



Elis Madsen (2019)
Algae Leaf
Monoprint on vellum paper

Coe College

2019 Student Research Symposium

Tuesday, April 16th, 2019

SCHEDULE OF EVENTS

9:00 - 10:30 AM Poster Session | Learning Commons, Stewart Memorial Library

10:30 - 11:30 AM Distinguished Alumni Speaker | **Kristie Dotson '96** | "Boredom and Beginnings: A Story from a Coe College Alum"| Perrine Gallery, Stewart Memorial Library

1:00 - 2:15 PM Presentation Session 1 | Multiple Locations

2:30 - 3:45 PM Presentation Session 2) | Multiple Locations



To the Coe College Community,

Welcome to the 19th 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. Our students have devoted a great deal of time and energy toward these presentations, and having members of the college community there to support and ask questions is very meaningful for them.

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 an alumna to give students an idea of just how far their Coe education can take them. At 10:30 a.m., this year's Distinguished Alumni Kristie Dotson, "Boredom and Beginnings: A Story from a Coe College Alum Kristie graduated from Coe in 1996 with a B.A. in African American Studies, Business Administration, and English Literature. She went on to earn a MA in Literature from the University of Illinois at Chicago (1999), and a M.A. (2005) and Ph.D. (2008) in Philosophy from the University of Memphis.

The remainder of the afternoon will be devoted to oral presentations occurring in two sessions of five concurrent panels. There is a remarkable range of scholarship represented in the symposium, and we urge you 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 Kim Lanegran, Marc Falk and Crystal Triplett in the Learning Commons for their work in organizing the Symposium. A special word of heartfelt thanks goes to Coe College Trustee Dave Mehaffy (Class of 1976) for his generous sponsorship of this event. Enjoy the day!



Paula O'Loughlin
Provost

POSTER PRESENTATIONS
9:00 AM - 10:30 AM
Learning Commons
Stewart Memorial Library

Alire, Larrisa (2020) Faculty Sponsor, Neal McNabb. **“Violence Against Women in South Africa.”**

My poster examines violence against women in South Africa through a comparative justice lens. Data is taken from the United Nations, International victim surveys and various academic journals along with police data. The poster then wraps up with several proposals as to how to combat violence against women in South Africa.

Bishop, Isabel (2019) Faculty Sponsor, Steve Feller. **“Glass Stability Parameters of Alkali Borate Glasses.”**

This study is an expanded look at different alkali borate glasses and trends of their glass forming ability at different compositions. An initial study was conducted by Coe College and The Federal University of Sao Carlos, Brazil, in 2011. The initial study applied a series of parameters to describe the stability of lithium borate glasses. Our research expands on those findings by examining these stability parameters in other alkali-borate glass systems.

Bordwell, James (2021), Kristjan Nixon (2020), Kei Yoshida (2020) Faculty Sponsor, Benjamin Chihak. **“Simple Models of Movement Coordination Account for Mere Fractions of Road-Crossing Behavior.”**

The CDC reports that annually nearly 135,000 pedestrians are killed or severely injured in traffic crashes. To reduce the frequency and severity of these crashes we must first understand how pedestrians coordinate the task of crossing a busy intersection. Previous research has proposed different movement-coordination strategies that may be used for gap-interception (e.g. the constant-bearing angle strategy). In this study, we sought to further test these strategies. Thirty-six subjects navigated through gaps in bicycle traffic within a virtual environment. Results suggest distinct movement patterns along the approach which are not accounted for with simplistic models of movement control.

Clark, Griffin (2020), Fratony Jeremy Lewis (2021), Nadine Qadoura (2022), Keenan Lee (2019) Faculty Sponsors, Sarah Farrell and Sam Brown. **“Workplace Transitions Study.”**

Previous literature indicates that self-compassion can be used as an intervention tool to cope with traumatic events and mediate negative emotions, like depression and anxiety. Self-compassion is defined

by three components: mindfulness, common humanity, and self-kindness. Our study investigates how self-compassion affects workplace transitions, correlates with goal orientation, conformity to masculine norms, and affective workplace commitment. Recent alumni of Coe College completed an online survey measuring their self-compassion. Data suggested that self-compassion was negatively related to conformity to masculine norms, and positively correlated with learning goal orientation, and has a slightly positive relationship with affective workplace commitment.

Davis, Sabrina (2019) Faculty Sponsor, Megan McCarty.. **“The Potential Bias Against Non-Binary Individuals in Helping Situations.”**

We expect that gender non-binary individuals will receive less positivity in helping situations than their binary counterparts. To test this, we conducted an audit study, where first authors of psychology articles were asked to send their papers to a fictional student, Riley, whose gender was manipulated through email signatures.

Ernzen, Erica (2020), SaCora Fisher Faculty Sponsor, Renee Penalver **“Did you hear that? The Effects of Word Frequency and Incidental Learning on Internal-external Source Monitoring.”**

Source memory is memory for the context in which a particular target item was learned. The source-monitoring framework is the leading model of source memory (Johnson, Hashtroudi, & Lindsay, 1993). An experiment on internal-external source monitoring systematically examined how word frequency and incidental learning affected source memory. Data collection is still underway. Results will be discussed in terms of the source-monitoring framework.

Fields, Dante (2021), Gagandeep Singh (2020) Faculty Sponsor, Ben Chihak. **“Intersection Approach and Traffic-Crossing Behavior in a Virtual Environment.”**

Safe navigation through the environment requires people to successfully interact with objects in the world around them. Previous studies have found that subjects consistently employ different strategies when approaching and crossing intersections. These strategies include both collision avoidance and constant bearing angle models. In the current study, subjects were placed at a virtual intersection and asked to cross between two sets of bicycles on a path. Results indicate that participants are employing three distinct strategies in their approach to the intersection, none of which can be explained by a simplistic control model such as CBA.

