COLLEGE OF
ARTS & SCIENCES
ASHLAND UNIVERSITY

Undergraduate Research and Creative Activity Symposium

April 18, 2023
John C. Myers Convocation Center

A Letter from the Dean

Welcome to the fourteenth annual Undergraduate Research and Creative Activity (URCA) Symposium, hosted by the College of Arts & Sciences at Ashland University. Modeling the format of a professional conference, students have the opportunity to present original research; read creative fiction, poetry, or essays; and exhibit new works in visual arts and design that invite dialogue, debate and meaningful conversations.

Mentored research and creative projects foster students' intellectual inquiry and promote sustained engagement within their filed of study under the guidance of dedicated faculty. Experiences gained at the symposium enable students to present at other conferences; author or co-author publications in journals; compete and perform at state, regional and national levels, and exhibit work in variety of venues and formats.

Students who participate in research in any discipline are well prepared for graduate studies or professional careers. Coursework, internships, and advising within the College of Arts & Sciences enhance students' ability to solve problems, think critically and creatively, analyze data, and speak and write effectively.

The URCA symposium is a celebration among students and faculty who share a mutual joy of learning, encounters that often lead to life-long professional relationships. Alongside our faculty, I am delighted to host and highlight the outstanding academic achievements of students across the disciplines in the College of Arts & Sciences.

With many congratulations to our participants, I wish you all the best.

Dr. Katherine T. Brown, Dean
College of Arts & Sciences

The College of Arts & Sciences at Ashland

The College of Arts & Sciences is a vibrant academic community at the heart of the university undergraduate experience. Grounded in liberal arts, students prepare for careers in science, business, the arts, education, communication, government and service organizations as well as for pro-fessional programs and graduate school.

Ashland University Mission Statement

Ashland University, guided by our Christian heritage, is a comprehensive, private university that provides a transformative learning experience, shaping graduates who work, serve and lead with integrity in their local, national, and global communities.

Undergraduate Research and Creative Activity Symposium Committee

Chair, Dr. Christopher Swanson, Professor, Mathematics
Mr. Mohsine Bensaid, Director,Writing & Communication Center
Mr. Clayton Chiarelott, Coordinator, Writing & Communication Ceter
Dr. Scott Garlock, Professor, Music
Dr. Nicholas Johnson, Associate Professor, Chemistry
Dr. Mitchell Metzger, Professor, Psychology
Dr. Wendy Schaller, Associate Professor, Art History
Dr. Kelly Sundberg, Assistant Professor, English
Dr. Robert Wyllie, Assistant Professor, Political Science
Ms. Krystal Hamilton, Administrative Assistant (Program Design and Layout)

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Oral Session I
9:00-10:15 a.m.
Trustees Room

Birth Order, Family Size, and Anxiety in Adolescents

Sarah Fisher

Student's Major: Psychology
Faculty Sponsor: Dr. Diane Bonfiglio, Psychology

Psychologists and the public have been interested in determining if there is a relationship between birth order and other variables, such as personality, mental health, and educational and occupational success rates. However, it is difficult to draw concrete conclusions about the impact of birth order due to the contradictory research results (Damian & Roberts, 2015). Some research has shown that higher birth order has been associated with more psychiatric disorders and suicide attempts (Easey et al., 2019). This study examined whether birth order and family size have an association with levels of anxiety experienced by adolescents. Participants were given a demographics questionnaire to complete, as well as a birth order and family size questionnaire. The birth order and family size questionnaire asked about number of siblings, type of siblings (biological, half, step, or adoptive), age of siblings, and the number of years spent living with those siblings before the participant was 18 years old. Lastly, participants filled out both the State and Trait forms of the State-Trait Anxiety Inventory for Adults (Spielberger, 1983). State anxiety measures anxiety levels in someone's present state, whereas trait anxiety measures the level of anxiety someone experiences in general. I expect adolescents who are first born children or only children will have statistically significantly higher levels of state and trait anxiety than adolescents who are of later birth order. Additionally, I expect that adolescents who have a larger family size will have statistically significantly lower levels of state and trait anxiety than adolescents with a smaller family size. These data will be analyzed using two separate linear regressions to determine if birth order *and* family size predict state and trait anxiety.

New Approach Methods: The Next Evolution in Safety Research

Dr. Phillip Wages

Dr. Phillip Wages is an Associate Director at the Estee Lauder Companies, where he uses his talents to ensure consumer safety and advance the use of new approach methodologies (NAMs) in the field of toxicology. He obtained a B.S. in Toxicology with Honors from Ashland University in 2011 with minors in Chemistry and Political Science. While at Ashland University he was active in the Honors Program, the Ashbrook Scholar Program, Student Senate as well as served as a Student Affairs Intern. Dr. Wages received his doctorate in Toxicology from the University of North Carolina at Chapel Hill in 2016 and was a postdoctoral fellow at Vanderbilt University from 2016-2018. In 2018 he accepted a non-tenure track Research Assistant Professor Position within the Vanderbilt Chemistry Department. From 2019-2022 he worked as a regulatory toxicologist and risk assessor for PepsiCo. Dr. Wages has contributed to fourteen peer-reviewed publications throughout his career as well as organized several scientific sessions and meetings. He is a member of the Society of Toxicology and ToxForum. Dr. Wages is also a Diplomate of the American Board of Toxicology as of 2022.

The science of toxicology has continually refined and improved predicting safety ever since the earliest days of humans foraging for foods. The most recent work in the field of toxicology led to the emergence of new approach methods (NAMs). NAMs are primarily driven by two reasons: (1) the ethical as well as societal calls to reduce, refine, and replace the use of animals in research, and (2) the need for increased access to validated assays that rapidly predict human safety. The importance of NAMs in both basic and applied research will be showcased in three examples. The first example demonstrates how toxicological research aims to elucidate the early molecular events of air pollutant-induced adverse human health effects. The second example highlights how rapid, automated assays can accelerate research to help inform clinicians and public health experts of potential hazards. The final example demonstrates how the translation of mechanistic toxicological research into human relevant assays has revolutionized how cosmetic products are assessed for skin allergy. These three examples reveal how both basic and applied research in tandem can tangibly impact how toxicologists and regulators assess the safety of chemicals that humans interact with daily.

