



**Dietrich Honors Institute
Senior Thesis Projects
Spring 2020**

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Introduction from the DHI Director

April 14, 2020

I am immensely proud of the DHI Seniors who persevered through the interruption of the Spring 2020 semester to complete their thesis papers. Below you will find a range of projects that demonstrate students' engagement with pressing public issues close to home and around the world. Our DHI Seniors have applied their knowledge, skills, and experience to questions about the environment, medicine, law, and literature to name a few.

Amidst this global crisis, I hope our Seniors, and all our DHI students, will find strength in what they have achieved at Thiel College. Their curiosity, diligence, and determination will serve them well in these uncertain and distressing times.

Congratulations to the DHI Class of 2020! On behalf of the Dietrich Honors and Thiel College communities, know that you have our support and admiration. We look forward to your future joys and successes.

With gratitude

A handwritten signature in black ink, appearing to read 'Sheila Nowinski', written in a cursive style.

Sheila Nowinski, PhD

Director, Dietrich Honors Institute

DHI Senior Thesis Projects, Spring 2020

Jacob Carter DeRue

Children's Stories in The Chair of Truth: Critical Perceptions of Child Witnesses in a Court of Law

Dr. Marie Courtemanche, Associate Professor of Political Science

Dr. Kristel Gallagher, Associate Professor of Psychology

Trial juries composed of peers are seen as a cornerstone of justice, as they are believed to result in a more equitable and impartial sentence. A key aspect of these specific types of trials are the witnesses who are presented to the juries. Legitimacy can be called into question in cases where the witness is a child. The goal of this study is to research whether a key witness' age (child less than 12 years old) has an effect on a potential juror's perception of the validity of the witness' testimony in a scripted trial. Using an experimental survey on the student body at Thiel College, I hope to find that people will have a more critical opinion of witnesses younger than 12 years old, due to the fact that children have the potential to be influenced by authoritative forces. The findings of this research may undermine the practice of using child witnesses in a court of law. Understanding this issue is of particular importance given the need for the fair administration of justice and everyday citizens becoming more critical of the court in this highly polarized political environment.

Jack Fontana

Identifying the Viability of Bacteriophages as an Alternative to Antibiotics

Dr. Sarah Swerdlow, Associate Professor of Biology

Dr. Sheila Nowinski, Director, Dietrich Honors Institute

Bacteriophages (phages) are viruses that have the ability to kill bacteria that infect humans. Phages can be used to treat a variety of bacterial infections that can cause sickness or even death. The current treatment for bacterial infections is antibiotics, but the problem with that is the

genetics of bacteria. Bacteria undergo rapid mutations that change their genetics and can make them antibiotic-resistant. This makes the antibiotics nearly ineffective in fighting the bacterial infection, and over time most bacteria have or will evolve that will result in them being able to overcome the effects of antibiotics. This results in the need for an alternative, which is where phages come in. Phage therapy is the practice of treating bacterial infections with bacteriophages. Phage cocktails are a combination of multiple phages which are administered to a patient with the hopes that the cocktail will be able to kill the bacteria without the bacteria becoming resistant to the phage. Currently, phage therapy is not allowed to be used on the public population in the United States, although many studies have shown that phage therapy is just as effective, if not more effective, than antibiotics.

Chase Gifford

“To Look Powerful Is to Be Powerful”: Heroines in Young Adult Fantasy Literature

Dr. Sheila Nowinski, Director, Dietrich Honors Institute

Professor Brenda Delmaramo, Lecturer of English

Power can be interpreted in different ways. In young adult fantasy literature specifically, power is often wielded by heroines. This paper examines popular young adult series *A Court of Thorns and Roses* by Sarah Maas and *Red Queen* by Victoria Aveyard, tracing the power of female heroines from their origin story to their ultimate strength. How does magical, political, and personal power develop across the pages? How does power affect the heroine and others' perceptions of her? Is appearing powerful enough to wield and maintain power in these stories?

