Undergraduate Research Forum

Noon-2 p.m. • April 4, 2018 • Lima Campus Library

THE OHIO STATE UNIVERSITY

LIMA

PURPOSE

The Lima Campus Undergraduate Research Forum is designed to encourage students to actively engage in research. Beyond the Lima Campus Forum, participation in the Denman Undergraduate Research Forum, the University Libraries Research Prize, or publication in JUROS are all strongly encouraged, although faculty and students are welcome to pursue any appropriate forum for their discipline that will showcase undergraduate research.

THANK YOU

We would like to thank Interim Dean Joe Brandesky for his support of this forum. Thanks also to the support given by the Office of Student Life.

2018 UNDERGRADUATE RESEARCH AND MENTORING COMMITTEE

The Ohio State University at Lima Undergraduate Research
Lima.OSU.edu/research/undergraduate-research/undergraduate-research-forum.html

PROGRAM

1. **Michael Blosser and MacKenzie Downing** – *Preschoolers' False Belief Understanding, Story Comprehension, and Inference Production*
2. **Victoria R. Bradford** – *A Preliminary Assessment of the Experiential Involvement Scale and Hypnotic Responsiveness*
3. **Rachel A. Crites** – *Possibility of Cryptic Species of Praomys Found After the Testing of Morphology and Genetics in Praomys rostratus*
4. **Shane Dumm** – *Attachment Theory's link to Academic Performance through the mediating variable of Academic Engagement in a sample of College Students*
5. **Ethan Friend** – *How Diet and Migratory Status Relate to Digestive Morphology of Birds*
6. **Olivia J. Green** – *Finger Lengths and Hypnotizability: Is There an Association?*
7. **Hamzeh Jajeh and Muhammed Jajeh** – *Effects of the Emerald Ash Borer on Avian Population Abundance. Evidence for a "Trophic Subsidy"?*
8. **Stephanie Longwell and Taylor Ball** – *Potential for Mature Ash Tree Regeneration in Tecumseh Natural Area*
9. **Ashley Meihls and Andrea B. Morales-Casasola** – *The Psychology of Treating Depression and PTSD in J.K. Rowling's Harry Potter Series*
10. **Andrea B. Morales-Casasola** – *Assessment of Test Anxiety on the OSU Lima Campus: Prevalence, Intensity, and Coping Methods*
11. **Eve Villaruel** – *Parent Discipline Predicts Low-Income Preschoolers' Social Competence*
12. **Trenton Ward** – *Feasibility of Using Drones to Detect Great Blue Heron and Fox Squirrel Nests*
13. **Amanda K. Weller** – *Determining Relationships Among the Brush-Tailed Mice (Family Calomyscidae) Using Genetic Data*

ABSTRACTS

Michael Blosser and MacKenzie Downing
Faculty Sponsor: Dr. Virginia Tompkins (Department of Psychology)

Preschoolers' False Belief Understanding, Story Comprehension, and Inference Production

Previous research suggests that theory of mind (i.e., the ability to understand our own and other's mental states) predicts reading comprehension among school-aged children. Our study investigated the connection between theory of mind and narrative comprehension in preschoolers. This relation is important to examine in the preschool years because there is continuity between children's narrative comprehension and later reading comprehension. Thus, understanding the precursors to reading comprehension is important for understanding the underlying mechanisms of reading development, and also for its potential as an intervention tool. We examined the relations among false belief understanding and narrative comprehension (i.e., story comprehension, picture sequencing, and narrative production) across six months. Participants included 52 preschoolers (M = 4.42 years); 50% were female, and most were middle to middle-upper class. Children were tested twice, six months apart, on false belief understanding and narrative comprehension. False belief understanding assesses the child's understanding that a belief can differ from reality (e.g., a character will think there are crayons in a box that the child knows to contain ribbons). The story comprehension assessment consisted of ten questions (five implicit, e.g., causal inference and five explicit, e.g., setting). The picture sequencing tasks consisted of placing five pictures in the correct order. The narrative production tasks consisted of children narrating a wordless book; spontaneous inferences made by the child were coded. Children's receptive vocabulary was also assessed as a control variable. We found that children's false belief understanding and narrative comprehension were significantly related within time points and across the six months, even controlling for vocabulary. This study is novel for its focus on pre-readers and on children's production, not just comprehension, of stories. It suggests that the comprehension-theory of mind link occurs earlier in development than previously studied and suggests possible new avenues for early literacy intervention work.

