

The Ohio State University at Lima

Undergraduate Research Forum

April 1, 2015

Library, 11:00



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 Dean Gilbert for her support of this Forum. Thanks also to the support given by the Student Life.

PROGRAM

1. **Bethany Army** - *Evolutionary Divergence of Chipmunk Genera*
2. **Alexandria D. Crawford** - *A Test of the Effectiveness of Diatomaceous Earth to Reduce Mite Load and Increase Reproductive Success of the House Wren (*Troglodytes aedon*)*
3. **Alexander M. Davis III** - *Do House Wrens Signal Predator Type in Their Alarm Calls?*
4. **Kaitlyn Philpot** - *Are Male House Wrens (*Troglodytes aedon*) Open-ended or Closed-ended Learners?*
5. **Jacqueline Smith** - *A Hematological Study of House Wrens and its Association with Reproductive Success*
6. **Trey Thomas** - *Robotic Prairie-Chicken Design and Study*
7. **Sarah Goins** - *Social Conditioning and Fairy Tales: A look at Fish Tank*
8. **Torie Wright** - *The Girl Who Was Misplaced*
9. **Giuseppe Fricano** - *The Secret to Happy*
10. **Kaitlyn Morrisey and Heather Downey** - *Evaluation of a Mobile Produce Market Intervention on the Consumption of Fresh Fruits and Vegetables by Residents of Food Deserts in Allen County, Ohio*
11. **Jedidiah I. Ketcham** - *Preparedness and self-validation*
12. **Katharine N. Black** - *Mindfulness, progressive muscle relaxation, and the expectation to perform well when solving anagrams*
13. **Daniel Blosser** - *Evaluating a short story: Does it matter if, how, or when the author died?*
14. **Brittney F. Maunz** - *Hands on hypnotizability: Does finger length correlate with hypnotic responsiveness?*
15. **Samantha Metzger** - *Could highlighting efficiency be tested and aid future training? A follow-up analysis of a study of reading comprehension and dual-color highlighting*
16. **Richard J. Smith** - *Sex, Fear & Disgust: Attentional Biases Toward Emotional Words*

ABSTRACTS

Bethany Army

Advisor: Dr. Ryan W. Norris (Biology)

Evolutionary Divergence of Chipmunk Genera

Chipmunks represent a large radiation of squirrels, and range over much of Northern Eurasia and North America. Most of these species are part of a single radiation, the genus *Neotamias*. Fossils have been found in North America and Eurasia that may help indicate divergence times. Previous studies have suggested that the Eurasian fossils are too old to represent *Eutamias*, the genus that is currently present in Eurasia. We applied a new method, PenG, which includes the possibility of discovering of older fossils to a Bayesian analysis addressing this question. The PenG method was used in the computer program, BEAST, to calibrate a phylogenetic analysis of genetic data and estimate divergence times. Although our estimates of divergence times are older than previous studies, we still reject the idea that these early Eurasian fossils might represent *Eutamias*. We also discuss why *Neotamias* has so many species compared to other chipmunk genera. Glaciations and the cooling and drying of North America may have led to the radiation of the *Neotamias*.

Alexandria D. Crawford

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

A Test of the Effectiveness of Diatomaceous Earth to Reduce Mite Load and Increase Reproductive Success of the House Wren (*Troglodytes aedon*)

Parasites grow, feed, and inhabit a host organism while negatively affecting the health of its host. In many animals, heavy mite infestations negatively affect nestling growth and survival, adult survival and reproductive success, and parental behavior. Diatomaceous Earth (DE) is a non-chemical pest control with

a natural origin and low toxicity, often used to decrease ectoparasite load. I predict that not only should increased mite abundance correlate with decreased nestling size, but also nests treated with DE should have larger nestlings and fewer mites than untreated nests. DE was applied in half of the House Wren nest boxes at three sites near Lima, OH, before the birds initiated egg laying. Mites in the nest were quantified by removing nests after the nestlings fledged and extracting the mites using a burlse funnel trap. The number of mites did not correlate with nestling size or the number of fledglings. The number of mites was not influenced by nest size, egg laying dates or application of DE. My hypothesis that DE would reduce the load of ectoparasite and increase the reproductive success was not supported. The effectiveness of the DE may have been reduced due to the humidity inside the nest box.

Alexander M. Davis III

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

Do House Wrens Signal Predator Type in Their Alarm Calls?

