

2017

Student RESEARCH SYMPOSIUM



Featured Art

"Living Room"

Margaret Parkhurst

Collage with printed paper

TUESDAY, APRIL 11

- 8:30-10:15 a.m.** Poster Session
Learning Commons, Stewart Memorial Library
- 10:30-11:30 a.m.** Distinguished Alumni Lecturer
Kesler Lecture Hall, Hickok Hall
- 11:30-Noon** Recognition Awards Ceremony
Kesler Lecture Hall, Hickok Hall
- Noon-1:00 p.m.** Presenter Lunch (by invitation only)
Clark Alumni House Dining Room
- 1:15-4:15 p.m.** Oral Presentations—Stuart Hall, Marquis Hall,
Kesler Lecture Hall

STUDENT ART EXHIBITS

- April 7-14** **Opening Reception: Friday., April 7, 4:30-6:30 p.m.**
Andy Baird
Amber Brooks
Michael Campos
Olivia Leisinger
Robert Volpe
- April 21-28** **Opening Reception: Friday., April 21, 4:30-6:30 p.m.**
Erin Fuller
Brittney Hauke
Seala Hite
Amy Ketcherside
Margaret Parkhurst

MUSIC EVENTS

- April 8** Festival of Bands: Gala Concert
8:00 p.m. Sinclair Auditorium
- April 9** Festival of Band: Coe College Honor Band & Jazz Band
4:00 p.m. Sinclair Auditorium
- April 18** Student Recital: Laura Gibson & Makayla Kaune
7:00 p.m. Daehler-Kitchin Auditorium
- April 21** Coe College Concert Choir & Symphony Orchestra Concert
7:00 p.m. Sinclair Auditorium
- April 22** Senior Recital: Amanda Huesmann
2:00 p.m. Daehler-Kitchin Auditorium
- April 22** Student Recital: Zoe Tien
7:30 p.m. Daehler-Kitchin Auditorium
- April 23** Senior Recital: Hannah Van Deusen
1:00 p.m. Daehler-Kitchin Auditorium
- April 23** Coe College Chorale & Handbell Concert
4:00 p.m. Daehler-Kitchin Auditorium



COE COLLEGE

To the Coe College Community:

Welcome to the 17th annual Coe College Student Research Symposium! This day is set aside to celebrate the work of our undergraduate scholars in all areas of study. Whether the presentation highlights the creative energy captured in a novel or the in-depth laboratory study of the nature of matter, student work shared today is at the heart of the academic enterprise at Coe. Extending learning and teaching beyond the classroom through close interactions between students and faculty members is one of the highlights of a Coe education, and we encourage you to take advantage of the opportunity to learn about our students' work.

The day begins with a poster session in Coe's Learning Commons where students will present their research in an informal setting. Following the poster session, we are particularly pleased to welcome back a recent alumnus to give students an idea of just how far their Coe education can take them. At 10:30, this year's Distinguished Alumni Speaker, Alvon Reed, will deliver the keynote address – **Afrocentric Movement in Environments of Oppression: The Juke Joint**. Alvon graduated from Coe in 2003 with a B.A. in Spanish, received an M.F.A. in dance from the University of Iowa, and is currently Dance Artist in Residence at Cornell College. Immediately after the keynote, the college will recognize outstanding academic work by undergraduates in the classroom at our annual Award Ceremony. Following lunch, the remainder of the afternoon will be devoted to oral presentations occurring in three concurrent sessions. There is a remarkable range of scholarship represented in the symposium, and we urge to explore as much of it as you can.

Finally, we wish to thank everyone who has made this day possible – the students presenting their work, faculty mentors and facilitators, and particularly Chris Upah and Jenni Archibald for their work in organizing the Symposium.

Enjoy the day!

Paula O'Loughlin
Provost

Marty St. Clair
Associate Dean for Faculty Development

2017 STUDENT SYMPOSIUM SCHEDULE

April 11

POSTER SESSION

8:30-10:15 AM Learning Commons, Stewart Memorial Library

PLENARY TALK

10:35 AM Kesler Auditorium, Hickok Hall

Alvon Reed 2003

Alvon Reed is a recent graduate from the University of Iowa receiving his Master of Fine Arts in Dance with an emphasis in choreography. He graduated from Coe in 2003 with a degree in Spanish. Mr. Reed has performed lead roles with Inland Pacific Ballet, Nevada Ballet Theatre, Opus Dance Theatre, and Jennifer Muller/The Works. He also had the distinct honor of working with renowned post-modern choreographer, Bill T. Jones on the Broadway workshop entitled "*Superfly! The Musical*." He has also performed at the world renowned Apollo Theatre with tap dancing legend, Maurice Hines in a variety show called "Apollo Club Harlem." Alvon has worked as assistant choreographer for *Shrek The Musical* at the Theatre of Cedar Rapids and choreographer for their productions of *The Little Mermaid* and *Sister Act The Musical*. Alvon is currently choreographing TCR's production of *Peter Pan*. Additional choreographic credits include *American Idiot*, his own original musical about juke joint life in post war America titled, *Hattie Mae's Juke Joint* and *Evita* with Revival Theatre Company. Alvon currently works at Cornell College as their Dance Artist-in-Residence

AWARDS CEREMONY

11:35 -Noon PM Kesler Auditorium, Hickok Hall

Lunch for Participants (by invitation only)

