SYMPOSIUM

TWENTY-FIRST ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

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TUESDAY, APRIL 9, 2024

AFTERNOON CONCURRENT SESSIONS

Poster Presentations (P)

Carl Grant Events Center	Student Presenters
12:30-2:00 p.m.	Hayden Phillips (CHE) Abigail Albin (CHE) Tanner Parmely (CHE) Ian Banderchuk (EGR) Zane Bolton Benjamin Kuhl, and Kyle Whitmark (EGR) Marbry Castellaw and Tabathia Keyton (EGR) Jacob Smith and Shane Tendo (EGR) Andrew Myers and Shane Tendo (EGR) Ethan Brasher (EGR) Michael Kirk (EGR) Colby Davis and Braeden McAlister (EGR) Timothy White and YuXuan Zhu (EGR) Caleb Krueger (EGR) Jake Lancaster, Jude Lampley, and Amy Nason (EGR) Mikaila Rogers (EGR) Nathanael Madison and Aldric Zeak (EGR) Landon Haywood, Eli Patton, and Eli Snelson (EGR) Jonathan Brewer and Jacob Carbonell (EGR) Jacob Arehart and Ryan Keeton (EGR) Patrick Basie, Ryan Metcalf, and Jacob Smith (EGR) Nathanael Thomas (EGR) Daniel Lancaster (EGR) Micah Valdivia (EGR) Brian Julian, Dustin Lane, and Michael Reiser (NUR) Shannon Lantz, Andrea Montani, and Joshua Sellman (NUR) Samuel Jones, Evan Parkinson, and Samuel Vrinios (NUR) Krystle-Anne Crespo, Reece Moody, and Tejal Patel (NUR) Carmen Abarca, Amy Haynes, and Ithzel Solis (NUR) Crystal Hill and Ashley Walkner (NUR) Melanie Collazos-Valencia, Emily Fulkerson, and Julia Stauffer (NUR) Cassie Garner, Macy Morrison, and Aubrey Maxwell (NUR) Devin Daffron, Paige Eberle, and Laura Ellis (NUR) Meghan Pinson, Javaris Polk, and Lindsay Votaw (NUR) Alexis Alexander, Tiffani Ivery, and Maxwell Obasuyi (NUR) Drew Lewis, Phillip Tatum, and Gaines Wilson (NUR) Erica B. Thompson (NUR) Megan Burkhard (NUR) Jordan Fentress (NUR) Kayla Bonilla and Brooke Work (NUR) Jordan Bell and Collin Janke (NUR) Jessica Howell and Heather Vega (NUR) Taylor Bishop and Katie Yewell (NUR) Kevin Brooks (NUR) Kelsea Brannon and Henrry Garcia (NUR) Angel Guy (NUR) Robert Harrison Smith (NUR) Jerry Nguyen and Andrew Sayres (NUR) Daniel Baker and Wright Hobgood (NUR)

SCHEDULE

Poster Presentations (P)

Carl Grant Events Center	Student Presenters
12:30-2:00 p.m.	Cassie Moseley and Payton Naifeh (NUR) Mary Kim Ward (NUR) Charles Carter and Shane Martien (NUR) Xinyue Shen (PHRM) Collin N. Fiorentini (PHRM) Makenna Tiffany (PSY)

Oral Presentations (O)

Dept.	Room	Student Presenters	Time
ART Session Chair: Haelim Allen	PAC D-3	Olivia Felis Anna-Asher Baine Emily Gray Austria Eckenrode Abby Kraus Adelaide Thompson Grace Rodriquez Alexandra Brown Noah Windham	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m. 4:20 p.m. 4:40 p.m.
BIO Session Chair: Robert Bowen	WH 101	Marissa Montandon Sarah Greenwood Clara A. Kelleher Anna McCredy Ngan Kim Dong Megan Walker Sarah McGee	1:40 p.m. 2:00 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m.
BIO Session Chair: Andy Madison	WH 102	Gage Harrison Anna Hayes Prabhavi Aghamkar Gracie Shaddox Ben Smith Addison Harwell	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m.
BIO (Graduate)		Sammy Bakeer Sidney Morgan Cagle Emilee McLean Andrew Logsdon Brooke Hampel	March 27 April 3 April 5 April 10 April 17
BUS/COM/HIS SOC/THM Session Chair: April Rowsey	JEN 325 or BAC 44	Rachel Emery (BUS) Micah McGee (BUS) Bella Bianchi (BUS) Madeline Farley (COM) Abigail Gilbert (HIS) Mary Beth Propes (SOC) Daria M. Guthrie (THM)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m.

CSC Session Chair: Brian Glas	PAC A-7	Jacie Johnson Michael Sickle Luke Andre and Gavin Schroeder Alpay Altuntas Jessica Beal Alex Bope and Emily Rowland Ryan Boulds Cole Harris Isaac Johnson Preston Nabors Sterling Proctor Caleb Starkey Sun Kit Tsui Grace VanLiere	12:00 p.m. 12:20 p.m. 12:40 p.m. 1:00 p.m. 1:20 p.m. 1:40 p.m. 2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m. 4:20 p.m.
ENG Session Chair: Chris Bailey	PAC D-53	Katherine Anne Thierfelder Faith Behrens Sarah Grace Patrick Eunice Tan Samuel Stevens	1:40 p.m. 2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m.
LAN (ICS/FRE/SPA/ALNG) Session Chair: Jean Marie Walls	Language Lab	Lydia McGinnis (ICS) Avery Chenault (ICS) Abigial Gilbert (FRE) Magdalen Wills (SPA) Hannah Dyer (SPA) Maddy Piefer (ALNG)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m.
NUR/EGR/PHY Session Chair: Shari Wherry	WH 202	Jennifer E. Williams (NUR) Heather Moran (NUR) Timothy Boccarossa, Vishal Karmacharya, Nathanael Madison and Aldric Zeak (EGR) Tabitha Keylon (PHY)	2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m.

ART

From Overload to Efficiency: The Role of Minimal Layouts in UX Optimization (O)

Presenter: Olivia Felis
Faculty Project Advisor: Haelim Allen

Researchers are consistently expressing how decision fatigue and choice overload negatively affects the human brain and lessens the ability to perform tasks quickly. In a fast-paced world, the quicker a user can complete an online task using a website or app, the more appeal they have to the UX, or User Experience. To achieve this, designers have studied the paradox of choice, created by Barry Schwartz, to understand how a plethora of choices overburdens a user. There are certain instances in which maximal web design is appropriate to use, but the most successful businesses use a minimal layout. They have achieved a delicate balance of efficient, but limited choices, while presenting the effect of full opportunities. Examining the user interface (UI) and user experience (UX) of the most successful web and app designs will expose the significance of minimal layout design.

The Beauty of the Everyday (O)

Presenter: Anna-Asher Baine
Faculty Project Advisor: Christopher Nadaskay

Throughout art history, a common theme in subject matter has been everyday scenes, often in places that the artist felt familiarity. These pieces speak to the viewer in a way that others do not. Van Gogh's paintings of Arles, France clearly convey the delight that he took in the scenes that surrounded him. Monet's paintings of his beloved garden demonstrate the artist's affection for that carefully cultivated place. Whenever an artist paints a scene that they know and love, they are inviting the viewer to join them in a memory. With this series, "The Beauty of the Everyday" I am hoping to invite the viewer to see the beauty of places that the Lord has used to supply me with many wonderful memories and to hopefully give the viewer a new scene to look back on with joy.

Impressions of Israel: Capturing the Feel of a Place Through Painting (O)

Presenter: Emily Gray
Faculty Project Advisor: Christopher Nadaskay

This semester, I have explored expressionistic landscape painting. My work has focused on oil paintings of places I visited in Israel this past summer. Expanding on initial sketches and paintings I did from life on-site, I created a larger-scale, more permanent body of work. My goal has been to capture not only the landscape itself as a photograph would, but also to use the technical aspects of the craft of painting to express the emotional and spiritual significance of each place as I remember it. My work demonstrates experimentation and a progression toward a manner of working that I feel best expresses my memories of Israel.

The Sincerity of Ephemerality (O)

Presenter: Austria Eckenrode
Faculty Project Advisor: Christopher Nadaskay

Portraiture dates back at least 5000 years ago. At that time, they were produced on Egyptian sarcophagi with the motivation to exalt those of the upper class or to commemorate the dead. The production of individual portraits has evolved since then, allowing for a great deal of freedom today in the arts. Now, artists explore portraiture as a means of expression of personal thoughts and ideas. The body of artwork I have crafted aims to capture the beauty of ephemeral moments and their sincerity. Observation of the people around us enables us to catch and retain those moments and reflect upon their significance. In order to achieve a more permanent record of those moments, candid photographs have been carefully chosen and rendered onto canvas. Each painting within the series aims to follow an overall cohesive style with a focus on color and value structure. Through these paintings, I am trying to elicit a deeper connection to themes of the value of a memory and the important role that painting can play in furthering our appreciation of beauty in others.

Spotlighting the Undervalued World of Prop Design: Examining the influence pertaining to Graphic Design History (O)

Presenter: Abby Kraus
Faculty Project Advisor: Haelim Allen

Films are an immersive experience that allows viewers to escape into an enchanting world of fictional reality. Seldom recognized, graphic design is a main contributor to the creation of these realities, specifically through the design of graphic props. Graphic props are designed elements such as signage, letters, packaging, posters, and other items that briefly appear, usually in the background of films. These props aid the production of films by visually authenticating, for the viewer, the believability of the cinematic world. The creation of a convincing prop requires extensive research in design history which informs prop design. The designer must reimagine past designs to establish the credibility of the prop and environment of that era. The iconic props evident in such films as *Bridge of Spies, Willy Wonka & the Chocolate Factory*, and *Harry Potter* are attributed to historical design movements. Unheralded as it may be, the impact of graphic design on the film industry is revealed through the examination of the seldom acknowledged world of graphic design props.

Digital Marketing in the Current Age on Brand Identity (O)

Presenter: Adelaide Thompson
Faculty Project Advisor: Haelim Allen

The age of social media has greatly affected how companies approach their online identities. Social media users look to be entertained more than marketed to—hence a change in many brands' online identities. Some of the more successful businesses who have made this switch are Wendy's, Duolingo, Hootsuite, and Washington Post. These diverse businesses prove to be excellent examples of how entertainment, trends, slang, informality, and less polished designs can be utilized to promote more user engagement. By altering their online identity to be less formal and corporate minded, they are better able to capture the attention of the younger generation.

Drawing Assessments: The Importance of Art Therapy (O)

Presenter: Grace Rodriguez
Faculty Project Advisor: Haelim Allen

Art therapy is used to assess and implement both two-dimensional and three-dimensional art mediums in order to help evaluate a client. The two-dimensional assessments implemented when starting the counseling process include the Draw-a-Person Test, the House-Tree-Person Test, and the Kinetic Family Drawing Test. These assessments will assess a client and qualities about them such as past and current experiences, background, and character traits. The Draw-a-Person Test uses the drawing medium to reflect the patient's self-concept by drawing a figure along with answering a series of carefully designed questions. The Kinetic Family Drawing Test also reflects the client's self-concept, but in a family unit. It also uncovers the nuclear self and internalized feelings, along with other aspects. The House-Tree-Person Test on the other hand focuses more on the conscious and unconscious information about clients, telling the therapist about the client's personality and how they may interact with people and the environment. These art therapy assessments help the client progress through counseling; however, it is important to start the counseling process at an early age in order to help develop healthy habits and tools through everyday life.

Ryan, Apeach, Ned and Friends—How Cartoon Caricatures helped a Corporation Stay on Top (O)

Presenter: Alexandra Brown
Faculty Project Advisor: Haelim Allen

Kakao is a corporate entity that has ties to many different businesses and services such as taxi drivers, banking, and most popularly, instant messaging in South Korea. As opposed to using other social media apps such as Snapchat or Instagram, 98.2% of Koreans use the popular messaging app KakaoTalk for all communication purposes, surpassing any other messaging platform used in South Korea. There are many factors that led to their success as the biggest messaging app in the country, but perhaps the biggest asset that draws in customers are their animated characters. A lion without a mane, a peach, a bad-tempered duck, and many more cartoon characters make up the faces of Kakao's entire franchise. Ryan the lion and his friends quickly became extremely popular due to their distinct personalities which encouraged users to connect with certain characters, and have helped to pave the way for Kakao to become one of the biggest companies in South Korea.

The Negligence of Effective Design (O)

Presenter: Noah Windham
Faculty Project Advisor: Haelim Allen

From the logo of a startup business to the website for multimillion-dollar companies, design as visual communication is needed in every area of brand identity. Yet as the demand for design grows, so does the demand for a consumer driven approach and the introduction of cheap substitutes for good design. Attempts to streamline design have offered solutions to clients' design needs yet neglect key elements of effective design such as brand identity and originality. As the line between design and consumerism blurs and as what defines a good designer becomes more ambiguous, the need for educated and skilled designers is greater than ever. ■

BIOLOGY [UNDERGRADUATE]

Low Contact Strategy to Measure Flutamide's Effects on Territorial Aggression in C57BL/6J Male Mice (O)

Presenter: Marissa Montandon
Faculty Project Advisor: Robert Bowen

Testosterone plays a key role in the regulation of aggression, physical activity, mating, and other behaviors influenced by the presence of an experimenter. This research explored the effects of an androgen receptor antagonist (flutamide) on territorial aggression in male C57BL/6J mice utilizing Silastic implants as a low-contact strategy for chemical delivery. A series of aggression trials were conducted on no-, high-, and low flutamide exposure groups. The time to an initial aggressive interaction and the total number of aggressive interactions with the unknown mouse were quantified. The introduction of flutamide at high and low concentrations resulted in a significant reduction in the total number of territorial aggressive interactions in the home cage 24 and 96 hours after implantation but appeared ineffective 192 hours post-implantation. This anti-androgen exposure methodology reduces confounding variables that impact mouse behavior and could prove beneficial to studying other androgen-related behaviors..