Gage Gladysz

Utilizing Next Generation Sequencing to Sequence and Classify Marine Cyanobacteria for Drug Discovery

Dr. Neil Lax, Assistant Professor of Neuroscience

Dr. Laura Pickens, Associate Professor of Psychology

Cyanobacteria are a group of photosynthetic prokaryotes that are well-known in the drug discovery field for their distinct ability to produce useful secondary metabolites. Among these metabolites are compounds that have binding affinity to human proteins such as serotonin receptors. It is believed that these marine cyanobacteria synthesize these metabolites to reduce predation by marine invertebrates. In this descriptive study, we used an Illumina NextGen MiSeq to sequence the 16S rRNA gene from collections of cyanobacteria made in Curacao. This was done to be able to determine and classify the dominant species that may produce active compounds. The 16S gene was chosen due to its reliability of sequence readouts with NextGen sequencing techniques. After the 16S gene was sequenced for our samples, we then created a phylogenetic tree of a specific sample.

Laura Hardner

“Don’t Fear the Reaper”: Examining Death in Literature as Expressions of Grief

Dr. Mary Theresa Hall, Professor of English

Professor Brenda Delmaramo, Lecturer of English

Throughout history, literature has provided an outlet for humans to relate to one another. The use of language allows people to convey emotions and connect with others. There is no event more relatable than the one we will all inevitably experience: death. In their creative works, many artists have conveyed this fear of mortality, specifically through the personification of death as a character. This study examines the personification of death in multiple selections of media – from medieval to modern literature – from the perspective of the Kübler-Ross Model, colloquially known as the Five Stages of Grief. These selections include Chaucer’s “The

Pardoner's Tale" from *The Canterbury Tales*; John Donne's poem "Death Be Not Proud"; the medieval play *Everyman*; the episode "Nothing in the Dark" from the 1960s television series *The Twilight Zone*; and Marcus Zusak's young adult novel, *The Book Thief*. This project blends the fields of psychology and literature by incorporating empirical studies highlighting the strengths and weaknesses of the Kübler-Ross Model. It also provides critical analyses of these selections. The objective of the project is to enhance the understanding of death as the ultimate human experience.

Brent J. Henderson

How Past Industrial Areas of the Shenango Valley Have Influenced the Shenango River, Using Salamander Survey Data Analysis.

Dr. Fatimata Pale, Professor of Biology

Dr. Anna Reinsel, Associate Professor of Environmental Science and Chemistry

Industry in the Shenango Valley of Pennsylvania has held a wide variety of industrial businesses in its past. These industries have processed a large range of materials from coal, iron ore, asphalt, harsh chemicals, and oils. Although many businesses have closed or relocated out of the Shenango Valley, their effects are still seen today in the form of abandoned warehouses, empty parking lots, and pollution both above ground and below. In May of 2019, a salamander survey was conducted by the Shenango River Watchers to research the effects of the recent PCB finding on the river that has now closed all fish consumption downstream of the Shenango Lake Dam. The Westinghouse Electric site, which was recently cleaned up in 2011, is now leaching PCBs into the Shenango River again, depositing pollutants into water and streambed sediment. The results of the survey show little effects on salamander populations when look at the Simpson's Index of Diversity. Conductivity (heavy metals) in the river water increases as water moves through past industrial sites. Temperature also increases as water flows downstream. These are both primarily cause by pollution from past industrial activities, and the development of sites that remove or degrade habitat around riparian areas of the Shenango River. Printed with permission of B.J. Henderson

Amber Hoskins

The Effectiveness of Sports Participation on Child Development

Dr. Natalie Homa, Assistant Professor of Psychology

Dr. Sheila Nowinski, Director, Dietrich Honors Institute

The effectiveness of sports participation on child development A.L. Hoskins N.L. Homa, Ph.D., Professor of Psychology; S. Nowinski Ph.D., Assistant Professor Department of History Many parents encourage their children to participate in athletics. However, in recent years the level of youth sports participation has declined. The aim of this study is to examine the effects of sports participation on child development. A literature review studies the positive and negative effects of sports on physical, social, and cognitive development. An analysis of data from the Aspen Institute Project Play show a high correlation of positive child development and sports participation. The study concludes with a discussion of the potential consequences of declining sports participation and how the decline in sports participation could be harming the development of our children.