12:00 noon – 1:00 PM Clark Alumni House Dining Room

ORAL PRESENTATION SESSIONS 1:15 – 2:30 PM

Session 1: Peterson Hall 119

Dr. Bruce Nesmith, Facilitator

1:15-1:30 **Is Gay Okay?: Evaluating the Challenges in the U.S. Asylum Process for Queer Asylum-Seekers**

Allison Bailey

1:35-1:50 **Researching Factors that Lead to Homelessness in Cedar Rapids**

Alysia Cleppe, Anna Dentlinger, Mari Hunt, Tristan Menachof

1:55-2:10 **Socialization of the Rainbow**

Sarafina Feldman

2:15-2:30 **Utilitarian Arguments for Prison Abolition in Orange Is the New Black**

Thomas Petrino

Session 2: Marquis Hall 201

Dr. Karen Meade, Facilitator

1:15-1:30 The Development and Simulation of Borosilicate Glass Similar in Properties to Water for the Advancement of Radiation Therapy

MaryJane Been

1:35-1:50 Minimal Packings of Double Hexagon Tiles on Pseudo-Rectangular Boards

Bethany Baker

1:55-2:10 Minimal Clues for Unique End View Puzzle Solutions

Anna Marek, Devin Lawson

2:15-2:30 Impact on *Vibrio parahaemolyticus* Biofilm Formation and Architecture when grown in Co-culture with various *Shewanella* species

Kathryn E. Appler

Session 3: Kesler Lecture Hall

Dr. Paula O'Loughlin, Facilitator

1:15-1:30 The Ties that Bind: The Restitution of Art after World War II

Sydney Buckles

1:35-1:50 The Religious Journalist: Orestes Brownson and the Power of the Periodical in the Nineteenth-Century United States

Gibson Dodd Odderstol

1:55-2:10 A Cultural Difference: Business in Japan

Julia Stadeker

2:15-2:30 "Surrender Language" "Ritual, Religion and Transformation"

Nina Wilson

2:40-3:55 p.m.

Session 1: 201 Marquis Hall

Dr. Amber Shaw, Facilitator

2:40-2:55 The construction of African American women's identity in relation to reproductive control, 1855-1918

Lisa McDonald

3:00-3:15 Maternal Memoir: A Women-Centered Family History and Creative Non-Fiction Project

Margaret Parkhurst

3:20-3:35 Perceptions of Women's Rights While Studying Abroad

Ella Remund Wiger

3:40-3:55 Queer Weather, or the Ambivalence of Safe Spaces in Daphne Du Maurier's Jamaica Inn

Marissa Bouska

Session 2: Stuart Hall 405

Ms. Elizabeth Hoover de Galvez, Facilitator

2:40-2:55 **An Examination of NBA Player Contracts**

Alec Strauss

3:00-3:15 **A Mathematical Model of Coral Reef Response to Destructive Fishing Practices with Predator-Prey Interactions**

Myles Bradley

3:20-3:35 **A Study in Food Waste: Dumpster Diving and Cuisine**

Andy Cheng

3:40-3:55 **Effects of video news media on college students' perceptions of transgender individuals**

Alexandria Muldrew

Session 3: Kesler Lecture Hall

Mr. Nicholas Twemlow, Facilitator

2:40-2:55 **Like A Girl, a play by Caitlin Rose**

Caitlin Staff

3:00-3:15 **Scales of Justice**

Caitlin McKendry

3:20-3:35 **Bruxist Unhinged**

Katie Rejsek

3:40-3:55 **Creative Writing Senior Thesis Panel**

Anton Jones

4:00-4:15 **Wingless: The Angel's Shadow**

Aimee Hyndman

Cover art provided by Margaret Parkhurst

ABSTRACTS – POSTER PRESENTATIONS

Sarah Brickson 2019

Lindo Castillo 2018

Faculty Sponsors: Drs. Thomas Moye and NukhetYarbrough

Relationship between beliefs and object perception

Our research examines the relationship between perceptual boundaries and magical ideation (or schizotypal thinking). Perceptual boundaries were assessed using a timed object categorization task and magical thinking was measured using the Magical Ideation Scale (Chapman & Eckblad 1983). This research is part of a larger study analyzing the correlations between perception, need for closure, creativity, and schizotypal thinking.

Qierra Brockman 2018

Faculty Sponsor: Dr. Cassy Cozine

The Effects of Astragalus on Heat Shock Stress Inflammatory Pathways in *Caenorhabditis elegans*

The heat shock protein response (HSP) of *C. elegans*, a major component of the organism's response to stress, is homologous to the HSP response of humans and shares several homologous inflammatory signaling molecules. When thermal stress is applied to *C. elegans*, these homologous stress and inflammatory pathways associated with HSPs are upregulated. Mediating stress responses and inflammatory pathways has a variety of implications; in some instances, inducing or enhancing an inflammatory response may be protective for an organism in terms of innate immunity. In the case of chronic inflammatory conditions, dampening the stress and inflammatory response may improve quality of life and disease progression. *Astragalus membranaceus* is a traditional Chinese herb and has been reported to have various inflammatory and immunoregulatory effects. However, alternative medicine in general has not been well documented in regards to the effects these compounds have on cells and signaling pathways. The work presented aimed to examine the effects of *Astragalus* on the stress and inflammatory pathways of *C. elegans* to further understand the mechanisms that *Astragalus* uses to mediate its reported effects on inflammation. Using a wild-type strain and the HSP16.2 GFP transgenic strain of *C. elegans*, the effects of *Astragalus* at various concentrations with and without heat shock were examined. *Astragalus* appears to increase the transcript levels of several inflammatory and stress response components demonstrating that this homeopathic compound may modulate inflammation and stress response pathways in *C. elegans*.