Franke, Mareena (2019) Faculty Sponsor, Ugur Akgun. **“Catalytic Surface Science: Ammonia Oxidation.”**

The exploding flask demonstration with methanol is a common way to illustrate heterogeneous catalysis in the classroom. The reactivity of different d-block metals was examined for this demonstration with ammonia. Although there were no mini-explosions in the standard set-up, the Rh, Pd, Ir, and Pt wires continued to glow indicating an exothermic reaction. The products were then analyzed using infrared

spectroscopy and mass spectrometry. For the metals tested, N₂ was the major product, and some N₂O was also produced. The Pt and Rh wires also produced a minimal amount of NO. As the percent of oxygen in the airflow was increased, more oxidation products were formed. In addition, the cause of the explosions was determined to be the build up of H₂ reaching the explosion limit.

Gayer, Dylan (2022), Logan Rockwell (2022), Ian Slagle (2022) Faculty Sponsor, Stephen Hughes. **“How We Learned to Stop Worrying and Love the Bots.”**

Swarm robotics can be utilized to enhance various fields: search and rescue, space exploration, etc. These situations have constraints, such as bandwidth, computation, and capital, and must be optimized accordingly. This swarm uses leftover materials, such as hobbyist microcontrollers, off the shelf ultrasound sensors, etc., to map new environments. The Arduino on each robot sends data through MQTT, a low bandwidth, small code footprint protocol, to a C# program, through a MQTT to C# library that was created for this project, that plots the data, then calculates the optimal scan location, sending that location to the robot to scan again.

Hedlund, Marissa (2019) Faculty Sponsor, Martin St. Clair, **“Assessment of Volatile Organic Compounds and Toxic Metals in Locally-Produced E-Cigarette Liquid.”**

E-cigarette liquid products produced and sold in Cedar Rapids have been analyzed for specific, harmful volatile organic compounds and toxic metals using analytical techniques. Annual exposure levels for the average consumer, health, and regulatory implications are discussed.

Houle, Megan (2019) Faculty Sponsor, Paul Storer. **“Estrogen modulates glutamate uptake by cultured astrocytes.”**

During brain injury, the neurotransmitter glutamate can be released in toxic levels by resident cells. Astrocytes, glial cells which maintain a stable extracellular environment, remove excess glutamate from the surrounding environment via the glutamate transporters GLT-1 and GLAST. Furthermore, the enzyme glutamine synthetase (GS) in these astrocytes converts cleared glutamate into the non-toxic metabolite glutamine. There is evidence that estrogen plays a neuroprotective role in the brain, perhaps by enhancing this glutamate uptake process. This study used the C6 astrocyte cell line to explore the ability of beta-estradiol to increase the expression of glutamate transporters and consequently the clearance of glutamate from the cellular environment.

JadKarim, Luzan (2020) Faculty Sponsor, Cassy Cozine. **“The Specialization Pathway of Cardiomyocytes in Obese Mice vs Normal Mice in Sap130 Gene and pcdha Gene Mutation.”**

HLHS shows penetrance in offspring with a combination of homozygous Sap130 gene and Pcdha9 gene mutations. We believe that this combination of mutations is more common in the fetuses of obese mothers (BMI of 30 or above). This means that obese heterozygous mothers are more likely to pass on the mutated form of the two genes causing HLHS to their child than mothers with lower BMI.

McAdam, Laura (2020) Faculty Sponsor, John Chaimov. **“Landscapes of Fear Photography Exhibit.”**

During their reign of terror the Nazis established over 42,000 camps throughout Europe. While we will never fully comprehend what occurred at each of these camps, visiting them helps give one a glimpse into their fear, pain, and loss. Just as each person who walked through those gates was unique, so were the prisons that housed them. Here you see pictured the concentration camps of Sachsenhausen (Berlin), Dachau (Munich), and Terezin (Prague); along with the extermination camp Auschwitz-Birkenau (Krakow). Though I've walked where they had previously tread, I will never fathom what it was like in their shoes.

McCormick, Mary (2020) Faculty Sponsor, Cassy Cozine. “**Effects of Curcumin on the Stress and Inflammatory Pathways of *C. elegans*.**”

Curcumin, an active component of turmeric, has been reported to impact inflammation and the immune system. Using *C. elegans* as a model organism, we examined the effects of curcumin on the lifespan, reactive oxygen species production, and inflammatory transcript modulation. We found that curcumin may alter reactive oxygen species production and transcript expression after exposure to the pathogenic microbe *P. aeruginosa*.

Meshach, McCoy (2020) Faculty Sponsor, Jesse Ellis. “**Using Daytime Song Characters to Assess Identity of Night Singers in Ovenbirds (*Seiurus aurocapillus*) at the Wilderness Field Station.**”

Ovenbirds are a species of warblers native to much of the eastern and central United States. They have two different vocalizations: songs and flight songs. These vocalizations were recorded from a sample of 10 ovenbirds at the Coe College Wilderness Field Station. Recorded songs were analyzed for distinctiveness by comparing the songs of known individuals with the flight songs of unknown individuals. The results of this analysis can be used to determine individual distinctiveness in ovenbirds and get an overall better understanding of flight songs.

Mefferd, Mallory (2020) Faculty Sponsor, Paul Storer. “**Antihistamines Modulate the Inflammatory Activity of Cultured Microglia.**”

Multiple sclerosis (MS) is a neuroimmunological disorder, distinguished by the loss of myelin-producing oligodendrocytes and axonal damage in the central nervous system. Microglia are of key interest in the pathogenesis of MS. Notably, microglia are understood to respond to histamine, a biogenic amine that modulates the innate immune response via the H1 receptor. Through treating microglia with the H1 antagonist/antihistamine Clemastine (found in Tavist-D), we were able to examine the potential role that these factors have on the microglial immune response. This study supports the role of antihistamines as a potential therapeutic for MS.