Effects of Blue Light Entrainment on Physical Activity and Behavior in Mice (O)

Presenter: Sarah Greenwood
Faculty Project Advisor: Robert Bowen

Exposure to blue light alters sleeping patterns and elicits negative behavior in humans. It is unknown if nocturnal behaviors in mice change after blue light exposure. The purpose of this study was to expose mice to blue light-emitting diode (LED) lights during the daytime restful period and evaluate nighttime activity for the potential changes to the normal participation patterns observed in mice exposed to white light. Wheel running distance, duration, and speed monitoring in C57BL/6J male mice occurred for 21 days. During the second week, a group underwent LED light exposure, and a different group experienced white LED light exposure. The lights were on a 12-hour light/dark cycle at full brightness during the exposure period. Blue LED light exposure did not appear to affect wheel running patterns. This indicates that the mechanisms adversely affected by blue light do not drive wheel running behavior.

Inhibitory Mechanisms of Herbal Extracts on *Staphylococcus epidermidis* Biofilm (O)

Presenter: Anna McCredy
Faculty Project Advisor: Esther Choi

Staphylococcus epidermidis is a commensal bacterium but can cause opportunistic infections by forming biofilms on medically implanted devices. Biofilms account for 80% of microbial infections and increase morbidity and mortality rates. Biofilms, multicellular communities of microbes, offer protection for microorganisms against host immunity and antibiotics. Our research aimed to determine the effectiveness of three herbal extracts in disrupting biofilms of *S. epidermidis*. Curcumin, Timosaponin-AIII, and O-Acetyl-L-carnitine hydrochloride showed a 33%, 30%, and 70% reduction in biofilm formation, respectively, without interfering with bacterial growth. These results demonstrate that the herbal extracts are effective at preventing biofilm formation without exerting selective growth pressure. Taken together, herbal extracts show promise as alternative and complementary measures to reduce staphylococcal biofilms, potentially providing a clinical application that could significantly enhance the effectiveness of antibiotic treatments.

Determining the Proper Dosage of MK-2206 Needed to Inhibit Akt Pathway Activity in Mice (O)

Presenter: Clara A. Kelleher
Faculty Project Advisor: Robert Bowen

Sex steroids have demonstrated biological regulation of physical activity behaviors and various chronic diseases significant to human health. The presence of human technicians while administering compounds to manipulate the physiology of sex steroids adversely affect behavioral and health outcome data in rodents. The purpose of this study was to assess the utility of administering MK-2206, a disrupter of Akt-related pathways including the insulin signaling pathway, via low-contact strategies to reduce technician presence during observations. MK-2206 was administered via gavage under anesthesia to male (n=15) C57BL/6j mice split into three groups of differing concentrations of the compound. Both mass (g) [F=1.63, p=0.220] and blood glucose (mgdL-1) [F=1.85, p=0.145] were unaffected by MK-2206 throughout the study period. These data present no evidence of pathway manipulation, indicating administering MK-2206 via gavage with anesthesia is not a beneficial strategy to manipulate Akt-related mechanisms in male mice.

BIOLOGY [UNDERGRADUATE]

Using *CADII* and *VPS4B* Genes To Create Phylogeny Of The Wasp Family Rhopalosomatidae (Hymenoptera) (O)

Presenter: Ngan Kim Dong
Faculty Project Advisor: Jeremy Blaschke

Malaise-trap usage has greatly improved collection of understudied cricket-assassin wasps (Hymenoptera: Rhopalosomatidae), but many specimens have yet to be thoroughly examined for their evolutionary relationships. Twenty-eight DNA samples from four genera of Rhopalosomatidae (*Rhopalosoma, Paniscomima, Liosphex, and Olixon*), underwent PCR amplification, sequencing, alignment, and phylogenetic analysis using *CADII* and *VPS4B* to expand on the understudied diversity between the different genera. *CADII* was chosen because it is relatively free of introns, extreme nucleotide biases, and large hypervariable regions. The phylogenies showed that *Rhopalosoma* and *Paniscomima* are closely related. All four groups were recovered monophyletic, and every genus represents a unique lineage of cricket-assassin wasp.

Effects of Estrogen on the PDE5A Gene in Adult Zebrafish (O)

Presenter: Sarah McGee
Faculty Project Advisor: Faith Zamamiri-Davis

Infertility rates are on the rise, with around twenty percent of women having difficulties in conceiving. Birth control usage has also increased, especially in teens and young women at reproductive age. The PDE5A gene was studied for its role in oocyte maturation and development. 17α-Ethinylestradiol (EE2) is a form of synthetic estrogen that is found in most oral contraceptives. In this experiment, zebrafish (*Danio rerio*) were divided into three groups with varying exposure periods to EE2. After zebrafish were exposed to EE2, total RNA was extracted and quantified to measure the expression of the PDE5A gene using RT-qPCR. Minor behavioral and morphological changes were observed in the group exposed to EE2 for 96 hours. RT-qPCR data was inconclusive at the time of submission. However, additional trials are in progress to determine results.

Behavioral Adaptations and Interactions of *Lepomis macrochirus* and *Amatitlania nigrofasciata* (O)

Presenter: Gracie Shaddox
Faculty Project Advisors: James Kerfoot

Fish feeding habits and behavior can undergo significant adaptations contingent on species they interact with within their ecosystem, perhaps exhibiting cautious and evasive behaviors to avoid conflict. The goal of this study was to explore the interaction between tropical non-native species *Amatitlania nigrofasciata* (convict cichlid) and temperate native species *Lepomis macrochirus* (bluegill) to assess how the feeding behavior of each species changed in the presence of a conspecific, an allospecific fish, or alone. Food consumption, vigilance, and hiding behavior for both species were examined to determine how either species' behavior was influenced. A non-parametric Scheirer Ray Hare analysis was conducted and no significant differences in feeding and behavior were discovered across treatments for either species. Research treatments showed that conspecifics spent less time hiding than allospecifics and that bluegill did not change its feeding behavior or vigilance because of the invasive convict, indicating that these species are equal competitors.

Molecular Study of NFκB and Thyroid Hormone Activation in Macrophages (O)

Presenter: Gage Harrison
Faculty Project Advisors: William Thierfelder

Thyroid hormones (TH) are essential regulators of metabolism, and their activity is often upregulated during energy-requiring processes, including inflammation. Lipopolysaccharide (LPS) from gram-negative bacteria induces transcription of the TH-activating enzyme deiodinase-2 (DIO-2) in astrocytes by activating the transcription factor nuclear factor κB (NFκB), but it is unclear whether NFκB also regulates DIO-2 in pro-inflammatory macrophages. In this study, a gene-edited mouse macrophage cell line was screened for successful deletion of an NFκB subunit using a PCR-based enzymatic assay. Deletions were assessed using DNA sequencing. Cells with or without the deletion were treated with LPS and tested for expression of DIO-2 by RT-qPCR, with the expectation that cells containing the deletion would be unable to regulate it. Elucidation of this mechanism would help clarify connections between thyroid hormone regulation and inflammatory diseases.

Downstream Effects of Thrombin-Induced Par-1 Activation in Fibroblast Cells (O)

Presenter: Ben Smith
Faculty Project Advisors: Marc Lockett

An essential part of the wound healing process is the downstream activation of protease activated receptor-1 (PAR-1), which is induced by thrombin. The following research will test thrombin's ability to initiate the wound healing process. We will test fibroblast cells in the presence and absence of thrombin. Fibroblasts are the most important cells in the dermis and help capillary growth, collagen formation, and granulation tissue formation. Then, the expression of the desired genes will be measured. Thrombin induced PAR-1 activation has been shown to increase the expression of the genes CYR61 and connective tissue growth factor (CTGF). CYR61 promotes cell adhesion and angiogenesis. CTGF is a gene that promotes fibroblast cell proliferation. It is hypothesized that the presence of thrombin will induce the expression in PAR-1 regulated genes.

Effect of Inflammatory Environments on Proliferation and Migration of the MCF-7 Breast Cancer Cell Line (O)

Presenter: Anna Hayes
Faculty Project Advisor: William Thierfelder

The Michigan Cancer Foundation 7 (MCF-7) breast cancer cell line is a widely used cell line for medical research. This research project will seek to determine how iodothyronine deiodinase 2 and 3 (DIO2 and DIO3) transcription is regulated by pro- and anti-inflammatory stimuli of MCF-7 by cytokines such as TGF-B, PMA, IL-6. IL-10, and T3. The expression of DIO2 and DIO3 are related to cancer cell proliferation and migration. This research will seek to determine if breast cancer metastasis is partially regulated by DIO2 or DIO3. The results of this research suggest that DIO2 is not affected by the presence of cellular inflammation.

Plasmin Effect on PAR-1 Regulation and Angiogenesis (O)

Presenter: Addison Harwell
Faculty Project Advisor: Marc Lockett

Angiogenesis plays a role in cell tumor growth. During tumorigenesis there is an increase in blood vessels density to the tumor resulting in higher rates of cellular growth. Angiogenesis involves changes in gene expression, including genes affected by activation of protease activated receptor-1 (PAR-1), via proteolytic enzymes. This research examines plasmin's ability to regulate PAR-1 and its downstream effects. Fibroblast cells were grown in the presence and absence of plasmin to isolate the effects on PAR-1 signaling. Control RNA and experimental RNA from various timepoints of plasmin treated fibroblast cells have been extracted. The expression of two targeted genes have been measured. Cyr-61 mediates endothelial cell adhesion, and TNF-α promotes cell proliferation and angiogenesis. It was hypothesized that if plasmin is present, the upregulation of PAR-1 activity in 3T3-L1 cells will increase the expression Cyr-61 and TNF-α.

Transcriptional Regulation of Deiodinase 3 (O)

Presenter: Prabhavi Aghamkar
Faculty Project Advisor: William Thierfelder

Thyroid hormone triiodothyronine (T3) is a major regulatory hormone that regulates metabolic rate, protein synthesis, cell proliferation, and, for the purposes of this study, affects tumor metastasis. The deiodinase 3 (DIO3) gene codes for type 3 iodothyronine deiodinase, an enzyme that inactivates T3. DIO3 transcription is upregulated by interleukin-6 (IL-6), which is known to signal through the signal transducer and activator of transcription 3 (STAT3) pathway. In this study, MCF7 breast cancer cells were transfected with pCas9 STAT3 guide RNA constructs and assayed for deletion of STAT3 using a T7 endonuclease mutation detection kit. Results revealed a successful deletion of STAT3. To assess the proportion of IL-6-induced DIO3 expression regulated by STAT3, DIO3 mRNA levels were measured using quantitative reverse transcription polymerase chain reaction (RT-qPCR) in cells with or without STAT3 deletion after treatment with IL-6.

Using *POL* and *EF1a* to Create a Taxa Comprehensive Phylogeny of Rhopalosomatidae (O)

Presenter: Megan Walker
Faculty Project Advisor: Jeremy Blaschke

Rhopalosomatidae are under-studied cricket-assassin wasps distributed around the world. Creating phylogenetic trees of this family increases knowledge of biodiversity. This analysis provided genetic support for the current morphologically informed classification of all four genera within Rhopalosomatidae. PCR amplification, sequencing, alignment, and phylogenetic analysis were done using two genes: RNA Polymerase II (*POL*) and Elongation Factor 1 alpha (*EF1a*). Phylogenies were constructed using Maximum-Likelihood and statistically analyzed with bootstrapping. *Paniscomima* was sister to *Rhopalosoma*, *Liosphex* was sister to both of these, and *Olixon* was most distantly related to the other three genera in the family. Future phylogenetic studies of Rhopalosomatidae should amplify and sequence more *EF1a* samples from all four genera to construct a phylogeny including a greater number of specimens. These results provide statistically robust representation of evolutionary history, giving greater insight into the relationship of the four genera as a monophyletic family. ■

BIOLOGY [GRADUATE]

Effects of Antiandrogen (Flutamide) Treatment on Wheel Running Behavior in Mice (O)

Presenter: Sammy Bakeer
Faculty Project Advisor: Robert Bowen

Physical inactivity is a leading cause of death worldwide. Studying mechanisms that regulate physical activity is an important health and societal goal. Testosterone regulates physical activity behavior in humans and mice. Flutamide, an antiandrogen, potentially inhibits testosterone's effects by competitively binding to the androgen receptor. This study aimed to examine the effects of flutamide on wheel running behavior to confirm a potential model of testosterone's regulatory effects on physical activity behavior. Twenty (20) male (n=10) and female (n=10) mice were split into control (cholesterol administered) groups and flutamide treated groups. Mice were provided free access to in-cage running wheels and daily distances, durations, and speeds were quantified. There were no significant differences in wheel running behavior of flutamide treated mice and controls. These results indicate that testosterone regulates physical activity independently of the androgen receptor.

Regulating Metastasis in Breast Cancer: The Role of Transforming Growth Factor Beta (O)

Presenter: Emilee McLean
Faculty Project Advisor: William Thierfelder

The goal of this research is to determine how the expression of Deiodinase 3 (DIO3) is regulated in the breast cancer cell line MCF7 through the cytokine called Transforming Growth Factor Beta (TGFβ. Because TGFβ is known to upregulate the expression of DIO3, there is a possibility that DIO3 may affect the cell's ability to create metastatic tumors. It is believed that the effect of TGFβon the DIO3 gene is mediated by a transcription factor called SMAD4. During this research CRISPR gene editing was used to delete the transcription factor SMAD4 from the cell. By doing so, the deletion should cause the activation of the DIO3 gene through TGFβto be crippled.