Leah Brownlee 2018

Faculty Sponsor: Dr. David Lo

NF Kappa B Activation Depends on mTORC1 in Neurons and Endothelial Cells

The mechanistic target of rapamycin (mTOR) complex 1 (mTORC1) and nuclear factor kappa B (NF- κ B) signaling pathways are important for endothelial cell function. In addition, these signaling pathways play an essential role within hypothalamic neurons in controlling energy homeostasis and blood pressure.

Despite the importance of these pathways in various tissues, little is known about whether or how they interact to carry out their downstream effects.

Our results demonstrate that mTOR physically interacts with IKK, and TNF α -mediated NF- κ B activation is inhibited by rapamycin, suggesting that NF- κ B signal transduction is dependent on mTORC1 in both neurons and endothelial cells.

Sierra Bulawa 2018

Teaierra Curry 2017

Kelsey Kornacker 2017

Allison Lacina 2017

Brandon Miller 2018

Wenxia Sweeney 2020

Faculty Sponsor: Dr. Michael Baker

Effects of an extraneous stimulus on sensitization of methamphetamine-induced motor effects in female chicks

Sensitization of the rewarding effects of drugs of abuse is thought to mediate the preference for such drugs over natural reinforcers in addicted individuals. Sensitization has been shown to be context-dependent, reflecting the role of Pavlovian conditioning mediating the increased responsiveness to the drug. Previous conditioned place preference studies demonstrated that introducing an extraneous stimulus disrupted drug-seeking behavior, but in a separate study did not disrupt sensitization in male chicks. Chicks received methamphetamine (0.0 or 1.0 mg/kg) on posthatch days 7-12 and activity was recorded during a 20-minute trial. On the last day, an extraneous stimulus was placed in the test apparatus for half the chicks in each group. Data collection is in progress.

Jancillin Chacko 2017

McKayla Morris 2019

Yareli Hernandez 2018

Faculty Sponsors: Drs. Thomas Moyer and Nukhet Yarbrough

Relationship Between Beliefs and Object Perception

The research we are conducting examines the possible relationship between the psychological construct of “need for closure”, and performance on a categorization task. Participants were assessed using the Need for Closure Scale (NFC), which measures a person’s desire for certain knowledge of the world and aversion for ambiguity. We will correlate scores on the NFC with the width of perceptual boundaries in an object categorization task. We predict that high NFC scores will be negatively correlated with the width of perceptual boundaries.

Madison Clark 2017

Molly Anderson 2018

Xochil Moreno Perez 2019

Faculty Sponsor: Ms. Karla Steffens-Moran

Cultural Competency on Coe's Campus

We will be presenting information about the current need on campus for a cultural competency class to be added to the school curriculum. This will include past research, effects at other colleges, and results of Coe's current level of cultural awareness. We will explain our reasoning based on previous and current research describing the individual and social benefits of having students learn this type of material.

Bailey Dixon 2017

Sonja Peterson

Faculty Sponsors: Drs. Thomas Moye and Nukhet Yarbrough

Perceptual Boundaries, Magical Ideation, and Need for Closure

Our research explores relationships between the width of perceptual boundaries as measured by an object categorization task, magical thinking (including belief in paranormal phenomena) and the psychological trait of "need for closure". Paranormal beliefs were assessed with the Revised Paranormal Belief Scale (R-PBS). Magical ideation was measured using the Magical Ideation Scale (MIS). We also employed the Need for Closure Scale (NFC), which measures the desire for definite knowledge about the world. This research is part of a larger project looking at unconventional thinking and beliefs.

Sean Donaldson 2017

Mari Hunt 2017

Faculty Sponsor: Dr. Brie Swenson Arnold

Identifying African American Civil War Veterans of Iowa

This project's focus was to identify African American Civil War veterans who settled in Iowa in order to discover how the Grand Army of the Republic (GAR)—the largest veterans' organization for Union soldiers—influenced these veterans' experiences. Using numerous records from the military, censuses, newspapers, and veterans' organizations, students developed a database of 600 black Iowans who served in the Civil War. Although the GAR's role remains unanswered, the database and information collected form a crucial foundation that will enable future research of Iowa's African American Civil War veterans because it illuminates a history difficult to uncover—Iowa's rich black history.

Samantha Fitzgerald 2018

Faculty Sponsor: Dr. Maria Dean

Investigating the Assembly of HCN1 using Velocity Sedimentation

Hyperpolarization-activated cyclic nucleotide-gated 1 (HCN1), abundant in the brain and heart of mammals, is a pacemaker protein that is important to the regulation of sodium and potassium ions. Preliminary studies have identified the tetrameric structure of HCN1, but its assembly has yet to be discovered. There is evidence that a retention signal in the molecule may play an integral factor in its assembly and export. A series of experiments using mammalian cell transfection, velocity sedimentation, and Western Blotting were used to investigate the purpose of the motif in HCN1 assembly and export.

