27th ANNUAL UNDERGRADUATE SYMPOSIUM

2021

ASSUMPTION UNIVERSITY

Office of the Provost and Vice President for Academic Affairs

This year, we come together virtually for the 27th Annual Undergraduate Symposium. The Undergraduate Symposium is an event that highlights the research and scholarly achievements of Assumption students working in collaboration with dedicated faculty mentors. These collaborations represent a model for integrating teaching, original research, and the beneficial effects of peer review in promoting intellectual development and professional growth. The symposium provides the campus community with the opportunity to gain a greater appreciation of the individual and collective accomplishments of our faculty and students, as well as to applaud those achievements.

I hope that you enjoy learning about each student project included in this abstract program. I invite you to attend all of the presentations and engage with each student, who are eager to showcase their work at the 27th Annual Undergraduate Symposium. We look forward to an in-person event next year.

Sincerely,

Greg Weiner, Ph.D.
Provost and Academic Vice President

Undergraduate Symposium
Spring 2021

ABSTRACTS

Session A
8:50 AM – 10:05 AM
Zoom ID: 995 1325 7527
Moderator: Prof. Thomas Wheatland

Henry Kissinger and the "Inevitability of Tragedy" as a German Exile

Joseph Facteau '21
History

Henry Kissinger is a controversial yet incredibly influential figure in the history of the Cold War and also American politics. However, his early life is often seldom known. Kissinger was a Jewish exile from Germany who, if he stayed in Germany for even one more year, would almost certainly have died in the Holocaust. This past fall I focused on his life and how his interesting life as a German exile would shape his later political career in the United States.

Faculty Mentor: Dr. Thomas Wheatland

Mediocrity vs Monsters: Hannah Arendt's Banality of Evil and its Critics

Sam Surowiec '21
History

When Adolf Hitler rose to power, effectively ending the short-lived Weimar Republic, he caused many German and Jewish intellectuals to flee for safety. One of those important intellectuals was Hannah Arendt, a bold and brilliant political philosopher who broke many gender barriers during her life. Known for her austere manner of writing about sometimes delicate matters, one of Arendt's most significant controversies in her career arose after her coverage and publications about the 1961 trial of Nazi fugitive Adolf Eichmann. Her book Eichmann in Jerusalem: A Report on the Banality of Evil brought about scathing reviews from Jewish and non-Jewish academics alike, mainly because of the callous way she accused of writing regarding the participation of Jews in the Final Solution and her controversial conclusions about Eichmann's character and motivations. Yet many of Arendt's claims and comments involving the Eichmann trial were misunderstood by those who did not understand her writing and her principles, both of which were shaped by her early life and time in exile.

Faculty Mentor: Dr. Thomas Wheatland

Music in Exile

Sean Duda ’21
History

Arnold Schoenberg was a composer of Jewish descent who fled from Germany when the Nazis came to power. This presentation will look at Schoenberg’s life during his exile, how it affected his compositions and his composition process. Participants will listen to some examples of Schoenberg’s music that he composed while in exile, however this presentation will mainly be focused on Schoenberg’s struggles with his new home and his new audience that came with it.

Faculty Mentor: Dr. Thomas Wheatland

The Exile Experience of Erich Maria Remarque: Finding a New Identity

Chloe Amour ’21
History

At the time of Hitler’s rise to power, many young Germans found themselves in a predicament; they could either stay or flee their own country. Erich Maria Remarque, one of Hitler’s exiles, left the Germany he once knew behind him to travel the world, while navigating his career and trying to find a sense of self. Remarque, who served as a soldier during World War I, went on to write critically acclaimed novels, such as *All Quiet on the Western Front* and *Arch of Triumph*. Remarque’s exile experience allowed him to discover his identity and publicize his radical, non-conformist views. It is remarkable to look at how courageous Hitler’s exiles truly were – who managed to make incredible contributions, despite the hardships of living in an exile state. Reflected in *Arch of Triumph*, Remarque presented his anti-fascist views, in the revenge plot within the novel, and its complications on one’s sense of belonging.

Faculty Mentor: Dr. Thomas Wheatland

The Ascension to Empire and the Fall from Grace

Alex Devolve ’23
History

The Habsburg Dynasty was renowned for its inbreeding and infamous collapse after the first World War, but how did the Habsburgs manage to fall so completely and devastatingly? In order to hit bottom so hard one must first rise to a point of prominence. The Habsburg Empire started from meager beginnings but grew to be an early global power. Between marriage alliances and political maneuvering, the Habsburgs were destined for greatness. The Habsburgs started with land in the western Alps and would eventually use brilliant marriage alliances to build the largest European Empire that would reach from the Pacific Ocean all the way to the Russian steppes. Through marrying off their offspring to different kingdoms the Habsburgs developed very complex but strong political structures.