Effects of Cell Free Supernatant of Pseudomonas fluorescens on Antibiotic Sensitivity of *Staphylococcus epidermidis* (O)

Presenter: Sidney Morgan Cagle
Faculty Project Advisor: Esther Choi

Staphylococcus epidermidis is a human skin commensal, but also one of the leading causes of hospital infections due to its ability to form biofilms. Biofilms, microbial aggregates, present significant challenges due to their accumulation on implants and medical devices. Given the resistance of biofilms to antibiotics, alternative therapies are crucial. This study investigated the impact of combining *Pseudomonas* fluorescens culture supernatant (CS) with antibiotics on *S. epidermidis* biofilms. Antibiotic sensitivity testing revealed increased zone of inhibition and lower minimum inhibitory concentration values in samples with CS compared to untreated. These findings suggest the potential of *P. fluorescens* CS with antibiotics as a promising treatment for biofilm-related infections. Future research could explore CS efficacy on other clinical *S. epidermidis* strains, analyze its gene expression, and evaluate its clinical efficacy.

Influence of Interspecific Interactions between the Native Bluegill (*Lepomis macrochirus*) and Non-Native Convict Cichlid (*Archocentrus nigrofasciatus*) (O)

Presenter: Andrew Logsdon
Faculty Project Advisor: James Kerfoot

This study addressed how temperature influences interactions between native Bluegill (*Lepomis macrochirus*) and invasive Convict Cichlids (*Archocentrus nigrofasciatus*). Understanding these dynamics is essential for effective ecosystem management amidst increasing invasive species threats. The study investigated the influence of temperature on Bluegill growth parameters, considering their poikilothermic nature. It clarifies how various treatments, such as conspecific and interspecific competition, impact Bluegill's condition and growth, displaying their adaptive responses. The hypotheses state no significant difference will be observed in Bluegill growth parameters across temperatures or treatments. Bi-weekly trials assessed Bluegill growth patterns in weight and fork-length under varying temperatures (18°C, 23°C, and 28°C). Two-way ANOVA analysis focused on temperature and treatment effects on the Bluegill growth parameters. Preliminary findings suggest no significant differences in the growth parameters across temperature or treatment conditions. This research is beneficial by displaying the importance of temperature in native-invasive species interactions and offering insights into conservational efforts.

Effects of Varied Estradiol Levels on the Inflammatory Response of *mus musculus* Ears (O)

Presenter: Brooke Hampel
Faculty Project Advisor: Robert Bowen

Estrogen plays many different roles in our bodies. All these roles are not fully understood and have been explored. Estrogen has an especially profound effects on women, which can commonly be seen as women mature and undergo menopause. The effects of estrogen depletion are commonly observed through the skin. This can be seen in the form of wrinkles, drier skin, increased wound healing time, etc. To gain insight on estrogen's role in the skin's healing, we decided to focus on inflammation. In this research project we ovariectomized 15 mice and implanted silastic implant with estrogen. 5 mice were dosed with high estrogen, low estrogen, or no estrogen. Mice were treated with irritant behind the right ear with the left ear being the control. Thickness of mice ears were measured via digital caliper. The difference between thickness of treated and control ear were analyzed with factors of time and estrogen level. ■

BUSINESS

The Role of Online College Courses in the Development of Future Business Leaders (O)

Presenter: Rachel Emery
Faculty Project Advisor: April Rowsey

COVID-19 normalized online learning in higher education for a brief period of time, highlighting both the advantages and challenges associated with such learning. Most institutions of higher education have since moved undergraduate programs back to exclusively on-ground or face-to-face delivery, prompting curiosity about the potential benefits lost by choosing to forego online options altogether. This study examines how supporting undergraduate business students with at least some (though not all) online course options might result in unique advantages (e.g. increased familiarity working with technology tools, enhanced ability to self-manage and work independently, the opportunity to hold internships and jobs during common workday hours, etc.) in the effective preparation of future business leaders. The purpose of this study is to uncover and highlight data and insights to form findings helpful to both college administrators and business students about this timely topic.

Ethic of Care in the Workplace (O)

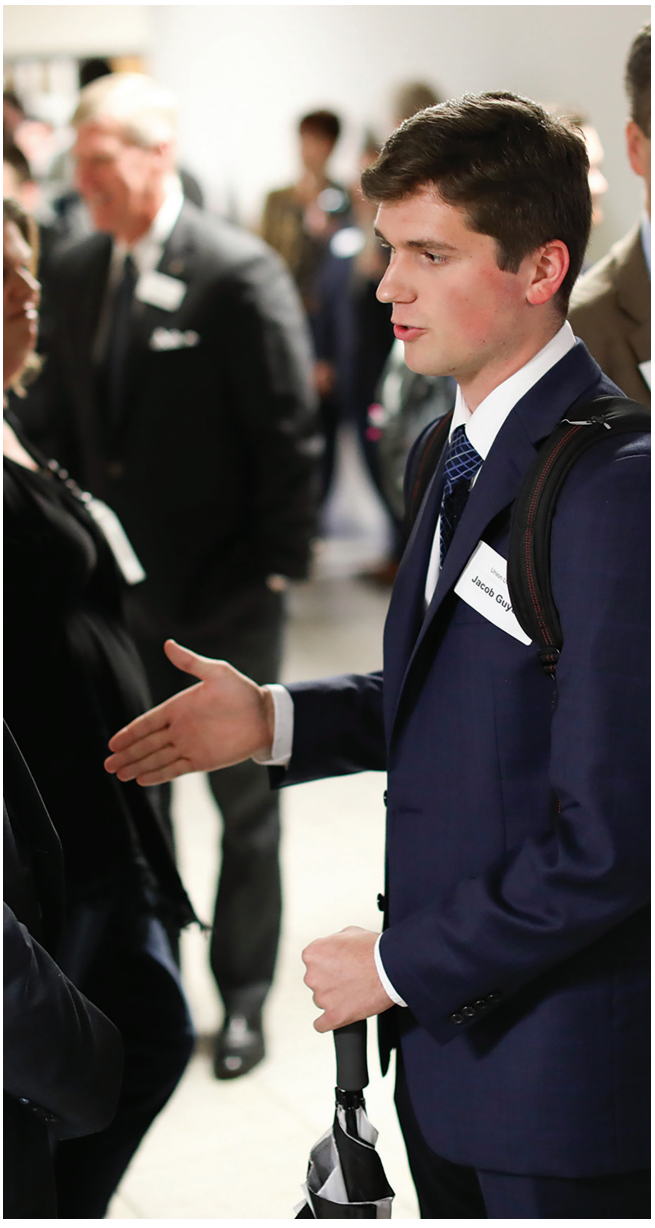
Presenter: Micah McGee
Faculty Project Advisor: April Rowsey

For organizations to thrive during turbulent periods, it is necessary to have a better understanding of the relational mechanisms and practices present in the work environment that either inhibit or encourage employee flourishing. This study seeks to develop a more thorough understanding of the practice and process of supervisory caring as a means of supporting employees in adapting during times of change. It further examines how theory and practice from the discipline of nursing offer a more robust conceptualization and operationalization of the caring construct in the work environment and, thus, promote positive outcomes. Additionally, it explores the relationship between the caring construct and workplace anxiety, thus extending our understanding of their influence on employee Affective Organizational Commitment (AOC) and Employee Dynamic Capabilities (EDC), yielding insight for organizations seeking to overcome the challenges of our current labor environment. Finally, this work identifies several directions for future workplace care research.

Financial Attitudes and Beliefs of College Students at a Christian University (O)

Presenter: Bella Bianchi
Faculty Project Advisor: Colene Trent

A multi-year survey is utilized to determine the financial literacy of college students as it relates to their own financial situation. The survey also explored the attitudes and behaviors of these students with respect to their faith and religious affiliation since they all attend a Christian university. We find that these students are more financially knowledgeable than college students studied in the literature and do exhibit unique financial beliefs because of their religion. ■



CHEMISTRY

Synthesis and Characterization of Iron-Quinone Complexes with Bidentate, Tridentate, and Tetradentate Ligands (P)

Presenter: Hayden Phillips
Faculty Project Advisor: Randy Johnston

Chromium(III) and iron(III) complexes of chloranilic acid have served as effective two electron oxidizers for alcohols. However, these compounds are not useful in understanding the oxidation mechanism because the metal complexes cannot be isolated. Understanding the reaction mechanism allows for the application of such a reaction in a variety of ways. Recently, syntheses of iron(II) and iron(III) benzoquinone complexes have been reported in the literature. The research presented here examines the different possible syntheses involving iron(II) and iron(III) quinone complexes with bidentate, tridentate, and tetradentate ligands using both chloranilic acid and tetrahydroxy-1,4-benzoquinone. The bidentate, tridentate, and tetradentate ligands used were bipyridine, diethylenetriamine, and tris(2-aminoethyl) amine, respectively. The products of the syntheses were characterized using IR spectroscopy and thermogravimetric analysis. The findings of this work will be presented.

Designing a Greener Organic/Inorganic Synthesis Lab Using an Iron (II) Catalyst (P)

Presenter: Abigail Albin
Faculty Project Advisor: Sally Henrie and Randy Johnston

A catalyst is a green technique used in chemical synthesis to lower the activation energy required for a reaction to proceed. Since efficient catalysts frequently need rare transition metals like ruthenium, palladium, and rhodium, an inexpensive, greener transition-metal catalyst is necessary for students to study and use in an undergraduate laboratory experiment. In this three-part experiment, a coordination compound that acts as a catalyst in a hydrosilylation reaction of acetophenone was modified from original research to suit the needs of an undergraduate Organic/Inorganic Synthesis lab. A synthesized ligand is reacted with an iron(II) compound. Then, acetophenone is hydrosilyated using the synthesized catalyst. To utilize additional green chemistry techniques, use of a microwave is incorporated in the synthesis to replace the often-used refluxing technique. This greatly reduces time and energy demands. This greener catalytic synthesis will encourage students to follow greener chemistry techniques in an undergraduate laboratory and future chemistry practices.

Utilization of Crystallization Inhibitors Produced In Situ with Glucoheptonate (P)

Presenter: Tanner Parmely
Faculty Project Advisor: Michael Hayes

This research explores the dextrose-cyanide reaction and the production of two diastereomers, alpha and beta, with distinct physical properties. The alpha isomer, represented by off-white crystals, offers greater historical commercial value compared to the dark, viscous liquid containing predominately the beta isomer. Previous research focused on maximizing alpha isomer production, but this study investigates suppressing alpha isomer crystallization to eliminate the need for external crystallization inhibitors in the beta-rich commercial product. Temperature manipulation during the reaction plays a crucial role, with past claims of lower reaction temperatures favoring increased alpha isomer formation disproven. Harcros seeks to avoid the need to add crystallization inhibitors and turned to Dr. Hayes for investigation. Experimental results confirm the temperature-dependent production of crystallization inhibitors along with glucoheptonate. Producing glucoheptonate at higher temperatures results in less crystallization in the product. Adjusting the isomer ratio from 3:1 (alpha:beta) to 1:1 by removing crystallized alpha proves successful at reducing crystallization. Samples with a 1:1 isomer ratio, particularly at 70 to 90°C, resist crystallization, demonstrating an inhibitory effect by as yet unidentified side products. However, the 70-90°C range is identified as critical, beyond which inhibitor effects diminish. Reheating room temperature glucoheptonate alters crystallization properties, raising questions about possible air oxidation effects. ■

COMMUNICATION ARTS

Best Practices for a Public Relations Strategic Communication Plan for Anti-Human Trafficking Organizations (O)

Presenter: Madeline Farley
Faculty Project Advisor: Ashley Fitch Blair

Anti-human trafficking organizations have unique struggles when it comes to external communication. There are many legal and ethical complexities to consider in creating a public relations strategic campaign that is also compelling. This study aims to answer the question, "What unique best practices should anti-human trafficking organizations consider when creating a public relations strategic plan that is impactful, legal, and ethical?" There is much research regarding how to create compelling strategic plans for the average organization and what ethical and legal challenges must be considered for anti-trafficking organizations, but there is little information regarding how those two topics work together to help public relations practitioners form impactful content. Best practices for these organizations based on the research done in these separate areas of study will be presented. ■

COMPUTER SCIENCE

Cybersecurity in Civil Aviation (O)

Presenter: Jacie Johnson
Faculty Project Advisor: Brian Glas

This research project critically examines the evolving landscape of cybersecurity within the aviation sector, highlighting the transition into the digital age and its accompanying threats to safety, privacy, and operations. By analyzing past cybersecurity incidents, current defense mechanisms, and proposing forward-looking strategies, this project emphasizes the importance of robust cybersecurity governance, advanced technological solutions, and international collaboration in safeguarding aviation against cyber threats. Through a comprehensive review of existing regulations, industry standards, and the potential of emerging technologies like AI, this project offers a blueprint for future resilience in aviation cybersecurity. It aims to create a proactive approach in addressing the complex cyber risks facing the aviation industry today and in the future, ensuring the safety and security of the global airspace in the digital era.

Developing a Secure Mobile Application for a Local Insurance Agency (O)

Presenter: Michael Sickle
Faculty Project Advisor: Brian Glas

The purpose of this project is to develop a secure mobile application for a local insurance agency using Java, Flutter, MySQL Database, and several other tools. The approach involves developing a backend with the programming language Java and the Spring framework. This includes secure identification, authentication, and authorization methods for logging in users, and secure communication with the database and application programming interface (API) of the agency's Customer Relationship Manager (CRM). The approach also involves creating a user-facing frontend using the programming languages Dart and Flutter. Both the backend and frontend should be able to communicate securely with each other.

Building More Than Basketball (MTB) Gym's Online Presence: A Website Development Project (O)

Presenter: Luke Andre and Gavin Schroeder
Faculty Project Advisor: Brian Glas

The goal of this project is to provide the *More Than Basketball* gym with a user-friendly website in which users can view activities going on in the gym, book time slots to rent the gym, and pay for services the gym provides. *More Than Basketball* will be hosted on a virtual machine. The website will be linked to Ace Shroeder's Instagram account to view her posts. This website will also include user profiles and the ability for users to sign waiver forms which will be stored in the database. This website will adhere to certain security protocols to encrypt data transmission between the server and the clients, and industry standard encryption for user profiles, as well as the connected database. We will also have security standards for admin profiles.