Is Beauty an Ever Ancient, Ever New Repose?: Augustine and Byung-Chul Han on Restlessness

Anne Casey
Student's Majors: Philosophy & Political Science
Faculty Sponsor: Dr. Robert Wyllie, Political Science

Many contemporary philosophers and social theorists assume that anxiety and depression are becoming more prevalent in modern times, especially with the increase in psychological research into anxious and depressive disorders. However, even ancient writers like Augustine of Hippo describe feelings of restlessness and other symptoms of anxiety. This raises questions like, did the ancients experience anxiety to the extent that modern people do? Did they experience anxiety in the same way? Can remedies proposed by ancient authors continue to avail modern people? In order to investigate this problem, I compare a contemporary analysis of modern depression and anxiety, Byung-Chul Han's *The Burnout Society*, to a famous account of restlessness from the late fourth century, Augustine's *Confessions*. This paper draws out this surprising convergence: both Augustine and Han turn to aesthetics and propose that challenging experiences of beauty can save us from anxiety or restlessness. The contemporary prevalence of anxiety is a result of many aspects of the modern world, but Han's writings push us to consider the role of aesthetics in particular. Perhaps part of modern restlessness is a result from asking less from art, or modern art turning away from offering the challenging engagements with beauty that draw us into contemplation, offering fewer opportunities for repose than the ancients might have had.

Oral Session II
10:30-11:30 a.m.
Trustees Room

An Anti-Myth for Immigration: Revelation, Embrace, Love

Tiffany Sims

Student's Majors: Religion, Political Science, & Theatre
Faculty Sponsor: Dr. Craig Hovey, Religion

This presentation describes the creative process for my ten-minute play, *Clarity in a Cave*, which wrestles with themes like the exclusion of the "Other" and cycles of violence, as well as love and reconciliation. Reading theorists like Rene Girard and Miroslav Volf on the scapegoating mechanism led me to consider how this form of exclusion and violence might be presented in theater. While theater theorists such as Augusto Boal and Anne Bogart develop methods to address cycles of violence, they fall short of providing a solution to the Girard's scapegoat mechanism. Relying on Volf's analysis and reflections upon love as a Christ-centered approach to exclusion, I consider how plays can dramatize how Christian love is a form of reconciliation that can overcome Girardian scapegoating violence. I describe how these theories inform the themes and characters of *Clarity in a Cave*.

The Self in the World: A Creative Writing Practice that Creates Possibilities

Ashley Bethard

Ashley Bethard is a writer in Dayton, Ohio. Her essays, stories, and poems have been published in VIDA Review, The Rumpus, PANK Magazine, Hobart, Fanzine, Catapult and others. In 2022, she received an Individual Excellence Award from the Ohio Arts Council for her nonfiction writing. An attendee of the 2019 Tin House Winter Workshop, she was awarded the Ohioana Walter Rumsey Marvin Grant in 2017. She earned her MFA in Creative Writing from Ashland University ('10). In 2016, she was named to Newspaper Association of America's "30 Under 30" list. She is Editor-in-Chief for Dayton Daily News, and Chief Content Officer for Cox First Media. You can find her at ashleybethard.com, and on Substack at ashleybethard.substack.com.

In my creative writing practice, research is a doorway - a way in. It's how I feed and follow my curiosity, and how I explore the self in the context of the larger world, and it allows the work to take on new dimensions and exciting shapes that weren't a possibility at the start. I embrace lyrical language and sustained metaphor to illustrate connection between the self and the world. It's how I add dimension, as a painter would use different shades to deepen shadow or show where the light hits, or to use brush strokes as a way to add layers of emotional complexity. Writing is an opportunity to explore humanity from many angles. I've found that placing the self in the world - local, regional, national, global - has been deeply generative and humbling, showing the deep connections that exist between human beings, animals, plants, the biosphere. As Elvia Wilk writes in "Death By Landscape," "Western literary forms tend to focus on the story of a person against the backdrop of the world." She challenges this mode, writing, "the problem is not only that the human collective with its historical interconnectedness and its political potential is banished from the story. The nonhuman world is also banished to the background." My practice focuses on a mix of tracing thoughts and mapping the mind on the page, lyricism and metaphor, and research to widen the context of the self - a combination that has allowed me to find depth and scope in my work.

Application to Assist the Visually Impaired and Hearing Impaired

John-Tyler Sprankle

Student's Major: Computer Science
Faculty Sponsor: Dr. Selvanayaki Kolandapalayam Shanmugam, Computer Science

The growth in technology over the last few decades has helped to diminish or even eliminate the barriers faced by people with disabilities, especially visually and hearing-impaired citizens. The main objective of this work is to create a Text-to- Speech and Speech-to-Text Converter which could help visually and hearing-impaired citizens to perform their day-to-day activities. This objective is accomplished in three major steps for both text-to-speech and speech-to-text conversion. In the first step, the input image or input speech is taken and transformed using preprocessing techniques. One of these techniques is Image Masking where unwanted background noise is removed from an image. The second step includes the detection and extraction of text from the preprocessed input image or text from the preprocessed input speech using character and speech recognition techniques. The final step handles the process of converting the extracted text to its related voice or the extracted words into its related text using Google Text to Speech. This system development uses Python and Python libraries such as OpenCV, PyTesseract, Google TTS, and Speech Recognizer to accomplish this task. One advantage of using Python is that it contains an extensive set of libraries that one can use to build an innovative application. Currently, the application can successfully translate text from an image into spoken words as well as spoken words into text. The current limitation resides with the quality of the output as it completely relies on the quality of the input.

