructions that are not possible with a straight edge and a compass. The math behind the constructions is rooted in abstract algebra. We will demonstrate how to construct the trisection of an angle and the doubling of a cube using origami mathematical principles from abstract algebra and geometry. Origami is also useful as a manipulative to teach mathematics to high school students and future educators. We will show that origami can link the abstract to the concrete which provides a more comfortable learning environment for the students.

Using Excel To Solve Issues Relative To Attendance Tracking Data At A Regional Comprehensive University

Ben Osman*. Mr. Hunter Chandler, Ms. Sara Larson, mentors, **School of Business Administration, Smith College of Business and Technology**

The purpose of this action research is to investigate the importance of student attendance and to solve logistical issues relative to attendance tracking data at a regional comprehensive university. From a retention perspective, student attendance is vital to the holistic success of the student; student success is institutional success. The partnership between higher education's business and educational models depend on the accountability of multiple stakeholders. There are three stakeholders that promote the importance of attendance tracking: (1) students, (2) faculty, and (3) administration. Student attendance will secure financial aid and prioritize staff intervention efforts for retention. Using the Pivot Table function in Excel, one can consolidate data into a more usable form. In this case combining multiple, separate student entries, into a summary of the students' attendance records allowing administrators to see those students who haven't attended classes so long as data was recorded for that student. Faculty tracking attendance is the key to an efficient administrative review of student attendance. Complete student attendance records are valuable, intangible assets to an organization and stressing to educational faculty that maintain an u to-date attendance records is important to multiple administrative office, this includes the Offices of Financial Aid and Retention and Academic Advising. With the conclusion of this project, an instructional guide provides ste by step information to make the attendance data usable; this physical information enhances the institutional knowledge of the University's attendance procedures.

The Moderating Effects Of Fear Of Intimacy On Loneliness And Grief

Abby LeMaster*. Dr. Daniel Maitland, mentor, **Department of Psychology, College of Science**

The purpose of this study is to understand the relationship between grief and loneliness as moderated by an individual's willingness to make self-disclosures with close others. In order to study this, we had 90 participants from a medium-sized Hispanic Serving Institution complete a cross-section survey administered online. The student's average GPA was 3.21 (SD = .44). On average, participants were 22.61 (SD = 5.99) years old with ages ranging from 18 to 53. 76.7% of the participants were under the age of 22. 85.6% of the sample identified as female, 13.3% as male, and 1.1% non-gender binary. 60% of participants self-identified as Latinx, while in the domain of race 71.1% identified as white, 20.0% multiracial, 5.6% black, 1.1% American Indian/Alaskan Native, and 2.2% chose not to answer.
Statistical analyses were conducted using the SPSS Process Macro (Hayes, 2017) model number 1. Analyses suggested that the relationship between loneliness and grief is moderated by a willingness to share experiences as measured by the Fear of Intimacy Scale. Visualization through the marginal effects plot suggests that the magnitude of the moderating effects of fear of self-disclosure change as a function of scores with higher scores indicating a stronger moderating effect. These findings suggest that individuals with high levels of fear of intimacy may be particularly vulnerable to loneliness, whereas at low levels other factors may account for more variance. These findings may have important implications for individuals seeking psychotherapeutic treatment for coping with grief.

The Moderating Role Of Fear Of Intimacy In The Relationship Between Sexual Compulsivity And Sexual Satisfaction

Aubree Daniels*. Dr. Daniel Maitland, mentor, **Department of Psychology, College of Science**

Sexual compulsivity is a potentially problematic behavior that frequently results in disruptions to life functioning. One domain that is frequently impacted is that of sexual satisfaction, often defined as being completely happy and satisfied with all sexual aspects of a relationship. Not all individuals who engage in compulsive sexual behavior are unsatisfied with their sex lives, but many are. The current study sought to elucidate the role of intimacy in relationship between sexual satisfaction and sexual compulsivity. We hypothesized that fear of intimacy would have significantly moderate the relationship between compulsive sexual behavior and the degree to which each participant rated their sexual satisfaction.
Using an online cross-sectional survey, participants (n=253) completed questionnaires relating to sexual compulsivity, sexual satisfaction, and fear of intimacy. The sample collected from a mid-sized Hispanic Serving Institute in the southern United States was made up of participants ranging from 18 years old to 52 (M = 22.63, SD = 5.86). The majority of participants identified as Women (N = 214), Latinx (N =143), and White (N = 177). Data analysis was conducted using the PROCESS Maro (Hayes, 2017) in SPSS. Results supported our hypothesis that fear of intimacy moderates the relationship between sexual compulsivity and sexual satisfaction. These findings may help clinicians better understand the function of sexual compulsivity and develop interventions when sexual compulsivity becomes problematic and affects client wellbeing.

Long Term Swift Monitoring Of The Narrow Line Seyfert 1 Galaxies Pg1211+143 And Rxj1117+65

Dylan Grupe*. Dr. Dirk Grupe, mentor, **Space Science Center, Space Science Center**

I am presenting x-ray and UV observational data of the Narrow-Line Seyfert 1 galaxy PG1211+143 from the NASA Swift satellite observatory. I will show the long term x-ray and UV lightcurves of this source and discuss them in the context of various AGN variability models. I will especially focus on new observations since a year ago. In addition I will present on RXJ1117+65 similarly, including data as recent as March 1st 2020.

The Role Of Fear Of Intimacy In Maladjustment Following Traumatic Experiences

Emma Gundler*. Dr. Daniel Maitland, mentor, **Department of Psychology, College of Science**

In this study, an online cross sectional survey was administered to college students at a mid-sized Hispanic Serving Institute in the southern United States. The questionnaires in the survey assessed exposure to trauma, trauma symptoms, and social functioning. 264 students completed the survey. Participants were 21.47 (SD = 5.46) years old on average. 54 of the 264 were male, the remaining 210 were female. The sample was 71.2% white and 62.1% Latinx. 155 of the participants in the sample reported that they had been exposed to a trauma as indexed by criteria A of the diagnostic criteria for Post-Traumatic Stress Disorder in the DSM 5.
Data analysis was conducted using the SPSS Process Macro (Hayes, 2017) model number 6. The results suggest serial indirect effects of trauma symptoms and fear of intimacy on the relationship between experiencing a trauma and viewing the world as hostile or having negative views of the self as a result of trauma. We concluded that fear of intimacy and trauma symptoms play a meaningful role in maladjustment to trauma. Understanding how these two factors can influence maladjustment may help to better understand the PTSD and influence our understanding of best practice in treating trauma.

Improving Adherence To Contact Precaution Protocols: A Quality Improvement Project

Airyl Heath*, Aiyanna Jones*, Amber Jackson*, Lauren Lacy*, Lauryn Stumbo*, Mackenzie Kulp*, Michael Horsley*. Dr. Suzanne White, mentor, **Department of Nursing, College of Science**

Isolation precautions are intended to minimize pathogen transmission and reduce hospital-acquired infections (HAIs).Recently, contact isolation precautions are being questioned due to rising occurrences of hospital-acquired infections and improper execution of contact precaution protocols. Factors that affects the effectiveness of isolation precaution protocols can be split into different sections. These sections are: staff education, financial impact of supplies, and adherence to isolation precautions protocols. The following review is to improve continuity of staff education among departments, increasing financial budget for personal protective equipment (PPE), and creating a system to guarantee staff compliance with contact isolation precautions.

Backyard Bio Security: How Social Media Bridges The Gap Between Urban Chicken Farmers

Carrie Sorrell*. Dr. Morgan Getchell, mentor, **School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

Urban chicken farming, defined as the practice of keeping a small flock of chickens in an urban or suburban setting for the purpose of this study, has increased in popularity in recent years. The purpose of this study is to examine how well-equipped urban chicken farmers are to care for their chickens, where they get information from, and how they judge that information to be credible. Specifically, the research looks at two diseases, Highly Pathogenic Avian Influenza (HPAI) and Virulent Newcastle disease, and whether these urban farmers know about the diseases and can deal with them appropriately based on the information they have gathered during their time farming. Semi-structured interviews that lasted approximately 20 – 30 minutes were conducted from a convenience sample of famers gathered from online posts. The results of the research seem to be that urban chicken farmers primarily use their chickens for eggs and teaching children about “real food.” The chickens are typically seen more as pets than livestock animals, with only a small portion of people understanding the effects of HPAI and Virulent Newcastle disease. As for information gathering, social media is a key source for these urban chicken farmers, though they tend to stay skeptical of the information found on social media sites. Local vets and extension offices are a trusted source of information. Overall, urban chicken farming is growing in popularity, however, to help urban chicken farmers to understand fully the bio-security needs of chickens and overall healthcare, social media should be a primary source where the USDA shares content in relation to this topic.

The Physics Applied To Linemen In Football

Dalton Lewis*. Dr. Ignacio Birriel, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

The project is the physics applied to linemen in football and the equipment that is used with it. The problem that needs to be solved is the fact that football teams often deal with constant injuries because of improper equipment or unsafe play. The reason that a study on the equipment is necessary because there is little data available to the public on the effects of forces upon players, specifically linemen, who are contacted every play. The forces that are felt by a lineman are small by comparison to the larger hits but are constant throughout a game. Due to the lack of information, I decided to study the effects myself. I am using a semi-realistic head form, wireless accelerometers, and a football helmet to research how forces inside of the head and on the helmet differ. I am using a contraption that I am making to ensure the same force will be applied to the helmet each time. I am then running multiple trials with different helmets to determine which ones are the best. This study will assist in proving to football programs and players that newer equipment will help them be safer for longer and allow for them to healthy after their careers are over.

Use Of E Dna In Detection Of Multiple Salamander Species In Eastern Kentucky Streams.

Emily Hollingsworth*, Gabe O'Hara*, Luke Kirk*, Maui Hall*. Dr. Ben Brammell**, Dr. David Peyton**, mentors, **Department of Biology and Chemistry**, College of Science, Biology and Chemistry **, Asbury University**

Environmental DNA (eDNA) utilizes DNA released from aquatic organisms into the environment to detect their presence; this is a rapidly expanding method of detecting aquatic and pseudo-aquatic organisms. To validate the use of environmental DNA (eDNA) for detecting salamander species in eastern Kentucky stream samples, multiple PCR products generated from species specific eDNA primers for southern two-lined (Eurycea cirrigera) and northern dusky (Desmognathus fuscus) salamanders were subcloned into plasmids and sequenced. The PCR products represented a region of the cytochrome b gene that has been used in similar studies. The sequence data indicated a perfect match between PCR produced from the collected eDNA and published GenBank sequences.

Peer Coaching Effectiveness At The College Level

Katie Birdwhistell*, McKinzie Hall*. Dr. Alison Hruby, Dr. Deanna Mascle, mentors,
School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences

This Teacher Action research project instated us as Peer Coaches in sections of ENG 100E ("E" for "Enhanced") and ENG 200 during the 2019-20 academic year. We worked with a section of ENG 100E in Fall and ENG 200 in Spring. ENG 100E is a specialized section of ENG 100 that provides an extra hour of instruction per week for students who need supplemental writing support. As coaches we applied research-based Writing Center pedagogy to support the ENG 100E students as they made progress towards becoming proficient in college-level writing. To investigate the efficacy of our coaching methods, we used qualitative methods of field notes and analytic inductive coding to identify patterns in our field journal, to develop conclusions and understanding about the tutoring process. Using different methods of tutoring in multiple settings, we found that students who receive individual support improve their writing abilities by the end of the course. The conclusions that this project provided helped us, both pre-service English teachers, develop a sense of what works in supporting students' development as writers.

Working Memory Capacity For Non Biological Motions

***Sydney Young*. Dr. Gregory M. Corso, mentor,* Department of Psychology, College of Science**

The purpose for this research was to determine the number of moving objects of a non-biological nature that can be held simultaneously in working memory. Previous research regarding motion in working memory addressed the capacity and storage of biological motion (Guo, 2019)—the movements of animate entities—however, research on the capacity and storage of non-biological motion appears to be lacking. Participants (N=17) were undergraduate psychology students who completed a vision screening test and a working memory task in one 60-minute session. The working memory task consisted of a series of 210 videos displayed on a computer screen. In these videos, the participant first saw an array of moving rectangles; each rectangle moved on a unique path with a unique velocity, for 4 seconds, and then all rectangles disappeared. Displayed were arrays of either 2, 4, or 6 of 7 possible moving rectangles in nine possible locations around the screen. After disappearing, the array was followed by a video of a single moving rectangle. The participant then determined whether the single moving rectangle appeared in the array that preceded it. Upon deciding, the participant selected A for "yes" or B for "no" on the keyboard. Half were correct pairings, half were incorrect. For each participant, correct and incorrect responses were recorded and the signal detection parameters of d' and Beta were calculated. The d' measure is the participant's ability to detect if the single moving rectangle observed was the same or different from motions in the array that preceded it, requiring the motions to be held in working memory. Participant scores were averaged based on the number of moving rectangles in the array. The average d' measures for 2, 4, and 6 motions were 2.581, 1.772, and 0.995, respectively, indicating that as the number of motions increased, the ability to remember the presence of a motion decreased ($F(2,32) = 48.38$, $p < .05$). The average Beta scores for 2, 4, and 6 motions were 1.011, 1.144, and 0.799 respectively, indicating that participant responding was not biased more towards a "yes" or "no" response for any particular number of motions.