Kaitlin Fosler 2017

Faculty Sponsor: Dr. Sara Farrell

Outcomes of Mindfulness-Based Strengths Practice in College Students

This research presents the opportunity to discover the positive effects that mindfulness and strengths use can have on college students. Mindfulness-Based Strengths Practice (MBSP, Niemiec, 2014) is a program that integrates the well-known Mindfulness-Based Stress Reduction program with the VIA Character Strengths model. Previous research has found many positive outcomes associated with mindfulness interventions and strengths-based interventions separately, but little research has investigated interventions that integrate the two. The current study investigates the effect of mindfulness-based strengths practice on self-control, procrastination, implicit theory of intelligence, self-efficacy, goal achievement, satisfaction with life, stress, and experienced mindfulness. College students were assigned to a control group or MBSP intervention group. The intervention group participated in a 5-week abbreviated version of the MBSP program. All participants completed self-report measures of the outcome variables prior to the start of the intervention and at the conclusion of the intervention. Results will be presented showing the impact of the intervention on the outcome measures.

Rhiannan Heikens 2017
Jade Hess 2017
Cody Leach 2018
Alexandria Muldrew 2017
Justin Vink 2017
Alexa Wasicek 2017

Faculty Sponsor: Dr. Michael Baker

External Inhibition of Methamphetamine CPP-mediated Drug-Seeking Behavior in Female Chicks

Previous studies demonstrated external inhibition by an extraneous stimulus of approach behavior toward a drug-paired cue in male chicks. The current study is designed to investigate the same phenomenon in female chicks. The current study is designed to investigate the same phenomenon in female chicks. On posthatch days (PHD) 6-11, chicks received saline paired with a CS- for 15 min followed by methamphetamine, MA, (0.0 or 1.0 mg/kg; ip) & placed with a CS+ for 15 min. On PHD 12, chicks were placed in middle of the open chamber with the CS- and CS+ on opposite sides, an extraneous stimulus (ES) was placed with the CS+ for half the chicks. Time spent near the CS- and CS+ was recorded. Chicks that received MA with the CS+ and no ES spent more time near the CS+ compared to the CS-. Chicks with the ES that received MA with the CS+ spent more time near the CS- compared to chicks not exposed to the ES.

Jeffry Hernandez 2016
Yareli Hernandez 2018
Adrianan Morales 2017
Hanna Reese 2017
Thomas Schakel 2017

Faculty Sponsor: Dr. Michael Baker

Extraneous stimulus does not disrupt sensitization of methamphetamine-induced motor effects in male chicks

Sensitization of the rewarding effects of drugs of abuse is thought to mediate the preference for such drugs over natural reinforcers in addicted individuals. Changing the context by introducing an extraneous stimulus has been shown to weaken conditioned responses. Previous conditioned place preference studies demonstrated that introducing an extraneous stimulus disrupted drug-seeking behavior in chicks. Chicks received methamphetamine (0.0 or 1.0 mg/kg) on posthatch days 8-13 and activity was recorded during a 30-minute trial. On the last day, an extraneous stimulus was placed in the test apparatus for half the chicks in each group. Methamphetamine (MA) significantly increased activity across trials, but there was no significant interaction of MA dose and trials, or effect of the extraneous stimulus.

Madeline G. Jensen 2017

Faculty Sponsor: Dr. Martin St. Clair

An Assessment on the Practicality of Utilizing Lead-acid Batteries to Fabricate Lead-Iodide Perovskite Solar Cells

In order to sustain the environment for future generations, there is much focus on improving renewable energy resources like solar panels. One type of photovoltaic cell– perovskite solar cells– is quickly developing with high efficiencies. Lead is commonly used within perovskite structures, resulting in the need to find a safe, reliable lead source for perovskite fabrication. One proposed lead source is old lead-acid car batteries. The purpose of this study was to test a previously developed procedure that uses lead-acid car batteries to fabricate perovskite solar cells, and to assess the practicality of using this procedure at an industrial level.

Emily Laing 2017

Faculty Sponsors: Drs. Thomas Moyer and Nukhet Yarbrough

Perceptual Category Boundaries and Need for Closure

In the present study we operationally defined tolerance for perceptual ambiguity as the number of ambiguous exemplars selected in a perceptual category width task spanning from a typical member of one category to the typical member of another category. We investigated the relationship between tolerance for perceptual ambiguity and Need for Closure as defined by Kruglanski & Webster (1996). Need for closure is defined as an aversion toward ambiguity and a desire for definite knowledge. We hypothesized an inverse relationship between need for closure and tendency to accept ambiguous items as belonging to a category.

Cody Leach 2018

Ashley Peterson 2017

Megan Peterson 2018

Sonja Peterson 2018

Adriana Morales 2017

Rachel Hunter 2017

Emily Laing 2017

Faculty Sponsor: Dr. Benjamin Tallman

Relaxation Techniques for Patients Completing Elective Orthopedic Procedures

The current pilot study examined the combined effect of two non-pharmacological interventions for patients undergoing an elective total knee or hip replacement surgery. Joint replacement surgeries typically have an 85% patient satisfaction rate which may be impacted by negative factors during treatment, such as pain and anxiety. Patients were randomized to intervention (n=50) and control (n=50) conditions to examine the impact of cognitively-mediated relaxation exercises (e.g., guided imagery and mindfulness meditation) and soft-tissue massage on health related quality of life variables. The poster will discuss outcomes of the study and implications for researchers and clinicians.

Michael Martinez-Szewczyk 2019

Faculty Sponsor: Dr. Ugur Akgun

Radiation Hard Elastomer Scintillators for a New Generation of Particle Detectors

The radiation hardness of specific scintillating materials used in particle physics experiments is one of the main focuses of research in detector development. This report summarizes the preparation methods, light yield characterization and radiation damage tests of a plastic scintillator with a polysiloxane base and pTP and bis-MSB dopants. The scintillator is shown to be a promising candidate for particle detectors with its intense light output around 400 nm and very little light or transmission loss after proton irradiation up to 4×10^5 Gy.