Enhancing Facility Management with React Native App: A Solution for A+M elb-care (O)

Presenter: Alpay Altuntas
Faculty Project Advisor: Brian Glas

This project aims to revolutionize facility management for A+M elb-care in Hamburg, Germany, through the development of a mobile application using React Native technology. By seamlessly integrating with a MySQL backend and leveraging PHP API endpoints, the app streamlines various operational tasks. It enables efficient management of employee schedules, attendance, and payroll, while also centralizing the coordination of client events for timely service delivery. Moreover, administrative duties are simplified through digital documentation processes, automated report generation, and enhanced communication channels between management and staff. Through iterative development and a user-centric approach, the app is designed to align closely with A+M elb-care's operational needs, with continuous usability testing and feedback loops driving ongoing enhancements to elevate operational excellence and ensure client satisfaction.

New Center Baptist Tithe Tracking Software Development (O)

Presenter: Jessica Beal
Faculty Project Advisor: Brian Glas

This project aims to develop a database and interface for the treasurer at New Center Baptist Church to house and keep track of contributions made by the members of the church and print statements at the end of the year. This project uses PHP middleware to talk between the HTML interface and the MySQL database server to display the information needed to add users to the database, add individual tithes and offerings to each user's account, and collect member contribution statements within a set of dates selected. This will help the church become more efficient in their contribution tracking and simplify the task of creating contributions for the volunteer church treasurer, given the current software being used is outdated and has become problematic due to a lack of maintenance from the hosting company.

Creating an Open World Adventure Video Game (O)

Presenter: Alex Bope and Emily Rowland
Faculty Project Advisor: Brian Glas

This project is focused on creating an open exploration-based video game with three different islands, each created with a unique variety of enemies and non-player characters (NPCs), as well as a final boss and a completed gripping storyline. This game is created using the Unity game engine and primarily written in C# programming language and displays both students' abilities in various game design elements like custom pixel art, story writing, as well as technical elements like an upgradable skill tree, inventory system w/ item trading, and traversal between different world locations. Come journey with us in our new world and explore!

Striking a Balance Between Accurate Skill-Based Matchmaking and Player Comfort (O)

Presenter: Ryan Boulds
Faculty Project Advisor: Brian Glas

The process of determining players' skill levels in a video game is not as straightforward as one might anticipate. The difficulty in assigning a numerical value to measure a person's proficiency in a game is dependent on various fluctuating variables due to humans performing differently in certain situations. This means that any automated system created will have to mitigate inconsistencies in how players perform over time. The way that players are rewarded or punished by the skill-based matchmaking system poses a double-edged sword in how it could have adverse effects on the way players engage in games. It must strike a balance between competitive integrity and player comfort in the way that it groups players of varying skill levels. For this project, I would like to give developers options that they can customize while addressing issues that I observed in other matchmaking systems.

Revenge of the Bardains: Passion turned to Knowledge (O)

Presenter: Cole Harris
Faculty Project Advisor: Brian Glas

As a young child, everyone dreams of something. Some dream of being an astronaut or a superhero. I dreamed of being a game developer. Now that I'm here, I would like to go back to dreaming! Follow the journey of game development: the good, the bad, and the ugly. Project management and planning is a crucial skill to get this far. Not only is this an exercise in managing and planning, it is an emotional and technological roller coaster. As the game is developed, art is formed from code. Different aspects are perfected, not all is perfect. This project ultimately marries the concept of programming, the art of storytelling, and the beauty in a well-managed project.

Creating a Unique Website for a Nashville Real Estate Company (O)

Presenter: Isaac Johnson
Faculty Project Advisor: Brian Glas

Do you want to move to Nashville? From Downtown, the Gulch, and 19 other neighborhoods in Nashville, we can find the right fit for you! The website is designed to show off the great diversity and uniqueness between these areas so you can feel right at home. You will need a realtor, and who better than The Johnson Team? This website is leveraging a unique approach to attract clients. It will

COMPUTER SCIENCE

appeal to what clients are looking for and answer their questions about the Nashville area and you are just one click away from having one of the best realtors in Nashville! This site will bring curious clients to The Johnson Team's website as well as convince others to move to Nashville.

Adversarial Machine Learning in PDF Malware Detection (O)

Presenter: Preston Nabors
Faculty Project Advisor: Brian Glas

This research reviews notable contributions in PDF malware detection, including static, dynamic, signature-based, and hybrid analysis. It presents a comprehensive examination of PDF malware detection techniques, focusing on the emerging threat of adversarial sampling and the need for robust defense mechanisms. The paper highlights the vulnerability of machine learning classifiers to evasion attacks. It explores adversarial sampling techniques in PDF malware detection to produce mimicry and reverse mimicry evasion attacks, which aim to bypass detection systems. Opportunities for future research are identified, including recreating previous work, applying adversarial sampling techniques to malicious payloads, testing different models, evaluating the importance of features, implementing adversarial defense techniques, and conducting comprehensive testing across various scenarios. By addressing these opportunities, researchers can enhance PDF malware detection and develop more resilient defense mechanisms against adversarial attacks.

The Risk Management Website Project (O)

Presenters: Sterling Proctor
Faculty Project Advisor: Brian Glas

Risk management has been described as the process of identifying, assessing, and controlling threats to an organization's capital, earnings, and operations. In my project, I have a website and database that will work together to calculate an individual's needs based on their input of field and how big their company is. The model that this website is using is the Factor Analysis of Information Risk (FAIR) quantitative model framework. As of the current day, FAIR is used more as a guideline than an actual standardization. The hope of this project is to bring the FAIR model into use, so that there may be a more standardized way of looking at this information.

Digital Sonar (O)

Presenters: Caleb Starkey
Faculty Project Advisor: Brian Glas

This project seeks to adapt the multiplayer board games Sonar and Captain Sonar to a videogame format. In these games you and your teammates control a state-of-the-art submarine and are trying to locate an enemy submarine in order to blow it out of the water before they can do the same to you. While these are typically team games with two and four roles per team respectively, I am augmenting the game to automate the radio operator role, thereby offering a more accessible experience for single-player teams and opens the door for more opportunities for future additions and enhancements to the game.

Visualizing the Union University Catalog (O)

Presenters: Sun Kit Tsui
Faculty Project Advisor: Brian Glas

Have you ever had trouble deciphering all the requirements that you need to fulfill for your degree in Self Service while switching back and forth between Self Service and your program's catalog to decide what courses you should take next? This project attempts to create an alternative interface where you can have a one-stop experience when deciding what classes to take and do so while collaborating with your advisor in real time sharing the same interface in your browsers. This project tackles this goal using various front-end and back-end technologies such as Solid.js, web sockets, Axum, and SQLite. The goal is to create a product that provides an enjoyable user experience, is scalable and cost efficient to operate, and is easy to deploy and maintain.

Go Phish (O)

Presenter: Grace VanLiere
Faculty Project Advisor: Brian Glas

Almost everyone should know what a spam email is or knows the dangerous consequences of getting involved with malicious phishing emails, but it's still a huge global security problem. Many of those emails are filtered out by the email system by identifying red flags in email headers that follow common phishing patterns. This research project is replicating many of the industry steps for analyzing email headers to find red flags and inconsistent elements that point to phishing patterns in emails. The goal of this project is to learn more about how protect people from receiving these malicious emails in their inboxes to reduce the risk of being phished. ■

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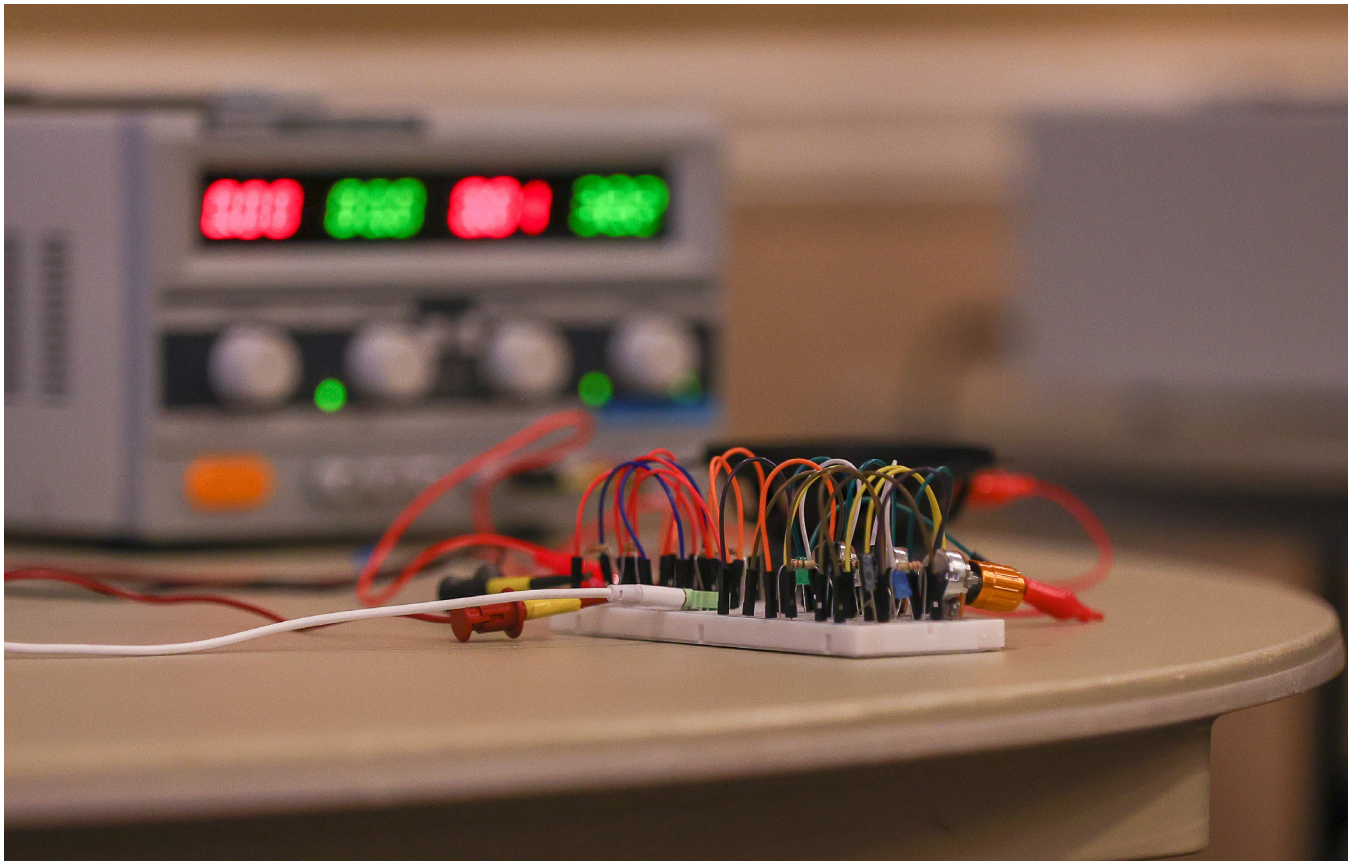

The Factors Affecting Flight Time of a Rubber Band Powered Airplane (P)

Presenter: Ian Banderchuk
Faculty Project Advisor: Don Van

Rubber band-powered model airplanes are a classic toy and pastime seen in many households. This project analyzes how several factors affect how long such planes can stay in the air. Among these are the rubber band used, the number of turns for the rubber band's windings, the environment for the plane's flight, and the wing type. The focus of the project is determining which changes in the factors make the biggest difference in how long the plane will fly. To achieve the desired outcome, the project analysis includes use of the fractional factorial method of experiment design.

Potentiometers for Studying Turbulence Inside a Wind Tunnel (P)

Presenters: Zane Bolton, Benjamin Kuhl, and Kyle Whitmark
Faculty Project Advisor: Jeannette Russ

Potentiometers are electrical instruments that effectively function as variable resistors. Thus, they enable us to adaptively manipulate the electrical current flowing in a circuit. This project seeks to explore the application of potentiometers for varying the output power of a fan inside a wind tunnel. Our setup allows us to study the effects of potentiometer-induced variations in air flow through the turbulence created around a model aircraft wing. We 3D printed this model wing along with a fan blade and conducted a series of trials with varying wind speeds to determine the ideal conditions for optimal wing performance and minimal turbulence.

Simple Circuits as Shown in Butterfly Flasher Circuit (P)

Presenters: Marbry Castellaw and Tabathia Keyton
Faculty Project Advisor: Jeannette Russ

Simple circuits make up things we see in our everyday lives. One example of this is a flasher circuit. This project shows how something fun can be created by a simple circuit using readily available electronic components. Using resistors, LED lights, and a potentiometer, we have created a circuit to emulate a butterfly flapping its wings. The LED lights turn on and then off going down the wings of the butterfly. The resulting circuit displays how energy flows in a circuit in a fun and creative way. In addition to the circuit prototype, the project includes a CircuitLab simulation of the project.

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The RPS RPG (P)

Presenters: Jacob Smith and Shane Tendo
Faculty Project Advisor: Jeannette Russ

The RPS RPG is a protoboard-based project designed for the sole purpose of having fun. By the power of digital logic – IFs, ANDs, and ORs, comes the ability to take part in a 2-player action-adventure strategic Role-Playing Game in which your probability of losing to your opponent is always much larger than your chances of success. To win, you will have to be able to predict and outwit your opponent. If you lose all 4 of your lives, you lose.

Triple Circuit Overload (P)

Presenters: Andrew Myers and Shane Tendo
Faculty Project Advisor: Jeannette Russ

In order to demonstrate the ability of current to take the path of least resistance, the Thevenin and Norton equivalents of different circuits and more advanced circuit design techniques, we combined circuits to present a self-correcting circuit that will pick the optimum path to deliver the most power to a load. Each path presents different opportunities for our current thus minimizing imperfections and wastages.