Olson, Alyssa (2019), Isabel Kees (2019), Qiuyang Zhang, (2020), Kasumi Rupert (2021) Faculty Sponsor, Maria Dean. “Study of HCN1 Assembly using Blue Native PAGE.”

Hyperpolarization-activated cyclic nucleotide-gated (HCN) protein channels are critical to pacemaker cells in controlling rhythmic activity. HCN1 is abundant in the eye, brain, and heart—with malfunctions associated with epilepsy, depression, and chronic heart failure. To investigate the assembly process, Blue Native polyacrylamide gel electrophoresis (PAGE) was used to monitor the fluorescently tagged protein found in wild type (WT) and mutated (RXR) HCN1 expressed in HEK-293 and COS-7 cell lines. Initial findings support dimer and tetramer formation in the mutant versus tetramer formation in the WT.

Pashas, Elena (2020), Anita Wong (2019) Faculty Sponsor, Megan McCarty. “Stereotypes of Gender Non-Binary Individuals.”

There is very little research about gender non-binary individuals, an umbrella term used to describe people who do not identify as exclusively male or exclusively female (e.g., agender, gender fluid). An important first step to understanding the biases non-binary individuals face is to investigate the stereotypes people have about them. Participants in an online survey indicated in an open response format their personal stereotypes of gender non-binary individuals. These qualitative responses were grouped into overarching categories. We conducted exploratory analyses to determine if these categories (e.g., sensitive, agentic) are related to participant demographic factors such as age and gender.

Pakhomenko, Evgeny (2019) Faculty Sponsor, Steve Feller. “Physical Properties of Amorphous Tellurium Dioxide

Unlike traditional glass formers, such as silica and boron, pure tellurium dioxide (TeO_2) does not easily become amorphous. It is known as a conditional glass former. Over the past few years amorphous TeO_2 has been produced using three methods: roller quenching, laser levitation, and most recently rapidly cooling a platinum crucible with small amounts (less than four grams) of molten TeO_2 , which was first observed by Tagiara et al. The resulting clear, dark green, grey, light green, and yellow glasses were subjected to physical property and spectroscopic analysis. In this poster we report on the physical properties of pure tellurium dioxide glasses. The physical properties examined were the glass transition (T_g) and crystallization (T_x) temperatures, glass color, and nanoparticle contamination.

Rausch, Allie (2019), Hayley Walton (2019), Wenxia Sweeney (2019), Paige Nelson (2019) Faculty Sponsor, Benjamin Tallman. **“Changing the Way We Assess and Treat Pain: A Cultural Shift.”**

Research suggests that the numerical rating scale does not allow for the objective assessment of pain. A pilot study is in development to implement an objective pain assessment tool for healthcare providers to use with patients on inpatient hospital units. An educational curriculum to train nurses and patient care technicians to assess and treat pain from a biopsychosocial perspective is in development. Results of the pilot study will be used to determine the feasibility and effectiveness of implementing the educational curriculum, including the FPS-HV, across all units in the hospital.

Rethwisch, Rachel (2020) Faculty Sponsor, David Lo. **“Rapamycin Inhibits Inflammatory Responses in Cultured Glial Cells: Implications for the Development of Obesity.”**

Hypothalamic inflammation is a major contributor to the pathogenesis of obesity. Recent studies have identified the nuclear factor kappa B (NF- κ B) inflammatory signaling pathway within hypothalamic glial cells, microglial and astrocytes in particular, as a critical mediator of metabolic dysregulation and obesity susceptibility. Rapamycin was previously shown to inhibit NF- κ B signal transduction in neurons stimulated with tumor necrosis factor alpha (TNF α), revealing a novel connection between the mammalian target of rapamycin (mTOR) and NF- κ B pathways. By investigating the connection between the NF- κ B and mTOR pathways in astrocytes and microglia, the current study seeks to better understand the molecular pathways that regulate the control of energy homeostasis under conditions of dietary excess.

Richardson, Jessica (2019) Faculty Sponsor, John Chaimov. **“My Adventures in Korea.”**

This slideshow depicts my experiences while studying abroad in South Korea.

Schaeffer, Kim (2019), Jaclyn Pecille (2019), Becca Magolan (2019), Anita Wong (2019), Erica Coxhead (2019), Natalie Zutter (2019) Faculty Sponsor, Scout Kelly. **“The Role of Exercise Procrastination in Daily Physical Activity Choices.”**

Exercise procrastination (delaying exercise) may affect overall physical activity (PA), but little is known about this relationship. In the present study, we examined whether exercise procrastination predicts larger discrepancies between people’s daily intended PA and actual PA. Participants complete baseline surveys, then for a week, wear an accelerometer and complete daily diaries to record current-day PA and next-day intentions. Data collection is ongoing, but we plan to present preliminary results. If our hypothesis is supported, we will have evidence that our Exercise Procrastination Scale is valid and have a better understanding of its role in daily PA choices.

Scott, Kenzie (2020) Faculty Sponsor, Michael Leonardo. **“Manipulation of the scrABC Operon and Defects in S Signal Production in Vibrio Parahaemolyticus.”**

The swarming phenotype is handled by the lateral flagella, which use "twitching" motility of many Type IV pili on the surface of the bacterial cell. In *Vibrio parahaemolyticus*, the swarming phenotype is induced by the expression and release of a small polypeptide called the "S" signal. This signal and control of its genetic response is modulated by the scrABC operon. Mutants with defects in any of these three genes lose their ability to induce the swarming phenotype. Cell-free supernatants from cultures expressing scrA can complement the mutants lacking the gene, as the S signal is found in the culture medium and can induce the system. In these experiments, S signal production was increased by introducing a plasmid with an inducible scrA gene to *V. parahaemolyticus*. This strain was used to prepare different cell-free supernatants with differing concentrations of S signal. These supernatants were then used to observe if they could activate *V. parahaemolyticus* cells, which are defective in scrA, into the swarming phenotype.