Berlin Mendez 2017

Faculty Sponsor: Dr. Randolph Christensen

“Changes in Brain-Derived Neurotrophic Factor in Non-Regenerating vs. Regenerating Spinal Cord in *Ambystoma mexicanum*”

Previous research by Binder and Scharfman and Novikov et al in 1997 shows that brain-derived neurotrophic factor (BDNF) plays a key role in promoting axonal growth and regeneration. This research examines the potential role of brain-derived neurotrophic factor in regenerating nervous tissue of *Ambystoma mexicanum* (axolotl). Stump tissue of the spinal cord will be compared to the spinal cord blastema. The results were as expected. The concentration of BDNF was significantly higher in the blastema than in the stump spinal cord.

Berlin Mendez 2017

Faculty Sponsor: Dr. Docktycz

Can Lantibiotics Shape the Populus Microbiome?

We hypothesized that lantibiotics have a critical role in shaping the microbiome. In this study, we developed a method to analyze antibiotics produced by bacteria from *Populus* roots using duramycin as a model lantibiotic. We determined selectivity and sensitivity through strain inhibition assays and observed progression of cell destruction by duramycin through a time-course experiment looking at cell morphology with atomic force microscopy (AFM). We functionalized AFM cantilevers with duramycin and gathered adhesion-force measurements between the tip and cell membrane to establish interaction levels between duramycin and bacteria strains. The adhesion-force measurements obtained were consistent with sensitivity levels of bacterial strains to duramycin. Results validate the efficacy of this method to test novel lantibiotics produced by *Populus* bacterial strains to determine the chemical bases for microbiome selection and composition.

Adriana Morales 2017
Claire Tollefsrud 2018

Faculty Sponsor: Dr. Sara Farrell

The Impact of a Positive Psychology Intervention on State Gratitude and Organizational Citizenship Behavior

This study extended prior research evaluating the relationship between state gratitude and organizational citizenship behavior (OCB) by investigating whether participating in a positive psychology intervention ('3 Good Things') would propel participants to participate in more daily OCB and whether this relationship is mediated by state gratitude. All participants were working adults and completed online pretest questionnaires measuring trait gratitude and perceived organizational support. A week later, participants completed a morning diary exercise ("3 Good Things" for experimental participants, "3 Daily Events" for control participants), mid-day assessment of state gratitude, and late-day assessment of OCBs performed that day. Results and implications will be discussed.

Paige Nelson 2019
Delaney Novy 2019

Faculty Sponsors: Drs. Thoms Moye and Nukhet Yarbrough

Relationship Between Creativity and Object Perception

We are looking for a relationship between the level of creativity a person has and object perception. The creativity level in each participant was assessed by the Runco Ideational Behavior Scale (RIBS) which is a 70 item instrument with a 5-point scale ranging from 0 to 5. The RIBS scale is so named because the items listed describe observable behaviors that reflect the individual's use of, appreciation of, and skills with ideas. Object perception was evaluated with an instrument that measures the width of a participant's perceptual boundaries. We predict a positive correlation between our two measures.

Megan Peterson 2018
Ashley Peterson 2017
Cody Leach 2017
Sonja Peterson 2018
Adriana Morales 2017
Rachel Hunter 2017
Emily Laing 2017

Faculty Sponsor: Dr. Benjamin Tallman

Where the rubber meets the road in clinical intervention research: Implementing research results into clinical practice

Implementing clinical intervention research in an applied setting presents a number of challenges for clinicians and researchers. The poster will review the results of combined effect of two non-pharmacological interventions for patients undergoing an elective total knee, hip, or shoulder replacement surgery, and discuss how evidenced-based interventions are can be successfully implemented into various hospital service lines. Some of the barriers of working with large hospital system will be discussed. Additionally, recommendations will be provided regarding clinical practice guidelines and hospital policy issues related to non- non-pharmacological interventions.

Hector Rea 2019
Collin Flynn 2019

Faculty Sponsor: Dr. Steven Feller

CO₂ Retention in Sodium and Potassium Germinate Glasses

Studies of high alkali germinate and silicate glasses were conducted. Using Raman spectroscopy and weight loss checks, we were able to see how an increase in the alkali content of our glasses directly correlated with the amount of carbon retained in the glass.

Sidniann Rummans 2018

Faculty Sponsors: Drs. Michael Baker and Benjamin Tallman

Reducing Premature Infant Stress: Intrauterine Sounds and Maternal Heartbeat as a Music Therapy Intervention

Premature infants will be exposed to “music therapy” in the form of intrauterine sounds to determine whether periods of autonomic instability, as reflected by heart rate variability and oxygen saturation, can be hindered. It is hypothesized that these sounds will serve as a calming and consistent substitute to the intrauterine environment infants are no longer afforded in the hospital. When handled for diagnostic and therapeutic procedures, preterm babies often react negatively, expending energy critical for growth and development. Over time, excessive energy expenditure can lead to physiologic or behavioral instability that can have severe impacts on the central nervous system.