A Critical Examination on the Viability of AI-Generated Design (P)

Presenter: Ethan Brasher
Faculty Project Advisor: Don Van

This project seeks to investigate the designs of artificial intelligence using a variety of factors. To generate the designs for testing, I am using an online AI that allows me to input my prompt and shortly thereafter receive the requested model created to the best of the AI's ability. Taking this design, after inputting a prompt like, "Create the most secure table possible" and modeling it in Fusion 360 will provide valuable insights about the quality and functionality of these designs. Additionally, by swapping out factors like materials, size and support features, we can optimize the outcome and efficiency. Following the design process, the goal is to compare the resulting designs, considering all factors, to human inventions and analyze the differences.

Finding The Ideal Design for 3D Printed Bouncy Balls (P)

Presenter: Michael Kirk
Faculty Project Advisor: Don Van

Flexible 3D printing materials such as TPU are well suited for a variety of scenarios. Its flexible properties are valuable in creating products that are used by people daily because it creates more friendly surfaces to hold. Another aspect is that the material is also very springy. This project attempts to identify the design that best utilizes the springiness of flexible material. This is done by testing a variety of designs for 3D printed bouncy balls and comparing those tests to each other.

Rock Paper Scissors through Digital Logic (P)

Presenters: Colby Davis and Braeden McAlister
Faculty Project Advisor: Jeannette Russ

This project will explore logic gates and their usefulness in the creation of games. The design will demonstrate a 2-player playable Rock Paper Scissors game. This design will use switches to send a signal based on the user's input. Then, using logic gates, the two input signals will be compared using logic gates. The logic gates will determine a winner and produce an output. Users can determine if there was a winner, or if it was a draw. This design will allow functionality for the users and a positive experience for those playing the game. This project will display the usefulness of logic gates, design insights, and specifications throughout the building process.

Visualizing V=IR Relationship with Potentiometer and DC Motor (P)

Presenters: Timothy White and YuXuan Zhu
Faculty Project Advisor: Jeannette Russ

Our goal with this project is to explore the behavior of potentiometers by analyzing the behavior of DC motors connected in the same circuit. A potentiometer is a variable resistor used in electrical circuits to adjust the resistance by moving a wiper along a resistive element. To accomplish our goal, we designed a circuit with a motor and several LED parts connected in parallel to a potentiometer. We then placed the entire circuit on a boat. The motor will serve as the accelerating component, and the potentiometer will serve as the "gas pedal". We also designed a current indicator with LEDs and resistors to present a visual effect of the amount of current flowing in the circuit. The LEDs will vary in brightness depending on the current controlled by the potentiometers.

Analysis of Rubik's Cube Solve Times (P)

Presenter: Caleb Krueger
Faculty Project Advisor: Don Van

The Rubik's Cube has long served as a captivating puzzle for enthusiasts worldwide. This made me curious as to what factors affect the solve time of the Rubik's Cube. In this study, I present an experiment aimed at evaluating the impact of various variables on Rubik's Cube solve times. Specifically, we explore four key variables: the type of cube utilized (standard vs. speed cube), preparation time allotted before solving, the method employed for solving, and the temperature of my hands during the solve. Through controlled experiments and data collection I will systematically analyze the effects of these variables on solve times.

Creating an Audio Amplifier (P)

Presenters: Jake Lancaster, Jude Lampley, and Amy Nason
Faculty Project Advisor: Jeannette Russ

This project explores how audio amplifiers work. Our project utilizes a NPN bipolar junction transistor to manually control the base current to amplify the sound and adjust the speaker volume. A capacitor is used to keep the input voltage of the transistor steady. This is so the volume from the speaker is not oscillating, making it sound louder and quieter. Our power source is a nine-volt battery. For the audio input, we are using a 3.5-millimeter audio jack, and for the audio output we are using a small speaker. The circuit for this project is assembled on a simple breadboard.

How Changing Variables in Baking Affects the Texture of a Cake (P)

Presenter: Mikaila Rogers
Faculty Project Advisor: Don Van

The knowledge of proper experimental processes and how to perform them is an exceptionally useful tool in many engineering applications. There are situations in which it is necessary to know how certain variables affect a system and to determine which variables have the most impact in a case where there are many variables. This project explores such a case by asking the following question: What variables have the greatest impact on the final texture of a cake? To do this, I examined four different variables, each of which had two options. These variables are baking time, pan size, cooking temperature, and location in the oven. After performing multiple experiments whilst altering these variables, the results of each experiment are then analyzed and compared to find the most impactful variable on the baking of a cake.

Controlling a Robotic Arm (P)

Presenters: Nathanael Madison and Aldric Zeak
Faculty Project Advisor: Jeannette Russ

Industrial products are used in a broad range of applications. From microelectronics to massive machines, these products offer solutions to many problems across the board. This project aims to provide a demonstration of how these products function and their numerous capabilities by using a robotic arm, found in the mechanical engineering lab. We provide a detailed explanation of how to operate this arm, as it has been 14 years since it last moved on campus.

Hovering Drone (P)

Presenters: Landon Haywood, Eli Patton, and Eli Snelson
Faculty Project Advisor: Jeannette Russ

With the innovative current technology, drones have become a popular form of autonomous robotics. The unique aerial vehicles can maintain control and have a sustained level of flight. This type of flight is going to be replicated using a potentiometer. A potentiometer is a manually adjustable variable resistor that can be used to control the power of the fan blades on the drone. With a 3-D printed body and guiding system to help with stabilization, the drone will be taking flight using motors controlled by the potentiometers. Adjusting the potentiometers will determine the height of the drone and help create stability as it hovers in the air.

Building Battleship (P)

Presenters: Jonathan Brewer and Jacob Carbonell
Faculty Project Advisor: Jeannette Russ

In this project, we explored the concepts behind constructing the game of battleship using fundamental digital electronics components. The key aspects of the project involve creating a grid in which to set the pieces, designing a system to fire guesses onto the grid, and fabricating an interface to display firing data to the user. We will use decoding, demultiplexing, and control switching to implement the circuit.

Unitree Go1 Exploration and Programming (P)

Presenters: Jacob Arehart and Ryan Keeton
Faculty Project Advisor: Jeannette Russ

The goal of this project is to learn how to use and modify the Unitree Go1 robotic dog, as well as create a "quick start guide" for anyone else that wants to program the robot. Using and modifying the robot includes utilizing a Linux virtual machine to communicate with the robot directly, as well as Python scripts to control the robot's various systems and behavior. The robot comes with external inputs that can be used to implement new sensors. These inputs are particularly interesting because they allow the robot to perform more complex tasks than simply walking around a room. A major goal of this project is to learn how to add additional sensors to the robot and use Python to program the system to accomplish more complex tasks.

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Investigating the Effect of Potentiometers on DC Motors Used as Flywheels (P)

Presenters: Patrick Basie, Ryan Metcalf, and Jacob Smith
Faculty Project Advisor: Jeannette Russ

In this project we investigate how potentiometers could be used to create a nerf gun with an adjustable fire rate and launch velocity. Our nerf gun will be a modification of a compact 3D-printed design called the Lepus designed by JackRabbitNerfer. We will add potentiometers to his design to allow for adjustment of the DC motors powering the flywheel. Additionally, an LED will be used to indicate the speed at which the DC motors are turning. Since the speed of a DC motor is based on its input voltage, we will wire the DC motors and potentiometers in series to adjust the input voltage. Conversely, an LED's brightness depends on current, so it will be wired in parallel with the potentiometer and DC motor to adjust the brightness.

The Effect of Angular Rotation on a Nerf Dart (P)

Presenter: Nathanael Thomas
Faculty Project Advisor: Don Van

In recent years the hobby of upgrading and innovating toy blasters to launch foam darts has increased dramatically with local events popping up all over the country. In addition, several foam dart blaster manufacturers have endeavored to appeal to this advancing market by producing their own high-powered blasters. One particularly interesting innovation is the SCAR barrel. This stands for String based, Auto Centering, and Rotating. The SCAR attaches to the end of a nerf blaster barrel and improves the accuracy by imparting spin on the nerf dart at a slight decrease in velocity. This project will analytically explore the accuracy improvement under different conditions.

What has the Greatest Effect on the Flight of a Disc? (P)

Presenter: Daniel Lancaster
Faculty Project Advisor: Don Van

The sport of Ultimate Frisbee is growing at a rapid pace in the United States. All the way from youth leagues to the professional level, the sport is gaining awareness and traction in households across the country. One of the biggest difficulties new players encounter is the ability to throw a disc properly. This experiment will determine what the biggest hindrance to accurate throws is by having a player throw a disc under different conditions and measuring the result of each throw of the disc. The hope is that the results of this experiment will help new players make the adjustments needed to excel in Ultimate Frisbee.

Optimizing Quadricep Performance in Weightlifting (P)

Presenter: Micah Valdivia
Faculty Project Advisor: Don Van

The purpose of this experiment is to test which variable will lead to the greatest increase in volume (ie. either an increase in weight per repetition or repetitions per set) over a variety of quadricep exercises. This will be done by creating a baseline for multiple quadricep lifts, then by testing what the effects of adding different variables will do to the capacity for lifting greater loads. The different variables that will be tested are the addition of: knee wraps, a weightlifting belt, shoes with thicker heels, lifting straps, pre-workout supplements, and intra-workout source of carbohydrates and electrolytes. Once enough data has been collected on overall quadricep volume for given variables, a Pareto chart will be used to determine which of the variables most significantly improve quadricep output ability.

Comparison of Off-the-Shelf Products for Process Efficiency Improvement (O)

Presenters: Timothy Boccarossa, Vishal Karmacharya, Nathanael Madison, and Aldric Zeak
Faculty Project Advisors: Jay Bernheisel and Georg Pingen

Improving process efficiency is a goal which many manufacturing companies strive to achieve. This project is a study into the selection of a singular part for that purpose. The part in question is a nozzle used for lubrication, and the different products come from BETE, Bijur Delimon, EXAIR, and Uxcell. The first company offers a product called an impingement fogging nozzle where a piece is manufactured in a specific way to impede the flow, causing the spray to be much wider than a simple hole. The next company offers a simple cone shape nozzle. EXAIR has two specific products: one which is a no-drip hollow cone nozzle, and the other is a simpler hollow cone nozzle. The last also offers a simple hollow cone nozzle. Each nozzle offers their distinctive advantages and disadvantages; thus, this project aims to determine which is the best with the given setup. ■

ENGLISH

All's Fair When Love is War: Chapter One Excerpt (O)

Presenter: Katherine Anne Thierfelder
Faculty Project Advisor: Christine Bailey

As part of her English Honors thesis, Katherine Anne Thierfelder is presenting an excerpt from the first chapter of her young adult fantasy novel *All's Fair When Love is War*. Following the sudden death of a student, Evelyn Lauderdale does the impossible and gets accepted midterm to the most prestigious school in her country: Flintlock Academy. Evelyn is determined to graduate Flintlock in the area of study that she wants and follow in her father's footsteps of success; nothing will stand in her way. That is until Evelyn agrees to a silly dare to go out with the single most frustrating guy she knows. What seems like the plot of a lighthearted romcom is really a story about three friends who learn that forgiveness isn't deserved and have their eyes opened to the political turmoil in their country all while navigating their internal struggles.

Ohk-gai-nah, Spirit of the Fierce Mother Hen: A Work of Creative Nonfiction (O)

Presenter: Eunice Tan
Faculty Project Advisor: Christine Bailey

Abiding in the liminal space between a family's history and present reality, Tan's creative-nonfiction piece "Ohk-gai-nah, Spirit of the Fierce Mother Hen" celebrates oral tradition passed on by the women in her Malaysian-Chinese family and contemplates its transcendent, haunting impact on her life today. Beginning with a retelling of the masterful storytelling of Tan's grandmother, the work explores the mysterious narrative of the author's great-grandmother who was also known as "Ohk-gai-nah" or "Fierce Mother Hen" and how her spirit relentlessly burns on in the hearts of Tan's head-strong grandmother, mother, and older sister. The piece then weaves Ohk-gai-nah's story into Tan's personal present-day struggles with being "too emotionally sensitive," leading to a powerful revelation that ties her closer to her great-grandmother and the women of her family than ever before.

ENGLISH & HISTORY

Loreignia: Chapter 1 (O)

Presenter: Faith Behrens
Faculty Project Advisor: Christine Bailey

About a year ago, Faith Behrens was inspired to write a fantasy story following three teens who are called to another world. The story is focused on Meredith Stone, an orphan whose background is shrouded in mystery; 16 years ago an anonymous donor set up a fund to send her to a prestigious boarding school in the United States. As an orphan, her one hope is to find belonging and a family. She thinks she has found this with her friends Lewis and Danielle, but when she is called to a different world, she is separated from her lifelong friends. Chapter 1 follows Meredith and her friends' journey to the world of Loreignia.

Gate A-24 (O)

Presenter: Sarah Grace Patrick
Faculty Project Advisor: Christine Bailey

Amelia sits at gate A-24, of New York City's international airport, wondering if her plane will ever show. The short story "Gate A-24" by Sarah Grace Patrick follows Amelia as she thinks of her family back in Mexico and ponders her life since moving to New York City. She recalls an argument with her mom just a month before she left, worrying over the last text she sent. As she waits, she meets an old man, and the two bond over their shared love of Billy Joel's music. The man shares his story with Amelia, reflecting on his relationship with his daughter and providing a temporary distraction from her thoughts. As the two part ways, Amelia is left with her worry and indecision, reaching to check her texts but afraid of what she might find.