Victoria R. Bradford
Faculty Sponsor: Dr. Joseph Green (Psychology)

A Preliminary Assessment of the Experiential Involvement Scale and Hypnotic Responsiveness

Recently, Lynn and colleagues developed the Experiential Involvement Scale (EIS; Lynn, Evans, Russ, 2017) as an experimental measure designed to assess openness and willingness to experience hypnotic suggestions. The scale is administered before and after hypnosis (items on the post-hypnosis version are worded in the past tense). The 10-item scales measures participants' willingness to receive suggestions without opposing them, letting go of resistance, being open to whatever happens during the session, and a sense of acceptance about hypnotic experiences. The EIS purportedly measures something beyond participants' expectancy to respond to hypnotic suggestions and belief about being a good subject. In an early assessment of the scale, we administered the EIS, along with measures of absorption, fantasy proneness, expectancy, and dissociation to N=170 college students attending The Ohio State University at Lima. Students were then hypnotized with the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962). Women and men scored similarly regardless of whether the EIS was administered before or after hypnosis. The EIS correlated positively with both objective (r=.31) and subjective (r=.26) scores on the HGSHS:A, as well as with measures of students' interest in being hypnotized and their prediction of passing suggestions during hypnosis. The EIS did not correlate with measures of absorption, fantasy proneness, or dissociation suggesting that it might be uniquely related to hypnosis. However, in a series of exploratory regression analyses, the EIS did not uniquely predict hypnotizability. In sum, we found limited evidence supporting the EIS as it relates to hypnosis but more research is needed.

Rachel A. Crites
Faculty Sponsor: Dr. Ryan Norris (Department of Evolution, Ecology, and Organismal Biology)

Possibility of Cryptic Species of Praomys Found After the Testing of Morphology and Genetics in Praomys rostratus

West Africa is home to many species of mammals found nowhere else in the world; among these is a small rodent species, Praomys rostratus, the subject of this research. Praomys rostratus, or the West African Soft-furred Mouse, is a small, reddish-brown or yellowish-brown, nocturnal mouse that roams woodland floors and trees. Based on field observations of RWN, we hypothesized that Praomys rostratus from Sierra Leone and Guinea (especially the Dieke area) represent separate species. To test this, I compared both morphology and genetics of P. rostratus between the two locations. I compared five physical features of P. rostratus using Student's t-tests. These features include weight, total length (nose to tail), tail length, ear length, and hind tarsus length. I obtained genetic data for the cytochrome b gene for P. rostratus from these areas and analyzed Kimura 2-parameter distances using PAUP*. Results from testing the P. rostratus morphology from the two locations were not significant for all five categories tested. Genetic results were more promising, but provide only a weak argument for more than one species. When both the morphology and genetics are taken into consideration, it can be concluded that there is not a separate species found within Praomys rostratus, but the possibility cannot be fully ruled out. Future studies can be conducted on this question, given that there are more data to expand upon.

Shane Dumm
Faculty Sponsor: Dr. Patrick Carroll (Psychology)

Attachment Theory's link to Academic Performance through the mediating variable of Academic Engagement in a sample of College Students

Research concerning attachment styles' effect on academics in college students is limited in terms of volume. The present research examines the effect of attachment style on academic performance. Moreover, we test whether academic engagement mediates the effect of attachment on performance. Our hypotheses are as follows. First, as compared to insecurely attached people, securely attached people will be more likely to trust and engage (solicit help from) professors. In turn, differences in academic engagement with professors will mediate the effect of attachment style on academic performance. Using Hazan & Shaver (1987) attachment scale, self-reported GPA, and an engagement questionnaire, college students at a regional university were tested on their attachment style, academic engagement and their academic performance. First, the analyses revealed the predicted effect of attachment on the mediator of engagement. Specifically, securely attached participants reported greater engagement with instructors than those identified as insecurely attached. Although not significant, the results showed that the effects of attachment on GPA were trending in the predicted direction. Specifically, securely attached participants showed higher GPAs than those who were insecurely attached. These findings indicate that securely attached students tend to engage more than insecurely attached students and, in turn, this may lead to greater academic performance. We will also discuss limitations and future directions for this line of research.