Photography Practicum: Learning The Basics Of Managing A Fine Art Photography Studio

***Megan Woods*. Dr. Robyn Moore, mentor,* School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The photography practicum provides Art and Design student researchers with the practical experience of managing a fine art photography studio. Students learn how to operate, manage, and maintain industry standard fine art archival inkjet printers as well as a fifteen-station traditional black and white darkroom. This project provides essential expertise and knowledge that students, as lab monitors, both share with other students and incorporate into their own fine art practice and professional activities. Student researchers learn how to mix, store, and dispose of photographic chemistry, provide daily assistance to undergraduate and graduate photography students, and generate ideas for improvements to the lab. Additionally, students improve their knowledge of various analog and digital photographic processes through self-directed research with the goal of helping other students learn how to further develop and understand their work. Students also contribute to the ongoing revision of the Photography Lab Manual, which specifies best practices and operating procedures for future photography lab monitors. The practical knowledge gained from this experience is highly valuable to colleges, universities, community colleges, artist co-ops, and professional photography labs that seek to employ individuals to manage and teach both digital and analog photographic practices. This research was funded with an Undergraduate Research Fellowship.

Isolating Genes And Identifying Genetic Variations In Horses

***Christopher Davis, Miranda Robinson, Taelor McMillin*. Dr. David Peyton, mentor,* Department of Biology and Chemistry, College of Science**

The goal of this research was to isolate certain parts of horse DNA to confirm certain genetic mutations that affect appearance. A few mutations were selected to identify, then the DNA could be extracted from blood samples for processing that resulted in a readable DNA sequence. Once DNA strands were extracted for interpretation, genes could be confirmed or ruled out.

Several genes are known to play a direct role in the pigmentation of horses, affecting such traits as light or dark coloration, spotting, and diluted coat colors. In this project, the DNA for several horses from the Morehead State University Farm was examined for mutations in genes known to be responsible for coat color variation. The mutations, when present, were compared to the visible phenotype to see if the predicted correlation was supported by the data. The results from two genes, the melanocortin-1 receptor (MC1R) and the agouti signaling protein (ASIP), are discussed.

Paris And The New Woman

Daniel Mutter*. Dr. Sylvia Henneberg, mentor, **School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

This project closely examines the real and fictional lives of women in Paris who in one way or another represent the New Woman, an ideal for the progressive woman that took root in the late 19th century. Characters in several works published by Henry James, Kate Chopin, and Edith Wharton are analyzed in terms of their relationship to the movement. Further, the lives of historical women such as Coco Chanel and Mata Hari are presented as a means of extending the conversation. Their accomplishments during their lifetime serve to portray the complexity of the New Woman, the evolving and diverse elements that shaped a feminist ideal and reality.

Improvement Of Oral Care To Prevent Hospital Acquired Pneumonia: A Quality Improvement Project

Brenna Wilson*, Hannah Tipton*, Kalle Eldridge*, Kendra Cornette*, Madison Flannery*, Morgan Cantrell*, Sarinity Vogeler*, Shayla Sparks*. Dr. Mary Suzanne White, mentor, **Department of Nursing, College of Science**

Approximately 300,000 cases of hospital acquired pneumonia (HAP) occur every year across the United States; an astounding number for a totally preventable infection. The most common cause of HAP is due to bacteria that grow in the oropharynx/upper airways of patients. Oral care is the most effective known prophylactic practice to decrease the risk of HAP. While there are protocols in place regarding oral care, many of these aren't implemented as they should be. The purpose of this project is to examine the existing literature concerning the correlation between oral care and HAP. As a result of this project, handouts will be developed for appropriate personnel of the protocols in place and the importance of instilling these protocols into practice. This project is strictly for quality improvement purposes, and no human subjects are involved.

Constructed Learning In Elementary Mathematicians

***Dorian Cook*. Dr. Lesia Lennex, mentor,* Department of Middle Grades and Secondary Education, College of Education**

Math manipulatives are an exciting way to interest elementary school students. Which designs are most useful? In what way(s) do manipulatives affect the learning process? In my Undergraduate Research Fellowship, I explored varying designs of math manipulatives and which could be most effective in teaching elementary school students. I then designed an affordable and easily manufactured manipulative. This poster details research with elementary school students in some of the ways the manipulatives were used to teach lessons on counting, tens places, and money skills. The data collected showed us that students used various approaches to solve the problems that they were presented with. We compared gifted students work to the general students work to see how different education levels responded to the work.

Focus Sensitive Operators Plus Stripping Ellipsis Create Ambiguity

Victoria Nash*. Dr. David Potter, Dr. Katy Carlson, mentors, **School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

This experiment investigated factors influencing the interpretation of sentences like (1-4), which contain a stripping ellipsis continuation and the focus sensitive operator (FSO) "not". The continuation in these sentences has been claimed to be ambiguous between two interpretations, (5-8), in which the negation modifies either the first verb (V1: say/meet) or the second verb (V2: poison). We tested this claim using an auditory forced-choice disambiguation task. Participants (n=43) heard 20 test sentences in four conditions: the sentence either contained a complement clause (1-2) or a relative clause (3-4), and either the first clause (1,3) or the second clause (2,4) contained an emphatic "DID." Participants chose between two interpretations of the ellipsis continuations, in which the FSO was attached to V1 (5,7) or to V2 (6,8).

1. James DID say that the villain poisoned Bill, and not Mary. (complement clause)
2. James said that the villain DID poison Bill, and not Mary. (complement clause)
3. James DID meet the villain who poisoned Bill, and not Mary. (relative clause)
4. James met the villain who DID poison Bill, and not Mary. (relative clause)
5. James didn't say that the villain poisoned Mary. (V1 attachment)
6. James said that the villain didn't poison Mary. (V2 attachment)
7. James didn't meet the villain who poisoned Mary. (V1 attachment)
8. James met the villain who didn't poison Mary. (V2 attachment

The results revealed that these sentences are indeed ambiguous between V1 and V2 interpretations, with an overall V2 interpretation bias. Further, conditions with high "DID" were given significantly more V1 interpretations than those with low "DID," showing focus affecting attachment. Relative clause conditions showed a trend toward more V1 interpretations but this was not statistically reliable.
The ambiguity can be explained if the FSO "not" derives from either the first (9) or second (10) clauses within the elided syntactic structure. Further, this ambiguity requires that the syntactic structure associated with the ellipsis site be isomorphic to that of the antecedent, given that a non-isomorphic resolution (11) would contain insufficient syntactic structure to yield the V1 interpretation. This research was supported by NICHD 2R15HD072713-02 and NIH 5P20GM103436-13 grants.
9. …and James did not say that the villain poisoned Bill.
10. …and James said that the villain did not poison Bill.
11. … the woman did not call Bill.

Impact Of A Hydrolyzed Yeast Mineral Product On Cow Hair Coat Score And Behavior

Brandi Banks, Johnna Scott, McKenzie Layne, Shannon Carey*. Dr. Flint Harrelson, Dr. Patricia Harrelson, mentors, **Department of Agricultural Sciences, College of Science**

Endophyte-infected tall fescue creates a multitude of problems for many beef producers, with supplementation being one management strategy to decrease these problems. Our research objective was to determine if supplementation with a hydrolyzed yeast product could alleviate some symptoms of fescue toxicosis in mature cows. A 3-year study was conducted with registered Angus cow-calf pairs (n =34 or 38) which were stratified by cow age and body weight then randomly allotted to one of two treatments; control mineral (CON) or hydrolyzed yeast mineral (HYM). The same mixed grass pastures (n = 6 or 8; 1.21 ha each) which contained varying levels of endophyte (20 – 90%) where grazed by both groups in a rotational pattern for 126, 133, or 140 d, depending upon year. Cattle groups grazed each pasture for 7 days and mineral was provided at a target rate of 113.4 grams/head/day throughout the grazing period. Prior to entering a new pasture weekly, cows were assigned a hair coat score (HC) by two independent, trained personnel. Cow behavior was measured every 15-min within a 2-h block weekly. Percentage of cows active or inactive, outside or inside was recorded. Data were analyzed using the MIXED procedure of SAS. Cows consuming the HYM supplement spent a greater percentage of time outside being active ($P < 0.01$) and a lower percentage of time inside being inactive ($P < 0.01$) compared to CON cows. Hair coat was unchanged by treatment, however, a year ($P = 0.02$) and age effect ($P < 0.01$) were both observed. Results from this trial indicate that the hydrolyzed yeast mineral may be an effective tool to aid in combating heat stress associated with fescue toxicosis.

Evaluation Of Fungicides On Industrial Hemp

***Brock Dean, Todd Smith*. Dr. C Brent Rogers, mentor,* Department of Agricultural Sciences, College of Science**

Industrial hemp production has consistently grown in Kentucky for the past 5 years. The cannabinoid (CBD) products which are derived from industrial hemp have become very popular with the public for medicinal use. Over this time period there have been several incidences of crop damage due to fungal diseases. At this time, few if any, of the fungicides used in other agronomic crops are registered for use in industrial hemp. This study was initiated in June 2019 to evaluate three commercial fungicides for control of hemp leaf spot diseases.

A study was conducted at Morehead State University Derrickson Agriculture Complex in 2019 with plants supplied by GenCanna Global. A split plot design was used in this study. The main treatments were the fungicides Orbit, Cabrio, Abound and a combination of Orbit+Abound. A check (no fungicide) was included. Each treatment was then applied either once (July 25, 2019) or twice (July 25, 2019 and August 23, 2019). Plants were maintained using normal agronomic practices and fungicide performance was evaluated through visual rating on September 3, 2019. At the end of the growing season the hemp plots were harvested. Hemp fresh weight data was collected, and plants were hung in a tobacco barn to dry. In December plant dry weight was taken. A statistical analysis of this data was performed. Analysis of the visual rating showed that the combination of Orbit + Abound fungicides reduced fungal leaf damage more than any other treatment. The individual fungicide treatments were not significantly different from each other. Analysis of the hemp fresh and dry weights did not show significant differences, however dry weight data showed a trend toward significance that resembled the visual rating data.

Kodaly, Dalcroz, And Orff, Which Is The Better Method Of Teaching Elementary Music?

Harrison Stone*. Dr. Lola Aagaard, mentor, **School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

Comparing Teaching Methods in the Elementary Music Classroom
The objective of this research was to determine if there were differences in the effectiveness of three different elementary music teaching methods: Dalcroze, Orff, and Kodaly.
Dalcroze is eurythmi based and helps students develop a strong ear for singing and hearing music. Kodaly uses sound before sign to help students learn music before they can read it. With the Orff method, students learn by doing and are able to explore creatively on instruments.
Three groups of elementary (3rd grade) students were to have been instructed by the principal investigator (PI) in the spring of 2020, using a different method with each group. A fourth group was to have received regular music instruction from the PI, as a control group. At the beginning and the end of the five to seven weeks of 15-20 minutes of weekly music instruction, data were to have been collected from each student on the following variables:
1. Time taken to match pitch of a given note (in seconds/minutes)
2. Ability to stay on pitch of note (yes/no)
3. Ability to keep steady beat (rushing/dragging – yes/no)
4. Ability to find the beat of a piece (yes/no)
5. Performance ability – what order of complexity of piece can students perform well.

Coronavirus precautions in the local schools meant the planned data gathering had to be postponed, so student data will not be available for this presentation. However, each teaching method will be explained in detail, including pros and cons, and results from other studies of these methods will be compared.