Faculty Mentor: Dr. Thomas Wheatland

Session B
8:50 AM – 10:05 AM
Zoom ID: 971 3681 2402
Moderator: Prof. Lea Gordon

Using a Bioinformatic Approach to Determine New Genes Needed for Synapse Development in C. elegans

Sierra O'Keefe '22
Biology

The human brain is the most complex and least understood organ in the human body. In order to study this structure at a cellular level, *C. elegans*, or nematodes, are often used as model organisms. To uncover novel genes important for proper development of synapses a forward genetic screen was conducted and mutations which led to severe dendrite development phenotypes were identified. Once a mutant is identified, we must determine which genetic alteration is causing the phenotype. I used an established mapping strategy called variant-based mapping and employ a wide range of bioinformatic tools to map and identify a list of potential casual mutations. From this work, we hope to identify novel genes important for synapses development.

Faculty Mentor: Dr. Michele Lemons

Understanding the Pathobiology of Yersinia pestis

Lauren Kuhns '21
Biology

Yersinia pestis is a bacterium and the causative agent of the Plague. The most commonly known plague is the bubonic plague, or Black Death, that killed over 25 million people in Europe during the 14th Century (1). Distinct characteristics of the Black Death are the formation of buboes, or inflamed lymph nodes, as well as a fever and overall weakness. Bubonic plague infections are the most common type of human plague and occur through the bite of an infected flea or less commonly through direct contact with an infected animal. Yersinia pestis also causes the pneumonic plague when infection originates in or spreads to the lungs. Pneumonic plague is highly contagious and characterized by pneumonia, shortness of breath, and weakness. The last disease Yersinia pestis causes is the septicemic plague, which occur when the bacterium enters the bloodstream. This is usually observed in a late stage of bubonic or pneumonic plague. Symptoms of the septicemic plague include fever, abdominal pain, and shock. While Yersinia pestis is most notorious for ravaging 14th Century Europe, this bacterium is alive and well in today's society. According to the CDC, the US has seen approximately seven cases per year, while

Madagascar in 2017 had an outbreak of 2,348 cases. Although the fatality rate reaches 66% if left untreated, some antibiotics have been successful in treating the plague, such as streptomycin, tetracycline, and chloramphenicol. While cases in the US and most areas around the world are low, the fatality rate with treatment is still about 11%. Studying this microbe will allow us to better understand the pathology of this bacteria and further discover how to combat a bacterium with such strong virulence factors.

Faculty Mentor: Dr. Aisling Dugan

The History and Pathogenicity of Methicillin-Resistant Staphylococcus aureus (MRSA)

Marissa Doherty ‘21, Jillian Hamblin ‘23, Rachel Ferguson ‘23,
& Anne Guadalupi ’21
Biology

Methicillin-resistant *Staphylococcus aureus*, commonly known as MRSA, is a gram-positive bacterium resistant to β-lactam antibiotics, including penicillin and methicillin. This resistance is linked to the bacterial gene *MecA*, which is located on the plasmid SCCmec. MRSA also has various virulence factors that allow for the microbe to maintain viability within a host and provide protection against an immune response. In clinical laboratories, the *MecA* PCR assay is considered to be the “gold standard” for the detection of MRSA. Once diagnosed in a human, Vancomycin or Clindamycin antibiotics are prescribed to control the spread and growth of this bacteria. Additionally, incision and drainage may be performed as needed for certain skin and tissue infections. The MRSA bacterium can be hospital/health care-acquired or community-acquired, the latter which has had recently emerged within the last 10 years and has raised concern for public health. Although this bacterium most commonly causes mild infections of the skin, it can lead to other more severe bodily infections including pneumonia, endocarditis, toxic shock syndrome, or even sepsis. MRSA causes approximately 20,000 deaths in the United States annually. This scientific paper outlines the general history and pathogenicity of methicillin-resistant *Staphylococcus aureus*.

Faculty Mentor: Dr. Aisling Dugan

Porphyrins and Porphyrin Applications

Derek Girouard ’21
Chemistry

Porphyrins are a macrocyclic compound that can be modified in a myriad of ways offering useful and unique applications. These applications can range from ion sensing to catalysts in reactions. However, some of the most interesting applications revolve around medical and therapeutic treatments. Porphyrin derivatives can be used in processes known as photodynamic therapy (PDT) and photothermal therapy (PTT) to treat cancerous tumors. Porphyrins have been used in many ways in the body by their attachment to a variety of backbone structures.

Porphyrins have potential to be widely utilized in therapeutic treatments as they are further studied and adapted to these roles.

Faculty Mentor: Dr. Elizabeth Colby-Davie

The Evolution of Deuterium in the Pharmaceutical Industry and Its Effect on Method of Deuterium Incorporation

Angela Martinez ’21

Chemistry

The substitution of deuterium, an isotope of hydrogen containing one proton and one neutron, for a hydrogen has far reaching effects on the behavior of compounds. Previously, the primary purpose for deuterium was in the development of internal standards for NMR and mass spectrometers, due to their relative ‘silence’ in these studies, allowing scientists to elucidate mechanisms and trace a compound's movement throughout the body. However, recently, deuterium has been added to developing or previously created pharmaceutical compounds with the intent to stabilize the drug. This stabilization can take many forms, including decreasing the rate of metabolic breakdown, decreasing enantiomeric switching, and, in some cases, decreasing toxicity. With this more widespread application, a resurgence of studies has been completed to develop new methods of deuterating a wide variety of molecules, with a focus on common functional groups found within pharmaceutical compounds and mild reaction conditions.