Ethan Friend
Faculty Sponsor: Dr. Jacqueline K. Augustine (Department of Evolution, Ecology, and Organismal Biology)

How Diet and Migratory Status Relate to Digestive Morphology of Birds

A bird's diet and migratory status can give a better understanding of the diversity of species on the planet. This study looked at the effect of migratory status and diet on the size of the internal organs. We examined a total of 46 species of birds. A beginning weight was taken and then the internal organs were dissected out. Weights of the proventriculus, gizzard, heart, intestine, and the entire digestive system were recorded. Migratory status was determined using the literature and described as non-migratory (summer and winter ranges overlap), short-distance migrant (within a hemisphere) or long-distance migrant (between hemispheres). Diet was determined using two methods: 1. A literature search, and 2. Analysis of the gizzard contents. We included taxonomic order (Passeriformes or non-Passeriformes) as a covariate. We found that migratory status did not relate to the size of the internal organs, but diet and taxonomic order of the bird did influence the size of the proventriculus, gizzard, heart, intestine, and the entire digestive system. In future studies of the bird's migratory status, the fat content of the bird could have been measured and taken into consideration. The birds that we studied were most likely not actively migrating when they were collected. Looking at specimens that were in migration at their time of death could provide more information about the connection, if any, found between diet and the size of internal organs. Future studies could also examine intraspecific variation to determine how much individual differences may affect our ability to compare a diverse set of species. This study adds to the growing body of literature that emphasizes the connection between diet and digestive system morphology.

Olivia J. Green
Faculty Sponsor: Dr. Joseph Green (Psychology)

Finger Lengths and Hypnotizability: Is There an Association?

The digit ratio of the second to fourth fingers (2D:4D) is sexually dimorphic with women having a higher ratio than men. In addition, digit ratios may vary by sexual orientation and across some mental illnesses. Lower digit ratios may result from greater exposure to testosterone or androgens during prenatal development and these "masculine" ratios correlate with trait physical aggression (Bailey & Hurd, 2005). Most studies of hypnotic responsiveness fail to find gender differences; however, when differences do emerge, they typically favor women scoring slightly higher than men (see Green & Lynn, 2011; Kolto et al., 2014). In the present study, we photocopied the hands of N=448 college students and then administered a standardized measure of hypnotizability (HGSHS:A; Shor & Orne, 1962) and the Bem Sex Role Inventory (BSRI; Bem, 1974, 1981). As expected, the 2D and 4D finger lengths were longer for male students, relative to female students. As has been found in previous research, the 2D:4D ratio was smaller among our male participants. We did not find a significant correlation (r=.08) between the HGSHS:A and 2D:4D ratios. Using median splits on the 2D:4D ratios for each hand, we then divided our sample into low and high ratio groups. Based on left hand measurements, low and high ratio subjects scored similarly on the HGSHS:A. Using right hand measurements, high ratio participants (94 males, 131 females) scored significantly higher on the HGSHS:A than low ratio participants (122 males, 101 females). We believe this is the first study to find an association between right hand 2D:4D ratios and hypnotizability.

Hamzeh Jajeh and Muhammed Jajeh
Faculty Sponsor: Dr. Michael Reagon (Department of Evolution, Ecology, and Organismal Biology)

Effects of the Emerald Ash Borer on Avian Population Abundance. Evidence for a "Trophic Subsidy"?

The emerald ash borer (EAB), Agrilus planipennis, is native to Asia but was introduced to Detroit, Michigan in 2002 and has rapidly spread through most of eastern and midwestern North America. Once established, EAB devastated mature ash (Fraxinus spp.) tree populations, with mortality rates near 100% after only 5 years of exposure. However, EAB larvae could be a new food source for insectivorous bird species, and result in an increase in their population growth rates. Prior research found that several species of woodpecker increased in abundance after EAB was introduced to a location. We were interested if the observed increase in bird population abundance continues, or if population size would decrease after all the ash trees were killed by EAB. Unlike prior studies, we also included more years of data from more sites to see if the trends differ between locations. In addition, we included other bird species that may also be indirectly impacted by EAB, including cavity nesters and seed-eating birds. A change in canopy structure due to the ash tree mortality might increase sunlight exposure and therefore affect the number of seeds available for seed-eating birds. An increase in woodpecker activity due to the EAB invasion could potentially cause an increase in cavities in dead ash trees, which may indirectly increase population growth rates of cavity nesters. We used bird abundance data from the Breeding Bird Survey (BBS) to quantify the effects of EAB invasion on 12 bird species: 4 woodpeckers, 4 cavity nesters and 4 seed eating birds. Unlike prior studies, our preliminary analyses did not find any strong associations between population abundance and the presence of EAB for any of the bird species we investigated. Our results suggest that the indirect effects of EAB are not strong enough to alter populational growth rates.