The Sos Response Transcriptional Regulator Umu D Ab Of Acinetobacter Baumanni Exhibits Homodimerization In A Bacterial Two Hybrid System

***Kevin Johnson*. Dr. Deborah Cook, Dr. Janelle Hare, mentors,* Department of Biology and Chemistry, College of Science**

UmuDAb regulates the SOS mutagenesis response in the nosocomial pathogen Acinetobacter baumannii and the model bacterium A. baylyi. Its features are similar to UmuD and LexA, both of which form homodimers and are involved in the SOS DNA damage response with different roles and molecular mechanisms. UmuD is part of the error-prone DNA repair system. It interacts with UmuC polymerase, after RecA-initiated intermolecular cleavage of the UmuD homodimer, to facilitate trans-lesion, error-prone DNA synthesis. LexA is a transcriptional repressor of SOS genes that are induced upon LexA self-cleavage. UmuDAb shares a conserved asparagine (N100) with the UmuD asparagine (N41) that is necessary for UmuD dimerization. LexA has an aspartic acid (D100) instead of N100 and the crystal structure of the LexA homodimer indicates that its seven C-terminal amino acids contribute to dimer formation. By iTASSER and TM align predictions, UmuDAb appears to share a C-terminal secondary and tertiary structure similar to LexA. The possibility of UmuDAb dimerization was investigated by quantifying its interaction with itself using a bacterial two-hybrid system that uses a beta-galactosidase assay (BACTH). The hypothesis that UmuDAb forms dimers was supported by three of the four two-hybrid plasmid pair configurations. Significant interactions were observed when one or both UmuDAb C-termini were available ($P < 0.01$). There was no interaction of UmuDAb to itself when only its N-terminus was free. We then tested whether changing N100 to aspartic acid (N100D) affected UmuDAb's dimerization and observed a trend of lower interaction values that were not statistically significant. Finally, constructing a premature stop codon that removed the final 10 amino acids eliminated any interaction between UmuDAb proteins ($P < 0.001$). These results showed that: UmuDAb forms dimers if the C-terminus is free on one or both UmuDAb proteins, the N100D mutation has minimal effect on dimerization, and that no dimerization occurs if only N-termini are available for both UmuDAb proteins, or when the last 10 amino acids were removed from even one of the proteins. These results indicate UmuDAb is more similar to LexA in regards to its dimerization mechanism.

Palynology Of Pleistocene And Holocene Sediment Cores From Big Bone Lick, Kentucky

Maggie Alden*, Maggie Stephenson. Dr. Jen O'Keefe**, Dr. William Andrews**, mentors, **Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Kentucky Geological Survey**, University of Kentucky**

In 2017, Morehead State University Craft Academy for Excellence in Science and Mathematics students provided the first snapshot of the ecosystem's charismatic megafauna, such as mammoths, mastodons, sloths, bison, and musk-oxen, lived among. This study suggested that rather than a grassland environment, as was frequently reconstructed for the area, the wetlands comprising the "lick" were surrounded by lowland and upland forests. Additionally, dung fungi present in the initial samples suggested the presence of waterfowl, the bones of which have not been found at the site. In the subsequent three years, study of the pollen, plant spores, and algal and fungal remains recovered from two cores, obtained by the Kentucky Geological Survey in July 2004, has been underway. An additional four cores remain to be studied. This long-term project aims to improve the initial snapshot by mapping ancient ecosystems to occurrence levels in each core and tying this to the results of the 2017 study. Here we present an update of our progress, including new information about charcoal distributions relative to changing ecosystems.

Correcting Gender Inequality In Msu's Rotational Physics Device

Donald Matthews*. Dr. Ignacio Birriel, Dr. Kevin Adkins , mentors, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

At Morehead State University, we are redesigning a device used during our annual Mathmatics, Physics and Advanced Technology Exploration (MAPT) Day. The device is intended to stimulate high school students' interest in introductory physics concepts through a hands-on activity demonstrating the difference between kinematic and rotational motion. This study investigates the potential gender inequality present in the construction of the device, arising due to the difference in average height between men and women. The goal of this project is to optimize the geometric constraints of the device so that it is accessible and fair for all students.

A Sticky Situation With Bctcs

Abby Claire Hall*, Kala Brown*, Kelsey Heard*, Meyrick Barnett*. Dr. Deborah Sullivan-Davis**, Dr. Jennifer M.K. O'Keefe**, mentors, **Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Biology**, Bluegrass Community and Technical College**

DNA metabarcoding and melissopalynological analysis are now being used in tandem to identify and type local honey in many places. With the establishment of the Kentucky Honey Testing Laboratory (KYHTL) at Bluegrass Community and Technical College, a joint venture with Morehead State University's (MSU's) OPaL lab, this type of tandem analysis is in the development stage in Kentucky. Enzymatic processing techniques, coupled with light microscopy are used to prepare and analyze melissopalynological samples at MSU. These analyses rely on the use of key morphological features of pollen grains, such as size, shape, number and type of apertures and pollen wall structure to identify pollen from honey samples. Needless to say, not all pollen can be identified to species or even genus using this method because they lack differentiating characters. DNA metabarcoding of nuclear material contained within pollen grains in honey samples, on the other hand, can identify pollen types with greater precision. A combined report, produced under the auspices of KYHTL, provides beekeepers with the information they are used to receiving from traditional melissopalynological analyses, as well as more detailed information. This information can be used to label honey with its botanical source, thus permitting beekeepers to market their honeys for a premium and better compete with non-regional honey sources. Here we present the challenges of learning and practicing traditional melissopalynology and an example of a preliminary correlative report.

Development Of An Earthworm Model For The Study Of Action Potentials In And Undergraduate Animal Physiology Laboratory

Chayla Hacker*, Jacklyn Stiltner*, Reese Helton*. Dr. Michael Fultz, mentor, **Department of Biology and Chemistry, College of Science**

As animal physiology laboratories have shifted from the use of vertebrate animals for teaching purposes to invertebrate models, there is a need to develop new techniques to examine essential concepts including the neuron action potential. The earthworm is a potential new model as its anatomy and simplicity of its nervous system coding may be more easily measured than other invertebrates. This project is to develop a system to measure action potentials in earthworms and develop a laboratory procedure that would be appropriate for senior animal physiology students.

Boundary And Accent Effects In Possessive Phrases

Elizabeth Keeton *, Zachary Garrett *. Dr. David Potter, Dr. Katy Carlson, mentors,
School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences

In the dialogue "Who was it? The daughter of the pharaoh's advisor," the answer could be interpreted in two different ways: it either refers to the advisor to [the daughter of the pharaoh] (high possessive attachment) or the daughter of [the advisor to the pharaoh] (low possessive attachment). We hypothesized that a prosodic boundary between the second noun "pharaoh" (N2) and the third noun "advisor" (N3) would increase rates of high attachment, following previous work. We further wanted to test whether accenting either N1 "daughter" or N2 "pharaoh" would draw attachment to include the accented noun, as in other structures studied by Carlson & Tyler (2018).

In an auditory forced-choice task, 48 subjects listened to 24 responses to the question "Who was it?" under four different conditions: accented N1 with a prosodic boundary, accented N2 with a prosodic boundary, accented N1 without a prosodic boundary, and accented N2 without a prosodic boundary. Each time they heard a condition, the subjects chose between two paraphrases of the response: one choice reflected high attachment and the other choice reflected low attachment. The results confirmed our boundary hypothesis, as the high attachment answers were selected 20-30% more after hearing the conditions containing the prosodic boundary. The results also showed that an accent on N2 without a prosodic boundary led to 14% more high attachment answers than the N1 accent without a prosodic boundary: the accent didn't draw attachment to the phrase including the accented element as in Carlson & Tyler's research. Instead, we suggest that the acoustic realization of the accent on N2 induced the illusion of a boundary following it, so that both effects can be traced to prosodic boundaries.

Overall, the data confirms that a prosodic boundary has a significant effect on attachment. However, the data also shows that accent location can have a significant effect on attachment in no boundary conditions, and in the opposite direction from prior studies. This research was partially supported by NICHD 2R15HD072713 and NIH 5P20GM103436-13 grants.

Azimuthal Variations In Cosmic Ray Acceleration By The Galactic Supernova Remnant G330.2+1.0

Dylan Johnson*. Dr. Thomas Pannuti, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

We present a spatially-resolved X-ray spectroscopic analysis of the Galactic supernova remnant (SNR) G330.2+1.0 using archival observations made with the Chandra X-ray Observatory. Unlike most SNRs which exhibit X-ray spectra dominated by thermal emission, prior spectroscopic analysis of G330.2+1.0 reveals that the detected X-ray emission from this SNR has a non-thermal origin. Specifically, the observed X-ray emission is synchrotron radiation produced by cosmic-ray electrons accelerated by G330.2+1.0 and detailed spectroscopic analysis of this emission holds the promise of determining how G330.2+1.0 (as well as other SNRs) accelerate cosmic-ray particles. We have extracted spectra from more than 30 regions arranged across the entire azimuth of the SNR and fit the extracted spectra with simple power laws as well as more sophisticated models such as the synchrotron cutoff model SRCUT. To apply this latter model in a rigorous manner, we have included archival radio observations made of G330.2+1.0 using the Giant Metrewave Radio Telescope and the Molonglo Observatory Synthesis Telescope to measure both the flux density at a frequency of 1 Gigahertz and the spectral index for each region. We have then used these measured quantities to constrain the fits and provide an estimate for the maximum energies of cosmic-ray electrons accelerated at each region. Our results indicate clear variations in the X-ray spectral properties along the entire azimuth of the SNR along with ranges of the maximum energies of the accelerated cosmic-ray electrons. Initial results of our work will be presented and discussed.

What Goes Into Production Of A Music Festival Like Woodstock, 1969?

Daria Denysenko*. Mr. Glenn Ginn, mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

For my research with professor Glenn Ginn, I conducted an experience-based study. Our research was only one semester long. At that time, we researched several music festivals in the 1960s and 1970s. Our focus was on Woodstock festival in 1969 and a few others happening right after Woodstock like Altamont in 1969. We researched the success of Woodstock festival and other festivals that followed and compared it. The main purpose of this research was to understand why Woodstock being a disaster and a great financial burden in the years to come was such a great success in the long run and why we still refer to it when thinking about music festivals and the history of rock and roll even today. Moreover, we have put on a Woodstock tribute show called “Woodstock: Back to the Garden” on October 29th, 2019. I was in charge of social media, MSU media coverage, advertising, event planning, finances, stage management, and staff and artist management both months leading up to the show and the day of the show.

At the end of the semester, we had completed our research on the festivals of the 60s and 70s and had put on a successful Woodstock tribute that helped us get inside the festival’s managers’ life and see how things work for ourselves. The show had an audience of 600 and raised $1100 in ticket sales. This has been the biggest show the Commercial Music Ensemble and Music Industry Club has put on so far. I will be presenting my research as a poster presentation at the Celebration of Student Scholarship.

Preliminary Palynology Of The Hooper Coal, Wilcox Group, Texas

***Alexander Newman*, Ashton Killen. Dr. Chris Denison**, Dr. Jen O'Keefe**, Mr. Nick Cowey**, Dr. Thomas Demchuk**, mentors,* Department of Physics, Earth Science and Space Systems Engineering**, College of Science, Bastrop, TX**, Astra Stratigraphics, Houston, TX**, RPS Group, Inc., McKinney Roughs Nature Park**, LCRA**

Poorly exposed Hooper formation sediments in McKinney Roughs Nature Park are providing clues about terrestrial ecosystem change across the Late Danian Event, a hypsithermal event that occurred at 62 MA. Hypsithermal events are short-duration extreme warming events documented in the fossil record. Here we provide an update on study of a newly located exposure within the park, called 'MoSU Ridge', as well as correlation with previous studies of the Nicks Pit, Coyote Road, and River Side Trail exposures. These coals contain abundant, but relatively low-diversity floras dominated by freshwater algae and fern spores, including sedge, willow, and dogwood family pollen. These assemblages are consistent with deposition in freshwater topogenous mires, much like coastal wetlands present in Texas today. Little evidence has been found for changes in plant communities across the hypsithermal, highlighting the resilience of Danian tropical plant communities, previously documented in South America.

Inventory Of The Bryophytes In The Eagle Lake Watershed, Rowan County, Kentucky.

***Kelsey Hargett*. Dr. Allen Risk, mentor,* Department of Biology and Chemistry, College of Science**

Bryophytes are non-vascular plants composed of mosses, liverworts, and hornworts. They can act as bioindicators of environmental quality, contribute to erosion control, provide nesting material for birds, and create habitat for small animals. Bryophytes are a very understudied group when compared to vascular plants, especially in Kentucky. The objective of this study was to inventory the bryophytes occurring in the Eagle Lake watershed in Rowan County, Kentucky. Six recent field trips to the study area yielded 94 specimens. By consulting the Consortium of North American Bryophyte Herbaria web site along with specimens filed in the Morehead State University herbarium, it was determined that a total of 54 bryophyte species (15 liverworts, 39 mosses) have been documented thus far. Hornworts have yet to be collected in the Eagle Lake watershed. Recently, Pellia epiphylla was documented as the first thallose liverwort to be found in the watershed. Another new genus to the Eagle Lake watershed, Fossombronia, was also identified. Additionally, the discovery of Fissidens bushii from the watershed was a county record for Rowan County.
This research was supported by an Undergraduate Research Fellowship from Morehead State University.