Faculty Mentor: Dr. Elizabeth Colby Davie

Session C
11:00 AM – 12:00 PM
Zoom ID: 995 1325 7527
Moderator: Prof. Lea Gordon

“Doing History”: Serving as a Guest Curator and Research Assistant for the Slavery Adverts 250 Project

Chloe Amour ’21

History

Over the past year, I have had the opportunity to work closely with Prof. Keyes on a digital humanities project, *The Slavery Adverts 250*. The project raises awareness of the significance of advertisements about enslaved people in the era of the American Revolution, a period often associated with expanding freedom. In my role as research assistant, my responsibilities include behind-the-scenes preparation and organization of digitized eighteenth-century newspapers and individual advertisements. Working on the project has been a way of “doing history” and

exploring the field of public history, while engaging in experiential learning. Through this experience, I have developed and refined transferable skills, such as critical thinking, problem solving, information literacy, and writing, which will prepare me for post-graduate work.

Faculty Mentor: Dr. Carl Robert Keyes

A Decade of Distrust: Why American Citizens Lost their Faith in the Government

Noah Veilleux ’21
History

The period from 1965 to 1975 saw trust in the government worsen as it fell to previously unseen lows. Trust in the government fell from a high of 77% to a low of 34% by the end of the period under study which can be attributed to three main issues presented to America at this time: the Vietnam War, the Watergate Scandal, and the Pike and Church Committee hearings. These three events worked in tandem to shed light on some of the corruption present within the American government. Trust plummeted, never to rise to its previous heights again.

Faculty Mentor: Dr. Deborah Kisatsky

The Age of Scientists and Women: A New Era in Detective Fiction

Kerry Farrell ’21
English

Literature ebbs and flows throughout the course of time. The genre of detective fiction is no exception. Within the literary world, there are five universally acknowledged eras of detective fiction. The most recent genre has been deemed the Modern Era, spanning from 1950-present day. Using Patricia Cornwell’s Cause of Death and Elly Griffiths’ The Crossing Places, this paper will argue that the works published during the 1990s-00s should be deemed its own era. The 1990s-00s marks a new era in detective fiction where the focus of the plot is the main character and their development. Women are also more likely to be the main character in a series, as well as work in the sciences. Lastly, the novels from this era incorporate more of an emotional and psychological perspective rather than just focusing on the violence of crimes themselves.

Faculty Mentor: Dr. Becky DiBiasio

Rough Justice and the Delicate Art of Procedural Investigation

Maeve McDonald ’21
English

Is the definition of justice stagnant? Does the administration of justice always look the same? In this review of the detective fiction genre, it is revealed that as the genre itself transitioned from the period of amateur detectives to that of more formal police procedural,

there was also a change in how justice was administered. The former reflected justice often determined by one voice of authority and the latter enforced a justice as prescribed by the formal judicial system. Using Agatha Christie's novel Murder on the Orient Express and Patricia Cornwell's work Postmortem, this paper aims to explore this shift looking in particular at the sense the reader is given of the detectives as people, the concept of detective authority as opposed to the police procedural, the practice of seeking justice for its own sake rather than for the sake of the victim and finally moral justice as opposed to justice within the constraints of a legal system.

Faculty Mentor: Dr. Becky DiBiasio

Session D
1:15 PM – 2:15 PM
Zoom ID: 995 1325 7527
Moderator: Prof. Ben Knurr

Advanced Machine Learning Algorithms for Preprocessing Imbalanced Datasets

William Traylor '21
Computer Science

Machine learning classifiers tend to perform poorly on datasets with imbalanced class distributions. We implement a new algorithm developed in 2020, Outlier SMOTE, a modification of SMOTE, for preprocessing these datasets to reduce undesirable effects of imbalance. We compare the performance of Outlier SMOTE against older preprocessing methods, such as SMOTE, on the Porto Seguro dataset for automobile insurance claims. F-measure, precision, recall, AUC, and the Gini Coefficient are among the main metrics used to assess the performance of classification after implementing each of these methods for dealing with class imbalance.

Faculty Mentor: Dr. Joseph Alfano

Implementation of Strategic Predictions

Michael Asante '21
Mathematics and Computer Science

Classification is a fundamental problem in machine learning. An example is determining whether a social media post is spam or not spam. Strategic Classification considers a two-player game: One player called Jury, aims to construct a rule to find a classification that is as accurate as possible; while the other player, Contestant, aims to game the Jury's rule to construct a submission that achieves the highest classification possible. I have written a Python notebook implementation of an algorithm that was developed in the paper "Strategic Classification" by M.