Poster/Exhibition Session I
11:45-12:45 p.m.
Alumni Room

Using Spectrophotometry and Hydrocarbon Analyses to Identify *Chrysobothris* (Buprestidae) Species

Julianna Zito

Student's Major: Biology
Faculty Sponsor: Dr. Cynthia Perkovich, Biology

Flatheaded appletree borers (FAB; *Chrysobothris* spp.) are a group of 12 distinct species that are difficult to positively identify from one another without molecular analysis. All FAB are attracted to purple-colored pole traps, but there is some evidence of variations in attraction to emitted spectral peaks (in the visible light spectra) as cues for conspecific and mate detection. There may be differences in the spectral emissions of individual species that allow for conspecific recognition. Furthermore, there may also be differentiations between spectral emissions of males and females from the same species. Previous studies have found that males were more highly attracted to a red hue (the purity of a base color) and a peak reflectance at longer wavelengths (i.e. red and near infrared). Contrastingly, females were more attracted to violet hues. This differentiation of attraction between sexes may influence mate seeking behaviors. These changes in spectral emissions occur in other beetles due to small pits on the cuticles of elytra, containing sex pheromones (species specific hydrocarbons) and the morphological structure of these pits. We analyzed five males and five females from 10 FAB to understand patterns of hydrocarbon composition, elytra pit morphology, and spectral emissions. Using spectral analyses may be an inexpensive alternative to molecular classification to assist scientists with species differentiation.

Predatory Mites: Eco-Friend or Foe?

Gabriella Yuhasz

Student's Majors: Biology & Environmental Science
Faculty Sponsor: Dr. Cynthia Perkovich, Biology

In recent agricultural practices, predatory mites (Phytoseiidae: Phytoseiulus sp.) have become an area of interest for possible pest management strategies. Predatory mites are polyphagous arachnids that often reduce crop and greenhouse pest populations, including thrips, aphids, and spider mites. The use of predatory mites as a biological control method is more environmentally friendly than their harsh chemical counterparts. Moreover, if used effectively, predatory mites can help reduce pest management costs due to their sustainable life cycles. We tracked greenhouse pests in the Ashland University greenhouse for several weeks to determine the pests present on the institute's plant collection. Predatory mites were released after initial pest populations were assessed. We continued to monitor predatory mite success, measured in the reduction of pest populations, and the growth of the predatory mite colony. As pest populations fall, predatory mites' food source is greatly reduced. However, the mites can be sustained between pest breakouts by feeding on pollen from ornamental pepper plants (Capsicum annuum). Therefore, during this experiment, we also analyzed the success of predatory mite colonies on ornamental pepper plants. Our research in the greenhouse will help provide data to create ecologically and economically friendly pest management recommendations for Ashland University and other small greenhouses.

Analysis of the Bioaccumulation of Metals in Spiders in Ashland, Ohio

Isaac Smith

Student's Majors: Biology & Toxicology
Faculty Sponsor: Dr. Cynthia Perkovich, Biology

The United States of America uses roughly 1 billion pounds of pesticides annually to control agricultural pests. Some pesticides take the form of metal salts such as copper sulfate ($CuSO_4$), zinc sulfate ($ZnSO_4$), and aluminum phosphide (AlP) and may be a source of ecotoxins in preserved environments. Runoff from agriculture fields and residential areas can accumulate and elevate levels of heavy metal toxins in the surrounding preserved ecosystems. Spiders are often used as bioindicators to assess the presence of toxic metals because they accumulate metal ions in their exoskeletal structures. We collected spider populations from two nature preserves in Ashland, Ohio. At each preserve, we identified areas close to agricultural fields where runoff was probable, along with areas far from possible contamination. We sampled exoskeletal compositions of the spiders using energy dispersive X-ray spectroscopy (EDS). Additionally, we analyzed soil samples to determine the bioaccumulation of metals in the spiders compared to the environment. From the sampled species, wolf spiders (Family: Lycosidae: *Tigrosa helluo)* were selected due to their abundance at both sites. While there were no discernable differences in the soil between sites, there were differences in the elemental makeup of individual spiders among the sites and treatments. Ecotoxicology and differences in ecophysiological mechanisms of metal bioaccumulation in spiders remain unclear, but our findings offer possible recommendations and further questions for future research.

Concordance of Mutations Identified by Random and High-Throughput Mutagenesis Procedures

Sophia Gomez

Student's Major: Biology
Faculty Sponsor: Dr. Paul Hyman, Biology

Bacteriophages (phages) are viruses that infect bacteria and need a host to survive. Successful infection requires the presence of several bacterial gene products: receptors for attachment, transcriptional and translational regulators, and other host factors. Mutations in these host genes can allow the host to become resistant to bacteriophage infection. Using a genome-wide loss-of- function mutant library of *Klebsiella* sp. M5a1 generated via a random barcode transposon site sequencing system (RB-TnSeq) method, which is used to determine microbial gene function and mutant fitness. We are generating resistant M5a1 bacteria by spontaneous mutagenesis and determining if these mutations align with genes identified in the RB-TnSeq genetic screen. Currently we have used two phages, KLEB 17 and KLEB 20, to select resistant M5a1 strains. Recently, updated genomic sequencing showed that these are independent isolates of the same phage. PCR primers were designed to amplify the genes identified in the RB-TnSeq screen of resistance in both phages. So far, we have completed sequencing of six of the nine target genes in all 15 resistant strains. Four genes had no mutations in any of the fifteen resistant bacterial strains. We identified mutations in the two other genes including missense, nonsense and frameshift mutations possibly caused by the phage resistance. Through this work, we may be able to see if the RB- TnSeq genetic screen identifies the locations of all random mutations or if we will find bacteria with resistant mutations in genes that were not identified by the RB-TnSeq screen.