Reclamation Of Unused Coal Lands Through Bluegrass Hemp

Anya Deaton*, Haley Turner*, Leanna Shelton*, Lydia Deaton*, Sheridan Combs*. Dr. Ahmad Hassan, Dr. Fatma Mohamed, mentors, **Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics**

Throughout the last century, Eastern Kentucky has been pivotal in the coal production for the united states. As such many jobs and economic opportunities were largely formed through coal mining. In recent years, however, coal production has shifted elsewhere leaving the rural communities of eastern Kentucky at risk of economic failure. This project is focused on providing a redevelopment plan for an abandoned coal mine in eastern Kentucky. The Entrepreneurial Coal Lands Redevelopment Program (ECLRP) is focused on reclaiming abandoned coalmines to encourage economic evolution and development in low-income communities. Redevelopment of coalmines can create jobs and promotes social development. Bluegrass hemp is a business model that will turn an abandoned coal mine into a useable greenhouse facility. Our project details the business plan for Bluegrass hemp along with the development of the community. The foundation for Bluegrass Hemp seeks to generate workforce development in construction and training in technical work. The development of Bluegrass Hemp will bring economic growth to the Elliot County community, in addition to improving all of eastern Kentucky. Our business plan outlines finances, marketing, organization and everything needed to start this business.

Effect Of Aspect On The Richness And Diversity Of Land Snail Communities In Southern Rowan County, Kentucky

Tessa Whalen. Dr. Allen Risk , mentor, **Department of Biology and Chemistry, College of Science**

Land snails are in the second largest animal phylum recognized world-wide, yet they are largely under researched. They play very important roles in many ecosystems including micronutrient cycling, dispersal of plant seeds and fungal spores, and provide a food and calcium source for other organisms. With 204 species, Kentucky has a rich diversity of terrestrial snails recorded thus far. There are many environmental factors that affect the population and diversity of land snails including sources of limestone, vegetation, elevation, soil acidity, and leaf litter moisture. Many of these factors are affected by slope aspect, meaning the compass direction that a hill faces. In order to address the effect of aspect on land snail communities, three 20 meter by 20 meter plots were established on a north-facing slope in southern Rowan County. Within each plot, two one gallon leaf litter samples were collected by logs, limestone outcrops, and the uphill sides of trees. Then a one person-hour was used to harvest shells freely within the plot. Finally, a one person-hour was spent collecting shells freely outside of each plot near limestone outcrops. Each one gallon bag full of leaf litter was examined under a dissection microscope for micro snail species. Thus far, 17 species of macro snails have been documented. Future work includes identifying the remaining samples from the north-facing slope, data analysis, and setting up similar plots on a south-facing slope for comparison. This research was supported by Morehead State University's Undergraduate Research Fellowship Program.

Catalogue Of Lichen Species In The Rowan County Sphagnum Swamp, Rowan County, Kentucky

***DeAnna Kidd*. Dr. Allen Risk, mentor,* Department of Biology and Chemistry, College of Science**

Rowan County Sphagnum Swamp is one of the best remaining examples of a bottomland swamp forest left in the Knobs region of Kentucky. Bottomland swamp forests are characterized by soil with a high percentage of organic matter above clay and Devonian shale. This arrangement leads to standing water much of the year and a strongly acidic soil. Common tree species in the Rowan County Sphagnum Swamp include Acer rubrum (red maple), Quercus palustris (pin oak), Liquidambar styraciflua (sweetgum), Nyssa sylvatica (sourgum) and Betula nigra (river birch). Bottomland swamp forests used to be more common, but have dwindled due to land clearing for timber and agriculture. The research project included cataloging the species of lichens found in the Rowan County Sphagnum Swamp through three field trips to the study site. Forty-two collections have been made so far for this project with samples being deposited in the Morehead State University Herbarium (MDKY). Lichen samples were identified using dissecting and compound microscopes, C (bleach) and K (KOH) chemical tests, and observation under ultraviolet light. Common species of lichens included Buellia erubescens, Lecanora hybocarpa, Punctelia rudecta, and P. missouriensis. Uncommon species included Lecanora thysanophora. This research was supported by a Morehead State University Undergraduate Research Fellowship.

An Ecological Hotspot For Fishes; The Wild River Section Of The Red River Gorge, Kentucky

***Cole Ralenkotter*, Erika Howard*, Jonathan Eisenhour. Dr. David Eisenhour, mentor,* Department of Biology and Chemistry, College of Science**

Fishes of the Wild River section of the Red River (between KY 746 and KY 715) were surveyed at eight sites (approximately 200 m each) in the late summer to mid-fall of 2019. Most of the Wild River section has never been surveyed for fishes. Fishes were sampled by both backpack electrofishing and seining, with the goal of determining the fish community makeup and health of the surveyed region. Captured fishes were identified and counted; these data were analyzed using the Kentucky Index of Biotic Integrity (KIBI) to determine fish community health. A total number of 4,103 individuals were encountered, comprising 41 total species. Five of these species were newly recorded in this section of the Red River. KIBI scores ranged from 67 to 90, in the high end of “Good” to “Excellent” categories. The lower end of the study area, below a series of category II-III rapids, was particularly diverse in fishes. Sites there had the highest KIBI scores (84-90), high species richness (29-32), and high numbers of darter, madtom, and sculpin species (12-14), a group of fishes especially sensitive to environmental disturbances. Comparison with historical collections suggest the fish community of this area is stable. Our analysis indicates the fish fauna is nearly undisturbed, an uncommon condition of small rivers in Kentucky.

Attentional Resource Allocation In Dual Tasks

Mia Carman*, Reganne Miller, Vanessa Jones. Dr. Gregory Corso, mentor,
Department of Psychology, College of Science

Autonomous vehicles require drivers to monitor the system. If the automation fails, the driver needs to take control of driving. Drivers are often distracted by secondary tasks such as texting or talking on a phone. The current experiment was designed to investigate changes in performance on a tracking task while performing a secondary task, simulating an autonomous driving task with distractions. Participants (N=10) were required to perform a tracking task, a randomly assigned auditory or visual secondary task, and a dual-task that combined both single tasks. The secondary tasks consisted of math problems, presented visually or auditorily. Participants were required to identify whether the answers to these problems were correct or incorrect by pressing 1 or 2 on a keyboard. During the tracking task, a cursor moved about a square area that contained a smaller target area where the cursor remained while the system was automated. The cursor deviated from the target area when the automation failed, and the participant was tasked with moving the cursor back to the target area using a joystick. Participants completed each single task twice (tracking and arithmetic) once in a practice phase and once in a testing phase while the dual-task was completed once in the testing phase. The dual-task consisted of the tracking and randomly assigned distracting task conditions. The secondary task would cue before automation failed, requiring participants to respond to both tasks at once. The total time for collecting tracking data was 2-minutes (RMSE integrated over one-tenth second intervals) during automation failure and secondary task completion. The mean RMSE data for each participant across two 1-minute intervals (60 seconds of tracking data) were used in two repeated-measures ANOVAs. For each analysis, RMSE for each participant performing the different distraction tasks and five baseline conditions (the cursor was permitted to drift for two minutes) were used. No significant differences in RMSE were found while performing the distraction tasks or the baseline condition over the first minute, ($F(59, 708) = .722$, $p. = .894$) occurred. A significant difference in RMSE over the second minute ($F(59, 708) = 1.603$, $p. = .004$) was found. Two additional ANOVAs without the baseline tracking condition were performed, and no significant differences occurred for either secondary task condition for the first or second minutes.

Unexpected Results: Tracking And Different Modality Secondary Task Performance

Mia Carman, Reganne Miller, Vanessa Jones. Dr. Gregory Corso, mentor,
Department of Psychology, College of Science

Autonomous vehicles require drivers to monitor the primary task of driving while they may be focusing on a secondary task; if the car's automation failed, the driver would have to effectively take over the primary task of driving. The experiment for our study implements a primary visual-spatial tracking task and a secondary arithmetic task (visual or auditory), simulating the driving and hypothesized secondary task. Latency and accuracy for the secondary tasks in single and dual conditions were analyzed. We hypothesized that the tracking task would impair performance on the secondary task and would have differential effects depending on secondary task type, performance on an auditory secondary task would be superior to performance on a visual secondary task. Female undergraduate participants (N=24) were treated according to approved IRB protocol. After signing the consent form, participants completed a vision test and demographic survey. For the task structure, participants were required to perform a tracking task and were assigned randomly to either an auditory or visual secondary task. For the secondary task, addition and subtraction problems and answers were presented; the participants were required to decide if the answer was correct or incorrect by pressing 1 or 2 on a keyboard. Participants completed the single tasks twice (tracking task and arithmetic task), once in a practice phase and once in a testing phase. For the tracking task, a cursor moved over a square plane containing a smaller target area where the cursor stayed while the system was in automatic. When automation failed, the cursor deviated from the target, moving randomly about the whole plane, and the participant was required to move the cursor to the target area using a joystick. Latency and accuracy data were recorded for the secondary task. Two ANOVAs were performed, one for latency and one for percent correct. A significant secondary task difference for latency, $F(1, 22) = 74.3$, $p.<.01$, was observed (auditory > visual). For secondary task trials where the answer was correctly identified, there was a significant latency difference between problem types, $F(1, 22) = 8.065$, $p.<.01$ (incorrect > correct) and a significant accuracy difference $F(1, 22) = 7.675$, $p.<.01$ (incorrect > correct). No significant accuracy differences between the single and dual task conditions for the secondary task were observed. Discussions, additional findings, and limitations are discussed.

Creating A Circular Chromosome In Saccharomyces Cerevisiae

Ethan Chandler*. Dr. Melissa Mefford, mentor, **Department of Biology and Chemistry, College of Science**

At the ends of linear chromosomes, there are regions of repeated nucleotide sequences, called telomeres, that do not encode for any specific gene. In eukaryotic DNA replication, small sections of DNA are lost at the end. Since these lost sections are telomeres, the genetic information on the chromosome isn't compromised. An enzyme called telomerase adds nucleotides to the telomeres after each round of DNA replication to maintain the length, and therefore, the effectiveness, of the telomeres in nearly every eukaryotic organism. The ability of telomerase to maintain the telomeres has profound effects in an organism. It is believed that decreasing telomerase function over time plays a role in the aging process; additionally, many human cancers have drastically increased and unregulated telomerase activity. Since telomeres and telomerase have such significant, varying effects on an organism, the overall goal of this research is to gain insights into the evolutionary history and possible additional functions of telomeres and telomerase.

In order to accomplish this, I will circularize Chromosome XI of Saccharomyces cerevisiae. Ch. XI was specifically chosen due to its moderate length and short telomeric sequences. In the circular state, Ch. XI lacks telomeres. I will then monitor the viability and fitness of S. cerevisiae strains with a circularized Ch. XI; this will supply the aim of the research. To circularize Ch. XI, I will insert a DNA cassette into sub-telomeric regions on each end of Ch. XI. These cassettes on each end contain a complimentary half of the gene URA3, which encodes for an enzyme crucial in pyrimidine synthesis. Strains of S. cerevisiae with cassettes will be placed onto media lacking uracil. This environment selects for the recombination of the URA3 gene. This recombination event brings the ends of Ch. XI together and thus circularizes the chromosome. Currently, I have successfully assembled and inserted the DNA cassettes into the arms of Ch. XI.; I will confirm the integration of the cassettes in their correct locations via PCR. In the likelihood that S. cerevisiae strains with a circularized Chromosome XI are sufficiently viable and fit, a long-term goal of this research is to engineer a strain in which all of its individual chromosomes are circularized.

Fall And Rise: Changes In The Fish Community Of Triplett Creek Following Restoration Of A Channelized Reach.

Austin Spradlin*, Jon D. Eisenhour. Dr. David Eisenhour, mentor, **Department of Biology and Chemistry, College of Science**

In the early 1970s, Triplett Creek in Morehead, Kentucky, was straightened, deepened, and widened, resulting in a rather homogenous aquatic habitat, varying little in depth, flow, and substrate. In summer of 2018, a section of the stream was "restored" in order to alleviate the bank instability and flooding problems created by the 1970s channelization, restore the health of its aquatic community, and improve recreational opportunities, including fishing and kayaking. Our goal was to examine changes in the fish population resulting from the extensive changes to the channel and substrate during the restoration. We studied the fish populations at four sites (two sites in the restored area and two unaltered reference sites) in June of 2018, just before the restoration work occurred, and then three times after the work occurred, in October 2018, June 2019, and October 2019. Fishes were qualitatively sampled using backpack electrofishing and seining. Encountered fishes were identified and counted, which allowed us to assess the fish community health using the Kentucky Index of Biotic Integrity (KIBI). In June 2018, prior to any restoration work, the four sites had KIBI scores between 59 and 70, all of which rated as "good". However, the two sites in the restored area had a higher proportion of nonnative species, and fewer darters compared to the reference sites. In October 2018 and June 2019, after the restoration work, the restored sites declined slightly in KIBI scores, had reduced number of species detected, especially species considered "intolerant" by KIBI, and had reduced number of darter species, while the control sites showed little change. However, in October 2019, much of these metrics had greatly improved in the restored sites. In the future we expect the fish communities of the restored section to continue to improve, as riparian vegetation becomes established, the substrate stabilizes, and invertebrate communities (food for fishes) colonize the new habitat.