Hardt, N. Megiddo, C. Papadimitriou, and M. Wootters to optimize Jury's classification rule. I have applied my implementation to the Apontador dataset, provided by researchers Costa et al, to check results of the "Strategic Classification" paper.

Faculty Mentor: Dr. Joseph Alfano

Portrayals of the Poor and Working Class in Children's Film: A Thematic Analysis

Christina Goldin '21
Human Services and Rehabilitation Studies

This paper presents an analysis of how socioeconomic class is presented in children's films. The eighteen highest grossing Disney films (2015-2020) were viewed and analyzed. Findings reveal a deficit orientation in the portrayal of poor and working-class people in children's films. Five themes were identified in the films analyzed: the poor and violence, the poor and dysfunctional families, the poor and unintelligence, the poor and chaotic lifestyles, and the poor and the bootstrap narrative. Through an extensive thematic analysis, deficit ideology and a benign framework were identified as the main frames through which socioeconomic class is presented to children in film.

Faculty Mentor: Dr. Cinzia Pica-Smith

Cahun and Moore and the Representation of Gender Fluidity

Kat Gatto '21
Art History

Claude Cahun created photographs with her lover Marcel Moore that transcended societal norms during the twentieth century. The artists' depicted the nature of their lesbian relationship and gender identities in dual self-portraits. By studying four of their black-and-white photographs we see that they freed themselves from societal constraints. The result is that they created art that challenged how society viewed gender as two separate entities instead of a spectrum. Thus, their pieces called for the increased representation of gender-fluid individuals within civilization.

Faculty Mentor: Dr. Elissa Chase

Session E – Psychology on Salisbury
1:00 PM – 3:30 PM
Zoom ID: 971-3681-2402
Moderator: Prof. Lea Gordon

Social Connection and the Anthropomorphization of Nonhuman Agents

Gertrude M. Cox ’21
Psychology

Due to the public health crisis of COVID-19, feelings of social isolation have been increasingly common. People are spending less time around others, and more time alone in their homes. For many, social distancing results in increased use of technology to help connect with the outside world. Social disconnection may motivate individuals to anthropomorphize or to ascribe human-like traits to nonhuman agents. In the present study, participants completed a personality survey before being randomly assigned to view a video inducing a feeling of either humanity, humor, or social disconnection. After viewing the clip, participants completed a paranormal beliefs scale and gadget anthropomorphization task. While there were no differences between video groups on anthropomorphism, participants who gave higher ratings of anthropomorphic traits to their gadgets also demonstrated higher rates of paranormal beliefs and higher levels of extraversion.

Faculty Mentor: Dr. Leamarie Gordon

Gender, Emotion, & Courtroom Decisions

Alis Iannacchione
Psychology - WPI

Victim impact statements (VIS) have been controversial due to their emotional nature and how they may influence jury decision-making. Previous research has shown that highly emotional content in VIS increases the chance of a harsher sentence afforded to the defendant in criminal cases (Nadler & Rose, 2003). Research also shows that the gender of the victim and juror play a role in sentencing decisions (Holcomb et al., 2004; Williams et al., 2007; Pozzulo, et al., 2010). This study seeks to expand upon the literature by examining how the emotional content of victim impacts statements as well as the gender of the victim and mock juror influence civil court cases regarding personal injury. A total of 164 participants were included in the analysis and they all read a personal injury case with a plaintiff being either male or female as well as read a VIS which was categorized as either high or low in emotion. They answered questions on how much money in damage amounts they would award to the plaintiff followed by their perceptions of the plaintiff, defendant and the incident. Contrary to past research, we found that emotionality of the VIS, plaintiff gender and gender of the participant had no effect on damage amounts awarded to the plaintiff. This prompts for further investigation for VIS in civil cases to see if other factors such as the type of injury or race of the plaintiff and juror influence damage amounts.

Faculty Mentor: Dr. Jeanine Skorinko

Student Voices: A Qualitative Study of Student Emotion and Motivation

Jasmin Veerapen ’21
Psychology

Emotions play a critical role in student learning and adjustment to college, but it is unclear how best to assist in students’ regulation of emotion, motivation, and engagement. In this project we conducted qualitative interviews of student perceptions of their best and worst learning experiences in college. Participants completed a prescreening phase by providing their demographic details and then were scheduled for a 30-60 minute interview over Zoom. Two researchers asked a series of open-ended questions about motivation, learning, emotions, campus culture, and the role of social identities. A team of four researchers coded the interviews using a grounded theory approach. In this presentation we will share some insights from these interviews, including that students reported that their learning and motivation was positively impacted by synchrony and reciprocity, connectedness with material and professor, and instructors tending to the emotional and social spheres of the classroom.