An Investigation of Visuospatial Bootstrapping

Mikehlah Carr, Kyleen Culler, & Marissa Simmons

Students' Majors: Psychology (MC, KC, MS)
& Communication Studies (MS)
Faculty Sponsor: Dr. Mitchell Metzger, Psychology

Visuospatial bootstrapping (VSB) occurs when performance on verbal working memory (WM) tasks is better when information is presented within established visual frameworks (Darling & Havelka, 2009). Mallik et al. (2022) showed that this effect also generalized to other stimulus displays (e.g., clock face). In this experiment we sought to further examine the extent of visuospatial information that was needed to produce the VSB effect. Participants were shown a numeric sequence and had to correctly recall the sequence (load ranged from 5-8 numbers). Sequences were presented in 2 display conditions: one number at a time or in a grid of two rows and five columns which were shown for 250ms, 500ms, or 1000ms. Stimulus display and load were within-subjects variables, and stimulus duration was a between subjects variable. Two main effects were found with load ($F(3, 243) = 400.10$, $p < .01$) and duration ($F(2, 81) = 6.89$, $p < .01$). Performance decreased as the number of digits increased and the 250ms condition produced lower scores than the 500 or 1000ms conditions. A visuospatial bootstrapping effect was not observed as there was no main effect for stimulus display ($F(1,81) = 1.51$, $p > .05$). The results showed that a 2x5 display was similar to the single digit display which contradicts previous studies of VSB (Darling & Havelka, 2009; Mallik et al., 2022). The data collected here suggests that to observe a VSB effect, more spatial information than what is provided in a 2x5 display is necessary.

Evaluation of Electronic Cigarette Vapor Using Solid Phase Micro-Extraction and Gas Chromatography Mass Spectrometry

Jordanne Green

Student's Majors: Forensic Biology & Toxicology Faculty
Sponsor: Dr. Robert Bergosh, Chemistry

Electronic cigarettes (e-cigarettes) are designed to transfer mixtures of air and vapors into the respiratory system. E-cigarettes use plastic or metal cylinders that contain electronic vaporization systems. They produce an aerosol by heating up a liquid. Generally, e-cigarette liquids contain propylene glycol, glycerin, nicotine, and can contain flavorings. The health effects of the e-cigarette vapor are largely unknown. The vapor of a Vaporfi e-cigarette with a classic tobacco cigarette cartridge was examined to determine the components of the vapor. To collect a sample of the e-cigarette vapor, Solid Phase Micro-Extraction (SPME) was used. SPME uses a fiber coated with an extractive phase to collect analytes in a sample. The SPME fiber was inserted through the septum in an air-tight vape chamber and exposed to the e-cigarette vapor for 15 minutes. Three different SPME fibers were used, a 75µm carboxen-polydimethylsiloxane (CAR/PDMS) fiber, an 85 m polyacrylate fiber, and a 100 µm polydimethylsiloxane (PDMS) fiber. The samples were analyzed using gas chromatography mass spectrometry (GCMS). Mass spectral database analysis was performed on the GCMS spectra; and, as expected, propylene glycol, glycerin, and nicotine were detected on all three of the fibers. Two of the fibers also found benzothiazole, 2,5-di-tert-butylphenol, and 2,4-di-tert-butylphenol. Future research will include obtaining samples of benzothiazole and 2,4-di-tert-butylphenol and analyzing them using GCMS to confirm their presence in the vapor.

Time-Weighted Average Sampling of the Allelochemical Allyl Isothiocyanate

Allison Kesner & Caitlin Lindeman

Students' Majors: Biology (AK, CL),
Environmental Science (CL) & Toxicology (CL)
Faculty Sponsor: Dr. Jeffrey Weidenhamer, Chemistry

Many invasive plants are allelopathic, inhibiting the growth of neighbors. *Alliaria petiolata*, garlic mustard, is a notorious invasive species found in North America that releases biologically active, volatile chemicals. One of these, allyl isothiocyanate (AITC), can deter predators, and inhibit the germination and growth of plants and mycorrhizal fungi. AITC is biologically active at micromolar concentrations and is also released in low concentrations. Volatile compounds are difficult to analyze. Given their low concentrations, one approach is to concentrate compounds on a sorbent. Solid-phase microextraction (SPME) uses a thin fiber of silicone to trap volatile compounds for analysis by gas chromatography-mass spectrometry (GC-MS). When retracted inside a protective needle, volatile compounds are absorbed into the end of the fiber as they diffuse through the hollow needle, a chemical analysis technique called time-weighted averaging (TWA). Our objective was to characterize how different parameters influenced AITC analysis using this technique. AITC was diluted to a concentration of 100 mg/L using silicone oil. Fibers were retracted 0.5cm to 1.5cm in the hollow needle, and exposure times were 0, 0.5, 1, 1.5, and 2 hours. All TWA trials were performed in triplicate at constant temperature (25°C). Increasing retraction distances decreased the amount of AITC recovered, and increased sampling times resulted in an increase of AITC recovered. However, analysis of AITC retention indicated that AITC is volatile enough to desorb from the fiber with increasing time, which complicates quantification through time-weighted averaging. Further studies will examine the TWA analysis of the less volatile benzyl isothiocyanate.

T.W. Fantasy: A Website for the Storage of Fantasy Stories

Emily Murray & Jules Papesh

Students' Majors: Computer Science (EM, JP) & Geology (EM)
Faculty Sponsor: Dr. Selvanayaki Kolandapalayam Shanmugam, Computer Science

Around 94 million people discover stories on the internet per month. Finding specific stories of fantasy with specific tags, all in one place, is incredibly difficult despite current online resources. This website, T.W. Fantasy was created to store a large number of fantasy-related short stories that can be found and uploaded, and to encourage creativity. The website T.W. Fantasy strives to create an option for users to upload short stories, which are then stored in a database with functioning tags in the backend database server. The functioning tag system includes and excludes certain stories in the results. As a next functionality, the website also allows users to find very specific stories or hide them from view, and read through the most inclusive array of fantasy stories out there. This application uses three major components of programming paradigms: HTML, C#, and CSS to design and style the web page, Javascript client-side scripting to validate the webpage, and server- side scripting to validate and establish communications with the backend database. This website is solely dedicated to fantasy short stories and allows users to browse through specific stories they will enjoy.