Evaluating Possible Factors That Effect A Consumer's Likeliness To Purchase

***Megan Bailey, Savannah Muse, Sydney Brown*, Sydney Young, Vanessa Jones. Dr. Gregory M. Corso, mentor,* Department of Psychology, College of Science**

According to the Consumer Healthcare Products Association, nearly 81% of adults use over-the-counter medicines as the first response to minor ailments. Alongside the increased use of over-the-counter medications is the high prevalence of improper consumption of these medications. Despite frequent misuse there have been little to no modifications made to packaging regulations. For the current research project, the responses from Amazon Turk Master Workers (N=105) were used. All participants were treated according to the approved IRB protocol. After giving consent the participants were asked several demographic questions regarding their gender, age, race/ethnicity, handedness, income level, and education level. After completing the survey participants were required to rank each of the labels (four at a time) based on informativeness, trustworthiness, aesthetics, and likeliness to purchase. Four different labels were developed for each drug type: antihistamines, antacid, stomach relief, and pain relief. For each drug type there were two generic and two name-brand label types, containing a highlighted area located in the top right corner. Contained in the highlighted region was information that consumers might feel is important, such as dosage, active ingredients, and purpose for the drug. A multiple regression analysis was performed to examine possible relationships between the predictors (ranking of informativeness, trustworthiness, and aesthetics) on the likeliness to purchase. The regression equation was: Likeliness to Purchase Rank = 1.24 + (Informativeness Rank x .671). Trustworthiness ($t = .342$, $p. = 0.738$) and Aesthetics ($t = -.342$, $p. = 0.785$) were not significant factors on the Likeliness to Purchase the drug. The ANOVA for the regression was significant, $F(3, 12) = 19.29$, $p. < .001$. The regression model accounted for 83% of the variance. Further, demographic data were used as quasi variables in relation to the ranking data to explore whether there was a relationship between the demographics of our participants and their rankings of the sample labels. The results yielded significant positive correlations at a .05 level between income level ($r = .229$) and age ($r = .279$) on a participant's ranking of the type of medication label and the brand of the label. These results may be valuable to drug manufacturers in that the information provided on packing labels provides an important indicator for purchasing the drug.

Evaluating Information Retained By Consumers Of Otc Medication Labels

Megan Bailey, Savannah Muse*, Sydney Brown, Sydney Young, Vanessa Jones. Dr. Gregory Corso, mentor, **Department of Psychology, College of Science**

The purpose for this experiment was to explore a person's ability to find relevant drug information given different label designs. Participants (n= 60) were presented with name-brand and generic medication labels for short durations and were asked specific questions. Three different labels were used: Labels containing important information inside a highlighted area, labels containing important information outside a highlighted area, or labels without a highlighted area. Durations of 2, 3, or 4 seconds were used. Also manipulated were the type of medication, and whether the label was brand-name or generic. However, these were of no concern for this experiment. For a trial, a label would appear for a set duration, and was followed by a question. Questions included but were not limited to, dosage information, tablet count, and the purpose for the medication. Four answer choices were presented for each of the 160 medication labels and questions. Responses were made by depressing a key on the keyboard. The dependent variables were response time and percent correct. Participants were placed randomly in one of the three duration-groups. For each participant, the response time for each correct response and the percent of correct responses for each of the label types (in, out, or no highlighted area) were analyzed. The location of the information resulted in significant response time differences, $F(2,114) = 9.450$, $p. <.05$. Response time was longest for questions where the information needed to answer the question was not presented in a highlighted area and shortest when the required information was in the highlighted area. For percent correct, a significant interaction between duration and label conditions was observed, $F(4,114) = 2.627$, $p. < .01$, . Labels with no highlighted information resulted in the lowest percent correct, and for these labels, the percent correct remained relatively constant for the three durations. The percent correct for labels with information inside or outside the highlighted area increased as the duration increased. One issue for this study was that the location of the highlighted area was always located on the right-hand side of the medication label. Follow-up research to determine if the location of the highlighted area influences latency and accuracy of responding should be performed. This research points out the importance of placing information, deemed essential in a highlighted area on drug labels.

How Parenting Sensitivity Is Related To Childhood Trauma In Parents And Children

Abigail McDevitt, Ashley Hamm*, Kaitlyn Wood*, Tiffany Hicks. Dr. Shari Kidwell, mentor, **Department of Psychology, College of Science**

In recent years, greater attention has been paid towards aversive childhood experiences and their impact on later functioning. Repeated exposure to traumatic life events has been associated with increased risk in both mental and physical health domains (KyBRFS, 2015), including parenting behaviors, such as decreased maternal sensitivity (Downey and Coyne, 1990; Lovejoy et al., 2000). The present study explores connections between parent-child synchrony scores on The Toddler CARE-Index (Crittenden, 2007) and Adverse Childhood Experiences (ACEs) in both parent and child. As part of a larger longitudinal study, 21 children (mean age 4.5 years) from Eastern Kentucky participated in the Strange Situation (Ainsworth, Blehar, & Waters, 1978) with a parent, which was coded for parenting sensitivity/synchrony. When the children were adolescents (mean age 16 years), they were administered the Transition to Adulthood Attachment Interview (TAAI; Crittenden, 2006), and the parents completed the Life Experiences Questionnaire (LEQ; Cowen, Wyman, Work, & Parker, 1990). Both were coded for ACEs. Although coding is ongoing, the authors hypothesize that parents who were exposed to more adverse life events would: a) show less synchrony with their child at age 4.5; and b) have children who were also exposed to more adverse life events. This research was supported by MSU Graduate Assistantships and by MSU RCPC and KY NSF grants.

How Attuned Are Depressed Parents To Their Adolescents Underlying Mental States?

Angela Lentz*, Kaitlyn Woods, Kimberly Meade *. Dr. Shari Kidwell , mentor, **Department of Psychology, College of Science**

Caregiver's depression has been found to have considerable negative effects on the socioemotional development of children. Lack of parenting sensitivity to child emotional cues is one primary reason for such outcomes. More recently, however, researchers have begun to examine how depressed parents think about their children. This study explores the association between parent's depressive symptoms and their capacity to reflect about their children's underlying mental states (i.e., RF). Twenty-one families participated when children were four years of age, and then 12 years later. Self-reported depression was assessed at each time point, using the CES-Depression Scale (Radloff, 1977). Depressive behaviors were also rated on a 4-point scale from a dyadic task when children were 4 years of age. At the last research visit, when children averaged 16 years, parents were interviewed about their teen's inner experiences during a dyadic reminiscing task. Specifically, a 7-point scale was used to rate reflective functioning (RF). Higher scores are suggestive of parent's awareness of their teen's unique thoughts and feelings. We predict that parents with greater depression symptoms will tend to have lower reflective functioning. This research was supported by MSU Graduate Assistantships and by MSU RCPC and KY NSF grants.

Study Of The Happiness Of Rural South Korean Elementary School Students Attending After School Academies

Erica Ball. Dr. April Miller, Dr. Mee Ryoung Shon, mentors, **Department of Early Childhood, Elementary and Special Education, College of Education**

This study investigates the underlying challenges South Korean elementary school children confront and their high academic performances. This study inquires after school academies, called Hagwons, and the rural South Korean elementary school students' frequency attending these schools. This study also analyzes how much time those students spend doing things that make them happy. People in western countries see the education system and after school programs as a positive aspect of South Korea since the students do so well academically. However, digging deeper into the South Korean education system shows different results. In this study, a survey was administered with various questions covering the Hagwons they attend, time spent outside of school, and their overall happiness. We administered the survey to 37 students in a rural area elementary school of 55 students. The results of the study have shown that when pressure on the student becomes more prominent, there is an increase in stress and a decrease in overall happiness. We also find that as their grade level increases, happiness decreases. The data indicated that as children go from lower elementary to upper elementary, the expectations of parents become more demanding causing happiness to decline.

Association Of Comfort Seeking Behavior, Emotional Disclosure And Attachment Style Among Rural Adolescents.

Cameron Blanton, Shelby Wright. Dr. Shari Kidwell, mentor,* **Department of Psychology, College of Science**

Attachment develops from childhood through adulthood and is thought to have a major influence on individuals' capacities to regulate emotions and maintain relationships. For example, attachment affects how people interpret and understand their world socially (Fraley et al, 2011). Although a variety of methods exist for assessing attachment, we propose a novel method of observing comfort-seeking and the disclosure of feelings to others. The current study examines these variables in relation to an established attachment questionnaire. As part of a larger longitudinal study, 21 adolescents (average age 16.5 years) were interviewed about their experiences dealing with sadness and anger using a procedure based upon Gottman & Fainsilber-Katz (1997). We are utilizing Likert scales to rate their receipt of social support and their level of emotional disclosure when dealing with these stressful emotions. Teens separately completed the Experiences with Close Relationships Scale- RS (ECR), a 40-item questionnaire that involves perceptions of support from important relationships (Fraley et al., 2011). We predict that teens observed to have lower social support, limited emotional disclosure, and weak attachment to the interviewer will be more likely to report less security and support on the ECR. This research was supported by an MSU Undergraduate Research Fellowship and by MSU RCPC and KY NSF grants.

Perception Of Political Propaganda: Does Party Affiliation Matter?

Cory Rawlins. Dr. Sandra Riegle, Dr. Sara Lindsey, mentors,* **Department of Middle Grades and Secondary Education, College of Education**

Our research objective is to determine the extent to which college-aged students at a small regional University could identify propaganda. Propaganda is the purposeful promotion of certain beliefs and/or points of view and can used be as a political tool to sway the opinion of an intended audience. Recent research has shown that Twitter can be used as a tool to communicate ideas while also spreading propaganda. Further, approximately 45% of people aged 18-24 in the United States use Twitter, an age range that includes college students. Based on this aforementioned research, we formulated a survey to gauge the extent to which college-aged participants could identify propaganda-laden tweets. Demographic variables examined were age, gender, and political party affiliation. After the survey results were analyzed, emergent patterns were examined. Discussion focuses on the need to educate for critical thinking, including identifying propaganda techniques and determining credible sources.

Coping Mechanisms And Emotional Regulation Tendencies Among At Risk Rural Adolescents

Cameron Blanton , Shelby Wright. Dr. Shari Kidwell, mentor,* **Department of Psychology, College of Science**

The current study examines the association between adolescent's coping strategies for sadness and anger in accordance with their report of feeling emotionally dysregulated. Although teaching coping strategies is a central goal of psychotherapy, there is a heterogeneity of thinking about coping. Our study takes a mindful acceptance approach informed by research with teens (e.g., Hankin, 2008). As part of a larger longitudinal study, 21 adolescents ranging from 16 to 18-years (9 female) were interviewed about feelings of sadness and anger based upon a procedure by Gottman & Fainsilber-Katz (1997). These interviews are being coded for maladaptive and adaptive coping, using a series of 5-point scales and frequency counts of specific categories of coping (e.g., avoidance, distraction, social support, etc.). Teens also rated their perceptions of dysregualated emotions on the Difficulties with Emotion Regulation Scale (Gratz & Roemer, 2004). We predict that teens observed to have greater levels of maladaptive coping strategies for sadness and anger will also self-report higher levels of emotional dysregulation. This research was supported by an MSU Undergraduate Research Fellowship and by MSU RCPC and KY NSF grants.

The Role Of Elaborative Discourse In Regulating Children's Emotion

Jade Holland, Madison Turner*, Sabrina Little*. Dr. Shari Kidwell, mentor,
Department of Psychology, College of Science

Research suggests that caretakers who use an elaborative style of discourse better prepare a child to understand and regulate their emotions than caretakers marked by a more pragmatic, repetitive style of discourse (Labile, 2004). In our study, we examined elaborative discourse during a dyadic reminiscing task in relation to children's capacities to understand and regulate their emotions during an interview. As part of a larger, longitudinal study, 35 caregivers recalled recent positive and negative instances of behavior with their children (average age 6 years) over a ten-minute period. Those with an elaborative style asked open ended questions to collaborate with and structure the task for their child, including discussion of feelings and motivations. Elaborative discourse was rated on a 5-point scale in accordance with Labile's guidelines. A separate interview was completed with the children, wherein they were asked to describe their experiences with six emotions. Emotion understanding and regulation were rated with a series of 4 point scales. Analyses are currently underway. However, we hypothesize that parents' with higher levels of elaborative discourse will have children who understand and regulate their emotions more adaptively. It is noteworthy that our sample of Eastern Kentucky families is markedly different than those described in the literature.
This research was supported by an MSU Undergraduate Research Fellowship and by MSU RCPC and KY NSF grants.