Simko, Shawn (2021), Gabriel Ademoski (2020), Zackery Thune (2019) Faculty Sponsor, Ugur Akgun. **“A Glass Based Neutron Detector with Machine Learning Capabilities.”**

Detecting neutrons above background levels indicates nuclear materials, creating significant applications for handheld neutron detectors in homeland security. Borosilicate scintillating glass samples enriched with boron-10 and lithium-6 were engineered to optimize detector performance using europium and terbium scintillation agents. Scintillation properties and neutron/gamma detection capabilities of the glasses were tested. The detector was simulated in Geant4. With simulated data, an Artificial Neural Network (ANN) predicted the source location. The handheld neutron detector design with an ANN implemented can achieve 99.8% accuracy in neutron/gamma discrimination, 0.537% error on source distance, 3.91% error on phi, and 2.03% error on theta.

Sweeney, Wenxia (2019), Hayley Walton (2019), Allie Rausch (2019) Faculty Sponsor, Benjamin Tallman. **“The Future of Healthcare: Assessing Nurses' Perceptions of Utilizing Innovative Technology on Hospital Units.”**

There is a lack of research examining healthcare providers' perceptions of utilizing technology with patients. At St. Luke's Hospital an educational curriculum is being developed to educate nurses and patient care technicians regarding the effectiveness and utility of using VR. In order to better understand how to integrate technology into St. Luke's system, we have developed a questionnaire that will help us to better understand how providers use technology in daily life.

Talal Khan, Muhammad (2021), Ashim Neupane (2021) Faculty Sponsor, Brittney Miller. **“Minimal Edge-Disjoint Domino Packings on Rectangular Grids.”**

A genetic algorithm is a search heuristic that is inspired by Charles Darwin’s theory of natural evolution. This algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction to produce offspring of the next generation. For our research, we employed a Genetic Algorithm to find minimal edge-disjoint domino packings on rectangular grids. We started off with random sample grids that we mutated for N generations until optimal results were achieved. Scatter lines were plotted to predict the packing numbers and establish linkage with the packings we already had.

Varney, Gabriel (2020) Faculty Sponsor, Ugur Akgun. **“Use of Machine Learning in Proton Imaging.”**

CARNA, a compact high-density scintillating glass calorimeter, can be used as a proton imaging device. Its unique geometry allows for the measurements of the position and residual energy of pencil beams of protons, without trackers. Using protons for imaging will eliminate the errors due to the conversion tables. This report highlights the successful application of machine learning in image reconstruction by using the Geant4 simulated proton CT scans with CARNA. We utilized both Artificial and Convolved Neural Network methods for machine learning, and used various fundamental shapes to train the Artificial Intelligence to predict the tumor shape.

Walton, Hayley (2019), Allie Rausch (2019), Wenxia Sweeney (2019), Paige Nelson (2019) Faculty Sponsor, Benjamin Tallman. **“Nurses’ Perceptions and Attitudes Towards the Management of Patients’ Pain.”**

Research suggests that nurses experience barriers related to the assessment and treatment of patients’ pain. The current study examined the perceptions of nurses regarding barriers to pain assessment, documentation, and treatments in a midwestern hospital system. A questionnaire was sent to nurses working in hospital units (N=111) and regional clinics (N=29). The results of the current study will be used to create an educational program that will be developed and administered to allied health professionals to increase awareness of assessing and managing pain from a more holistic perspective.

Wong, Anita (2019), Erica Coxhead, (2019), Becca Magolan (2019), Natalie Zutter (2019) Faculty Sponsor, Scout Kelly. **“Keeping Up With Yesterday: Daily Experiences of Exercise Procrastination.”**

Exercise procrastination (i.e., choosing to put off intended exercise to a later time) is associated with lower overall moderate and vigorous physical activity (Kelly & Walton, in prep), but it is unclear how this occurs (Kroese & de Ridder, 2016). We developed a study to examine the relationship between Exercise Procrastination and daily physical activity choices, specifically, the discrepancy between a person’s daily intended and actual physical activity. We assessed this hypothesis with a weeklong daily diary study in which participants wore an ActiGraph accelerometer. Data collection is ongoing; we will present methodology and plans for data analysis.

Yin, Danqi (2021) Faculty Sponsor, Brittany Miller. **“Classifying Polynomial Solutions For a Functional Equation.”**

The research aims to investigate solutions of the functional equation $U(z)f(z) + zU'(z)f(U(z)) = 0$. For particular linear fractional maps $U(z)$, we checked different types of functions for f (polynomials) to see whether they solved the functional equation or not. In some scenarios, we have classified the solutions or have shown a class of functions that are not solutions.

DISTINGUISHED ALUMNI SPEAKER
10:30 - 11:30 AM Perrine Gallery
Stewart Memorial Library

Kristie Dotson '96 Kristie Dotson, "**Boredom and Beginnings: A Story from a Coe College Alum.**"

Kristie Dotson is an Associate Professor of Philosophy at Michigan State University, and has also recently held the Cowling Distinguished Professorship at Carleton College (Spring 2019), the Presidential Visiting Associate Professorship at Yale University (Spring 2018), a Visiting Professorship at the University of Auckland NZ (Summer 2018), and served as a Senior Fellow at the Center for Intersectionality and Social Policy Studies at Columbia Law School (Spring 2014). She is part of the coalition *#WhyWeCantWait*, which attempts to challenge the way current visions of racial justice are constructed to outlaw open concern for women and girls of color.