Faculty Mentor: Dr. Sarah Rose Cavanagh

Daily Behaviors and Technology Use

Constantina Gatsonis
Psychology - WPI

Previous research has demonstrated that viewing television while eating is related to increased caloric consumption (Bellisle, Dalix, & Slama, 2004; Blass et al., 2006; Braude & Stevenson, 2014; Ogden et al., 2013; Thorp et al., 2013; Vik et al., 2013). However, smartphone usage is exceeding television usage over time. Despite the prevalence of smartphone use, only a few laboratory studies have investigated the relationship between phone use and eating behavior. This study sought to fill this research gap by investigating smartphone use and eating behavior in everyday life. One hundred and thirty-eight participants used MyFitnessPal and the native iPhone screen time function for three days (Thursday, Friday, and Saturday) in order to track daily calories and time spent using their smartphones. There are no correlations between total Thursday calories and total Thursday screen time minutes, total Friday calories and total Friday screen time minutes, and total Saturday calories and total Saturday screen time minutes. Morning screen time minutes did not predict calories eaten in subsequent meals for Thursday, Friday, or Saturday. Additionally, the type of screen time (e.g., social networking, reading, etc.) was not related to participants’ total daily calorie intake.

Faculty Mentor: Dr. Angela Rodriguez

Use of a Card Sort Procedure to Teach Prompt Types for ABA Service Delivery

Carol D'Agostino '21
Psychology

We examined the effectiveness of a card-sorting procedure to teach prompt definitions for three discrete trial programs (receptive labeling, social questions, and motor imitation.) Participants proceeded to engage in a multi-step testing process that was combined with supplemental handouts. During the pretest section, participants sorted cards from all three discrete trial programs; the cards depicted examples of correct versus incorrect explanations for both initial and correction trials. Participants then examined a set of handouts which provided correct and incorrect examples from the aforementioned discrete trial programs (also mentioning more and less restrictive examples of gestural, vocal, and motor prompts for both the initial and correction trials.) After observing correct prompts for one program, participants were asked to complete an applicable card sort until they reached an accuracy rate of at least 90%. After reaching this threshold, a posttest was provided before the process repeated with the next discrete trial program. To conclude, a final posttest was administered. It was found that the number of training and sorting cycles to reach the set criterion of at least 90% accuracy ranged from 1–6 full trials amongst various participants. Though generalization to the untrained program in the posttest portion varied with each participant, the cumulative data suggests positive transfer. This procedure of sorting and training may teach prompt definitions (both initial and correction,) but changes must be made in order to reduce the time over which the process spans, as well as increase overall posttest accuracy. We suggest that maintenance of learned material be assessed over time.

Faculty Mentor: Dr. Karen Lionello-DeNolf

Selegiline: The Effects of Monoamine Oxidase Inhibitors on the Behavior and Physiology of Caenorhabditis Elegans

Kathryn Nippert, Luigi Apollon, and Emily Stead
Psychology - WPI

This study aims to determine the effects of one antidepressant Selegiline, a monoamine oxidase inhibitor, on the behavior and metabolic pathways of the model organism C. elegans. According to multiple hypotheses of depression, it is majorly caused by dysregulation of monoamine neurotransmitters, like serotonin and dopamine. We used c. elegans to model this neurological disorder. Specifically, egg laying behavior and lipid composition in c. elegans were investigated. These functions share common neurotransmitter pathways that are implicated in depression. Additionally, a survey was conducted at WPI to contextualize these results in terms of impact on people by demonstrating depression prevalence. Results showed that Selegiline impacts the egg-laying timeline of c. elegans, where more eggs are laid on day 1 and 2 compared to control. Relative analysis of lipid assay data revealed that Selegiline increases saturated fatty acid content and significantly decreases polyunsaturated fatty acid content. This indicates potential FAT-2 or FAT-7 enzyme dysregulation. The results of the survey identified correlations between perceived stress, socioeconomic status, and depressive symptoms in WPI students. Additionally, on average WPI students scored a 24.2 on the CES-D scale, which assesses

depressive symptoms, a score over 16 is considered depressed. It is important to note that these results were obtained during the COVID-19 pandemic and may not be generalized to other populations or time periods. Overall, these results highlight the prevalence of depression and the importance of understanding the physiology of the disease while providing insight into the potential biological mechanisms implicated in depression.

Faculty Mentors: Dr. Angela Rodriguez & Dr. Jagan Srinivasan

Pregnant Women's Experiences in the Workplace: Thematic Analysis and Recommendations for Improvement

Ashley Danielson
Psychology - WPI

The purpose of this work was to provide a set of recommendations that enforce supportive practices regarding pregnant faculty and staff at a higher education organization. There is limited research regarding the impact policies and benefits have on pregnant faculty and staff working in higher education. This research presents three studies to address these gaps. Study 1 compares existing pregnancy-related policies of three comparable higher education organizations and the applications of said policies. Study 2 presents themes and opportunities for improvement that emerged from interviewing fifteen employees, who have been pregnant within the last three years, at the organization evaluated. Study 3 evaluates findings from the two previous studies in a SWOT analysis to discern the plausibility of implementing recommendations. Results of Study 1 revealed that the evaluated organization has strengths to its policies and benefits but, compared to other organizations, there is room for improvement as to how some benefits are implemented, for instance, locations for lactation. Results from Study 2 revealed that although participants criticized their workplace and described areas for improvement, namely easier access to policies and benefits documents, they still describe their overall experience as positive. Results from Study 3 revealed the recommendations to be made to improve the evaluated organization, such as developing one central location for all work-family related documents and information. Overall, findings emphasize the importance of including both staff and faculty in higher education research and the impacts work-family related policies and benefits have on employee perceptions of their workplace.