Marina Silva 2017

Faculty Sponsor: Dr. Joyce Janca-Aji

Québécois: Langue et Identité (Language and Identity)

Inquiry of French-Canadian identity in the province of Québec, Canada. Examines the intersections of language and shared history/cultural identity through perspectives in literature, cinema, and the visual arts. A unique Québécois identity emerged from French colonization and remained through subsequent English colonization. In today’s politics Québec sovereignty is sought by Québécois groups formed in the 1960s. Questions guiding research are: “How does a group of people find a sense of belonging?, What obstacles have Quebecers faced throughout recent history?” and “Why do people identify as Québécois?”. Research is collected and presented in an online website format. (French & English text)

Alec Strauss 2017

Faculty Sponsor: Dr. Gavin Cross

An Examination of NBA Player Contracts

In the NBA athletes receive contracts. I have developed many questions pertaining to the contracts of NBA players. Using regression analysis I have developed a model to analyze player contracts, and answer some of my questions.

Zackery Thune 2019

Faculty Sponsor: Dr. Ugur Akgun

High Density Scintillating Glass For A Novel Proton Imaging Detector

High-density scintillating glasses are proposed for a novel proton-imaging device that can improve the accuracy of the hadron therapy. High-density scintillating glasses are needed to build a cost effective, compact calorimeter that can be attached to a gantry. This report summarizes the study on Europium, Terbium, and Cerium-doped scintillating glasses that were developed containing heavy elements such as Lanthanum, Gadolinium, and Tungsten. The density of the samples reach up to 5.9 g/cm^3 , and their 300-600 nm emission overlaps perfectly with the peak cathode sensitivity of the commercial photo detectors. The developed glasses do not require any special quenching and can be poured easily, which makes them a good candidate for various geometries.

Collin Wilkinson 2018

Faculty Sponsor: Dr. Ugur Akgun

A Novel Proton Imager

In recent years, proton therapy has achieved remarkable precision in delivering doses to cancerous cells while avoiding healthy tissue. However, in order to utilize this high precision treatment, greater accuracy in patient positioning is needed. An accepted approximate uncertainty of $\pm 3\%$ exists in the current practice of proton therapy due to conversions between x-ray and proton stopping power. The use of protons in imaging would eliminate this source of error and lessen the radiation exposure of the patient. To this end, this study focuses on developing a novel proton-imaging detector built with high-density glass scintillator.

The model described herein contains a compact homogeneous proton calorimeter composed of scintillating, high-density glass as the active medium. The unique geometry of this detector allows for the measurement of both the position and residual energy of protons, eliminating the need for a separate set of position trackers in the system. Average position and energy of a pencil beam of 106 protons is used to reconstruct the image rather than by analyzing individual proton data. Simplicity and efficiency were major objectives in this model in order to present an imaging technique that is compact, cost-effective, and precise, as well as practical for a clinical setting with pencil-beam scanning proton therapy equipment.

In this work, the high-density glass scintillator and the design of the imager are discussed; a proof-of-principle Monte Carlo simulation study is performed; preliminary two-dimensional images reconstructed from the Geant4 simulation are presented. Finally, the details of the novel glass development for this detector are discussed.

ABSTRACTS – ORAL PRESENTATIONS

Kathryn E. Appler 2017

Faculty Sponsor: Dr. Michael Leonardo

Impact on *Vibrio parahaemolyticus* Biofilm Formation and Architecture when grown in Co-culture with various *Shewanella* species

Biofilm architectures of five *Vibrio parahaemolyticus* strains and eight *Shewanella* strains were examined in monoculture and with different co-culture pairings. Biofilms grown on submerged coverslips were visualized using confocal microscopy.

Further studies were conducted on the potentially synergistic relationship between FDA and CN-32 biofilms when grown in co-culture. These studies included FDA grown with supernatant from a CN-32 culture or with phenol chloroform extracted polysaccharides of CN-32. Both experiments led to an increase in FDA biofilm thickness. Thus, we observe striking beneficial and harmful interactions between genera known to share natural ecological niches and future work will explore these interactions.

Allison Bailey 2017

Faculty Sponsor: Dr. Bruce Nesmith

Is Gay Okay?: Evaluating the Challenges in the U.S. Asylum Process for Queer Asylum-Seekers

The purpose of this paper is to find what distinct challenges the queer community faces when applying for asylum and what the possible solutions are for these challenges. My analysis of the possible challenges and solutions for queer asylum-seekers in the United States is broken down into three lenses: the asylum process, the history of immigration and asylum in the United States, and the comparison of the United States' asylum process with the United Kingdom and Canada.

Bethany Baker 2017

Faculty Sponsor: Dr. Jonathan White

Minimal Packings of Double Hexagon Tiles on Pseudo-Rectangular Boards

A packing is a tiling of a board such that there are no overlapping tiles and another tile cannot be placed. We examine minimal packings of double hexagon tiles on pseudo-rectangular boards and establish the smallest number of double hexagon tiles needed for a minimal packing of finite boards.

MaryJane Been 2019

Faculty Sponsor: Dr. Ugur Akgun

The Development and Simulation of Borosilicate Glass Similar in Properties to Water for the Advancement of Radiation Therapy

Current dosimeters in radiation therapy are ion chambers, radiographic films, and thermoluminescence detectors. These methods only provide point dose or 2-D information. We propose developing a water equivalent glass for a 3-D and radiation hard alternative. With this glass, the accuracy of verification will be improved and the dose depth distribution will be given. A similar packing fraction and electron density are needed to have a similar energy deposition to water. Using the calculated electron densities of borosilicate glasses and following in the work of Feller et al on packing fractions, a wide range of possible compositions were determined.