Sebastian Kolker

Behavioral Theory of Gamers: by Gamers

Dr. Shannon Deets, Assistant Professor of Psychology

Dr. Cynthia Sutton, Professor of Sociology

There tends to be a social gap between “gamers” and “non-gamers”, and part of this gap arises from non-gamers just not understanding gamers and their behaviors. So, in order to help foster a better understanding between gamers and non-gamers, I am researching common behaviors in gamers, and why they have these behaviors according to gamers themselves. The two major components of this paper are one, the psychological side of this that will feature some of the already conducted research on this topic and an informed look into the results, and two, the survey side that will feature asking gamers themselves why they think they do it. The second component is what will make this unique from the other related studies on this topic, as it will be

centered on what they believe the reason behind it is. As a gamer myself, I will also be adding my own thoughts on the matter, with me also approaching it with an open mind so I can best represent the different reasons that may exist behind these behaviors.

Theresa Kretzmer

Attitudes Toward Psychology: Is Psychology Viewed as a Soft Science?

Dr. Natalie Homa, Assistant Professor of Psychology

Dr. Kristel Gallagher, Associate Professor of Psychology

Psychology has at times been regarded as a “soft science.” This term may have negative connotations, and can lead people to disregard its findings, look down their noses at its’ practitioners, and to defend their fields by arguing that they aren’t “soft sciences.” However, what exactly is a hard science? What is a soft science? Why does one seem superior to the other, and is that its intended meaning? “Soft science” has been used by some to mean that a field labelled with this term lacks intellectual rigor in some cases (Hayward, 2019). In others, the term is instead used to say that a science is soft when it has many intangibles, the variables can be difficult to isolate and control. Hard sciences can thus have more reliable and tangible results, while soft sciences rely more on correlations (Hellmenstine, 2019). To discover the nature of this term and its influences on perceptions of fields, participants were asked to complete online surveys rating professionals in various fields on their perceived warmth and competence. In addition, participant characteristics, such as age, career, and gender identity, were examined as predictors.

Matthew O'Connor

Should AI Be Implemented into the Auto Industry?

Dr. Jingnan Xie, Assistant Professor of Math and Computer Science

Professor Anthony DiCarlo, Lecturer of Math and Computer Science

As society faces a new problem we are forced to come up with a solution. Technology has helped us progress forward. These changes have either helped us or hurt us. The newest bit of technology that we need to explore is AI driven cars. While the technology is relatively new it has seen great strides. The question becomes is it really a good idea to implement AI into every car. On the face value it will help with drunk drivers and overall safer transportation. However there are unseen circumstances where AI driven cars can do more damage than good.

Jacob Paci

The Impact of Media on Attitude Polarization: How Media Viewership Affects Opinions on Gun Control

Dr. Marie Courtemanche, Associate Professor of Political Science

Dr. Jared Hanneman, Assistant Professor of Sociology

Previous research has shown that viewing media content can influence an individual's perception of various political issues. The focus of this study is to see if increased media usage affects perceptions on gun control. Because attitudes on guns are deeply polarized it is expected that media coverage may have a different impact on Democrats and Republicans. Republicans who view more media should be less supportive of gun control legislation while the opposite should hold for Democrats. These expectations are supported using the 2016 American National Election Survey. The findings suggest that while the media may influence perceptions on gun control their power is constrained by the prior beliefs of an individual.