Faculty Mentors: Dr. Jeanine Skorinko, Dr. Angela Rodriguez, & Dr. Adrienne Hall-Phillips

The Effect of Parenting Style on Degree of Self-Efficacy and Hardiness and Resultant Success in Adapting to College

Mikaela Newman '21
Psychology

Existing literature suggests that parenting behaviors influence self-efficacy and hardiness in youth and that high levels of these characteristics are associated with better adjustment to

college overall. In order to observe the correlation between parenting style, hardiness and self-efficacy, and adjustment to college, participants completed self-report measures of parenting style received, self-efficacy, hardiness, adjustment to college, and depression, anxiety, and stress. Analysis found significant positive correlations between parental involvement, autonomy support, and warmth and self-efficacy and hardiness. Significant negative correlations were observed between self-efficacy and hardiness and depression, anxiety, and stress. The results suggest the possibility of a mediation effect of self-efficacy and hardiness between parenting and susceptibility to depression, anxiety, and stress, illustrating the role of parents throughout on healthy development and mental health. This role is partially filled in helping children learn self-efficacy and hardiness, protecting them from the negative impacts of the more challenging parts of life.

Faculty Mentor: Dr. Alison Stoner

"Medusa": A Video Game Designed to Affect Rape Myth Acceptance Levels

Alexis Boyle, Dalila Jarvis, Tyler Sprowl, Joy Tartaglia
Psychology - WPI

We designed a video game called "Medusa". Players start the game as Perseus and their goal is to defeat the evil monster Medusa. Once the player is about to kill Medusa, a flashback occurs which transfers the player into Medusa. Now, players learn about Medusa's life before she is cursed, her implied sexual assault, and why she is cursed. They play until Medusa is about to be killed by Perseus, and then the game ends. We engaged human participants throughout the game design. First, some participants played a version of our game in a paper/pencil format. This allowed us to test the storyline of the game. After developing the first electronic prototype, participants played that version of our game and provided feedback on the storyline, the controls, and anything confusing. After incorporating that feedback, we again recruited participants to play the game to provide additional feedback. We hypothesized that playing Medusa would lead to increased empathy towards Medusa and reductions in rape myth acceptance and hostile sexism. To study this, participants were randomly assigned to play one of two versions of the game: 1) playing as Perseus only, or 2) playing as Perseus and Medusa. After playing the game, we measured empathy towards Perseus and Medusa, player identification with these characters, empathetic concern, hostile and benevolent sexism, and rape myth acceptance. We are currently collecting data, but our prediction is that the game Medusa has the potential to increase empathy towards Medusa and lower rape myth acceptance levels.

Faculty Mentors: Dr. Jeanine Skorinko, Dr. John Sanbonmatsu, & Dr. Jennifer deWinte

Poster Session
5:30 PM – 6:30 PM
Zoom ID: 960 0727 5655

Row Reduction Algorithm in Python

Emily Armstrong ’23
Mathematics

The row reduction algorithm is clearly defined in linear algebra and has been coded far too many times. So why not code it again? During my first few weeks of this Spring 2021 semester when I learned the row reduction algorithm, I had an open-ended coding project, so I decided to just that and code a more interactive row reduction algorithm for students to practice understanding the steps involved in row reduction without having to do the actual math. This code ended up aided in my understanding of the elementary row operations involved in the row reduction algorithm, which we wouldn’t learn in class until 7 weeks after my code was completed. I am very proud of my coding work and would love to show it off.

Faculty Mentor: Dr. Brooke Andersen

Biodiversity of Green Algae From Desert Soils

Cameron Choquette ’22
Biology

Maintaining natural biodiversity is important for every ecosystem around the world. Green algae from deserts are still severely understudied. New species are discovered from soil crusts every year, but we are still only scratching the surface of the true soil biodiversity in drylands. Different substrates likely harbor different microfloras, and gypsum substrates are rare and chemically unique. Samples were collected from Organ Mountains (granite) and White Sands National Park (gypsum) in New Mexico and the algae isolated from these soils was characterized. The growth of the algal samples on agarized media was measured and recorded. Once the samples exhibited sufficient growth, DNA analysis through PCR amplification of the 18S and rbcl genes was performed and the data was entered into DNASubway for sequence alignment and phylogenetic analysis.