Marissa Bouska 2017

Faculty Sponsor: Drs. Audrey Golden and Joyce Janca-Aji

Queer Weather, or the Ambivalence of Safe Spaces in Daphne Du Maurier's Jamaica Inn

For my thesis, I revisit Du Maurier and her ties to Cornwall, because no one has before considered Cornwall and literature in terms of safe spaces and queer theory, but Jamaica Inn shows how Cornwall can be that kind of space, but may not be enough for those who are marginalized to thrive.

Myles Bradley 2018

Faculty Sponsor: Dr. Jonathan White

A Mathematical Model of Coral Reef Response to Destructive Fishing Practices with Predator-Prey Interactions

Blast and cyanide fishing degrade coral reefs and deplete reef fish that keep coral predators in check. We focus on the corallivore Crown-of-thorns starfish (CoTS), and its overfished predator, the Humphead wrasse. We build a system of differential equations to model the interactions between coral, wrasse, and CoTS biomasses within the Indonesian province of Raja Ampat. We consider coral damage that comes from constant-effort wrasse harvesting. We conduct numerical simulations and sensitivity analyses on key parameters. We hope to provide insight on the extent to which the coral reefs of Raja Ampat can hold up to rising fishing pressure.

Sydney Buckles 2017

Faculty Sponsor: Dr. Andrea Kann

The Ties that Bind: The Restitution of Art after World War II

World War II ended over seventy years ago, yet the restitution of artwork plundered by Hitler is still a hot topic in the news. My project identifies three main phases of art restitution after World War II, connecting the “life histories” of artworks to the families that lost them. When the life history or provenance of a work is lost, the original owner’s physical and emotional ties to the art become severed. My research, like restitution itself, attempts to heal these scars by bringing back the memories and personal connections for the families through stories about the art.

Andy Cheng 2017

Faculty Sponsor: Drs. Allison Carr and Jane Nesmith

A Study in Food Waste: Dumpster Diving and Cuisine

This study explores food waste, a mostly-unconsidered problem that should be considered more. This layered account combines argumentative research, personal narrative, and an autoethnographic study of dumpster diving. Over \$165 billion worth of food is wasted each year; that's over 40% of food produced in the United States. Food waste is also problematic for the environment; wasted food produces methane and accelerates climate change. This research addresses the importance of addressing and reducing food waste, highlighted through dumpster diving activities to display the massive amounts of wasted food and to prove that food does not adhere to sell-by dates.

Alysia Cleppe 2019

Anna Dentlinger 2018

Mari Hunt 2017

Tristan Menachof 2017

Faculty Sponsor: Dr. Julie Fairbanks

Researching Factors that Lead to Homelessness in Cedar Rapids

Students in the Ethnographic Methods class within Coe's Anthropology Program partnered with the Willis Dady Emergency Shelter (WDES) in the fall of 2016 to lay the groundwork for future research on factors contributing to homelessness. The class developed a questionnaire and then conducted focus groups at the shelter to evaluate and refine it. The overall goal of the research was to help prevent homelessness, and the final version of the questionnaire was made available to WDES for its use.

Sarafina Feldman 2017

Faculty Sponsor: Dr. Emily Bowman

Socialization of the Rainbow

This research looks into the socialization practices of the Rainbow Family of Living Light. The data is collected from literature, observations, and interviews conducted while in attendance at the 2016 National Gathering. I found the Rainbow Family's socialization practices foundation originates from their chosen family structure causing a sense of extended family and communal responsibility, specifically for. This foundation is expressed as "it takes a village to raise a child" (African Proverb). From this I was able to then derive similar values of individuality, adaptability, diversity, and family and ideologies of minimalism and their concept of a collective consciousness.

Aimee Hyndman 2017

Faculty Sponsor: Mr. Nicholas Twemlow

Wingless: The Angel's Shadow

Panel on the Fantasy manuscript I have been working on this year, concerning the worldbuilding, writing and editing process.

Anton Jones 2017

Faculty Sponsor: Mr. Nicholas Twemlow

Creative Writing Senior Thesis Panel

A group of creative writing students will be presenting their senior thesis manuscript. Mine will be about a misanthropic character trying to gain free will through being completely unpredictable.

Anna Marek 2018**Devin Lawson 2019**

Faculty Sponsor: Dr. Jonathan White

Minimal Clues for Unique End View Puzzle Solutions

End view puzzles are empty $n \times n$ boards with m clues of an alphabet of size p around the border. End View puzzles are solved when each row and column of the board is filled with a single instance of each element of the board's alphabet. When looking in from a clue on the outside of the board, the first letter seen in that row or column must be that clue. We discovered and named different strategies for solving. Additionally, we examined the minimal clues necessary for unique solutions of different sized boards and boards with no unique solutions.

Lisa McDonald 2017

Faculty Sponsors: Drs. Theresa Donofrio and Patrick Naick

The construction of African American women's identity in relation to reproductive control, 1855-1918

The history of reproductive control has traditionally been told through the eyes of the white female, without accounting for the specific challenges African American women faced due to the intersectionality of their race and gender. This thesis works to fill this void by analyzing the construction of African American women's identity prior to the 1920s that shaped African American women into the individuals who participated in the later women's clubs and eugenics movement. This analysis will consider constructions done by white women, African American men, and African American women.