Stephanie Longwell and Taylor Ball
Faculty Sponsor: Dr. Michael Reagon (Department of Evolution, Ecology, and Organismal Biology)

Potential for Mature Ash Tree Regeneration in Tecumseh Natural Area

First introduced to Ohio in 2003 and Allen County in 2012, the Emerald Ash Borer (EAB), Agrilus planipennis, has killed nearly all mature ash (Fraxinus spp.) trees in the state, including the Tecumseh Natural Area at The Ohio State University at Lima. The mortality in the Tecumseh Natural Area of mature ash trees is 100%. All hope is not lost, as it may be possible for ash tree populations to recover from ash seedlings and saplings that are growing EAB-free. We surveyed seedlings and saplings in the Natural Area to determine the potential for ash tree population regeneration. We also looked for evidence of current EAB by looking for signs of damage on ash seedlings and saplings that are growing in the Natural Area. The abundance of seedlings and saplings we observed could lead to a successful regeneration of ash trees in the woodlot. We did not find any evidence that the EAB currently resides in the Tecumseh Natural Area. Where we once found heavy mortality, we hope to see an abundance of new mature ash trees years down the road, but we also do not know and cannot predict if the EAB will return at any time.

Ashley Meihls and Andrea B. Morales-Casasola
Faculty Sponsor: Dr. Beth Sutton-Ramspeck (English)

The Psychology of Treating Depression and PTSD in J.K. Rowling's Harry Potter Series

This paper is focused on a psychological analysis of J.K. Rowling's Harry Potter series. With use of the DSM-5, we diagnose Harry and begin to examine treatment options. In book five, Harry showcases aggressive behavior, which many readers see as a portrayal of an angsty adolescent. However, when readers begin to examine the trauma that Harry has previously gone through, it becomes clear that Harry is suffering from PTSD with Depression. By showing the mental issues that Harry is dealing with, Rowling also begins to present different forms of therapy that are used to treat Harry. We discuss the impact of different forms of therapy such as Prolonged Exposure Therapy, Self-Administered Therapy, and the social support that comes from parents and friends. However, Rowling has a critical view of much of this therapy.

Overall, the therapy that Harry undergoes has no effect or a negative effect on his symptoms. This implies that Rowling is working to destigmatize Mental Issues by criticizing the approaches that many Psychologists take to diagnosing and treating their patients. The fact that Harry's symptoms are all being treated independently instead of as one entity is the main reason why Harry does not receive sufficient treatment.

Andrea B. Morales-Casasola
Faculty Sponsor: Dr. Joseph Green (Psychology)

Assessment of Test Anxiety on the OSU Lima Campus: Prevalence, Intensity, and Coping Methods

Previous research has suggested that a large percentage of students are affected by test anxiety, yet don't know how to successfully cope with it (Sung, Chao, & Tseng, 2016). In an attempt to better understand test anxiety within a college sample, we surveyed N=230 undergraduate students at The Ohio State University at Lima. Students completed a variety of questionnaires including the GAD-7, the Cognitive Test Anxiety Scale, and the Westside Test Anxiety Scale, and they granted us permission to obtain their GPA, SAT/ACT, and declared major from university records. Our goal is to better understand the frequency and severity of test anxiety symptoms among students on our campus and whether the intensity of test anxiety differs by major, rank, gender, or academic ability. We tallied and rank ordered students' preferred method of coping with test anxiety and discovered that the frequency of some strategies varied by gender. We also calculated correlations between our scales. Not surprisingly, our various measures of test anxiety highly correlated with one another. In addition, test anxiety levels negatively correlated with students' academic success. Female students reported higher levels of test anxiety relative to our male participants. Females also wrote relatively longer descriptions about their test anxiety experiences and used more negative emotional words in their descriptions of test anxiety. Our results may prove helpful to individual students suffering from test anxiety, as well as campus counselors, administrations, faculty and staff that work with students struggling with test anxiety.