Faculty Mentor: Dr. Karolina Fučíková

The Unusual Ventral Light Reflexes of Fairy Shrimp (Branchiopoda: Anostraca)

Raymond Furgal ’21
Biology

Crustaceans are a sub-phylum of arthropods that have all the eye “designs” found in animals. Dorsal light reflexes are widespread in many aquatic animals, including crustaceans, and are behavioral responses to light in which the animal presents its dorsal surface towards a light

source. Branchiopods, a group of crustaceans, are thought to predominantly use light cues for orientation. Fairy shrimp (Branchiopoda: Anostraca) are unusual because they generally swim with their ventral side upward, which correlates with the direction of light that is typical for temporary pond environments. Fairy shrimp could use a ventral light reflex for orientation purposes. It remains to be seen whether anostracans use their simple eyes, or compound eyes, for light orientation. Here, we summarize findings of the dorsal light reflex of a subset of crustaceans. We also ask: how widespread are ventral light reflexes? Could excitatory/inhibitory pathways for reflexive behavior be reversed in fairy shrimp?

Faculty Mentor: Dr. Nicolas Lessios

Color, Textura y Movimiento

Paula Gómez ’22
Graphic Design

Infusing designs with a sense of movement, choosing the right colors, and enhancing them with textures, immerse the viewer into the composition more due to the endearing attraction to the visual and tactile senses. Graphic designers make great use of the Basic Principles of Design, the former elements being a crucial part of these foundations. Furthermore, color can be narrative because of the way it can affect our emotions and make us feel a certain way. For instance, in the poster of Vertigo, part of the *Hitchcock in the Park Poster Series*, red implies both the passionate emotions of the main character towards a woman and the dangers involved in the plot. Similarly, projects to be presented that will illustrate texture and movement, as well as color, are *Earth Day, TOC TOC’ title Sequence, The Impact of Agriculture on Climate Change, and Human Virus.*

Faculty Mentor: Dr. Lynn Simmons

Exploring the Characteristics and Diseases caused by Clostridium botulinum

Lauren Jakobs ‘22, Cassandra Saniuk, Olivia Sawicki ’22
Biology

Clostridium botulinum is a bacterial species which is known to cause the disease botulism. This gram positive, bacilli-shaped bacterial species was discovered in 1895 by Emile Pierre van Ermengem. The genome of *C. botulinum* consists of one circular chromosome that is 3,886,916 base pairs in length and carries 3650 predicted genes. This bacterial species is naturally found in soil, untreated water, or marine sediments, but it can also live inside the human body. *C. botulinum* is most likely to be transmitted to humans through poorly canned or preserved foods, ingestion of honey, inhalation of the toxin, or an open wound. The first set of symptoms with

someone who has developed an infection of *C. botulinum* includes nausea and diarrhea, which occur about 12-36 hours after ingesting the neurotoxin. Depending on the dose these symptoms will progress rapidly, followed by cranial nerve weakness and progressive symmetrical paralysis in the body. This paralysis can lead to respiratory failure and eventually death in 5-10% people infected. In order to diagnose this bacterium in a lab setting, you have to both culture and isolate the bacilli by using blood agar media and demonstrate the presence of the toxin by performing a mouse lethality assay. The botulinum toxin is the pathogenic component of the bacterium. This microbe can be controlled through temperature (heat), pH levels, and various chemical agents. In a human infection, it is difficult to control because of the emergence of drug-resistant pathogenic strains and there is currently no vaccine available to prevent botulism. Treatment for an individual infected with *C. botulinum* includes a botulism antitoxin that interferes with the botulinum toxin in the bloodstream, stopping symptoms from getting worse. In addition to treatment with the antitoxin, comfort measures and symptom treatment is done to help alleviate any severe symptoms. The incidence of botulism has been steadily decreasing and today there are approximately 110 cases per year in the United States. Understanding the pathobiology of C. botulinum will better help researchers determine how it can be prevented and treated.

Faculty Mentor: Dr. Aisling Dugan

ACE2 and its Involvement in Coronavirus Infections

Evan Kessinger ’21
Biology

SARS-CoV2 is the etiological agent of COVID-19, a viral infectious respiratory disease 2.9 million deaths and 132 million infections. Effective treatments for the disease are still lacking however the multiple safe and effective vaccines have been rolled out for public use. Angiotensin-converting enzyme 2 (ACE2) is the viral receptor for coronaviruses, such as SARS-CoV-1 and 2. ACE2, found on permissive host cells. ACE2 binds with the spike protein of SARS-CoV-2 and this binding initiated the viral entry into the cell. ACE2 is a membrane-bound peptidase which plays a physiological role in regulating blood pressure through the renin-angiotensin system. The renin-angiotensin system uses small peptide chains called angiotensin to signal vasodilation and vasoconstriction, with ACE2 cleaving angiotensins leading to vasodilation. Genetic mutations in ACE2 are associated both with high blood pressure and higher rates of COVID-19. ACE2 is also conserved throughout many mammalian species. This is further supported by mink, cat, and mice species becoming infected with SARS-CoV2 and also suggest these animals could serve as reservoirs for reinfection and increase the viral mutation rates. Further study of ACE2 can give insight into new treatment options for COVID-19 such as ACE2 blocking antibodies, small molecule inhibitors and soluble AVE2 receptor. Together these suggest that ACE2 is an important protein for the study of coronaviruses such as SARS-CoV-2 as well as other emerging coronaviruses and how to prevent their spread.