Caitlin McKendry 2017

Faculty Sponsor: Mr. Nicholas Twemlow

Scales of Justice

A full length play about a man, John, who, after an accident, is given three trials by the Egyptian and Greek Gods to determine the weight of his soul. As he is tested, the questions of right verse wrong and second chances come to light. The Gods start to learn more about human life and themselves while John tries to determine what kind of person he is.

Alexandria Muldrew 2017

Faculty Sponsor: Drs. Daniel Lehn and Thomas Moye

Effects of video news media on college students' perceptions of transgender individuals

Through using the internet, imagination, mutual friendships, and more, researchers have shown how indirect contact can reduce prejudice between groups. The present study intends to show the potential video news media has in becoming a new medium for indirect contact. College students watched a news video either supporting or opposing transgender bathroom laws. Compared to the control group, participants in both conditions were significantly less prejudiced against transgender individuals. Findings from this study support video news media as a form of indirect contact, and the potential of this medium in future research is discussed.

Gibson Dodd Odderstol 2017

Faculty Sponsor: Dr. Meira Kensky

The Religious Journalist: Orestes Brownson and the Power of the Periodical in the Nineteenth-Century United States

This project argues that the periodical was an effective and important medium for the discussion of theological and philosophical matters in the United States throughout the Antebellum period and the Civil War. The amount of periodical literature produced in this time frame is vast. As such, this project primarily examines the work of Orestes Brownson as a case study in his two periodicals, the Boston Quarterly Review and Brownson's Quarterly Review, which were published (with periods of interruption) between 1843 and 1878.

Margaret Parkhurst 2017

Faculty Sponsor: Dr. Allison Carr

Maternal Memoir: A Women-Centered Family History and Creative Non-Fiction Project

This project looks at the way women's lives have changed in the past four generations, using anecdotal evidence from the author's own family members. Women's lives are ripe for examination and women's stories are legitimate sources of knowledge, the theory of conversational partners and interviewing as a form of acquiring knowledge were instrumental to this project. By asking questions of living female relatives, the author has attempted to shed a light on family stories that are less often recited, and to understand more about the creative power women hold in families and in homes.

Thomas Petrino 2017

Faculty Sponsor: Dr. Kimberly Lanegran

Utilitarian Arguments for Prison Abolition in Orange Is the New Black

Orange Is the New Black (OITNB), Netflix's most popular program, makes a consistent utilitarian argument for the abolition of prisons. Features of OITNB such as its title sequence place the show in agreement with the prison abolitionist Angela Davis. The show simultaneously rejects potential justifications for punishment—deterrence, retribution, and rehabilitation—by depicting punishment as useful to neither punisher nor punished. Characters are often forced to choose between equally undesirable options, which mirrors the false choice about prison reform facing viewers. While excluded from mainstream discourse, prison abolition is an option for states—a preferable option, according to OITNB.

Katie Rejsek 2017

Faculty Sponsor: Dr. Nicholas Twemlow

Bruxist Unhinged

Bruxist Unhinged is a jaw-clenching collection of poetry reflecting on a fluctuating state of emotion throughout daily life. From a poem about a house centipede that will grind your teeth to the gums, to a poem about living on the moon that will finally release that jaw tension, Bruxist Unhinged aims to flex and relax every imaginative muscle possible.

Ella Remund Wiger 2017

Faculty Sponsor: Dr. Joyce Janca-Aji

Perceptions of Women's Rights While Studying Abroad

I am having current Coe students who have returned from studying abroad fill out a survey asking about their experiences and their knowledge of women's roles and rights in their host country. I am not interested in analysis of women's rights in the host country, simply in how aware students were of women's rights and differences in gender norms while abroad.

Julia Stadeker 2018

Faculty Sponsor: Dr. John Chaimov

A Cultural Difference: Business in Japan

Asia has been and continues to be crucial to the global market. Japan is particularly interesting because in 2009, the small island was projected to be the second largest contributor to the world's economy welfare due to their substantial GDP growth rate. However, since the Japan earthquake and tsunami in 2011 and another in early 2016, their growth has subsided. Even so, Japan's product advancements are globally superior to many developed countries--some even argue with that Japan's business operations more efficient than the US. What factor (political, social, or otherwise) does Japan have that no other country seem to have?

Caitlin R Staff 2017

Faculty Sponsor: Mr. Nicholas Twemlow

Like A Girl, a play by Caitlin Rose

Like A Girl is a full-length dark comedy written by Caitlin Rose. It is the story of two sisters who share uniquely female experiences despite being very different people. Like A Girl explores the societal expectations for women, the differences between females and males, and the physical challenges women learn to live with.

Alec Strauss 2017

Faculty Sponsor: Dr. Gavin Cross

An Examination of NBA Player Contracts

In the NBA athletes receive contracts. I have developed many questions pertaining to the contracts of NBA players. Using regression analysis I have developed a model to analyze player contracts, and answer some of my questions.

Nina Wilson 2-17

Faculty Sponsors: Mr. Gordon Mennenga and Dr. Angela Ziskowski

"Surrender Language" "Ritual, Religion and Transformation"

"Surrender Language" is a completed 58,000 word novel produced for my senior thesis in Creative Writing. It is about an aging history professor with Parkinson's disease who is forced into retirement and befriends a student of his.

"Ritual, Religion and Transformation" is the title for my thesis for the history degree I will complete in May. It concerns the ritualistic actions taken by a Danish invader named Ivarr in the conquering of England, and how those actions shaped the post-Danelaw culture in England.

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