Communication among individuals is essential for defending against predators and competitors. We hypothesized that House Wrens would vary their behavioral response and alarm call when presented with two types of predators: a snake and an owl. These were chosen because they represent different modes of attack (crawling vs. flying), and have been shown to elicit responses from wrens previously. During 5-minute predator presentations, wrens reacted by attacking the predator, giving an alarm call, or flying to cover. Compared to the owl, the wrens approach the snake more closely and increased the maximum frequency of their chatter call. Compared to the snake, wrens chattered longer at the owl. My hypothesis was supported: House Wrens do modify their behavior response and alarm call depending on the type of predator. This experiment also demonstrated that individuals vary in their aggressiveness to predators. A similar experiment could be used to measure changes in the level of aggressiveness with an increase in the number of young being raised or as the nest progresses through the egg laying, incubation, and nestling feeding stages.

Kaitlyn Philpot

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

Are Male House Wrens (*Troglodytes aedon*) Open-ended or Closed-ended Learners?

Songbirds are typically either ‘open-ended’ or ‘closed-ended’ learners. Open-ended learners can expand their vocalizations even as sexually mature adults; whereas, closed-ended learners generally develop songs within their first year with few changes after that. Song is important to study because it may indicate the quality of the signaler and affect a male’s reproductive success. The purpose of this study is to determine if male House Wren (*Troglodytes aedon*) songs change with age or experience. If House Wrens are ‘closed-ended’ learners, they should have consistent song between first and second nests within each year and between years. If House Wrens are ‘open-ended’ learners, they should show consistent changes in song length, rate and frequency range. Male House Wren song was recorded for 15 minutes during the incubation stage with a microphone attached to the pole that holds the nest box. Song rate (#songs/minute), duration (length of each song), and frequency were analyzed from the recordings. Males had a higher song rate in year 2 than in year 1, but there was no difference in song length or frequency. Within a year, there was no difference in song rate, song length or frequency between first nests and second nests. Because there were no changes in song length or frequency, House Wrens appear to be close-ended learners, with age of males being indicated by song rate. Future research should determine whether song rate influences reproductive success.

Jacqueline Smith

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

A Hematological Study of House Wrens and its Association with Reproductive Success

Evolution occurs when species adapt to a fluctuating environment. Pathogen prevalence in the environment may affect the health of an individual, and in turn, affects that individual’s health and

reproductive success. This study uses hematological findings to quantify immune function in House Wrens (*Troglodytes aedon*), and to determine whether this, in turn, effects individual mass, laying date, clutch size, and offspring. Blood was drawn from 96 adult House Wrens and physical morphology was recorded. The nestling's physical morphology was measured at ten days after hatching. A principal components analysis was used to summarize the four differentiated types of white blood cells with two principal component scores. The PC1 score indicates more heterophils but fewer lymphocytes, but was not related to any measures of reproductive success. A high female PC2 score, indicating more eosinophils and basophils, correlated with a smaller nestling tarsus. Eosinophilia and basophilia often result from an allergic immune response as well as parasitism. For females, clutch size increased with a higher white blood cell (WBC) count. Male hematology did not relate to clutch size or nestling size. Mass tended to decrease with higher total protein in both sexes but did not correlate with other hematological results. These findings suggest that immune function positively impacts the health and size of offspring. The blood analyses and WBC differential are valuable in that this is the first study to describe this feature of wild House Wrens. Because it may be that only healthy birds can reproduce, future work should examine the hematology of non-breeding House Wrens to see if abnormal blood counts are to blame for their lack of reproduction.

Trey Thomas

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

Robotic Prairie-Chicken Design and Study

A robotic model is needed to test whether male prairie-chickens can differentiate between females of their own species, and females of a closely-related species. Robotic models are good for studying topics such as this because they closely simulate the behavior and appearance of a live prairie-chicken when they are created out of real taxidermy parts.

The purpose of this project was to create a better design for the chassis that supported the body of the prairie-chicken, and that would also house all of the electrical components. There were a few problems with the original prototype that needed to be resolved with the new model. These problems included difficult access to the electrical components, grass getting caught in the motor when it was in use, and it

was unbalanced. These problems were resolved with a few minor changes, such as adding a removable screw-on top, a wider wheel base, and a barrier between the motor and the wheel that kept the grass away.

The first step to resolving these problems was to create a basic model of the chassis on a 3-D modeling software called SolidWorks, and it closely resembled the prototype. Then I decided how these problems could be resolved most efficiently. For example, adding the barrier for the motors. I added an extrusion outwards from the body, towards the wheels. Then, I measured the distanced for each hole to be placed in the body for the electrical components.