Dr. Dotson received her BA in African American Studies, Business Administration, and English Literature from Coe College (1996). She went on to earn a MA in Literature from the University of Illinois at Chicago (1999), and a M.A. (2005) and Ph.D. (2008) in Philosophy from the University of Memphis.

Dr. Dotson's academic work focuses on research and writing in epistemology, feminist philosophy (particularly Black feminism and feminist epistemology), and critical philosophy of race. She edited a special issue on women of color feminist philosophy for *Hypatia: A Journal of Feminist Philosophy* entitled, *Interstices: Inheriting Women of Color Feminist Philosophy* and has published in numerous journals including *Hypatia*, *Comparative Philosophy*, *The Black Scholar*, *Feminist Philosophical Quarterly*, *Transactions of the Charles S. Peirce Society*, and *Social Epistemology*. Dr. Dotson is working currently on a book, *Varieties of Epistemic Oppression* (under contract with Oxford University Press), and a monograph entitled, *How to Do Things With Knowledge*.

PRESENTATION SESSION 1

1:00 - 2:15 PM

Panel A: Marquis 201

Laissa Rodriguez-Moreno, Facilitator

1:00-1:15 PM Jean Springsteen (2019) Faculty Sponsor, Ryan Baranowski. "A Cournot Model of Regulatory Capture."

This research studies regulatory capture by looking at the trade-off firms face between regulation costs and competition in a Cournot oligopoly. Firms have incentive to pursue regulation when it drives out competition and increases their profits, and this trade-off is modeled. Firms may exhibit rent-seeking behavior if pursuing regulation will advance their profits even at the expense of economic efficiency. With firms pursuing monopolistic profits, regulatory policies may advance the interests of firms instead of economic welfare. By studying how regulatory costs affect profitability of firms in the oligopoly, the condition at which firms prefer regulation is found.

1:20-1:35 PM Mason Van Gorp (2019), Wade Hill (2019) Faculty Sponsors, Kim Lanegran and Bruce Nesmith. "Partisan Voting: Moderating Made Impossible."

Despite the United States Constitution failing to mention them, political parties have become an integral part of American politics. As relations and rhetoric between America's two most long-standing parties becomes noticeably more vitriolic, many citizens are asking critical questions. What has caused party tensions to reach an unprecedented height? Has hyper-loyalty in party politics prohibited potentially moderate legislators and dialogue? Through analyzing party platforms and bills that address partisan issues during the Bush, Obama, and Trump administrations, this research draws critical conclusions regarding today's political climate founded on voting trends revealed by an original system designed to score current members of Congress on their partisanship during their tenure in Washington.

1:40-2:10 PM Thomas Kahle (2019) Faculty Sponsor, Derek Buckaloo. "Breaking Point: The Motivations behind the American Indian Occupation of Alcatraz Island."

This project examines the inspirations for the 1969 American Indian occupation of Alcatraz Island. Through a range of oral histories, newspaper publications, and news footage, this research presents the Alcatraz

takeover as the climax of Native American grievances specific to 1950s/60s Indigenous welfare. The motivations for the occupation are identified as stemming from the socio-economic status of Native Americans and the seemingly endless struggle of Indigenous peoples to maintain their culture or “Indianness.” Frustration over these conditions is said to have translated into an Indian administration of Alcatraz that prioritized the flourishing of Indigenous customs while dismissing white American influence.

2:15-2:30 PM Briana Gipson (2019) Faculty Sponsor, Drew Westberg. “Not Your Negro’: Mapping the Economic Resistance of Black Business Tradition Post Great Recession.”

This presentation will explore the economic resistance of Black businesses following the Great Recession. Using 2007 and 2012 Survey of Business Owners data and American Community Survey data at the county level for all metropolitan areas, this study examines the influence of spatial segregation and concentration on Black business ownership. This study joins this controversial debate by exploring the history of the Black self-help tradition, and the geography of Black businesses before and after the Great Recession. This presentation will argue that Blacks have long and continue to declare that they are not the United States’ ‘Negro.’

Panel B: Kesler Auditorium
Megan McCarty, Facilitator

1:00-1:15 PM Emily Montelius (2020) Faculty Sponsors, Brittney Miller and Jonathan White. “Fault Free Tileability of Rectangles, Cylinders, Tori, and Mobius Strips with Dominoes.”

We study fault-free tileability of boards with dominoes as tiles, where the boards are rectangles, cylinders, tori, and Mobius strips. A tiling is a way of arranging pieces on a board, such that there is no space left uncovered, nor any space covered by more than one tile. To be fault-free every line that intersects the tiling must also intersect the interior of at least one of the tiles. We have complete results for cylinders and tori.

1:20-1:35 PM Zoe Fredriksen (2019) Faculty Sponsor, Martin St. Clair. “Spatial Representation of Row-Crop (Zea mays and Glycine max) Proximity on Seasonal Nitrate Concentrations in Local Watersheds of Bear Creek, Blue Creek, Lime Creek, Morgan Creek, Mud Creek, N. Bear Creek, and Otter Creek.”

Fertilizers added to corn and soybean fields contribute to water contamination. Since 92% of Iowa is comprised of farmland, this is a state-level water quality issue. Water with nitrate levels higher than 10 mg/L

is not recommended for consumption. The “Big Loop” test area has been consistently sampled by the Coe College Water Quality Laboratory over a span of 17 years. The purpose of this independent study is to build an ArcMap using GIS to perform spatial analysis to compare the percentage of row crop to nitrate levels in the summer vs. the winter.