The Impact Stress Has On Canine Physiological Parameters And Different Methods To Reduce It

Hutton Fritzel*, Isabella Matterazzo*. Dr. Amy Staton, mentor, **Department of Agricultural Sciences, College of Science**

As veterinary medicine continues to make advancements towards improving veterinary visit experiences for clients and patients, new medications and practices are constantly being adopted and used. These changes are being implemented to make the veterinary profession an overall more positive experience for the professionals, clients, and patients. One of the most prevalent improvements is the practice of Fear Free. There are now more than 66,000 Fear Free Certified® veterinary and pet professionals nationwide. The Veterinary Technology Program at Morehead State University requires all students to complete Fear Free certification during each year of their college experience. The veterinary technology students get hands-on experience by working with several local animal shelters and rescue organizations. The animals found in these facilities have various different backgrounds. Oftentimes, these animals have behavioral issues ranging from mild nervousness to severe aggression stemming from fear, anxiety, and stress (FAS). To successfully complete the necessary skills required of the program, students practice Fear Free techniques while working with these animals and reduce FAS.

In February, 2020, Dr. Staton and two undergraduate Veterinary Technology students (all Fear Free certified®) began working at a local animal rescue facility to study the effects handling has on FAS in dogs. Each week dogs that are housed at the animal shelter are handled using Fear Free methods or traditional methods while blood collection is being performed. By measuring the physiological parameters, which include; temperature, pule, respiration, blood pressure, and blood glucose, regardless of which method is used, allows a definitive difference to be shown in the Fear Free methods versus the traditional handling methods on the FAS of the animals.

Are Telomeres Required? Genetically Engineering A Eukaryote With Circular Chromosomes

Nadia Richardson*. Dr. Melissa Mefford, mentor, **Department of Biology and Chemistry, College of Science**

Telomeres are regions of repetitive DNA at the ends of linear eukaryotic chromosomes. While telomeres play important roles in protecting the ends of chromosomes, they cannot be fully copied by the DNA replication machinery. To overcome this end-replication problem, an enzyme called telomerase adds sequences to the 3' end of the chromosome. Without telomerase activity, telomere lengths decrease and may be a leading cause of aging; while u regulation of telomerase activity is implicated in >85% of cancers. Interestingly, prokaryotes have circular chromosomes that lack telomeres and these organisms have no need for telomerase. So, why did linear chromosomes, and thus the need for telomeres and telomerase, evolve?
To begin to address this broad question, I am genetically engineering a circularized version of Chromosome XVI in the yeast Saccharomyces cerevisiae. Our method involves inserting DNA cassettes containing selectable markers at the ends of both arms of chromosome XVI. The right arm will have a cassette with LEU2 and half of URA3 as the selectable markers, and the left arm will have a cassette with the other half of URA3 and HIS3. Once the cassettes have been integrated into both arms, we can select for a recombination event between the cassettes that joins the halves of URA3 and causes circularization. I have successfully confirmed integration of the DNA cassettes in both arms of chromosome XVI. I am currently attempting to select for the recombination event that will cause circularization utilizing this method. In an effort to increase recombination efficiency between the halves of the URA3 gene, we have recently designed a CRISPR gRNA that will direct DNA double-strand breaks within our DNA cassettes. Once yeast with a circular chromosome XVI are confirmed, we will assess their relative fitness. This experimental approach may eventually shed light on the evolution of linear chromosomes in eukaryotes.

Expanding The Repertoire Of Original Works For Small And Large Ensembles

Derek Easterling*. Dr. Thomas Pappas, mentor, **School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

For my research "Expanding the Repertoire of Original Works for Small and Large Ensembles" I composed six musical works for varied ensembles, which were premiered by students during the music department's "Student Recital" on December 6, 2019. These new compositions expanded the repertoire of original works for 1) Wind Quintet, 2) Wind Quintet plus Soprano Saxophone, 3) Solo Piano, 4) Brass Quintet, 5) Solo Saxophone with Percussion Ensemble, and 6) Wind Ensemble. Due to time restraints, only five of the six pieces were performed. For each piece, I incorporated techniques from different composers, such as Frédéric Chopin, Astor Piazzolla, and John Mackey, and used their techniques to create my own style. While MSU does not currently offer a degree in Music Composition, there is much interest in composing and performing new works by students. This UGF provided an outlet for the study of composition by means of mentorship with a Music Theory professor. It gave student performers the opportunity to collaborate with the composer as they interpreted and premiered each new work.

Adverse Childhood Experiences And Their Affect On Criminal Behavior In Appalachia

***Erin Daniel*. Dr. Timothy Hare, mentor,* School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The goal of this project is to explore the relationship between adverse childhood experiences (ACEs) and criminal behavior in childhood and adulthood in Appalachia. Children who experience ACEs are at risk for a range of poor mental health outcomes and behavioral problems. It is also possible that ACEs increase the likelihood of engaging in delinquency in childhood and violent criminal behavior in adulthood. Appalachian people experience many hardships including poverty, alcohol and substance abuse, and incarceration of parents of children. I review the nature of ACEs, their short- and long-term effects, potentially related deviant behavior, and some potential mechanisms by which ACEs may increase the risk for various forms of criminal behavior. For instance, adult individuals may mimic different abusive and criminal behaviors they experienced during childhood. I also review the socioeconomic context of Appalachian childhood experience and its effects on the likelihood of residents engaging in criminal behavior. Finally, I discuss neurological deficits affecting emotion and behavior, whether a result of genetic deformity or injury and how this results in criminal behavior. Most of the criminal behavior I attempt to predict are violent, interpersonal crimes. This research examines the direct link between ACEs and later interpersonal violence. To measure ACEs and deviant behavior, I use the following independent variables from samples in Kentucky by county: percent of single-parent households, percent of children in deep poverty, percent of children in food-insecure homes, percent of child neglect, and percent of children in foster care. I use the percent of youth incarcerated in the juvenile justice system in Kentucky as my dependent variable. I conducted a multiple regression test with these variables and concluded that the only variable that was statistically significant was the percent of children in single-parent households.

Exploring Young Males' Vulnerability To The Sex Trafficking Industry In A Rural State: A Survey Of Adjudicated Male Juveniles

Eden Sexton *, Jayce Eppes*, Justin Corlis *, Reagan Napier *. Dr. Elizabeth Perkins , mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The purpose of this research is to evaluate the challenge of assisting male victims of sex trafficking. As these victims are often overlooked, this study will provide a way in which the state will have an outlet to be aware and to help these victims in their recovery. This study began in 2017, Dr. Elizabeth B. Perkins (PI) and staff completed 40 interviews with young, homeless males in Louisville, KY. This preliminary data confirmed that the state of Kentucky needed information on these victims and a way to solve this problem. The method to collect this data is a survey that is being distributed to males in residential care of the KY Department of Juvenile Justice. The PI has modified a survey that was developed by the Urban Institute titled the Human Trafficking Screening Tool (HTST). The data from the surveys will be combined with the preliminary data of the first interviews that were conducted by the PI and her staff in Louisville, KY in 2017-2018 to come to a complete consensus.

A Study Of The Psychological Services Available To Law Enforcement Officers

Eden Sexton*, Jayce Eppes *, Justin Corlis *, Reagan Napier *. Dr. Elizabeth Perkins , mentor, **School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

It is well-established that law enforcement officers work in a dangerous and stressful occupation (White, Shrader, & Chamberlain, 2016). Law enforcement officers are inundated with stressors from a variety of sources ranging from those associated with shift-work to experiencing trauma in the field. When there is inadequate organizational support for officers, or when they do not take advantage of available supports (due to lack of awareness or stigma), the results can be tragic for them, their family, the agency, and the community. In 2011, a survey was sent to the top 50 largest metropolitan police departments, the top 50 largest sheriff's offices, and all state police agencies, to gather information about the psychological services available to officers. The goal was to obtain a "snapshot" of psychological services available to law enforcement officers, the challenges of encouraging participation in these services, and what respondents considered to be the greatest current needs for psychological services. The survey was then repeated in 2019, to the same agencies to see what advances had been made in both provisions of services and reduction of stigma.

This presentation will examine the findings from both surveys, 2011 and 2019, comparing responses for the most common psychological services available to law enforcement officers, how services are marketed/announced to employees, who provide the services, which services are utilized the most, and which services appear to have the most positive impact on officer wellness

Relationship Between Parents' Reflective Functioning Skills And Attachment Strategies

Emily Klotz, Hannah Daniels, Lauren Wright*. Dr. Shari Kidwell, mentor,
Department of Psychology, College of Science

Parental reflective functioning (RF) is the ability to understand children's behavior in terms of underlying mental states (Slade et al., 2005). RF has a demonstrated relationship with child attachment, but less is known about the relationship between a parent's reflective functioning skill and their own attachment strategy. This study assessed RF in the parents of 21 families when the children were 12 years of age. Specifically, a 7-point scale was used to rate RF in an interview in which parents discussed their child's thoughts, emotions, and behaviors during Word Making and Make A Speech About Yourself tasks. Parent attachment strategies were coded from the Adult Attachment Interview (AAI: George, Kaplan, & Main, 1985; Crittenden & Landini, 2011), an hour-long interview in which parents are asked about their childhood relationships with their parents and the current impacts of those relationships. Attachment was examined as high-risk, reflecting increased information processing errors and inflexibility, vs. low risk. Analyses are currently underway; however, we predict that lower parental reflective functioning ratings would coincide with higher-risk attachment strategies. If true, these findings will have implications for clinical interventions with parents and children. This research was supported by an MSU Graduate Assistantship and by MSU RCPC and KY NSF grants.

Differences In Consumer Preferences Among Over The Counter Drug Labels

Jorden Crowe, Megan Bailey*, Savannah Muse, Sydney Brown, Sydney Young, Vanessa Jones. Dr. Gregory M. Corso, mentor, **Department of Psychology, College of Science**

Our research aims to find what factors of Over the Counter Medication (OTC) labels consumers find most important and implement them to modify labels. We conducted this study and examined differences among two different populations and their preferences for modifications made to sample OTC labels. Our first group consisted of Amazon survey takers (N=105). The second group consisted of college students (N=33). Both groups of participants saw four types of label sets of four medication types: antihistamine, antacid, stomach relief and pain relief. There were four combinations of generic and name-brand labels, with and without key information in a highlighted area for a total of 16 label sets and 64 total labels. Label sets were ranked on Trustworthiness, Informativeness, Aesthetics, and Likeliness to Buy. 4 (Drug Type) x 2 (Name-brand/Generic) x 4 (Question Type – (informative, trust, buy, aesthetic) x 2 (Area or No Area) x Group (Workers/Student) mixed experimental design was used. Data from both groups were analyzed using three repeated measures ANOVAs. The first analysis investigated the Drug Type and Highlighted Area for the two groups). The second analysis investigated Question Type and Highlighted Area for the two groups. The third analysis investigated package preferences, for generic versus name-brand, with or without the highlighted area for the two groups. A significant four-way interaction existed between the two Groups on Question Type, Drug Type, and for a Highlighted Area with key information, ($F(6,117) = 2.244$, $p = .044$). No interaction among brand type preferences were found, but consumers preferred all brands with a highlighted area containing key information. The preference of key information was significant among question types showing a significant three-way interaction between the Highlighted Area, Question Type, and Groups ($F(3,408)=95.98$, $p < .01$). There was a significant three-way interaction between Drug Type, Area/None, and Group, ($F(3,507)=36.43$, $p < .01$). Both participant groups preferred key information, generic brand packages as indicators of likeliness to buy, and no significance was found between aesthetic preferences of the groups, further generalizing our results. Preference for key information in a highlighted area suggests that both sample groups are likely to buy medication with a label that provides such.

Searching For Supernova Remnants In The Nearby Starburst Galaxy Ngc 253

Percy Johnson*. Dr. Thomas Pannuti, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

At a distance of only 3.5 Megaparsecs, NGC 253 is the closest starburst galaxy to the Milky Way galaxy, featuring a robust star formation rate of 0.20 solar masses per year. This high star formation rate coupled with its proximity make it an excellent laboratory for the study of the end points of stellar evolution, as manifested by its large discrete X-ray source population of X-ray binaries and supernova remnants (SNRs). We are undertaking a detailed study of these X-ray sources using eight archival observations made by the Chandra X-ray Observatory. In aggregate, these observations total 350 kiloseconds of effective exposure time and hold the promise of probing the discrete X-ray source population of NGC 253 to a remarkably low limiting luminosity, consistent with the median X-ray luminosity of Galactic SNRs. Our work concentrates on identifying X-ray counterparts to SNRs that have been identified by prior optical and radio studies of NGC 253 as well as to identify new SNRs based on their X-ray colors. Initial results will be presented and discussed.