Eve Villaruel
Faculty Sponsor: Dr. Virginia Tompkins (Psychology)

Parent Discipline Predicts Low-Income Preschoolers' Social Competence

Educators are increasingly recognizing children's social competence as an important indicator of school readiness. One way in which children's social competence may be promoted prior to kindergarten is through parents' discipline. However, there is little research on this relation in preschoolers. We assessed whether parent discipline predicted preschoolers' social competence (social skills and problem behaviors) over time. We expected that more positive discipline (e.g., an explanation of why the behavior was wrong) would predict greater social skills and that more punitive discipline (e.g., yelling) would predict greater problem behaviors. The sample included 37 low-income preschoolers (M = 4.45 years). Parents completed a survey which included open-ended questions about how they would respond to 12 child misbehaviors (e.g., child hits, child lies). Each survey response was coded into four categories from most positive to most negative: explanations including explanation of others' feelings, consequence (e.g., timeout) with explanation, consequence alone, and power assertive (e.g., spanking, yelling). Children's Head Start teachers rated their social skills and problem behaviors with the Social Skills Improvement System Scale (Gresham & Stephen, 2008) at Time 1 and 5 months later at Time 2. We controlled for Time 1 social skills or problem behaviors to control for children's initial social competence. We found that, controlling for children's age and initial social skills, parents' explanations of child misbehaviors significantly predicted children's later social skills. Although parents' use of consequences was related to greater problem behaviors and parents' use of explanations was related to lower problem behaviors, these responses were not significant predictors once initial problem behaviors were controlled. The results suggest that parents' explanations for misbehavior may be beneficial for children's social skills perhaps because it models an appropriate means of dealing with conflict with others and focuses the child's attention on the reasons the behavior was inappropriate.

Trenton Ward
Faculty Sponsor: Dr. Jacqueline K. Augustine (Department of Evolution, Ecology, and Organismal Biology)

Feasibility of Using Drones to Detect Great Blue Heron and Fox Squirrel Nests

Technological advances in drone technology has allowed for opportunities to view wildlife from above, and is more efficient and convenient than manned aircraft. We tested whether Great Blue Heron (Ardea herodias) and Fox Squirrel (Sciurus niger) nests could be viewed using drone footage. These nests were studied because they are easy to detect from the ground in our study area, the Tecumseh Natural Area on OSU-Lima's campus. From the ground, we recorded the diameter at breast height of the trees in which the nests were located, and used a rangefinder to record the heights of the nests above the ground. The locations of the nests were flagged with orange marking tape and the coordinates were taken to allow for easier spotting during drone flights. Photographs were taken with both DJI Mavic Pro and Phantom 3 Standard drones from heights of 45.7m, 76.2m, and 106.7m above ground level. Studies were done in different weather conditions (snow cover/no snow cover; sun/cloud) to compare how the visibility of the nests varies. We found that nests were generally harder to detect than we anticipated even at the lowest height. The footage that was taken with snow slightly improved the detectability of the nests from the air. The Mavic and Phantom both seemed to perform similarly and worked well for the study. The study has overall shown that drones can be used to detect known nests, but conducting surveys in unsurveyed areas may be difficult. At this time, ground-based surveys should continue to be used. Drone surveys using thermal or ultraviolet imagery may increase detection over visual imagery. Additionally, post-flight editing software may adjust zoom or brightness to increase detectability or may be programmed to automatically identify potential nests. This cutting-edge field of technology shows great potential for monitoring wildlife populations.

Amanda K. Weller
Faculty Sponsor: Dr. Ryan Norris (Department of Evolution, Ecology, and Organismal Biology)

Determining Relationships Among the Brush-Tailed Mice (Family Calomyscidae) Using Genetic Data

Calomyscus, meaning "beautiful mouse", is a genus of little studied small rodents from South Central Asia. They are compact, pale colored, large eared, have tufted tails (hence the name), and mostly dwell near dry rocky mountain sides with sparse vegetation. At present, 8 species are recognized based on morphological characteristics and phylogenetic analysis of DNA. Calomyscus can be informally separated into 3 species groups: the C. tsolovi group from Syria with almost no information available; C. mystax, a group of much diversity (4 recognized species with several more probable species); and C. bailwardi, the group on which our project is focused. We are analyzing how the three recognized species in the C. balwardi species group (C. hotsoni, C. baluchi, and C. bailwardi) are related to each other. We analyzed data from the mitochondrial cytochrome b data, which suggests as many as 6 species in the group questioned. The project is ongoing, and we are in the midst of sequencing the nuclear gene IRBP, which will be used to test the existing hypotheses. The nuclear IRBP gene, along with a larger mitochondrial dataset will provide new evidence for recognized groups. Data currently suggest there are distinct differences between C. bailwardi and a proposed group "Eastern C. bailwardi", and also C. baluchi and and a proposed group "Northern C. baluchi". We are continuing to investigate hybrid zones in regions of Pakistan (Bolan Pass, Chagi, and Wadh), where lines of geographic distinctions between species are inconclusive.

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