1:40-1:55 PM Moritz Rusch (2019) Faculty Sponsor, Mario Affatigato. “Hydrophobic Glasses Enhanced Through Patterned Surface Microstructure.”

Searching for the most hydrophobic glass we model our project after the famous lotus leaf. One main function of its hydrophobicity is the ability to self clean. It reaches this effect through two engineered characteristics: On its surface is a layer of an inherently hydrophobic material, furthermore is its surface shaped with a specific micro sized pattern. We recreate these effects with two parts of our project: In one we identify from a survey study of different glasses the inherently most hydrophobic one, then we take this glass and use nano technology to create a pattern on its surface.

2:00-2:15 PM Martha Jesuit (2021) Faculty Sponsors, Firdevs Duru, Brittney Miller and Steve Feller. “Thermal and Structural Properties of Amorphous Tellurium Dioxide.”

The thermal and structural properties of tellurite glasses, written as JM_2O-TeO_2 , were studied. Raman spectra, glass transition onset (T_g), and crystallization (T_x) temperatures were measured. All thermal measurements, on a Perkin-Elmer DSC-7, were compared to the coordination of the tellurium. Coordination data was found by deconvoluting Raman spectra to find the ratio of Q4 and Q3 units. Pure amorphous TeO_2 was made using the water-quenching method then thermally tested against time to observe how the glass transition onset changed. Due to the strong crystallization tendency of TeO_2 , all samples were prepared in a glovebox to minimize the effect of water.

Panel C: Stewart Room 405

Nathan Hodges, Facilitator

1:00-1:15 PM Meredith Wall (2019) Faculty Sponsor, Meira Kensky. "Like a Father He Led Them All:" A Study of Athanasius's Life of Antony as a Pastoral Text.”

I argue that Athanasius wrote Life of Antony as a strategy of pastoral care, which means he wrote it primarily

for the spiritual and emotional wellbeing of his monks. I contend that he chose to use a hagiography of Antony because it was the most effective medium through which to argue for the overlapping nature of monastic and clerical authority. This is an additional lens through which to study Life of Antony, one that goes against the grain of contemporary scholarship, with its conclusions that Athanasius wrote the text as a tool to advance his own political and theological agenda.

1:20-1:35 PM Laura Niday (2021) Faculty Sponsor, John Lemos. "Implementing Retributive Theory in an Unjust World Would Promote Mass Injustice."

Herbert Morris' unique retributive theory of punishment is fraught with flaws that emphasize the need for a just society in order for accurate and just implementation. Criticism in this essay follows the claim that Morris' retributivism has a need for a just society, the definition of which is gleaned from John Rawls' "A Theory of Justice." Substantial evidence to solidify the premise that Morris' theory requires a just society is given through case studies of current states, using categories of unjust countries to display hypothetical, unjust implementation of the theory.

1:40-1:55 PM Brenna Kerwin (2020) Faculty Sponsors, Michelle Blair and Brett Wolgast. "Ludwig van Beethoven - His Late Musical Style and Piano Sonatas."

Brenna Kerwin has been nominated by the core-Music Faculty for her accomplishments in Music History and winner of the Eleanor Taylor Research Prize. The presentation will consist of a discussion of her research and paper on the late-Beethoven Piano Sonatas.

2:00-2:15 PM Delena Humble (2019) Faculty Sponsors, Allison Carr and Nathan Hodges. "Outside the Box: An Ethnographic Essay Exploring Biracial Identities in America."

For my senior honors thesis, I decided to research biracial identities in college students at our institution. Drawing on personal stories and memories, and augmented by research on race and identity, this autoethnographic project studies identity construction and negotiation via three self-identified biracial women: Jordan, Estephania, and me.

Panel D: Daehler Kitchen
Caio Bragatto, Facilitator

1:00-1:15 PM Connor Moellenbeck (2019) Faculty Sponsor, Bob Benson. "For the Students- A Speaking Tour Bringing Music Industry Professionals to Colleges and Universities."

The Presentation covers what "For the Students" is and how it benefits students of the music business

throughout the industry. I will highlight our team, events we have hosted and are planning to host, our vision, our content creation, guests we have had and the overall premise of the difficulty the music business presents and the opportunity for "For the Students" to bridge that gap.

1:20-1:35 Takamaru Miki (2020) Faculty Sponsor, Brett Wolgast. **"Paraphrase on *Rigoletto*" by Franz Liszt.** Piano performance.

Takamaru Miki has been nominated by the core-Music Faculty for his accomplishments in Applied Music. The presentation will consist of a verbal Program Note and Performance of a musical selection representative of his dedication and work in Applied Music.

1:40-1:55 PM Belle Canney (2021) as Diana, Josie Krook (2022) as Natalie, Sam Riley (2020) as Dr. Fine/Dr. Madden, Harrison Shaffer (2020) as Henry, David Stevens (2022) as Gabe, Michael Woodruff (2019) as Dan. Faculty Sponsors, Michelle Blair, Lorelee Songer and Brett Wolgast. **"Who's Crazy/My Psychopharmacologist and I from *Next to Nothing*" by Tom Kitt and Brian Yorkey.**

The students have been nominated by the core-Music Faculty for their accomplishments in Musical Theatre. The presentation will consist of a verbal Program Note and Performance of a musical selection representative of their dedication and work in Musical Theatre and Applied Music.

2:00-2:15 PM Eden Tarchinski (2019) Faculty Sponsors, Brett Wolgast and Allison Holmes-Bendixen. **"Alto's Lament" by Zina Goldrich and Marcy Heisler.** Vocal performance accompanied by Brett Wolgast on piano.