The model was tested in the field March of 2015, and some new problems arose when the carpeted track was obscured by grass. These problems will addressed with the next design of the model. “First Person View” technology will be added with a camera mounted to the front, which will transmit live images to goggles worn by the operator.

Sarah Goins

Faculty Sponsor: Dr. John Hellmann (English)

Social Conditioning and Fairy Tales: A look at Fish Tank

In her 2009 film Fish Tank, director Andrea Arnold uses a leitmotif of fairy tales to depict the way social conditioning has created a patriarchal mindset. This social realist film depicts the life of Mia, a teenage girl living in council-estate housing in urban England. Many critics of the film express the idea that Mia’s life takes a downward spiral due to her rebelliousness, but my analysis suggests she eventually recognizes the social constructs that inhibit her advance in life. The inundation of fairy tales in society is subtle, yet it conditions females to believe that they require rescuing by a male figure in order to live a happy, fulfilled life. This outlook sets women up to play the part of a victim, which ultimately leads to disappointment and disillusionment. In this study, I use psychoanalytic theory from psychologist Carl Jung to support my analysis that Mia’s motives are based on the way her unconscious has been molded by the fairy tale agenda that has snuck its way into our culture. Although the social conditioning of fairy-tales motivates Mia, she ultimately breaks the mold of artificial gender concepts and is met with a severe realization that her unconscious struggles to accept. By understanding that our unconscious is immersed in notions drawn from fairy tale principles and concepts, we can be more attentive to the elusive way in which social conditioning drives our motives and our understanding of gender roles. Mia’s character is easy to

identify with because her struggle conjures up feelings of needing to resist a society that has molded us to believe an idea that ultimately leads to dissatisfaction.

Torie Wright

Faculty Sponsor: Dr. Beth Sutton-Ramspeck (English)

The Girl Who Was Misplaced

Hermione Granger is often thought of as the heroine of J.K. Rowling's Harry Potter series. Hermione's placement in Gryffindor rather than Ravenclaw is rarely scrutinized, as she always uses her vast intelligence to outwit the troubles her male counterparts find themselves in; she makes herself out to be a strong candidate for the house that favors honest bravery. She is determined to belong in Gryffindor by the Sorting Hat, which sits upon students' heads, mulls over their traits, and decides which group they are most suitable for. However, I challenge the Sorting Hat's verdict, and my argument is not that she should be in Ravenclaw, the house associated with intelligence. After examining Hermione more deeply, I conclude that her rightful place is among the members of Slytherin, the most selfishly ambitious house at Hogwarts School of Witchcraft and Wizardry. To support this point, I dissect the layers of Hermione's seemingly altruistic attitude, uncovering hidden motives behind actions that prove she is a self-serving character, one who deserves a seat under the emerald and silver banner of Slytherin.

Giuseppe Fricano

Faculty Sponsor: Dr. Doug Sutton-Ramspeck (English)

The Secret to Happy

A 40-page chapbook of poems with a single speaker, *The Secret to Happy* chronicles a series of situational exposures of a man rising and falling in a state of existential madness. In a casual voice, the speaker discusses Chinese food, relationships, family visits, and nature walks, all of which invite the reader to discover his relational mental status in any given poem, to construct a timeline of events where the speaker may be mad or seemingly on the cusp of becoming so. The collection utilizes a thematic staircase

as a metaphor to divide the journey into two sections: Ascension, and Descension. The speaker's perceptions are inconsistent, leaving the reader to reconcile his fragmented consciousness, which leaves the reader in a state of uncertainty as to whether these perceptions are ordinary, or perhaps a bit mad. Ultimately, *The Secret to Happy* experiments with the relationship and thin line between the "normal" and the "crazy" and attempts to subvert the standard views of both.

Kaitlyn Morrissey and Heather Downey

Faculty Sponsor: Dr. John R. Snyder (Health and Rehabilitation Sciences)

Evaluation of a Mobile Produce Market Intervention on the Consumption of Fresh Fruits and Vegetables by Residents of Food Deserts in Allen County, Ohio