Find My Friend: A Website for Finding Obituaries

Kaitlyn Scheutzow & Keaton Sundberg

Students' Major: Computer Science
Faculty Sponsor: Dr. Selvanayaki Kolandapalayam Shanmugam, Computer Science

In Ohio, each city has its own obituary website, so there are many places for the elderly to try and find obituaries pertaining to them. To help elderly people in locating and providing the details of the obituaries based on their demographics, the user-friendly website **"Find My Friend"** was developed. This project's goal is achieved in two steps. The first step is creating a page for users to add all their information, such as schools, cities lived in, places of work, and more. Second, the functionality of the filtering and sorting mechanism using the Filtering Techniques and Sorting Algorithm is applied to show obituaries based on their personal information. This application, **"Find My Friend"** was developed using Hyper-Text Markup Language (HTML) and Cascading Style Sheet (CSS) to create the website and Client and Server-side Scripting to validate and manage user data in a SQL server database. This website will be accessible on phones, computers, and tablets for ease of use, which allows our users to find their friends hassle-free.

Brand Identity and Product Package Design

Sarah Shearer

Student's Major: Graphic Design
Faculty Sponsor: Professor Michael Bird, Art

A company is identified by its branding as it is their most recognizable feature. Branding includes all the visual elements of a company including logos, fonts, color palette, and more. Designers are responsible for producing a brand that will be recognizable in a competitive market place. We started by researching competitors within the products of our choice. This research guided our decisions for the target market and brand aesthetic. Once the foundation of the company was established, a stationary set was created which includes business cards, letterhead, and envelope designs. The next steps included developing unique product packaging and advertising materials for the brand. The final part of the brand identity included constructing an environment that is cohesive with the brand identity. The goal is to create a consistent brand identity that will encourage the target market to purchase or interact with the brand. Showcasing each brand side by side will demonstrate each design principle that we learn over the course of our degree such as typography, color theory, 2D design, 3D design, and more. Each brand shows viewers professional high-quality work and the different styles each artist has developed over the years as shown in their brand.

Poster/Exhibition Session II
12:45-1:45 p.m.
Alumni Room

Emerald Ash Borer (*Agrilus planipennis*) Larvae Infestation Assessment in a North Central Ohio Wetland

Jessica Raubenolt

Student's Majors: Environmental Science & Biology
Sponsor: Dr. Patricia Saunders, Biology

Knowledge of the host preference of the emerald ash borer (EAB) (*Agrilus planipennis*) is limited, especially in complex natural forest ecosystems where few ash trees remain untouched by the pest. However, upon further inspection of the galleries left behind by the larvae underneath the bark, the severity of the infestation from tree to tree varies greatly. This suggests that there is a factor that determines which trees are chosen by EAB for oviposition more often than others. It was hypothesized that EAB host preference and infestation severity is influenced by the surrounding environment and/or traits of individual ash trees, specifically circumference/diameter, soil moisture, and soil organic matter. To test these hypotheses, 49 ash trees were partially girdled to gain access to the within-tree density of emerald ash borer larvae. Relative density was assessed by counting the number of galleries left by previous infestations. Soil moisture, soil pH, soil organic matter, tree circumference/diameter, and distance between nearest ash trees were assessed to determine any correlation with gallery count. Through regression analysis and principal component analysis, it was determined that there was no significant relationship ($p>0.05$) between the number of EAB larval galleries and site conditions tested. A previous study (Timms, 2006) found a relationship between number of larval galleries and tree diameter and hypothesized that EAB would be limited in trees with large diameters, especially those with thick barks. These differing conclusions could possibly be due to the previous study being conducted in a plantation rather than a natural forest.

Population Genetics and Local Adaptation of Common Milkweed Populations

Savannah O'Bell

Student's Major: Forensic Biology
Faculty Sponsor: Dr. Soren Brauner, Biology

Common milkweed (*Asclepias syriaca*), the host plant of the Monarch butterfly, occurs widely throughout eastern North America. Northern and southern populations differ in growth traits and chemical defenses, but it is unknown how genetically different these populations are and whether the observed growth differences represent adaptations to local environments. Our study is using microsatellite DNA markers to estimate genetic distances between populations. These DNA markers are selectively neutral so genetic differences reflect how long the populations have been separated and the history of gene exchange between the populations. DNA from 260 greenhouse grown plants representing 30 populations across the native range was analyzed for 12 microsatellite markers. Common gardens (3000 plants each) have been established at universities in Minnesota, Ohio, and Virginia with plants grown from seeds collected from throughout the native range. The objective is to test at each garden whether plants from local seed show features that are more adaptive compared to plants from distantly collected seed. Growth differences in the common gardens that are greater than differences for neutral DNA markers will support the hypothesis that these traits have been selected for local adaptation. Genetic analysis to date indicates that the populations share most of the microsatellite DNA markers and are not strongly differentiated despite the extensive geographic range of the species. Genetic distances between populations and estimates of admixtures in the populations will be presented along with how this information can be used to test hypotheses of local adaptation of the milkweed populations.