The Enchanted Tree (O)

Presenter: Samuel Stevens
Faculty Project Advisor: Christine Bailey

To wake up in foreign circumstances is an uncomfortable experience, but for one former lawyer, it is the one she lives with every day due to late onset dementia. "The Enchanted Tree," by Samuel Stevens, follows her journey out of her home and through the woods where she is encountered with her own memories and the lies she tells herself. She must journey through the woods of her own life as the first female lawyer at Penny, Sparrow and Price Law Firm. She rediscovers her marriage to Harold, a veteran who struggled with PTSD, and the birth of her children. In the forest enchanted by forgetfulness, she remembers who she was, and where her home is. ■

The Development of Virginian Cuisine: Its Colonial and Early National Roots (O)

Presenter: Abigail Gilbert
Faculty Project Advisor: Keith Bates

Colonial Virginian food history is a subject relatively unknown to the general public, despite popularizing many dishes we now consider to be American staples into our culture. Under the influence of European, African, and Native American foodways, foods such as macaroni and cheese, fried chicken, french fries, ice cream, barbecue, tomatoes, and country ham were introduced during the Colonial and Early National periods in Virginia. These foods were served in the households of influential Virginians such as Thomas Jefferson, George Washington, and Mary Randolph, the author of the first Southern cookbook. This paper traces how classic Virginian dishes, popular both then and now, were brought to the colony while exploring their cultural significance in establishing a unique food identity. It represents a shift in culinary traditions from medieval and Renaissance techniques to those used today. ■

INTERCULTURAL STUDIES

Understanding Diversity and Its Impact on Identity Negotiation and Community Formation (P)

Presenter: Lydia McGinnis
Faculty Project Advisor: Jean Marie Walls

The United States is a multicultural, pluralistic society with many complex communities and systems. These give rise to a plethora of diverse experiences bounded by historical, sociocultural, and personal contexts. Given the highly polarized cultural climate in the United States and the Christian commitment of Union University, it is imperative that we understand and engage with diversity towards fostering productive dialogue, navigating conflict, developing empathy, and growing in Christlike community. This research examines cultural and ethnic diversity, its impact on the identity negotiation of minority populations, and its importance to community formation. To further understand this phenomenon, this project examines identity and community through case studies at three social levels on Union University's campus: a community with open membership (MOSAIC), a community with closed membership (the international student community), and personal experience (autoethnography).

The Influence of Education, Social Media, and Foreign Policy On Gen Z's Understanding of the Middle East (O)

Presenter: Avery Chenault
Faculty Project Advisor: Jean Marie Walls

The political, religious, and cultural contexts of the Middle East are often misunderstood and misinterpreted. Many have only learned about the Middle East through the perspective of war and conflict or were simply never educated on this area of the world. Current events have recently focused international attention on the Middle East and many members of Gen Z lack an understanding of the Middle East and the resources to think critically about the region. With widespread social media access, Gen Z receives much of their information on the Middle East through social media. The research in this project examines how social media, education, and foreign policy influence Gen Z's understanding of this complex region of the world. This study also draws from the experiences of Christian, Gen Z students who visited Israel to learn about the religious and geopolitical significance of the land and their observation and perceptions of those experiences. ■

LANGUAGE

Expresiones musicales y literarias de la identidad indígena peruana (Musical and Literary Expressions of Peruvian Indigenous Identity) (O)

Presenter: Magdalen Wills
Faculty Project Advisor: Karen Martin

Quechua is the indigenous language of the Incan empire. Today, there are approximately 8 million speakers of Quechua in South America. In Peru, Quechua is an official language and the most spoken indigenous language. This project explores indigenous and European perspectives of indigenous identity in Peru during colonial and post-colonial eras. Four musical artists from Peru, "Alborada", "Uchpa", "LENIN", and "Renata Flores" sing in Quechua and represent their indigenous, multicultural identities in different ways. Alborada takes on a stereotype of Native American identity, whereas the other three artists draw directly from their traditional culture and the modern world they live in. Two Peruvian authors, El Inca Garcilaso de la Vega and Clorinda Matto de Turner have also represented *mestizo* and indigenous identity in their writings. El Inca's most famous work is the *Comentarios reales*, about the history of the Incan empire and of Peru. El Inca expressed Peruvian culture and history in Spanish from a native's perspective. Clorindo Matto de Turner of European descent wrote *Aves sin nido (Birds Without a Nest)*, which is considered one of the first indigenist novels. It includes an important connection between the Quechua language, indigenous identity, and the nation of Peru.

Investigating Language Acquisition in Spanish-speaking Children and Bilingual Spanish/English-speaking Children with and without Autism (O)

Presenter: Maddy Piefer
Faculty Project Advisor: Jean Marie Walls

Understanding the typical rate of language development in Spanish-speaking children and bilingual Spanish/English-speaking children, as well as how this process differs for those with autism spectrum disorder (ASD), is crucial for effective speech-language pathology (SLP) clinical practice. This project seeks to examine the impact of sociolinguistic factors on language acquisition and communication skills in children with and without ASD and aims to shed light on these areas and identify gaps in SLP training and practice in Tennessee. By identifying potential disparities in SLP training and practice related to serving Spanish-speaking and bilingual populations, the study aims to inform the development of culturally responsive intervention strategies and improve access to quality speech-language services for diverse communities in Tennessee. Furthermore, the research underscores the importance of interdisciplinary collaboration among speech-language pathologists, educators, and researchers in addressing the complex linguistic needs of all children from diverse linguistic backgrounds.

La reine Marie Antoinette et l'impératrice Eugénie: le pouvoir de la mode (O) (Queen Marie Antoinette and Empress Eugénie: The Power of Fashion)

Presenter: Abigail Gilbert
Faculty Project Advisor: Jean Marie Walls

The reigns of Queen Marie Antoinette and Empress Eugénie of France both signified the end of an era. Both monarchs learned to control small elements of their lives through the use of fashion. This paper addresses how both queens used fashion as power in the politics of their times. It delves into the similarities and differences between the two queens and between their reigns during the last kingdom and last empire of France. Marie Antoinette expressed her independence by wearing extravagant garments in her role as the monarch and by wearing sheer slips at her country estate Trianon, a look which shocked the public and inspired fashion for the next several decades. Empress Eugénie was a fashion icon who worked with famed designer Charles Worth to introduce bustles and shorter skirts, replacing the popular crinoline and shifting the tides of fashion overnight.

Mujeres en la politíca: A Study of Female Political Participation in Latin American Countries (O)

Presenter: Hannah Dyer
Faculty Project Advisor: Karen Martin

The political representation of women in Latin America is remarkably high, outpacing countries generally considered to be more developed and democratic such as the United States, United Kingdom, and much of Europe. This is especially surprising considering the history of sexist sentiments represented by "machismo" culture, marked gender roles, and an emphasis on the primary role of women as mothers. This paper aims to explore the reason behind this seeming disparity between prominent cultural viewpoints and the reality of female political representation in Latin America, as well as explore avenues for future improvement in gender equality in governmental roles. It brings together research on how women reconcile societal views of themselves with their political careers. Examples of this are pulled from Julia Alvarez's In the Time of Butterflies, sources covering the history of women's integration into the political sphere, and current data on the numerical and substantive representation of women. The paper concludes that the current political situation faced by women is a result of historical challenges faced by Latin American countries including dictatorial regimes and the subsequent push for democratization. Further, research demonstrates that even if women attain numerical representation, it does not inherently equate to political influence. Lastly, it shows the strength of certain structural changes made in Latin American countries to increase numerical representation work even in cultures naturally resistant to them. ■

NURSING [GRADUATE]

Comparison of International Health Care Systems: Mexico (P)

Presenters: Brian Julian, Dustin Lane, and Michael Reiser

Faculty Project Advisor: Shari Wherry

Mexico's healthcare system is comprised of private and public sectors. Public healthcare is funded by the government and provided through three agencies: the Mexican Institute of Social Security (IMSS), the Institute of Safety and Social Services for Public Sector Workers (ISSSTE), and Mexico's Institute of Health for Welfare (INSABI), formerly the Seguro Popular. Mexico's healthcare system is employment-based, with a specific coverage agency for individuals based on the sector in which they work. The private sector encompasses privately owned hospitals that cater to individuals capable of purchasing private health insurance for premium services. For those not covered by any other healthcare, such as the unemployed, the government provides healthcare through INSABI. In addition, the Mexican Armed Forces have their own healthcare system independent from those previously mentioned (International Trade Administration, 2023).

Comparison of International Health Care Systems: Canada (P)

Presenters: Shannon Lantz, Andrea Montani, and Joshua Sellman

Faculty Project Advisor: Shari Wherry

Canada's healthcare system is set up as a Medicare system, offering healthcare for its citizens. The provinces share the costs with the federal Canadian government so that private citizens do not have to pay (Government of Canada, 2023). Compared to the United States, Canada spends about 6% less of its gross domestic product (GDP) and its citizens spend almost half of what U.S. citizens do on healthcare (Henderson, 2022, p. 209). This poster will examine how the Canadian healthcare system is funded, how payment is received for services, how services are utilized, and where Canada's healthcare system ranks according to WHO, as well as the challenges associated with Canada's healthcare system.

Comparison of International Health Care Systems: Spain (P)

Presenters: Samuel Jones, Evan Parkinson, and Samuel Vrinios

Faculty Project Advisor: Shari Wherry

The purpose of this presentation is to elucidate the differences between two large healthcare systems. The United States and Spain both have healthcare systems with unique qualities that make them vastly different. In this presentation, the goal is to identify GDP healthcare spending, financing, reimbursement, provider choice, and challenges in the Spanish healthcare system. The literature will be reviewed retrospectively to recognize how these aforementioned variables differ between the United States and Spanish healthcare systems. Understanding the comparisons between these two healthcare systems allows for the identification of areas for potential improvement within that specific system. Furthermore, it allows for the removal of inefficient aspects of a healthcare system leading to overall improvements in health and wellness.

Comparison of International Health Care Systems: Australia (P)

Presenters: Krystle-Anne Crespo, Reece Moody, and Tejal Patel

Faculty Project Advisor: Shari D. Wherry

Australia has a 2-tier health care system comprised of public and private insurance. The universal public Medicare program provides universal funding for hospital care delivery and substantial coverage for physician services and pharmaceuticals. This is supplemented by a secondary private healthcare industry that covers additional health services, optometry, and dental, including access to community care and private hospitals. The split system encourages a balance of quality, accessibility, and cost control, with Australians spending less per capita ($6,372 vs. $12,555 USD per year) and as a percentage of GDP (9.6% vs. 16.6%) than Americans and benefiting from a longer life expectancy (83.3 years vs. 76.4 years) (OECD, 2024). Despite these benefits, the Australian healthcare system faces challenges balancing innovation with affordability and making use of emerging health technologies. This poster will further examine specific economic components to gain a better appreciation of Australia's healthcare system.

Comparison of International Health Care Systems: India (P)

Presenters: Carmen Abarca, Amy Haynes, and Ithzel Solis

Faculty Project Advisor: Shari Wherry

The purpose of this presentation is to highlight the challenges faced in India with the delivery of healthcare. The

NURSING [GRADUATE]

population of India is currently estimated to be 1.4 billion residents with over 6% of the Indian population still living in poverty. Despite the economic growth, the healthcare infrastructure in India continues to fall short. The recent implementation of PM-JAY incentivized receiving secondary and tertiary care free of cost but governmental steering remains a major obstacle as well as fraudulent insurance claims. Despite these efforts, the healthy life expectancy in India is still only 60 years of age with the primary cause of death relating to ischemic heart disease. Transmission of disease remains a struggle for India due to a lack of access to clean water. India's healthcare system struggles with technological advancements which interferes with efficient patient care and data management across the country.

Comparison of International Health Care Systems: China (P)

Presenters: Crystal Hill and Ashley Walkner
Faculty Project Advisor: Shari Wherry

The Health Policy and Economics course has been diving into the complex topic of economic healthcare reform in the United States and the underlying reasons for the country's higher healthcare costs compared to other nations. To gain a deeper understanding of this subject, the course examines various countries' healthcare payer systems, reimbursements, provider options, financing, challenges, production, gross domestic product spent on healthcare, and global rankings compared to the US. This group concentrates on China and will share insights about its healthcare system. China has made significant progress in enhancing its Basic Medical Insurance (BMI) system and currently provides coverage to over 95% of its population, considering its staggering population of over 1.35 billion. As a result, it has become the world's largest healthcare security network, providing most of China's citizens with access to essential medical care and services (Yi, B. in 2021).

Comparison of International Health Care Systems: Sweden (P)

Presenters: Melanie Collazos-Valencia, Emily Fulkerson, and Julia Stauffer
Faculty Project Advisor: Shari Wherry

This presentation offers a comparative analysis of the healthcare systems in Sweden and the United States, exploring key differences in structure, access, quality, and outcomes. Sweden operates under a universal healthcare system with decentralized management, providing comprehensive coverage to all citizens and residents (Swedish Institute, 2023). In contrast, the United States utilizes a predominantly private, market-driven system, with private insurance companies playing a significant role (Henderson, 2022). This presentation will consider the challenges and opportunities for both healthcare systems addressing cost containment, access to care, equity, and Sweden's decreased spending on healthcare compared to the United States (World Health Organization [WHO], 2024). Performing a comparative analysis will provide valuable insights into the strengths and weaknesses of each healthcare system, allowing for discussion on potential reforms and policy redirection.

Comparison of International Health Care Systems: Russia (P)

Presenters: Cassie Garner, Macy Morrison, and Aubrey Maxwell
Faculty Project Advisor: Shari Wherry

The Russian healthcare system operates in a vastly different manner than the United States. This presentation will examine challenges and hardships Russians have faced in the advancement of their healthcare system. Societal factors such as war, geographical variation and lack of governmental peace have greatly influenced the care Russians have received. By comparison, Russia is considered less advanced in healthcare practices than countries with similar GDP. Considerations such as payer systems, funding, availability of technology, freedom of choice, and reimbursement regulations all greatly affect the care received and overall quality of life. Healthcare is not equal for all people; join us as we take a closer look at how Russians receive medical care.