Risk And The Perception Of Size And Velocity

Kirsty Beckett*. Dr. Gregory M. Corso, mentor, **Department of Psychology, College of Science**

Past research has found that larger objects are perceived to be moving at a slower velocity relative to smaller objects (Brown, 1930). The purpose for our study was to replicate earlier work and to incorporate Risk into the decision-making process. After signing the consent form, the participants (N=16) were administered a demographic survey, Cattell's 16pf personality assessment, and a risk assessment. The participant's task was to observe circles of varying sizes and velocities heading on a collision course. Before colliding, the circles would disappear, and the participant was to indicate when they were going to collide. The participants responded by clicking the left mouse button. An analysis of the data for the same Size circles, collapsed over Velocity, resulted in a significant effect for Time-to-Collide ($F(2, 30) = 6.343$, p.=005). Smaller objects were perceived as moving faster than larger objects replicating earlier research. However, when the risk assessment measure was included as a covariate in the analysis, the perceived time-to-collide for the circles was no longer significant. When the Velocity variable was incorporated (three levels of Size and two levels of Velocity – all within-subject variables and using the Risk Score as a covariant) into the analysis, a significant 5-way interaction was observed. An additional analysis between Risk and all the combinations of Velocity and Size revealed only one significant correlation. These analyses suggest that a person's risk level is used to set a criterion against which judgments of the perceived collision time are assessed. Future experimentation is needed to confirm the reasoning behind these findings.

Federalism And Monetary Policy: A Constitutional And Political Economy Analysis.

***Olivia Dale*. Dr. Michael Hail, mentor,* School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Federalism and Monetary Policy: A Constitutional and Political Economy Analysis. This study examines state and local government organization and the relationship to national governance and the making of monetary and banking policy will be the primary focus of this research. This study explores the operation and relationship of intergovernmental organizations in the policy process and includes cases and data on inter-agency organization and policy and regulatory interactions. These are assessed comparatively within the U.S. system of federalism with emphasis on the U.S. Constitution and state Constitutions.

Federalism And Homeland Security: Examining Privacy Issues Of Personal Devices And Management Of Security Policy

***Shelby Gevedon*. Dr. Michael Hail, mentor,* School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The focus of this research is an examination of privacy, federalism, and government organization for intergovernmental issues and their relationship to national security. Exploring the operation and relationship of intergovernmental organizations in the policy process includes exploring cases, conducting experiments, and building data on inter-agency organization, policy and regulatory interactions. Case studies will be regulated with the assessment of privacy interference on personal technology devices. These will be assessed comparatively within the U.S. system of federalism.

Federalism And Security: Examining Medical Administration And Public Management Of Security Policy In The U.S. System Of Intergovernmental Relations

***Taylor Jenkins*. Dr. Michael Hail, mentor,* School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

This research is an en examination of medical and health policy and state and local government organization and the relationship to national security. This work explores the operation and relationship of intergovernmental organizations in the policy process including exploration of cases for hospital administration and data on inter-agency organization and policy and regulatory interactions. There will be survey and case study research conducted in the next phase and these will be assessed comparatively within the U.S. system of federalism.

The Reaction Of Glazes On Diffrent Clay Bodies.

Kimberly Rapier*. Mr. Adam Yungbluth , mentor, **School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

This project outlines how the diffrent chemical properties in glazes interact with the different material's in a multitude of different clay bodies.

There is a spelling mistake.
What defines a multitude of different clay bodies?
What Δ is the testing range? What atmosphere?

Neuroscience Outreach: Visits To High Schools In Eastern Kentucky

Hannah Daniels*. Dr. Ilsun White, mentor, **Department of Psychology, College of Science**

As a part of Neuroscience Outreach program (2002-present), we visit schools in Eastern Kentucky each year, giving lectures on brain and behavior and distributing educational material. This effort is to enhance public awareness about brain health and the effects on the brain of drug abuse and addiction, with a focus on alcohol and addictive drugs. Our goal each year is to reach over 1000 students (9th-12th) in 10-13 counties in our region. This year, we also assessed interests of students in abnormal and normal function of brain and behavior, including specific drugs of interests. Student interests in brain function ranged normal and abnormal, including physiological, emotion, cognition, disorders (neurological, psychiatric, and developmental), and biological. Student interests in drugs also showed a wide-range of classes, including psychostimulants, hallucinogens, narcotics, alcohol, nicotine, sedatives, and therapeutic agents. Moreover, students expressed interests in learning technique used to measure physiological and brain function. We plan to incorporate student interests in future planning of Neuroscience Outreach. Supported by KAS Outreach grant.

Dna Sequence Confirmation Of Antibiotic Resistance Genes In The Triplett Creek Watershed

Minh Tran*, Sydney Blanton. Dr. Geoff Gearner, mentor, **Department of Biology and Chemistry, College of Science**

The purpose of this study is to identify the presence of antibiotic resistance genes (ARG) in the Triplett Creek Watershed (TCW) in Rowan County, Kentucky. Microorganisms from 12 water sources were filtered using membrane filtration and DNA was extracted from the microorganisms. The presence of ARGs was identified using Polymerase Chain Reaction (PCR) and agarose gel electrophoresis with primers of nine ARG: TetW, TetO, SulI, SulII, ereA, msrA/B, blaTEM, blaSHV, and blaCMY, as well as a marker for the bacterium Escherichia coli, uidA. There were 4 sites that produced the highest number of PCR products: EB 0.04, DC 0.27, TC 12.27, and PB 0.42. The DNA products from these four sites were then amplified and assessed using PCR with M13-ereA, M13-blaTEM, M13-sulI, M13-msrA/B, and M13-uidA primers. Spectrophotometric analysis and agarose gel electrophoresis were used to assess the quantity and quality of PCR products. PCR products were sequenced by GeneWiz. DNA sequences were analyzed by BLAST to confirm the identity of the ARGs.

Does Preference Predict Purchasing Decision?

Autumn Maddox*. Dr. Ilsun White, mentor, **Department of Psychology, College of Science**

The brain activity may predict consumer preference, by showing specific patterns of activity positively (beta) or negatively (theta) correlated with preference during presentation of products. Some studies, however, show discrepancy between preference and choice of product, suggesting that preference may not predict actual purchasing-decision. Experiment 1 examined if preference is closely associated with purchasing decisions, using pet products, and also compared differences between pet owners and non-owners. Volunteers were presented with 12 pet products and rated preference and purchasing decision. We hypothesized that there would be discrepancy between preference and purchasing-decision, with a greater product preference and purchasing decision in pet owners, compared to non-owners. Overall, preference and purchasing-decision was slightly higher in pet-owners, compared to non-owners, but showed comparable purchasing decision with respect to preference. Interestingly, in one item, non-owners show a greater preference and purchasing decision, compared to pet-owners. Our data suggest that preference can predict actual purchasing decision, irrespective of owning pets. In the next experiment, electromyographic activity will be measured during presentation of preferred product. Correlative physiological response would provide additional measures in further prediction for subsequent product choice and purchasing-decision. This is a senior project in Neuroscience Capstone class.

Cholinergic Glutamatergic Interaction In Alzheimer's Disease: An Animal Model

Georgia Clark*, Joe Jacobs. Dr. Ilsun White, mentor, **Department of Psychology, College of Science**

Learning and memory are mediated by multiple neurotransmitters, including dopamine, acetylcholine, and glutamate. Blocking receptors for these neurotransmitters impairs memory and learning, simple and complex. This study examined cholinergic-glutamatergic and cholinergic-dopamine interaction, using an animal model. Initially, rats were trained on a simple task, fixed-ratio 5 (FR5), then received combinations of drug administration: scopolamine (cholinergic antagonist)+amphetamine (dopamine agonist), scopolamine+MK801 (glutamate antagonist), scopolamine+saline, amphetamine+saline, MKI801+saline, and saline+saline. Scopolamine, which blocks muscarinic receptors, is commonly used as a pharmacological model of Alzheimer's disease. Consistent with our previous report, scopolamine reliably impaired performance on FR5 by increasing the response latencies. Amphetamine-alone shortened response latency, but failed to reverse scopolamine-induced deficits. However, MK801, which blocks NMDA receptors, showed a biphasic pattern, with reversal of scopolamine-deficits at a low dose but worsening performance at a higher dose. Our findings suggest that behavioral deficits associated with disrupted cholinergic transmission are not mediated by dopaminergic system, and that blockade of NMDA receptors may indirectly improve cholinergic deficits, indicating cholinergic-glutamatergic interaction. Although cognitive enhancers commonly used in Alzheimer's patients are primarily cholinergic agonists, our data provide further evidence for beneficial effects of glutamatergic cognitive enhancers.

Ants As Potential Surrogates For Assessing Biodiversity

Amber Schifano*, Cody Evans*, Joshua Griffith*. Dr. Sean O'Keefe, mentor, **Department of Biology and Chemistry, College of Science**

An important metric used for conservation efforts is biodiversity. Its use is important for ecological assessments and conservation evaluations. Biodiversity is usually defined as the measure of taxonomic diversity and disparity within an area. Several groups of organisms have been used as surrogates to assess overall biodiversity for an area, such as plants, mammals, birds, butterflies, beetles, etc. Ants represent another potential surrogate taxon for assessing biodiversity. Ants occur in many types of habitats, fulfill a variety of ecological roles, can be diverse, and are often quite numerous. In addition, there are several useful references for ant identification. Shannon and Simpson indices are typically used to evaluate alpha diversity and their results can be used to assess beta diversity. The total of alpha and beta diversity equals gamma diversity. The Shannon index is used to find diversity among a community. The Simpson index is used to find proportional abundance within a given area. Alpha diversity is the diversity at each local site. Beta diversity is the difference in diversities between sites. The values calculated from these indices can be used to assess different levels of biodiversity of ants within Rowan County. Two leaf-litter samples were collected from three wooded sites in Rowan County: Eagle Lake, Cave Run Lake, and Rodburn Hollow. We collected 16 different genera of ants and processed more than 3,700 individual specimens from all three locations. From this, six genera were represented by three or fewer specimens while one genus had nearly 1800 specimens. Five to ten genera were collected in each sample with there being eight from Stoney Cove, nine from Eagle Lake, and twelve from Rodburn Hollow.

A Chandra X Ray Observation Of The Infrared Detected Supernova Remnant G340.6+0.3

Walker Hartman*. Dr. Thomas Pannuti, mentor, **Department of Physics, Earth Science and Space Systems Engineering, College of Science**

The Galactic supernova remnant (SNR) G340.6+0.3 is a poorly-studied source that to date has only been explored in detail at radio wavelengths. The deep search for infrared counterparts to Galactic SNRs that was conducted by Reach et al. (2006) using data from the Spitzer Space Telescope discovered an infrared counterpart to this SNR. This result makes G340.6+0.3 one of only a small number of Galactic SNRs detected at infrared wavelengths. Typically, infrared emission from SNRs is produced by shocked ions or molecules located in the interstellar medium (ISM) adjacent to SNRs, and therefore these particular SNRs are crucial laboratories for the investigation of interactions between ISM and SNRs. As part of our study of this SNR, we present an analysis of an archival 70 kilosecond observation made of G340.6+0.3 with the Chandra X-ray Observatory. Our initial analysis of this observation reveals that -- unlike the extracted X-ray spectra of most Galactic SNRs -- the extracted X-ray spectra of G340.6+0.3 cannot be fit in a satisfactory manner by a single thermal component but instead requires multiple thermal components. This result indicates unusual plasma conditions associated with this SNR. Initial results will be presented and discussed.

Parenting Behaviors And Children's Emotion Regulation

Brooke Thomas, Griffin Newell, Olivia Kee*. Dr. Shari Kidwell , mentor, **Department of Psychology, College of Science**

Parental sensitivity is a critical element in child-parent attachment, and refers to a parent's ability to understand and react to a child's emotions. The current study examines parental sensitivity and covert hostility during a delayed gratification task, in relation to child behavior in an emotion interview. Specifically, as part of a larger longitudinal study, 35 children (average age 6 years) and their parents waited eight minutes for children to be permitted to open a bag of prizes. We coded parental behavior in fifteen-second intervals for sensitivity and covert hostility in response to their child's cues. Sensitive parents responded in ways that would help their children wait effectively, while covertly hostile parents showed impatience and other child-dismissing behaviors. Our ratings were based upon guidelines in the Emotional Availability Scale (Biringen, 2000). A separate task involved children discussing their experiences with six emotions. This interview was coded on 4 point scales indicating children's level of engagement and adaptive regulation of their emotions and behavior. Although coding is ongoing, we hypothesize that parents with higher levels of sensitivity, and lower levels of hostility, will have children with greater emotion regulation capacities in the interview. This research was supported by MSU Graduate Assistantships and by MSU RCPC and KY NSF grants.

The Effects Of Erosion Structures On Triplett Creek From Fall 2016 2020

Evan O'Neill*. Dr. Timothy Hare, mentor, **Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics**

Triplett Creek is a branch of the Licking River, a 303-mile tributary of the Ohio River in Northern Kentucky. Due to flooding, the portion of Triplett Creek running through Morehead, KY was modified in the 1970s to reduce local damage. Unfortunately, the result was an increase in overflow, riverbank erosion, and sediment deposition. The city installed vane structures in 2016 to slow the flow of water and decrease erosion. These vanes direct water to the center of the creek to prevent erosion. The structures were made in part by breaking rocks on the bottom of the creek, which creates riffle habitats and increases oxygen levels in the water. The structures will hopefully achieve the original goal of preventing flooding while also improving water quality and increasing biodiversity

Currently, unmanned aerial vehicles (UAVs), or drones, are being used to map and model the area annually between the Bridge St. dam and Stone St. Each year, the new maps and 3D models are compared to those created previously to assess stream and shore changes. This project entails collecting remotely-sensed data using UAVs, processing the data using photogrammetric software into maps and 3D models, and evaluating the results by comparison with data from 2016, 2017, and 2018. This information is useful in determining the effectiveness of the erosion structures and guiding future action to protect and preserve the environment and associated properties.