More than 16,000 residents of Allen County live in areas identified as food deserts because they lack access to affordable and nutritious foods. These residents often have difficulty purchasing fresh fruits and vegetables, and consequently are prone to a variety of chronic diseases, including heart disease, diabetes, and cancer. In 2013, Activate Allen County, with the assistance of several community partners, began to take produce to consumers with the launch of a Mobile Produce Market (MPM). The purpose of this study was to assess the impact of the Mobile Produce Market on the consumption of fresh fruits and vegetables by citizens of Allen County living in food deserts. To gather information, brief intercept surveys were conducted with purchasers at the various sites the MPM stopped. Respondents were asked how frequently they purchased from the MPM; if their family's daily consumption of fruits and vegetables had changed since the MPM began serving them; what fruits and vegetables they typically purchased; how they rated the price, variety, quality, and taste of the produce; and to point to the general area where they lived on a map of the community. Intercept surveys with 78 purchasers were completed between December 8, 2014 and March 10, 2015. Results showed that 73% of respondents purchased from the MPM either every time or every other time it stopped. Access to the MPM increased the average daily consumption of fruits and vegetables for 64% of purchasers, going from an average of 1.67 servings before the MPM was available to 2.95 servings per day after the MPM began operating. The top five vegetables purchased were peppers, tomatoes, lettuce, broccoli, and onions; the top three fruits purchased were grapes, bananas, and apples. The price, variety, quality, and taste of the produce were rated as good or excellent by 89% of purchasers. Forty-seven percent of the purchasers pointed to communities on the map designated food deserts. Limitations to the study include the fact that these are self-reported data and a snap-shot in time.

The results do show that the Mobile Produce Market is enabling more individuals to consume more fresh fruits and vegetables although still less than the recommended five servings per day. Future studies might focus on why more residents of food deserts do not avail themselves of this intervention.

Jedidiah I. Ketcham

Faculty Sponsor: Dr. Patrick J Carroll (Psychology)

Preparedness and self-validation

Two studies tested the hypothesis that the experience of preparedness, that is being prepared for an outcome, validates attitudes in an unrelated area. The studies were run with college students on a computer with one of the 4 conditions randomly assigned. The conditions fit into the 2x2 matrix with “Preparedness” and “Priming” as the variables. Study 1 showed that participants primed with positive preparedness (vs. non-preparedness) words showed greater extremity, confidence, and attitude-consistent behavioral intentions regarding an unrelated proposal to increase funding for student wellness. The second study is currently ongoing and has run a total of 21 participants thus far, all are college students, as in the first study. Study 2 aimed to rule out valence as alternative explanation for these findings by having participants prepare for a negative event. Together, the results from two studies aimed to show that unlike Study 1, where the participants preparedness were primed for a possible positive event, the follow-up study tested the effect of preparedness for negative social feedback on subsequent changes in extremity, confidence, and attitude-consistent intentions for an unrelated proposal on funding for genetically modified foods. Taken together, the results across studies provide empirical answers to the conceptual question of whether preparedness for any event, positive or negative, can increase confidence to validate attitude-thoughts and intentions in a completely unrelated domain.

Katharine N. Black

Faculty Sponsor: Dr. Joseph Green (Psychology)

Mindfulness, progressive muscle relaxation, and the expectation to perform well when solving anagrams

Frewen (2008; 2011) developed the *Meditation Breath Attention Scores* (MBAS), a test of mindfulness where participants close their eyes, concentrate on their breathing, and periodically report if they are experiencing distracting thoughts whenever a chime sounds. In two previous investigations, we administered the MBAS to students and tested their ability to solve anagrams. We found limited evidence that anagram performance improved following training on the MBAS. However, our results could also be explained by a practice effect. In the present study, all participants tried to solve two sets of anagrams. We previously showed that the two lists of anagrams were equally difficult. We administered anagrams via computer with each word appearing for a total of 10 seconds. Between the first and second attempt to solve anagrams, we administered either the MBAS, a progressive muscle relaxation protocol (PMR), or had participants watch a psychology video (control condition). We manipulated participants' belief that the training would help them to solve anagrams on the second trial. Approximately half of the students were told that their anagram performance would improve after receiving the MBAS, PMR, or concentrating on the video. We collected data on 145 participants. Final analyses include 128 participants after eliminating those that frequently engage in meditation (1 or more times per month), provided incomplete data, or neglected to follow instructions. We found that our "high focus" MBAS group solved more anagrams on trial 2 and that the expectancy manipulation increased our MBAS "low focus" group's performance to solve more anagrams.

Daniel Blosser

Faculty Sponsor: Dr. Joseph Green (Psychology)

Evaluating a short story: Does it matter if, how, or when the author died?