Eden Tarchinski has been nominated by the core-Music Faculty for her accomplishments in Applied Music. The presentation will consist of a verbal Program Note and Performance of a musical selection representative of her dedication and work in Applied Music.

2:20-2:35 PM Jeremiah de la Peña (2019) Faculty Sponsors, Brett Wolgast and Alan Lawrence. **"Modality" by Will Benson '18.** Percussion performance accompanied by Will Benson on piano and Jonah Prall on bass.

Jeremiah de la Peña has been nominated by the core-Music Faculty for his accomplishments in Applied Music. The presentation will consist of a verbal Program Note and Performance of a musical selection representative of his dedication and work in Applied Music.

2:40-2:55 PM Makayla Kaune (2019) Faculty Sponsors, Brett Wolgast and Amy Sams. **“Baroque and Blue”** from *Suite for Flute and Jazz Trio* by **Claude Boling**. Flute performance accompanied by Steve Shanley on piano, Jeremia de La Peña on drums and Jonah Prall on bass.

Makayla Kaune has been nominated by the core-Music Faculty for her accomplishments in Applied Music. The presentation will consist of a verbal Program Note and Performance of a musical selection representative of her dedication and work in Applied Music.

Panel E: Sinclair Art Galleries

The Coe College Department of Art and Art History is pleased to present its capstone exhibitions by graduating studio majors. These exhibitions represent the culmination of a two-semester seminar where students conceptualize and create artworks, along with researching and writing about art, processes and more.

Isabel Bishop - “It’s Not That Scary.”

E. Sky Katz - “MONSTRARE.”

Elis Madsen - “Colorworks.”

Xenia Greniuk - "Animate Object"

PRESENTATION SESSION 2

2:30 - 3:45 PM

Panel A: Peterson Hall 119

Alexander Zambrano, Facilitator

2:30-2:45 PM Abhinav Shrestha (2019) Faculty Sponsor, Paula Sanchini. "A Geographic Information System (GIS)-Based Study on Topographical Preference of Common Tree Species in Palisades-Kepler State Park."

The study seeks to develop an understanding of the topographic characteristics that influence tree species composition of upland forests at Palisades-Kepler State Park, Linn County, Iowa. The role of *Quercus alba*, white oak, is a focus of this study. 123 plots containing 706 trees were sampled with the use of GPS receivers and field methods in the summer of 2017. The sampled field data were combined with its respective GPS data, and mapped on Digital Elevation Model imagery. Geographic Information System (GIS) analyses are used to develop a model of sites suitable for oak regeneration and maintenance within this forest.

2:50-3:05 PM Isabel Bishop (2019) Faculty Sponsor, Lucille Goodson. "It's Not That Scary: Using Art as a Medium for Garnering Interest in Physics."

Sterile lab environments, crazy haired mad men, and a blackboard full of mathematics gibberish. These stereotypical images don't begin to represent the complexity and wonder that we can find in science. "It's Not That Scary" is an exhibition that attempts to surpass the stereotypical by using art as a vehicle to introduce scientific concepts. This talk is about the process behind the exhibition and the goal of bridging the gap between the wonder and beauty of physics and the intimidation and uncertainty that holds many people back.

3:10-3:25 PM Rebecca Welch (2020) Faculty Sponsor, Caio Bragatto. “Simulating Ionic Mobility in Virtual Glass Systems with Molecular Dynamics.”

There are many properties of glass which are not fundamentally understood, one of which being how ions move through the glass and how they contribute to the conductivity of the material. There are a few existing theories in literature, but none of these have been agreed upon completely due to the limitations of experimentally tested results. However, by simulating a glass virtually, we can observe different mechanisms which would be difficult to see otherwise. Molecular dynamics was used to study the unknown characteristics of glassy systems, particularly focusing on conductivity, by simulating 3000 atoms and applying an electric field to the ions. This allowed us to analyze the movement of the ions and how they may relate to the theories that currently exist.

3:30-3:45 PM Wataru Takeda (2019) Faculty Sponsor, Steve Feller. “Topological Constraint Model of High Lithium Content Borate Glasses.”

Lithium borate glasses exhibit the “boron anomaly” and clustering of the lithium ions. Bødker et.al (Bødker, Mauro, Youngman, & Smedskjaer, 2019) predicted the Tg using statistical mechanics and topological constraint theory (TCT) over a wide range of contents (to 65 mol. % Li₂O). Although Bødker’s model predicted the fraction of the structures present, this paper examines the linkage between intermediate-range structures and properties of the glasses. Tg was found using TCT with the structural model of Feller, Dell, and Bray (Feller, Dell, Bray, 1982). The topology of the intermediate-range structure was related to rigidity, and to lithium clustering.

Panel B: Marquis Hall 201
Samantha Brown, Facilitator

2:30 - 2:45 PM Dana Bekebrede (2019) Faculty Sponsor, Gina Hausknecht. “Mother, Widow, Queen, Revenger: Gertrude in Hamlet.”

“The lady doth protest too much, methinks” is one of the most pervasive references to Shakespeare in popular culture today. It is difficult, however, for most to identify the original speaker: Hamlet’s Queen Gertrude. This is symptomatic of a larger problem; Gertrude is misunderstood. This essay explores the editorial practices that have stripped away Gertrude’s complexity and agency. Lines that could be attributed to the Queen are often attributed to other characters. There are compelling differences in her character between the three print editions of the play. When each of these editions are considered, a different Gertrude emerges, one who is actively involved in her son’s revenge plot.

2:50-3:05 PM Zeki Salah (2019) Faculty Sponsor, Meira Kensky. "Understanding Arthur Conan Doyle's Spiritualist Rhetoric Beyond a "Modern" Lens."