Faculty Member: Dr. Aisling Dugan

Spying Companies: The Oblivious Generation

William Knoll ‘21
Computer Science

The project Professor Ali Al Faris and I worked on is about the growing issue of personal data collection by corporations. In it we delve into the technical and moral aspects of such practices, as well as question its ethicality. In particular we investigated both Google and TikTok (at the time, a foreign owned) and conducted research on the differences between their privacy policies (how they conduct data collection). More importantly, in our research, we conducted a survey to collect opinions and public knowledge of these current and pressing matters of the digital world. From this, we further developed our questions and possible theories regarding American complacency and knowledge of online data collection. The presentation/poster will highlight our comparisons between Google and TikTok’s public opinion as well as illustrate our survey research in both graphical and informational context.

Faculty Mentor: Dr. Ali Al Faris

Medial Tibial Stress Syndrome in Female Military Recruits

Rachael Pulsone ’21
Human Services and Rehabilitation

Shin splints, also known as medial tibial stress syndrome (MTSS), is one of the most common injuries experienced by military recruits. Although female recruits represent a smaller portion of the military, they are at higher risk for developing MTSS. The goal of this paper is to review current studies about MTSS and its expression in recruits as it differs across gender. Studies in this paper cover risk factors, theories of pathology, etiology, and treatments of MTSS. In assessing the literature, women appear to be at greater risk for MTSS than their male counterparts. This difference may be attributed to a number of female specific attributes such as larger hip displacement, *q* angle, smaller tibial cross-sectional dimensions, excessive foot pronation, and differences in lower extremity mechanics when running. Due to the small number of studies exploring female military recruits' experience of MTSS further research is needed in this area.

Faculty Mentor: Dr. Christian Scannell

Social Connection and Anthropomorphization of Nonhuman Agents

Matthew Sanchez ‘22 and Taylor Poland ’22
Psychology

Feelings of social disconnection may motivate individuals to seek out social relationships in their environment, resulting in anthropomorphization. In a 3x2 mixed design, participants were asked to take the Big Five Inventory personality assessment and a pre-test regarding their beliefs in supernatural agents and how they anthropomorphize their pets. Participants were then randomly assigned to view a video that will induce feelings of one of three conditions (humanity,

humor, and disconnection) before taking a post-test asking identical questions used in the pre-test. The present study found that there was a significant main effect of time for both supernatural belief hypotheses.

Faculty Mentor: Dr. Leamarie Gordon

Martial Arts Therapy and Clinical Depression

Erin Smith ’21
Human Services & Rehabilitation Studies

Martial arts are one form of movement that is especially well suited for therapeutic practice for several reasons. The principles of traditional martial arts are rooted in mindfulness practices. Furthermore, martial arts therapy should continue to be researched as a viable option for treating mental illnesses such as clinical depression due to the effectivity of other movement therapies in treating clinical depression, the stigma surrounding mental illness in men, despite its prevalence, and the results of studies in which martial arts therapy was positively correlated with improved mental health. Finally, martial arts therapy is not associated with the side effects of psychopharmacological interventions which may not be safe for certain patients. While no treatment is effective for every patient, martial arts therapy is unique in its ability to access populations who might be at risk for clinical depression and provide a bio-psychosocial treatment with very low side effects.

Faculty Mentor: Dr. Gary Senecal

A Review of the ‘Flesh-Eating’ Bacterium, Streptococcus pyogenes

Deyana Underwood ’23
Biology

Streptococcus pyogenes, known as Group A Streptococcus (GAS), is a well-studied bacterium due to its ability to cause multiple human diseases. Some of these diseases are non-invasive such as strep throat while others are more invasive and life-threatening such as necrotizing fasciitis. Originally isolated in 1874, *S. pyogenes* is classified as a non-motile, Gram-positive, cocci-shaped bacterium that appears in chains or pairs. *S. pyogenes* has multiple strategies for evading the host’s immune defense. This talk focuses on its unique virulence factors including the M protein tail and its ability to perform beta hemolysis. Other important details such as clinical symptoms, methods of control and immune response will be discussed. As antibiotic resistance is on the rise, there is still more research needed on *S. pyogenes* to develop novel and more effective treatments for diseases caused by the bacterium.

Faculty Mentor: Dr. Aisling Dugan

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Finally, thank you to Joseph Jepsen ’22, Assumption University, for designing the Symposium logo for this year.

Next year’s Symposium will be held in April 2022

Please mark your calendars!

Assumption University