Green and Mohler (2014) reported that undergraduate students more favorably evaluated a literary work when they were told that the author had died. In fact, the price offered to buy a short story was nearly three times the amount offered by students who believed that the author was alive. This so-called *death effect* extended to subjective impressions of the work as well. The present investigation is a follow up and expansion of this earlier study. As before, we presented a short story to a sample of undergraduates attending The Ohio State University at Lima. Students reported the amount of money they would

hypothetically spend at auction to purchase a signed, original copy of the story. Unlike the first study that simply manipulated whether the author was alive or dead, the present study included multiple narratives of *how* (i.e., car accident, suicide, or heart attack) and *when* (i.e., two months or twenty years ago) the author died. Participants also completed the *Collett-Lester Fear of Death Scale, Revised* (Lester & Abdel-Khalek, 2003) and a modified *Suicide Opinion Scale* (Domino et al., 1978). As before, we predict that students will offer more money to buy the story and have more favorable opinions about the author when they believe that the author is dead. We will explore whether the *modality of death* and the *recency of death* affects students' evaluations. We predict that the more recent death narratives will generate sympathy toward the author and be associated the more favorable ratings. We also suspect that the more dramatic death by suicide or car accident narratives will produce more favorable ratings than the heart attack description. Of a total sample of 206 participants, final analyses were conducted on 152.

Brittney F. Maunz

Faculty Sponsor: Dr. Joseph Green (Psychology)

Hands on hypnotizability: Does finger length correlate with hypnotic responsiveness?

Digit ratios have been previously associated with several variables including gender, sexual orientation, and some mental illnesses. Specifically, the digit ratio of second to fourth finger (2D:4D) is sexually dimorphic with women having a higher ratio than men. The link between digit ratio and gender may be strongest for the left hand and connections between digit ratio and sex role orientation have been inconsistent (Stefan et al., 2007). Although most studies of hypnotizability fail to find gender differences, when differences do emerge, they show that women tend to score slightly higher than men (see Green & Lynn, 2011). In the present study, we explored whether responsiveness to a standardized measure of hypnotic susceptibility might correlated with either digit ratio or gender role orientation. As part of a larger study on personality correlates of hypnotizability, our study participants completed the Bem Sex Role Inventory, recorded their finger lengths, and then were hypnotized with the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A). The HGSHS:A was administered in a group format via a tape recording that lasted for approximately 40 minutes. We predict that people with higher 2D:4D ratios and people with a more “feminine” gender orientation will score higher on the HGSHS:A. We have examined correlations between our measures from 191 students attending the OSU Lima campus.

Samantha Metzger

Faculty Sponsor: Dr. Fabio Leite (Psychology)

Could highlighting efficiency be tested and aid future training? A follow-up analysis of a study of reading comprehension and dual-color highlighting

Highlighting is a commonly used technique for reading comprehension but is often performed inadequately. Our study was designed to test whether highlighting relevant information that falls under one main idea in one color, and then using another color to highlight relevant information that relates to a separate idea could enhance comprehension of the material. Analysis of the expanded sample of 186 OSU Lima students did not show significant differences in reading comprehension performances between single-color and dual-color highlighting. Considering highlighting efficiency (based on the number of highlighted words contrasted to an ideal rubric), highlighting is most useful for more difficult material, and training students to highlight with two colors would be no more beneficial than training them to highlight with a single color.

Richard J. Smith

Faculty Sponsor: Dr. Fabio Leite (Psychology)

Sex, Fear & Disgust: Attentional Biases Toward Emotional Words

The current study explored attentional biases toward emotional words in recognition memory and lexical decision tasks. Fifty-seven participants completed both tasks, which were comprised of emotion-evoking words (in three categories: sexual, fear, and disgust) and neutral words. Response times and accuracy in each task were compared across the four categories to assess attentional biases toward different categories of emotional words. In the recognition memory task, in which participants were presented mixed lists of neutral and emotional words and asked to decide if words presented in a subsequent list appeared in the first, correct responses to previously studied sexual words were made more slowly than responses to words from all other emotional and neutral categories. Consistent with our hypothesis, responses to sexual words were significantly more accurate than fear-eliciting and neutral words. In the lexical decision task, in which participants were asked to decide whether strings of letters were proper words or not, participants

responded to threatening words (from fear and disgust categories) more quickly than to sexual words. Similarly, disgust-evoking words elicited faster responses than neutral words. Participants responded to fear-eliciting words more accurately than to sexual or neutral words. Overall, the results demonstrate relatively faster responses to threatening words, whereas sexual words appear to trigger slower, more hesitant responses. A broader implication of these findings is that responses to different types of emotional stimuli may stem from different attention and memory mechanisms.

2015 Undergraduate Research and Mentoring Committee

Nicoleta Roman, Chair

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Joseph Green

Professor, Psychology

John Hellmann

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