Examining The Relationship Between The Use Of Fabric Wash Cloths And Wipes In Relation To Cost Effectiveness, Skin Breakdown And Risk For Infection

Abigail Gillispie*, Carmen Hall*, Daylee Grey*, Holly Hopkins*, Lauren Titus*, Makenzi Fraley*, Taylor Gilliam*, Taylor Napier*. Dr. Mary Suzanne White, mentor, **Department of Nursing, College of Science**

This is a quality improvement project to compare the use of chlorhexidine wipes versus soap and water for incontinence care. This information will be shared with clinical staff at a large teaching hospital. Urinary and fecal incontinence is a significant problem for hospitalized patients: Janqueira and Santos found that the prevalence of urinary incontinence in hospitalized patients was 22.9% (28% in women and 16.1% in men)(2017). Effective incontinence care can prevent incontinence-associated dermatitis (IAD) and pressure ulcers.

References

Junqueira JB, Santos VLCG. Urinary incontinence in hospital patients: prevalence and associated factors. Rev. LatinoAm. Enfermagem. 2017;25:e2970. DOI: http://dx.doi. org/10.1590/1518-8345.2139.2970.

Exo Lab: The Growth Of Wasabi, Purslane, Extra Dwarf Pak Choy, And Amaranth In A Microgravity Environment

Claire Butler*, Jay Giannasio, Katie Stumbo, Noah Blevins. Ms. Jennifer Carter, Ms. Rachel Blackwell, mentors, **Craft Academy for Excellence in Science and Mathematics, Craft Academy for Excellence in Science and Mathematics**

Magnitude.io launched the second Exo-Lab on SpaceX-14 to the International Space Station in the Fall of 2018. The experiment performed had a goal of growing Wasabi, Purslane, Extra Dwarf Pak Choy, and Amaranth in a microgravity environment. On Earth, in the Craft Academy laboratory within the Exo-medicine clean room in Morehead State University's Space Science Center, the ground experiment was grown. The ground experiment plants were grown in four tubes with all set to match the light conditions of those of the chamber on the International Space Station as a control. The Amaranth plant tube grew an orange fungus after two days. It was also recorded that Wasabi grew the fastest but fell over after three and a half weeks. Furthermore, the CO2 levels decreased immensely after he plants started to sprout. This happened at the same time as the humidity levels were rising. The findings conclude that while it is possible to grow food in a microgravity environment, further research and changes are required for success.

The Beginning Of The Ends: Circularizing Linear Chromosomes In Saccharomyces Cerevisiae

Brianna Haynes*. Dr. Melissa Mefford, mentor, **Department of Biology and Chemistry, College of Science**

Both circular and linear chromosomes exist in nature. Generally, prokaryotes contain a single circular chromosome while eukaryotes contain multiple linear chromosomes. In eukaryotes, the ends of linear chromosomes, called telomeres, cap and protect DNA ends; however, they cannot be fully replicated. Telomere shortening occurs during aging, and short telomeres have been correlated with many conditions, such as depression and heart disease. To combat the end-replication problem at telomeres, most eukaryotes require the enzyme complex telomerase to synthesize DNA at the chromosome end. Interestingly, prokaryotes have circular chromosomes without telomeres and do not need telomerase. In contrast, eukaryotes have linear chromosomes with capped telomeres that cannot be fully replicated, which require the presence of telomerase.
To address this difference between prokaryotes and eukaryotes, we are genetically engineering the simple organism Saccharomyces cerevisiae to convert each of their 16 linear chromosomes into a circularized version of the chromosome. Our approach involves building two DNA cassettes to be insert into the left and right arms of a chromosome. After integration of the cassettes, a recombination event between the left arm and right arm cassettes can be selected for and tested. I have successfully built DNA cassettes that I am currently inserting into both the right and left arms of chromosome I. Next, I will select for a recombination event between these two DNA cassettes that will circularize the linear chromosome. Once completed, I will assess the fitness of yeast containing the circularized chromosome I. This will give us insights into benefits provided by linear chromosomes and why they evolved.

Hunting For Mycobacterial Phages

Colton Kendall*, Katie Morrice*. Dr. Geoff Gearner, mentor, **Department of Biology and Chemistry, College of Science**

Bacteriophages, or phages, are viruses that infect bacterial cells. There are an estimated 1031 phage particles in the biosphere. Although large in number, there are less than 3,000 phages that have been genetically identified through genome sequencing. Partnering with the international SEA-PHAGES project, this research project seeks to discover and characterize novel bacteriophages living in the soil. Using the techniques developed by the SEA-PHAGES program, soil samples are collected and tested for the presence of phage. Using Mycobacterium smegmatis as the bacterial host, the presence of phage can be visually identified if plaques appear on the culture medium. Plaques are a clear area in a lawn of bacterial growth in which the bacteria have been killed due to phage infection. Soil was collected from the MSU campus, processed, and the resultant soil extract was co-cultured with M. smegmatis. Plaques formed on the M. smegmatis cultures, indicating the presence of bacteriophage. The next step is to isolate the bacteriophages from the cultures, purify them, then characterize their growth properties, their morphology, and their genome sequence. This project will resume in the Fall 2020 Semester.

2019 – 2020

Recipients of Undergraduate Research Fellowships

Morehead State University supports the initiative for students to engage in research, scholarship, performance activities and creative works. Listed below are the 2019-20 awardees and their mentors.

Caudill College of Arts, Humanities, and Social Sciences

Student URF		*Department*	*Mentor (s)*
Kaitlyn	Buttrey	Communication, Media, & Leadership Studies	Phillip Krummrich Dr.
Olivia	Dale*	History, Philosophy, Politics, International & Legal Studies	Michael Hail
Carrie	Sorrell*	Communication, Media, & Leadership Studies	Morgan Getchell
Kimberly	Rapier*	School of Creative Arts	Adam Yungbluth
Eliana	Eldridge	Communication, Media, & Leadership Studies	Ann Andaloro
Jeremy	Copley*	History	Alan Scott
Hunter	Bargo	History, Philosophy, Politics, International & Legal Studies	Adrian Mandzy
Erin	Daniel*	Sociology, Social Work, & Criminology	Timothy Hare
Daniel	Mutter*	English	Sylvia Henneberg Dr.
Chloe	Spencer*	Music, Theatre & Dance	Lola Aagaard Ann
Angelique	Clay	Communication, Media and Languages	Andaloro Philip
Andrew	Sexton*	School of English, Communication, Media and Languages	Krummrich Thomas
Derek	Easterling*	School of Music, Theatre and Dance	Pappas
Cristin	Brockett*	School of Creative Arts	Joy Gritton
Samantha	Neal*	School of Creative Arts	Elizabeth Mesa-Gaido
Olyvia	Neal	Communication, Media, & Leadership Studies	Ann Andaloro
James M.	Davidson*	School of Creative Arts	Elizabeth Mesa-Gaido
Elizabeth	VonMann*	School of Communication, Media and Languages	Sylvia Henneberg
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Cristen	Brockett*	School of Humanities and Social Sciences	Alana Scott
Abbey	Childers	School of Creative Arts	Joy Gritton
Alexandra	Quillen	School of Humanities and Social Sciences	James Masterson
Colby	Birkes*	School of Humanities and Social Sciences	James Masterson
Shelby	Gevedon*	School of Humanities and Social Sciences	Michael Hail
Zachary	Rice*	School of Humanities and Social Sciences	James Masterson
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Taylor	Jenkins*	School of Humanities and Social Sciences	Michael Hail
Katie	Birdwhistel*l	School of English, Communication, Media and Languages	Alison Hruby
Amethyst	Muncy	School of Humanities and Social Sciences	Dianna Murphy
Emily	Conley	School of English, Communication, Media and Languages	Ann Andaloro
Kristen	Hamm	Communication, Media, & Languages	Donell Murray
Karina	Gonzalez*	Communication, Media, & Leadership Studies	Phillip Krumrich
Jeremy	Copley*	History, Philosophy, Religion & Legal Studies	LeonardDunman

Jacob	Tackett*	Communication, Media, & Leadership Studies	Ann Andaloro
Taylor	Jenkins*	School of Humanities and Social Sciences	Michael Hail
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Abby	Caines*	School of Creative Arts	Adam Yungbluth
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Elizabeth	DeBord*	School of Creative Arts	Joy Gritton
McKinzie	Hall*	School of English, Communication, Media and Languages	Deanna Mascle
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Kaylee	Thornsberry	School of Creative Arts	Melissa Yungbluth
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Molli	Huffman	School of Humanities and Social Sciences	Rebecca Katz
Heather	Smith*	School of Creative Arts	Joy Gritton
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Katie	Birdwhistell*	English	Alison Hruby
Julia	Nitishin	English	Alison Hruby
Hannah	Conn	English	Alison Hruby

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Jordan	Vallejo	Early, Childhood, Elementary & Special Education	Christopher Beckham
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Chloe	Spencer*	Foundational and Graduate Studies in Education	Lola Aagaard
Dorian	Cook*	Middle Grades & Secondary Education	Lesia Lennex
Cory	Rawlins*	Department of Middle Grades and Secondary Education	Sara J. Lindsey/Sandra E. Riegle
Kaylee Grace	Johnson	Quality Assurance and Accreditation	Kim Nettleton

College of Science

Student URF		***Department***	***Mentor (s)***
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Vanessa	Jones*	Psychology	Gregory Corso
Kelsey	Hargett*	Biology & Chemistry	Allen Risk
Tyler	Thomas*	Earth & Space Sciences	Thomas Pannuti
Caitlyn	Clark	Agricultural Sciences	Vijay Subramaniam
Jessica	Fulkerson	Biology & Chemistry	Kurt Gibbs

Brandon	Dizney	Biology & Chemistry	Janelle Hare
Abbigail	Dorn	Biology & Chemistry	Kurt Gibbs
Sydney	Young*	Psychology	Gregory Corso
Austin	Spradlin*	Biology & Chemistry	David Eisenhour
Brandi	Banks*	Agricultural Sciences	Patricia Harrelson
Chayla	Hacker*	Biology & Chemistry	Michael Fultz
Belinda	Candra*	Biology & Chemistry	Wilson Gonzlez- Espada Dr.
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Vanessa	Jones*	Psychology	Gregory Corso
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Cameron	Blanton*	Psychology	Shari Kidwell
Shelby	Wright*	Psychology	Shari kidwell
Cameron	Blanton*	Psychology	Shari Kidwell
Jodi	Perkins	Psychology	Shari Kidwell
Kristy	Beckett*	Psychology	Greg Corso
Madison	Turner*	Psychology	Shari Kidwell
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Hutton	Fritzel*	Agricultural Sciences	Amy Staton
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Reganne	Millller*	Psychology	Gregory Corso Geoffrey
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Jacob	Wagoner*	Physics, Earth Science and Space Systems	Jennifer Birriel
Laura	Cadwallader*	Physics, Earth Science and Space Systems Engineering	Jennifer Birriel
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Dalton	Lewis*	Physics, Earth Science and Space Systems	Ignacio Birriel
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Cameron	Blanton*	Psychology	Shari Kidwell
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Kathryn	Gallenstein	Psychology	Wilson Gonzalez-Espada
Rebecca	Mikula*	Physics, Earth Science and Space Systems	Dirk Grupe
Dylan	Grupe	Physics, Earth Science and Space Systems	Dirk Grupe
Reganne	Millller*	Psychology	Gregory Corso
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Elmer R. Smith College of Business and Technology

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Patrick	Webb*	School of Business Admininistration	Sherif Rashad
Gabriel	Good	Engineering and Technology Management	Kouroush Jenab
Jonathan	Chesney	Computer Science and Electronics	Heba Elgazzar
Bethlehem	Carper*	School of Engineering and Information Systems	Qingzhou Xu
Jordyn Kyle	Seid	Computer Science and Electronics	Heby Elgazzar
Victoria	McCormick	School of Engineering and Information Systems	Kouroush Jenab
Adrienne	Spurlock	Computer Science and Electronics	Heba Elgazzar
Allie	Russ*	School of Engineering and Information Systems	Kouroush Jenab
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	Bebout	Computer Science and Electronics	Heba Elgazzar
	Gravitt	School of Engineering and Information Systems	Kouroush Jenab
	Howell	Engineering and Technology Management	Jorge A. Ortega-Moody

*presenting at the 2020 Celebration of Student Scholarship

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