Comparison of International Health Care Systems: Japan (P)

Presenters: Devin Daffron, Paige Eberle, and Laura Ellis
Faculty Project Advisor: Shari Wherry

Japan's healthcare system is characterized by universal coverage, accessibility, and highquality care. The system is primarily funded through a social health insurance model, where citizens must enroll in one of several nonprofit insurers. This ensures that virtually all residents have access to healthcare services. The Japanese system emphasizes preventive care and early intervention, contributing to the nation's health. The country boasts a relatively low healthcare expenditure compared to other developed nations (Henderson, 2022, p. 209), achieved through a fee-for-service reimbursement system that encourages cost-effectiveness (Henderson, 2022, p. 449). Despite an aging population, Japan's healthcare system has demonstrated resilience in providing comprehensive and affordable care. Our presentation aims to facilitate an analysis of Japan's healthcare system to shed light on different approaches to healthcare delivery, financing, and accessibility. This educational effort seeks to deepen understanding and foster discussions on potential lessons or insights that can be drawn from Japan's medical care system to inform healthcare policy and practices globally.

Comparison of International Health Care Systems: Israel (P)

Presenters: Meghan Pinson, Javaris Polk, and Lindsay Votaw
Faculty Project Advisor: Shari Wherry

This poster is a comparative examination of international healthcare systems, focusing on Israel. With a life expectancy of 82.6 years, surpassing the Organisation for Economic Co-operation and Development (OECD) average by 2.3 years, Israel demonstrates a strong healthcare infrastructure (OECD, 2023). Operating primarily on a public model, Israel ensures universal healthcare through the National Health Insurance Law, extending coverage to Israeli citizens and permanent residents through four health management organizations (HMOs) (Dreiher et al., 2020). While healthcare spending has risen to 7.6% of GDP, it remains below the OECD average of 9.3% (International Trade Administration, 2023). Challenges include addressing chronic diseases, regional disparities, and plans for an aging population. In contrast to Western nations, Israel's healthcare system lags in hospital beds, doctors, and nurses per capita (International Trade Administration, 2023). This poster seeks to provide insight into Israel's healthcare by comparing it with other international systems and addressing the payer system, financing and supply, reimbursement, production, provider choice, challenges, WHO world ranking, and GDP allocation.

Comparison of International Health Care Systems: United States of America (P)

Presenters: Alexis Alexander, Tiffani Ivery, and Maxwell Obasuyi
Faculty Project Advisor: Shari Wherry

This presentation highlights the challenges of delivering healthcare in the United States (U.S.). Despite being one of the largest developed countries in the world, the cost of healthcare in the U.S. is significantly higher compared to other nations. Although the Affordable Care Act was implemented, disparities in healthcare distribution continue, making universal healthcare a necessary solution. Due to limited resources, inadequate insurance coverage, and uneven distribution of providers and facilities, healthcare outcomes in the U.S. vary greatly. This resulted in a wide range of healthcare outcomes, with some individuals receiving superb care while others experience significant gaps in their treatment. This underscores the importance of exploring alternative approaches to healthcare delivery that could reduce costs while improving patient outcomes. One promising solution is integrated healthcare systems. Although this is a challenging task, integrated healthcare systems have the potential to provide valuable insights into patient populations and improve coordination of care.

Comparison of International Health Care Systems: France (P)

Presenters: Drew Lewis, Phillip Tatum, and Gaines Wilson
Faculty Project Advisor: Shari Wherry

World Health Organization recognizes France's healthcare as number one in the world thanks in a large part to their geography, culture and demographics (Henderson 2022, p. 432). Other key features to their system as noted by

Or et al. (2023) include a Social Health Insurance (SHI) with supplemental private insurance that virtually covers the entire costs related to care for their citizens. On the other hand, France's current economic strain is testing the healthcare industry's resolution, leaving policymakers to adapt the everchanging environment. Despite the relative straightforward nature of providing individual care to citizens, a national level of healthcare delivery is more intricate and nuanced than one would care to admit. The attempt of this presentation is to provide the reader with an understanding of France's healthcare system as it relates to the United States in key areas such as payer systems, financing and supply and even their challenges.

Improving Nurse Manager Joy and Meaning in Work through Evidence-Based Leadership Education: A Quality Improvement Project (P)

Presenter: Erica B. Thompson
Faculty Project Advisor: Cynthia Powers

Lack of engagement and decreased job satisfaction among nurse managers has a negative correlation with employee engagement and patient outcomes (Deetz, 2020). This quality improvement project aims to examine measures to improve nurse manager job satisfaction. A pre-posttest survey design with an educational intervention is utilized to elicit data from participants. The intervention consists of leadership competencies presented in educational webinars. The participants identified are inpatient nurse managers at a 220-bed acute care facility in a suburban area. Results comparing the pre and post-surveys indicate improvement in the perception of workload and competence after the educational intervention. The analysis also positively correlates the perception of senior leadership engagement with employee wellbeing, as well as an improvement in the perception of workplace climate after the intervention. The findings indicate that formal, evidence-based education for nurse managers contributes to job satisfaction and improved patient outcomes.

Does Education on the Benefits of an LMA on Hemodynamics Change Practice? (P)

Presenter: Megan Burckhard
Faculty Project Advisor: Jessica McAdoo

Objective: Current research shows that a laryngeal mask airway (LMA) causes the least sympathetic stimulation and/or hemodynamic changes on induction when compared to direct laryngoscopy with an endotracheal tube (ETT); however, many anesthesia providers feel that it is safer for the patient to have a secure airway through an ETT, regardless of how it affects hemodynamics on induction. For anesthesia providers in the surgical setting (P), does education on the reduced hemodynamic changes with insertion of a laryngeal mask airway over an endotracheal tube via direct laryngoscopy (I), compared to no education (C), increase the use in practice (O)? This project provided education to anesthesia providers to identify the knowledge deficit and help providers to select the best airway device for each individual patient. The education is not meant to be corrective or punitive but rather an improvement in practice based on current research. *Methods*: Through a pre-test, then providing education, followed up by a post-test, providers were assessed on whether the knowledge was relayed and/or beneficial to their practice. The same post-test questions were asked to see if the education made an impact by assessing whether providers will consider the use of a LMA in their practice when desiring to cause the least amount of hemodynamic changes on induction. The sample size is currently 7 Certified Registered Nurse Anesthetists (CRNAs) and growing as the project continues. *Results*: 10 out of 12 CRNAs felt the education was beneficial and will be utilized in their practice. The remaining 2 CRNAs stated the education topic was known and have utilized in appropriate patients. *Conclusion*: Providing education to anesthesia providers on the beneficial use of an LMA to reduce hemodynamic swings during induction proved to be beneficial to their practice. This project could make a change in clinical practice by providing education to providers on an airway device that could be safer for hemodynamically unstable patients. Through this education, anesthesia providers should always contender the use of an LMA for their patients when indicated.

The Impact of Education on Intracuff Lidocaine for Airway Reactivity and Use in Practice for Anesthesia Providers (P)

Presenter: Jordan Fentress
Faculty Project Advisor: Jordan Palmer

Intracuff lidocaine (ICL) is proven to be very efficacious in preventing coughing/airway reactivity on emergence from anesthesia when endotracheal tubes are utilized. However, during observation of practice, the use of ICL remains limited by anesthesia providers. This evidence-based practice update provides education supporting the use of ICL and evaluates the impact this education modifies practice. Multifacility, one-on-one education was provided using an evidence-based practice update supporting the use of ICL for the prevention of coughing and reduction of airway reactivity. 12 anesthesia providers were provided education and follow up questionnaires reviewing their own understanding and implementation of ICL in practice. 41.7% of the participants had utilized ICL at some point in their careers. 100% of participants found the education beneficial, but zero participants altered their practice because of this education. This education project and the data obtained from participants reveals a significant gap between evidence-based practice and practice implementation.

Video Laryngoscopy as a Teaching Tool (P)

Presenters: Kayla Bonilla and Brooke Work
Faculty Project Advisor: Jordan Palmer

Certified Registered Nurse Anesthetists (CRNAs) have many jobs involving patient care. One often overlooked job is teaching the next generation of airway managers to practice safely and confidently. Success is achieved early by the student when their preceptor is able to teach effectively and provide real-time feedback and guidance. This is especially true regarding learning intubations as a new clinical student. Therefore, we propose that preceptors are more comfortable with students when the preceptor can also visualize what the student sees. This Quality Improvement study aims to provide a recommended teaching baseline for preceptors of novice airway managers. Methods: Participants in this study were licensed CRNAs or anesthesiologists who were precepting a student within the student's first two weeks of clinical study. Surveys were conducted to assess the preceptor's comfort level with the student using direct or video laryngoscopy techniques. They were also asked how comfortable they were with providing direct feedback to the students. Results: Three survey questions were asked and evaluated using a paired t-test. 25% of providers were very comfortable with the direct laryngoscopy attempt, compared to 57% who were very comfortable with a video attempt. Providers showed more confidence in providing guidance with the video laryngoscopy method. Nearly 71% of providers surveyed rated that they were more comfortable visualizing the patient's anatomy with video than 31% with direct. Conclusion: Currently, there is no identified method/protocol to teach new airway managers how to intubate patients in a clinical setting. Incorporating the video laryngoscope as a teaching method for novice airway managers yields safer and more successful results. The early success of the student will lead to more confidence and preparedness when they advance to more challenging methods and airways.

Cadaveric Epidural Aspiration Assessment (P)

Presenters: Jordan Bell and Collin Janke
Faculty Project Advisor: Andrew Rice

A potentially fatal complication of epidural catheter placement is intravascular placement and

injection, causing local anesthetic systemic toxicity (LAST). There are no existing recommendations regarding syringe size or withdrawal volume when performing an aspiration test. This study aims to determine the proper syringe size and aspirate volume during epidural placement to prevent epidural vein collapse and a false negative aspiration test. The researchers measured and recorded various syringe sizes, aspiration volumes, and their respective negative pressures generated utilizing a handheld meter with integrated absolute pressure sensor. A cadaveric vein 3mm in diameter was harvested and cannulated with an epidural catheter and pressurized to 5mmHg with normal saline. Researchers aspirated increasing volumes with each syringe and evaluated for vein collapse. Results showed that syringe size had an insignificant impact on negative pressure. Aspirate volume was the sole determining factor in vein collapse as a result of the negative pressure generated. Negative aspirate volumes of 3mls or greater resulted in venous collapse and resulting false negative aspiration of solution. Based on the results of this study, clinical recommendations for detecting blood aspiration during epidural placement are to use a 3ml or 5ml luer lock plastic syringes with aspirate volumes of less than 3ml.

Increasing Confidence and Proficiency Levels with Plastinated Cadaver Simulation: An Experimental Educational Project (P)

Presenters: Jessica Howell and Heather Vega
Faculty Project Advisor: Ross Palmer

The purpose of this educational project was to determine whether simulation with plastinated cadavers is superior to other types of simulation, such as video, lecture, or virtual reality. Most universities only use lectures and videos as their teaching methods for regional blocks. Plastinated cadavers are only being used in a small percentage of universities. According to Atwa et al. (2021), students prefer plastinated specimens due to their ease of use, ability to differentiate between structures, and easier understanding of complicated anatomy. For this project, a radial, ulnar, and median nerve block was conducted under ultrasound guidance on a formalin-fixed human cadaver. The cadaver arm was then cut into transverse cross-sections, and needles were removed. The plastination process was completed at Union University School of Nursing. Once complete, internal structures were identified and labeled. These plastinated samples will be available for future simulations in teaching regional anesthesia.

Prophylactic Cosyntropin to Decrease the Incidence of Post-Dural Puncture Headaches: An Experiential Project (P)

Presenters: Taylor Bishop and Katie Yewell
Faculty Project Advisor: Ross Palmer

Background and significance: Pain management for laboring patients includes neuraxial anesthesia. Common complications following an epidural include unintentional dural puncture, resulting in a post-dural puncture headache (PDPH). PDPH results from decreasing cerebrospinal fluid (CSF). Mainstay treatment for PDPH include prolonged admission and epidural blood patch (EBP) (Hasoon et al., 2020). The consequential EBP is an invasive procedure with associated risks. This experiential literature review aims to introduce evidence-based research surrounding the use of prophylactic cosyntropin. Prophylactic techniques

to decrease the incidence of PDPH, reduce the LOS and need for EBP, resulting in improved outcomes. *Purpose*: This project aims to provide anesthetic guidance on inadvertent dural puncture, subsequently determining if the use of prophylactic cosyntropin compared to no cosyntropin decreases the incidence of PDPH and EBP in the post-anesthetic period. This project allows providers to improve quality measures by disseminating research.

An Experiential Study Comparing Thoracic Epidural for Postoperative Pain (P)

Presenter: Kevin Brooks
Faculty Project Advisor: TaMara Carter

Background: Thoracic surgery is one of the most invasive surgeries a patient can have. Therefore, providing effective postoperative pain management is imperative for patient recovery. Providing anesthesia care is pertinent during the surgery and should follow the patient through the postoperative period for pain management. Postoperative pain management is controlled in multiple ways, including using narcotics, adjuncts, and different types of regional blocks. Although there are numerous treatment plans for thoracic surgery, the gold standard of treatment is implementing thoracic epidural analgesia (TEA). Even though TEA is the gold standard of care, multiple hospitals and anesthesia providers are not implementing this and using other alternatives. *Purpose*: This project evaluates the impact of thoracic epidurals on postoperative surgical thoracic patients, leading to enhanced recovery compared to no implementation of a thoracic epidural. *Design/Methods*: This project examines and evaluates existing literature concerning managing postoperative pain in patients undergoing thoracic surgery. The literature outcomes were synthesized and presented as an educational session to anesthesia providers who aim to enhance their understanding of the advantages of thoracic epidural analgesia, insertion of TEA, to improve patient recovery during the postoperative phase. *Outcome Measures*: Data collection consisted of having the participants take a pre and posttest. The written tests revolved around the benefits of TEA concerning pain management and patient recovery in the postoperative period after thoracic surgery. After the lecture, I then gave the participants a posttest to evaluate what the participants had learned. This information collected was then placed into an EXCEL format. The Likert scale questionnaire was also included, allowing the participants to determine if the in-service was beneficial. *Implications*: Providing effective pain management can significantly benefit postoperative patients who underwent thoracic surgery. Providing TEA can reduce the use of narcotics, shorten ventilator times, and decrease ICU and hospital length of stay in the postoperative period. The equipment needed for implementing a thoracic epidural is provided in most major hospitals, and the placement of one should be addressed for each thoracic surgery patient. *Conclusions*: The analysis of the pre and posttests and the summation of literature is intended to show that providers were more confident in placing a thoracic epidural then compared to not placing one to improve postoperative pain.