Exploring a Novel Role in Eye Lens Development for the Gene *cebpg* in Zebrafish

Emma Arra

Student's Major: Biology
Faculty Sponsor: Dr. Mason Posner, Biology

Many genes work together to produce the lens of the eye. Damage to these genes can produce errors in lens development that contribute to cataracts, which is the leading cause of blindness worldwide. The gene *cebpg* is known to protect cells against stress and is expressed early in the lens. No study has explored whether the gene plays an important role during lens formation. Through the process of damaging the *cebpg* gene using CRISPR editing, we are examining any changes in lens. Zebrafish embryos were injected with four guide RNAs that directed the enzyme Cas9 to damage the *cebpg* gene. Ninety percent of the 32 resulting fish larvae (known as crispants) showed an abnormally curved body. Seventy-two percent of crispants had abnormal lenses containing irregular boundaries between cells and pitting. We are using histology to examine the lens defects in our *cebpg* crispant larvae at the cellular level. Specifically, we will determine if lens cells are undergoing their normal loss of nuclei required to make the lens transparent. These data support the hypothesis that *cebpg* plays an integral role in lens development. Understanding this specific role will expand our knowledge of lens biology and what can go wrong to produce cataracts.

The Impact of Mental Stress on Suggestibility

Kathryn Recker

Student's Major: Psychology
Faculty Sponsor: Dr. Christopher Chartier, Psychology

Understanding how stress can contribute to an individual being more suggestible to leading questions is important in the criminal justice procedures, sales and marketing strategies, and survey development. Researchers, such as Elizabeth Loftus, have explored the response to leading questions in the justice system, finding that the wording of the question often dictates how a person will respond (Loftus, 1975). Other research suggests that an individual under stress will likely show deficits in decision making, becoming more vulnerable to social pressures and demands (Morgado et al., 2014). In the current study, participants were randomly assigned to be in either the experimental group (which experienced a stressor), or the control group (no stressor). All participants, regardless of which group they were in, watched a two minute traffic sequence video and were asked to pay attention to what they observed. Afterward, participants in the experimental group were introduced to a stressful situation through a five minute arithmetic task, while the control group participated in a five minute drawing activity to maintain low stress levels. Finally, participants were asked eight questions regarding the contents of the video: four leading, and four non-leading. An example of a leading question was, "Did you see *the* yellow bus?", when there was not one in the observed video. Data was analyzed using an independent sample t-test, and it was determined that, with $t(18)= -1.69$, $p=.109$, there was no statistical significance in the suggestibility of individuals when there was the added element of stress.

Is Empathy Biased? The Effects of Empathy in Moral Decision Making

Amanda Kaser

Student's Major: Psychology
Faculty Sponsor: Dr. Christopher Chartier, Psychology

Everyone shows empathy; however, people may be biased in how much empathy they give,which can create problems when making moral decisions. Empathy bias may be directly related to the similarities between the giver and receiver of empathy (Masto, 2015). It has been shown that people have a difficult time empathizing with others who are dissimilar to themselves (Decety, 2021). Likewise, in a study on imaginative resistance, which involves imaging different moral worlds, it was noted that there are difficulties in understanding another person's point of view (Stueber, 2011). The purpose of this study is to see if people show different amounts of empathy regarding age, race, and gender. My hypothesis is that people will show more empathy when the other person is of the same age, race, and gender of the person giving the empathy. If the results support my hypothesis, then this study will help support that people tend to be biased towards the individuals they are most similar to concerning age, race, and gender. I will run a 2x3 ANOVA test to determine whether the mean empathy score differed regarding race, age, or gender. Participants will view eighteen slides containing pictures of individuals and scenarios of unfortunate events and rate how much they agreed or disagreed with questions associated with the slide on a Likert-like scale. This study could help demonstrate that empathy should not be used alone when making moral decisions.

Establishing a Set of Extremely Replicable Phenomena in Social Psychology

Sarah Fisher & LaMar Sharpe

Students' Major: Psychology
Faculty Sponsor: Dr. Christopher Chartier, Psychology

Replications of many well-known studies in all fields have failed, throwing much of our accumulated scientific knowledge into question. We hope to combat the effects of the replication crisis by showing that there are some well-known social psychological effects which can be easily replicated. We developed easy-to-implement procedures and materials to test 10 well-known social psychological effects modeled off of similar efforts in cognitive psychology (Zwaan et al., 2018). The 10 social psychological effects included in this study are the trolley problem distance effect (Greene et al., 2009), gender differences in receptivity to sexual offers (Clark & Hatfield, 1989), the halo effect (Dion et al., 1972), primacy effects in impression formation (Asch, 1946), resume evaluation based on racially stereotypical names (Bertrand & Mullainathan, 2001), ingroup favoritism in the dictator game (Tajfel et al., 1971), the ultimatum bargaining game (Guth et al., 1982), informational social influence (Deutsch & Gerard, 1955), the prisoner's dilemma game (Liberman et al., 2004), and the fundamental attribution error (Ross et al., 1977). For each study, we programmed a brief online version in FormR, and will collect data on Amazon's Mechanical Turk from English speaking participants in the United States and Canada. We expect that all 10 effects will successfully replicate the original findings. Each of the 10 studies have been individually pre-registered, declaring our hypotheses and analysis methods for each study before collecting any data. Each study has an individual hypothesis and analysis plan that determines whether each replication attempt is a success or failure.

Triphenylphosphonium Cation Substituted Phosphazene Rings

Bryce Patterson

Student's Major: Biology
Faculty Sponsor: Dr. Nicholas Johnson, Chemistry

Cyclic chlorophosphazenes have been an active area of research because of the inherent utility of the polysubstituted ring. A large body of research focuses on the use of cyclic chlorophosphazenes as a drug delivery system. Cyclic chlorophosphazenes are inexpensive to synthesize and show the ability to easily substitute with a wide variety of compounds. This allows for the properties of the potential drug delivery system to be highly tunable. One area of focus for the research group has been triphenylphosphonium cations (TPP) for targeting mitochondria in cancerous cells. Cancerous cells begin undergoing rapid proliferation and this affects the mitochondria making them hyperpolarized. Utilizing TPP moieties attached to the cyclic chlorophosphazene system would enable the drug to target these hyperpolarized mitochondria and allow for higher specificity in an anticancer drug.The TPP targeting moiety cannot be directly substituted onto the phosphazene ring; however, this was accomplished by utilizing 3-(4-hydroxyphenyl)-1-propanol. Utilizing a basic compound such as cesium carbonate, the phenolic proton of 3-(4-hydroxyphenyl)-1- propanol can be removed and subsequently substituted onto the phosphazene ring. The alcohol moiety can then be converted to TPP. The product of these reactions was characterized via NMR spectroscopy. Currently, we are undergoing attempts to purify and isolate the final product in order to evaluate the biological activity of the compound.