Brenna Parsley

The Perfect Storm: Looking at Links between Human Trafficking and Natural Disasters

Dr. Kristin Carlson, Assistant Professor of Languages

Dr. Elizabeth Frombgen, Vice President of Academic Affairs and Dean of the College

What is the correlation between natural disasters and human trafficking? This paper looks at Hurricane Katrina (2005) in the United States as well as the 2010 earthquake in Haiti. Looking at

existing research in the fields of political science, economics, law and social work, as well as first-hand accounts of victims of human trafficking in these areas, will uncover the implications of human exploitation and vulnerabilities that can arise or increase with natural disasters. This interdisciplinary project seeks to shed light on the complexities of emergency and humanitarian response as well as reconstruction efforts post-natural disaster. During these times of unavoidable turmoil, it is important to prioritize the possibility of these human rights violations and unwind these complex issues that come with natural disasters.

B.H. Scalise

Gun Control in Schools

Dr. Jared Hanneman, Assistant Professor of Sociology

As school shootings have began to occur more often in the United States, answers to the problem are being demanded. Everyone wants their family and friends to be able to get an education and return home safe at the end of the day. In the case of these tragic events, less control can save innocent lives. Having armed guards or teachers in each school building can help prevent some of these casualties. In the past school shootings that have happened, police response time has been too slow to stop an active shooter before significant damage is caused. There are schools that don't have a police station close enough to make a real difference in these events. Banning guns completely will only stop law abiding citizens from getting the guns. Criminals will still get illegal guns off the streets like they already do. Armed civilians and guards have proved to be beneficial in active shooter events. They have been able to eliminate threats within seconds before significant damage is done. In schools that already have armed guards and teachers, it has been a success in that there have been no accidental shootings. There have also been limited cases where anyone has tried to attack these schools.

Elijah Sklack

Third-Party Logistics: A Look at the Supply Chain and whether Companies Should Move the Products Themselves

Professor Angelo Giannini, Professor of Business Administration and Accounting

Professor John Gomolchak, Assistant Professor of Business Administration and Accounting

The purpose of this paper is to take an analysis of the financial risks and or benefits of a company utilizing third-party logistics to move its product. Modern manufacturers and major companies utilize logistic companies every day to move their products and seem to have even acquired a dependence on them. This paper takes a cost analysis look at the operations of overseas logistics operations and applies it to an international manufacturer and the Fortune 500 company that hired them. Expected findings to show that the operation cost of an operation like this is too costly for a manufacturer to move product across oceans for just one company. Further, it is not worth the time or the investment of a large company to engage in moving product from multiple countries into one area.

Devan VanVliet

Identifying the Medicinal Capabilities of Turmeric and Its Effectiveness as an Alternative Medicine

Dr. Kathryn Frantz, Professor of Chemistry

Dr. Anna Reinsel, Associate Professor of Environmental Science and Chemistry

Turmeric has been utilized in Ayurvedic medicine for thousands of years to treat inflammatory conditions. Ayurvedic medicine is one of the world's oldest medical systems and originated in India. Turmeric comes from the roots of the *Curcuma Longo* plant and contains three constituents; curcumin, demethoxycurcumin and bisdemethoxycurcumin. Curcumin, the main component in turmeric, is a very pleiotropic molecule capable of interacting with multiple molecular targets. This allows turmeric's constituents to possess anti-inflammatory, antioxidant, hepatoprotective, and other therapeutic properties. These properties have been tested and observed through numerous animal and clinical studies. One animal study showed turmeric curcuminoids injections given to female Wistar rats significantly helped decrease joint inflammation in the Wistar rats that suffered from acute and chronic phases of rheumatoid arthritis. A clinical study involving 45 people compared turmeric curcuminoids and

phenylbutazone effectiveness at treating spermatic cord edema after surgery for inguinal hernia or hydrocele. The results showed that the intensity score decreased by 84.2% in the group taking the turmeric curcuminoids and decreased by 86% in the group taking phenylbutazone. Based on results from previous studies turmeric can be viewed as an effective therapeutic agent in assisting in the treatment of various diseases.