This research examines the rhetoric of Arthur Conan Doyle during his second spiritualist tour of America. I argue that Doyle appealed to a wide range of values in his spiritualist rhetoric that do not form a cohesive whole and are instead reflective of the religious culture of two geographic areas that he covers in his tour: Salt Lake City and New York City. I also frame Doyle's tour within popular discourse at the time including: tensions between religious faith and scientific materialism, tensions between institutionalized and individualized religious practices, and reactions to large-scale wars.

3:10-3:25 PM Joseph Aharroni (2021), Ali Dassner (2021), Henry Hoyhtya (2021) Faculty Sponsor, John Lemos. "Assessment of and Objections to Compatibilist Philosophy."

All three students travelled to St. Louis University to present our papers on Frankfurt's notions of compatibilism. Each of us summarized the famous Frankfurt Example and gave some critiques of the example. We will present our experiences from the conference as well as the main ideas in our papers.

Panel C: Kesler Lecture Hall

Neal McNabb, Facilitator

2:30-2:45 PM Hayley Walton (2019), Allie Rausch (2019), Wenxia Sweeney (2019) Faculty Sponsors, Benjamin Tallman, Rose Hedges, April Golwitzer, Nikolas Albarran and Lynn Nakad. "Engineering Health Care's New Reality: Finding Creative Solutions to Mold Hospital Standards."

UnityPoint Health-St. Luke's Hospital recently received a grant to purchase VR headsets in order to administer VR interventions to patients' with pain concerns. However, upon purchasing the VR headsets, it became clear that sanitation would be an issue, as the masks inside the headset are made of fabric. To remedy this, our research team partnered with MakerHealth, a DIY medical research cohort, in order to come up with a solution. Through trial and error, we were able to create a silicone mask that fulfilled our needs. This presentation will illustrate the procedure and outcomes of this experimental process.

2:50-3:05 PM Paige Nelson(2019) Faculty Sponsor, Benjamin Tallman. “Health-Related Quality of Life (HRQL) Following an Elective Orthopedic Surgery: A Randomized Controlled Trial (RCT).”

We looked at the question, “Do patients receiving non-pharmacologic interventions perceive the surgery as less stressful, experience greater surgery satisfaction, experience greater perceived pain coping, and expect fewer problems caused by pain post-surgery compared to a control condition?” The study examined the use of cognitively-mediated relaxation exercises and soft-tissue massage as two combined non-pharmacologic treatments to manage postsurgical pain and to avoid potential negative side-effects of opioid medications. We found no significant-between group differences for control and treatment groups for all variables. Results lend support to the importance of practicing relaxation exercises to enhance health-related quality of life after surgery.

3:10-3:25 PM Samantha Collins (2019), Mia Resa (2020) Faculty Sponsor, Dr. Renee Penalver. “Did You Hear That?: The Effects of Word Frequency and Incidental Learning on Internal-external Source Monitoring.”

Source memory is memory for the context in which a particular target item was learned. The source-monitoring framework is the leading model of source memory (Johnson, Hashtroudi, & Lindsay, 1993). An experiment on internal-external source monitoring systematically examined how word frequency and incidental learning affected source memory. Data collection is still underway. Results will be discussed in terms of the source-monitoring framework.

Panel D: Stewart 405

Kelly Siems, Facilitator

2:30-2:45 PM Madison Ryan (2019) Faculty Sponsor, Sarah Kress. “Impact of Instructional Strategies on Student Learning.”

Alexis Weber and I (Madison Ryan) completed 15 weeks of research during student teaching. Alexis taught in 4th grade and kindergarten while I was in 3rd and 4th grade. We wondered what strategies resulted in the most learning for students. This became our research question. To explore this question, we employed a variety of instructional strategies. Our intention was to use strategies that would reach each learner. We found that the most effective way to reach students is to keep instruction interactive and provide multiple ways to learn material. Students were more engaged and scored higher on assessments.

2:50-3:05 PM Kaylee Skweres(2020) Faculty Sponsor, Christopher Johnson. “Teaching Me: Looking into the Academic Experiences of Students of Color and Non-students of Color at PWI’s.”

This study is sought out to address the emotional toll Students of Color take on being at a Predominantly White Institution (PWI). Using Erik Erikson’s Stages of Psychosocial Development, it is possible to understand how relationships and social interaction between Students of Color and faculty play a larger role in students success. Qualitative research interviews are used to search the meanings and central themes in the life of a student at Coe. By conducting interviews I will be able to understand the perspective of each participants learning experience which will result in a documentary showcasing some of these answers.

3:10-3:25 PM Jaimee Rindy (2019) Faculty Sponsor, Theresa Donofrio. “Bridging the Gap Between Fans and Creators in Modern Media.”

This is a presentation of my Advanced Media independent study during which I researched and examined the relationship between media creators and fans and the disconnect between interactive media and the desires of audiences. Using a combination of theoretical material and contemporary case studies, this essay discusses the problem with our current state of content creation and theorizes about future technology that will satisfy both creators and audiences.

3:30-3:45 PM Catherine Trumble (2019) Faculty Sponsor, Nathan Hodges. “Comedy and Grief in the Age of Trump: A Colbert Report.”

A Colbert Report analyzes several Late Show monologues performed by host Stephen Colbert between the start of Donald Trump's campaign for the Republican nomination and the first two years of his presidency. This analysis shows how Colbert performs and participates in a cultural grieving process for and with his audience which includes stages of denial, anger, bargaining, and depression. Colbert uses comedy as a tool in this process to make political news less overwhelming to his audience while keeping them engaged enough to avoid becoming apathetic.

**Panel E: Intercultural Center Student Art
Gallery**

"What Does Human Rights Mean to You?" presented by the Coe Human Rights Advocates

2:30-3:30 PM Art Showcase

3:30-5:00 PM Reception