Substituted Imidazoles as Potential Anticancer Agents

Madison Fish

Student's Major: Biology
Faculty Sponsor: Dr. Nicholas Johnson, Chemistry

Most drugs that show a high level of activity are lipophilic; however, this poses a problem for biological systems that require water-soluble drug molecules for effectiveness. One method to increase the aqueous solubility of pharmaceuticals is through the utilization of cyclic chlorophosphazenes as a drug delivery system. Cyclophosphazenes are a model system for this delivery for several reasons, one being the ease at which the phosphorus atoms of the ring structure can be substituted with a wide variety of side groups. It is necessary, then, for the drug carrier system to also be hydrophilic for the most successful activity. The focus of our research is to utilize cyclophosphazenes to enhance the hydrophilicity of active drug molecules. Specifically, we have utilized imidazole-based compounds as lipophilic drug molecules. Imidazoles have recently garnered much attention and have been shown to be effective as anti-cancer and anti-microbial agents. We have synthesized a highly lipophilic, imidazole-based compound containing a naphthalene substituent. Cyclic chlorophosphazenes trimer was then hexasubstituted with the previously mentioned imidazole. The results of this study were characterized via multi-nuclear NMR studies. The future focus of our research utilizes a series of oxygen-containing (benzoate) substituents to be substituted on an imidazole. The inclusion of these oxygen-containing moieties will affect the hydrophilicity of the drug system and allow for a structure-activity relationship to be developed. The efficacy of these hexa- substituted reactions can be characterized by NMR. The results of benzoate additions will provide insight into which compounds could work most effectively in drug delivery systems.

Drug Delivery Systems Based on Modified Phosphazenes

Omar Ajwa

Student's Major: Biochemistry
Faculty Sponsor: Dr. Nicholas Johnson, Chemistry

Delivering drugs into the body can be challenging due to many pharmaceuticals being lipophilic. In order to fix this problem, drug delivery systems can be used. Research has been focused on polyphosphazenes, specifically towards cyclophosphazenes [PCl2N]3, because they have long been known to have many properties that make them beneficial in biological applications. Phosphazene rings are also inexpensive and can easily be substituted with different molecules. One of these ligands that can be substituted onto the phosphazene ring, is tetraethyleneglycol monomethyl ether (TEGME). This will increase the hydrophilicity of the compound while also leaving other sites available for substitution. These other sites can be used in the future for drug modifications, imaging moieties, and targeting agents. Increasing the hydrophilicity of the structure allows for optimal drug delivery of these anticancer agents by allowing the drug to reach the targeted cells. Imidazoles have gathered much attention and have been shown to be effective anti-cancer agents. Since imidazoles have low aqueous solubility, they can be substituted on to the synthesized cyclophosphazene and TEGME drug delivery system to increase their solubility and become viable drug candidates. To further study how hydrophilicity and lipophilicity affect the imidazole, the cyclophosphazene can be modified to have more lipophilic ligands. The results of this study were characterized with multi-nuclear magnetic resonance (NMR) spectroscopy.

Brand Identity and Product Package Design

Abigail Marchand

Student's Major: Graphic Design
Faculty Sponsor: Professor Michael Bird, Art

A company is identified by its branding as it is their most recognizable feature. Branding includes all the visual elements of a company including logos, fonts, color palette, and more. Designers are responsible for producing a brand that will be recognizable in a competitive market place. We started by researching competitors within the products of our choice. This research guided our decisions for the target market and brand aesthetic. Once the foundation of the company was established, a stationary set was created which includes business cards, letterhead, and envelope designs. The next steps included developing unique product packaging and advertising materials for the brand. The final part of the brand identity included constructing an environment that is cohesive with the brand identity. The goal is to create a consistent brand identity that will encourage the target market to purchase or interact with the brand. Showcasing each brand side by side will demonstrate each design principle that we learn over the course of our degree such as typography, color theory, 2D design, 3D design, and more. Each brand shows viewers professional high-quality work and the different styles each artist has developed over the years as shown in their brand.

Oral Session III
2:00-3:30 p.m.
Trustees Room

Does Involvement in AU Religious Activities Predict Depression Levels?

Marissa Simmons

Student's Majors: Psychology & Communication Studies
Faculty Sponsors: Dr. Christopher Chartier, Psychology

University students can experience immense stress and depressive symptoms during their 4 years at university (Li & Wu, 2022). Religious activity and mental health have been positively correlated in many studies in the past (Dein, 2018). I was intrigued by these results and wanted to conduct research to test if involvement in Ashland University religious activities predicted levels of depression in college students. For my research, the participants I used were Ashland University undergraduate students whovoluntarily signed up for my study. Participants were then given the consent form along with three tests: an Ashland University Religious Involvement Scale, the Zung Depression Scale (Zung, 1986), and the Duke Religious Involvement Inventory (DUREL).To determine if there was a correlation between religious involvement and depression, I ran bivariate correlations. Looking at the first correlation, comparing the Zung Depression Scale and the DUREL score, there was a significant negative correlation, r (76) = -.257, $p < 0.05$. Thus, as the DUREL score increased (the participant was more religious), the Zung Depression score decreased (the participant was less depressed). Lastly, examining the results of the comparison between DUREL score and Ashland University Religious Involvement Scale score, there was a very significant positive correlation, r (76) = .711, $p < 0.001$. Thus, as the DUREL score increased, meaning people are more committed to their religion, the Ashland University Religious Involvement scale increased, meaning they were involved in more religious campus activities.

The Utility of NATO as an Instrument of Peace

Elijah McKay

Student's Major: International Political Studies
Faculty Sponsor: Dr. Gregory McBrayer, Political Science

Throughout the Cold War and up until the 2022 Russian invasion of Ukraine, scholars and statesmen often questioned whether the North Atlantic Treaty Organization (NATO) was an effective peacekeeping alliance or useful only as a tool of United States hegemony. This paper investigates the question through the lenses of comparative history and regime theory in order to defend NATO's utility for preserving European peace in Cold War Europe and its immediate aftermath. It compares NATO to two similar regional alliances, the Southeast Asian Treaty Organization (SEATO) and the Central Treaty Organization (CENTO), to demonstrate the relative effectiveness of NATO. It then demonstrates how NATO meets the criteria for the preservation of peace laid out by Donald Kagan in *On the Origins of War*. These arguments from comparative history and regime theory demonstrate that NATO provide the European continent with unique peacekeeping tools and remains highly useful to preserve peace on the continent.

Spin to Win - A Statistical Approach to Roulette Wheels

Jacob Levering & Sadae Smith

Students' Major: Computer Science
Faculty Sponsor: Dr. Selvanayaki Kolandapalayam Shanmugam, Computer Science

Some roulette websites are based solely around profiting money without any other focus. Our project, Spin to Win, aims to collect statistical data from Ashland University students and show how users react differently when given a regulated bet amount. Through the use of a roulette-based website, the data will show how average college students perform against each other when given a simulated roulette wheel. These factors will include how male students betdifferently from female students, how different majors react to the game, and how graduate students differ from undergraduates. The objective of the project is to create a simulated roulette website. The website will contain a login form that will track data from users for comparison purposes. By using HTML, CSS, and JavaScript also, other elements will be created for the game that users will be able to interact with. The game will also collect information such as what space was landed on the most, what space did players bet on the most, and the average amount of money aplayer ended up with.

The Holders

Tia Shanklin

Student's Majors: Creative Writing & English
Faculty Sponsor: Dr. Kelly Sundberg, English

My novel, *The Holders,* is a fantasy adventure with an intended audience of young adults and a theme of inclusivity and acceptance. The characters in *The Holders* seek to break stereotypes and show that labels are often harmful and inaccurate. Too many characters in fiction are reduced to stereotypes, but my fiction works to show people as individuals. There are good, bad, and gray characters in this novel, just as there are in reality. Fantasy is a genre that works to transport its readers to other worlds, but always, there will be scenes, events, and actions that are realistic. The world building in fantasy provides me with an opportunity to present my message of inclusivity and individuality through the medium of storytelling; However, there is a needed level of research to be done. While writing the novel, I conducted research on mythologies and mythological creatures because each character in *The Holders* possesses mythological qualities. However, these characters are my unique creations and work to celebrate the good in humanity and all of its diversity.

Austen as an Aristotelian: Happiness and Virtue in *Pride and Prejudice*

Ardith Amon

Student's Majors: Political Science & History
Faculty Sponsor: Dr. Gregory McBrayer, Political Science

In *Pride and Prejudice*, Jane Austen tells the story of Elizabeth and Mr. Darcy's happiness and how they came to happiness through virtue. Aristotle seems to portray happiness in the same light in *Nicomachean Ethics*, where he suggests that virtue can offer us authoritative control over happiness. Indeed, in *Pride and Prejudice,* the virtuous characters end up happy while the vicious characters do not. This paper examines *Pride and Prejudice* and *Nicomachean Ethics* in order to demonstrate how Austen is an Aristotelian. If Austen is an Aristotelian, then one implication is that there are truths about the world that are fundamental and discernable to all societies and all rational beings. Recognizing Austen as an Aristotelian allows us to perceive how Austen, a 19th century novelist, discovered truths about the human condition similar to those of an ancient Greek philosopher. It also encourages us to further appreciate the insight Austen provides in her novels and suggests that Austen is a philosopher in her own right, writing in the medium of the novel. Austen observed the world in which she lived and questioned how individuals can live well and achieve happiness. This paper places *Pride and Prejudice* in conversation with *Nicomachean Ethics* so as to gain a better understanding of what happiness is and how we can achieve it. This paper inspires its readers to apply what they learn from Austen and Aristotle to their own lives in order to live well.

Geo-Located Music

Jacob Owens

Students' Major: Computer Science
Faculty Sponsor: Dr. Selvanayaki Kolandapalayam Shanmugam, Computer Science

The expansionism of technology has granted opportunities in all industries. For the consumer markets, this has allowed the music industry to expand their influence on an exponential level unseen since the dawn of radio technology. Thus, to adapt to the market towards personalization, computerized algorithms are being utilized to detect playlist variants. Currently, such methods surrounding the development of targeted advertisements are based on demographics and habits on the Internet. Beyond, an upcoming startup company, is based around the missing incorporation of features in the navigation industry starting with music discovery. This project aims to fulfill the missing personalization within a trip, of any transportation form. Obtaining nearby coordinates relative to cities and states, it would generate music playlists based on the desired route of travel given by the user. Showcasing small to large artists along the way, provides a new scale of advertising and adoption of new tastes with the power of such algorithms. With higher accuracy and random artists to be pooled from higher mileage routes, it allows for a volume of new music exploration. The components process data through web scraping and API (application programming interface) databases (SQL - Structured Query Language) to obtain information of artists that have originated or currently live in a city that is part of the route. The user can access the data through their own credentials and sync with music services such as Spotify for seamless integration through JavaScript and HTML/CSS programming languages.