Improving Confidence and Competence in Students Conducting Regional Anesthesia Utilizing Plastinated Cadaver Cross-Sections (P)

Presenters: Kelsea Brannon and Henrry Garcia
Faculty Project Advisor: Ross Palmer

This project evaluated the use of a plastinated human cadaver's lower extremity to improve the confidence and competence of anesthesia providers. Ultrasound-guided regional anesthesia is a technical skill that all anesthesia providers should understand thoroughly. The plastinated model was predicted to assist anesthesia providers in regional anesthesia by adding a tangible, easy-to-understand learning tool. Studies by Chisholm & Varsou (2018) and Cale et al. (2022) found that cadaveric models increased anatomical knowledge. This project utilized the adductor canal block, performed with ultrasound guidance, on a formalin-fixed human cadaver. The cadaver was sliced into cross-sections and plastinated at Union University. Participants partook in a pre-and post-survey to evaluate their confidence and competency of the adductor canal block before and after working with the plastinated model. The results concluded that the plastinated model demonstrating the adductor canal block increased the confidence and competence of the participants.

An Experiential Teaching Project to Promote the Use of Nebulized TXA to Prevent Postoperative Bleeding in ENT Procedures (P)

Presenter: Angel Guy
Faculty Project Advisor: Jordan Palmer

Tranexamic acid (TXA) is an antifibrinolytic medication commonly used to reduce bleeding during and after surgeries. In ENT procedures, such as tonsillectomies, postoperative bleeding is a common complication, and TXA is often used to prevent or treat it. There are two primary forms of TXA administration in ENT procedures: nebulized and topical. Nebulized TXA is delivered directly to the surgical site using a nebulizer, while topical TXA is applied directly to the bleeding surface. This project aimed to educate healthcare professionals, particularly certified registered nurse anesthetists (CRNAs), on the benefits and proper administration of nebulized tranexamic acid in reducing postoperative bleeding. In this project, an educational flipbook was designed to improve anesthesia providers' knowledge and clinical guidance regarding the use of topical versus nebulized TXA for ENT procedures. Participants completed a pretest before the educational intervention and a posttest following the educational intervention to evaluate learning. The study results showed that the educational flipbook was an effective intervention that improved anesthesia providers' knowledge of utilizing nebulized TXA to reduce postoperative bleeding in ENT cases.

In Obese Patients, Does the Addition of Apneic Oxygenation with a High Flow Nasal Cannula Provide More Time to Perform Direct Laryngoscopy? (P)

Presenter: Robert Harrison Smith
Faculty Project Advisor: Jordan Palmer

The crux of this project is to promote the use of the high-flow nasal cannula in addition to standard mask preoxygenation in obese patients undergoing general anesthesia. While appropriate mask preoxygenation will theoretically provide several minutes of maintained oxygen saturation, once the mask is removed, the influx of oxygen and removal of carbon dioxide will end. It is at this time that the addition of a high-flow nasal cannula will excel in maintaining oxygen saturation. Even when a patient is not actively breathing or being masked, the high-flow nasal cannula can still be worn and will provide aid by delivering positive pressure to the patient and promoting the removal of carbon dioxide, thus maintaining an otherwise falling oxygen saturation. The application of the technique will allow more time for direct laryngoscopy according to the research gathered. This project is focused on educating and hopefully changing practice for currently licensed CRNAs. A detailed search of the literature was conducted in PubMed, Ebsco, Medline, and ScienceDirect, using various keywords in combination, such as "obese", "apneic oxygenation", "high flow nasal cannula", and "direct laryngoscopy."

Safety with iPACK Nerve Blocks: Utilizing 3-D Printer Technology and Handheld Ultrasound to Aid in Approach (P)

Presenters: Jerry Nguyen and Andrew Sayres
Faculty Project Advisor: Andrew Rice

Current clinical practice does not explicitly describe the best anatomical approach to the iPACK (infiltration between the Popliteal Artery and Capsule of the Knee) nerve block. Instead, it describes multiple anatomical approaches, including the medial and lateral approaches. In the past, femoral nerve blocks were the standard for regional anesthesia for lower leg procedures. Downsides of motor blockade slowed physical therapy activities, increased muscle atrophy side effects, and prolonged postoperative downtime with an increased risk of venous thrombosis in post-surgical patients. Adductor canal blocks are now standard, which has decreased the risk of quadricep femoris muscle atrophy while promoting early ambulation. Many surgeons who order this block negate blocking sensory nerve impulses to the posterior portion of the knee. If added, an iPACK block incorporates the sensory blockade benefits without motor nerve blockade to the posterior portion of the knee capsule, a location an adductor canal block does not cover. With the aid of an anatomical 3-dimensional printed knee model submerged in gelatin, a portable ultrasound, and the assistance of a guided lecture, the purpose of the study is to identify and educate providers on the safest and most efficacious anatomical approach to an iPACK nerve block in surgical patients receiving lower limb surgeries/procedures.

Applied Virtual Reality Simulation for adjunct to Gross Anatomy (P)

Presenters: Daniel Baker and Wright Hobgood
Faculty Project Advisor: Andrew Rice

Providing safe anesthesia requires in-depth knowledge of anatomy. This study intended to augment and enhance gross anatomy education for first year Student Registered Nurse Anesthetists (SRNAs) enrolled at Union University utilizing a VR anatomy application to provide more in-depth learning opportunities and additional resources to supplement their education. Virtual Reality (VR) headsets can provide more time with professionally dissected cadaver models, repetition, additional viewing angles, and real-time labeling of anatomy. This study showed that even when the software was made available with very few barriers, adoption from first year nurse anesthesia students can be low. Barriers to participation varied from time to lack of interest, but the technology was consistently recommended to be provided for future cohorts. As programs continue to be developed on the platform of VR, additional studies will be needed to assess their benefits for use in nurse anesthesia curriculum.

Educating CRNAs on Decreasing Pediatric Patient Perioperative Anxiety Using Educational Videos: An Experiential Educational Project (P)

Presenters: Cassie Moseley and Payton Naifeh
Faculty Project Advisor: TaMara Carter

This experiential educational project aims to educate the anesthesia and perioperative staff of LeBonheur Children's Hospital on decreasing perioperative anxiety in the pediatric population through informative videos. After both being nurses who worked in the Pediatric and Neonatal ICU, this unique population usually goes through multiple surgeries

and procedures while having feelings of fear and anxiety each time. Research has shown that letting children watch a video of what to expect before surgery decreases anxiety. During the duration of our clinical rotation, we presented examples of educational videos from other children's hospitals and other practices that alleviate anxiety in this particular population. We also presented research that supported this change in practice. Before the education, participants took a pre-test. After we presented the teaching and research, we received feedback from Anesthesiologists and Certified Registered Nurse Anesthetists (CRNAs).

Educating CRNAs on the Use of a Standardized Handoff Tool Improves Handoff Quality and Patient Safety (P)

Presenter: Mary Kim Ward
Faculty Project Advisor: Ross Palmer

In 2010, The Joint Commission labeled handoffs as a standard of care. However, this has not become routine in most clinical practices. Implementation of a handoff tool has been shown to improve handoff quality, improve patient safety, and decrease sentinel events. This project aimed to effectively educate Certified Registered Nurse Anesthetists (CRNAs) on the use of a standardized handoff tool to use during patient care transitions. Twenty-five CRNAs who met the criteria of not using a standardized handoff process voluntarily participated. A pre-test survey was conducted prior to an educational presentation and followed with a post-test survey. The results revealed a gap in knowledge before and after education. Future opportunities exist to develop a universally recommended standardized tool.

Are Nurse Anesthetists the Majority Providers of Obstetric Anesthesia Services? (P)

Presenters: Charles Carter and Shane Martien
Faculty Project Advisor: Jordan Palmer

This experiential research project explores anesthesia staffing models and billing codes used within the obstetric specialty. Identification of which type of provider performing/providing specific obstetric anesthesia services and what billing codes accompanied those services in Kentucky (an opt-out state) and Tennessee (a non-opt-out state) further supports the autonomous, independent practice of nurse anesthetists. The nurse anesthesia profession has grown and expanded dramatically, leading to increased responsibility and autonomy, notably within obstetric services. From background research, clinical experience, and expert opinion, we will find data supporting nurse anesthetists as the majority providers of obstetric anesthesia. We will present evidence noting who is performing the majority of obstetric anesthesia services, and pending facility/agency cooperation, the specific billing codes utilized within each facility for specific obstetric anesthetic procedures. This information should increase nationwide awareness regarding nurse anesthetists and their irreplaceable involvement in obstetric anesthesia. The data from facilities across the states of Tennessee and Kentucky reinforces the direct impact independent nurse anesthetists have in obstetric care.

Multimodal Analgesia to Reduce Narcotic Consumption in Abdominal Surgical Procedures (O)

Presenter: Jennifer E. Williams
Faculty Project Advisor: Andrew Rice

Multimodal analgesia has been studied as an adjunct to pain management in surgical patients. The purpose of this project was to determine if the utilization of a multimodal approach to pain control would demonstrate a decrease in narcotic consumption in post-operative abdominal surgical patients. Multimodal analgesia also has been included in the 2023 MIPS (merit-based incentive payment system) quality measure to help provide the best pain management to facilitate faster recovery after surgical procedures. If we can understand barriers and improve the utilization of multimodal adjuncts to pain treatment, we can improve quality patient treatment for the surgical patient. A total of fifty patients at Baptist Memphis were observed and data was obtained to improve compliance with multimodal pain control. There was not a statistically significant decrease in post-operative time, but we did observe a decrease in the morphine milliequivalents in the first two post-operative days. This study shows there is an opportunity for practice compliance improvements and utility to enhance patient care.

Implementation of a Structured Orientation Process to Assist in the Nurse Educator Role Transition: A Quality Improvement Project (O)

Presenter: Heather Moran
Faculty Project Advisor: Cynthia Powers

Nurse educators are instrumental in addressing the global nursing shortage. Without an adequate number of qualified faculty, the nursing shortage will continue to grow. Factors such as aging faculty, workplace culture issues, inadequate mentorship, and ineffective orientation have exacerbated the issue. When transitioning from clinical roles to nurse educators, individuals are faced with many challenges, with a lack of true understanding and orientation to the new role being one of the biggest. The purpose of this quality improvement project aimed to enhance the orientation process for new nursing faculty by providing monthly workshops tailored to individual learning needs and guided by an orientation checklist. A pre/post survey assessed the overall satisfaction and perceived effectiveness of adding the department-specific orientation compared to the university-wide program only. While initial findings did not show statistical significance, the aim of the project was met and showed practical significance for future implementation. ■

PHARMACY

Hormone Receptor-Positive (HR+) Breast Cancer Cells Growth is Inhibited by High Dose Ascorbic Acid Purpose (P)

Presenters: Xinyue Shen
Faculty Project Advisor: Lunawati Bennett

Approximately 83% of breast cancer cases manifest as hormone receptor-positive (HR+). In light of the considerable expense and potential toxicities associated with conventional therapeutics utilized in breast cancer management, researchers have endeavored to explore alternatives aimed at mitigating costs and minimizing adverse effects. Ascorbic acid, or vitamin C has demonstrated efficacy in cancer treatment since the 1970s; nevertheless, its optimal dosage for targeting breast cancer cells remains inadequately investigated. Therefore, the objective of this study was to determine the optimal concentration of vitamin C as an adjunct to standard therapy in HR+ breast cancer cells. *Methods*: The MCF-7 cell line was selected for its representative nature of hormone receptor-positive (HR+) breast cancer cells in this study. The impact of ascorbic acid on cell proliferation was assessed utilizing both the MTT assay and the scratch assay methodologies. Cells were appropriately diluted with culture medium to achieve a concentration of 1 x 10^5 cells per mL. Subsequently, 100 μL of the cell suspension was plated into individual wells of 96-well plates. Following an adequate incubation period and aspiration of the medium, the plates were supplemented with chemoagents medium along with varying concentrations of neutral vitamin C, distributed in a geometric progression ranging from 0.05 mM to 50 mM. Incubation periods of 24, 48, or 72 hours were implemented as per experimental requirements. Staining techniques were employed for subsequent analytical assessment. *Results*: Cell proliferation exhibited a notable decline with the escalation of vitamin C concentration, notably from 1.6 mM (67.15% MCF-7 cell concentration) to 3.1 mM (33.85% MCF-7 cell concentration). Subsequently, the cell concentration demonstrated a plateau pattern with further increments in vitamin C dosage. Notably, among the doses of 12.5 mM, 25 mM, and 50 mM, the average cell concentrations remained closely clustered (23.8%, 22.58%, 24.33%, respectively). Moreover, across the three designated time periods, plates incubated for 72 hours displayed the lowest average concentration under the higher vitamin C doses (21.8%) contrasting with those observed at 24 and 48 hours (24.7% and 24.2%, respectively). *Conclusion*: This study supports corroborates prior research findings suggesting the therapeutic efficacy of ascorbic acid in breast cancer treatment. Ascorbic acid notably exhibited cytotoxic effects on breast cancer cells, with the concentration of 12.5 mM demonstrating maximal efficacy in our investigation. Collectively, the findings advocate for the consideration of high-dose vitamin C as a viable adjunct therapy against HR+ breast cancer cells, particularly in conjunction with standard therapy. However, further exploration through animal models and prospective clinical trials inhuman subjects is warranted to substantiate and expand upon these preliminary observations.

Introducing Destructive Therapy as a Means of Assisting Health Profession Students Better Manage Stress and Anxiety (P)

Presenter: Collin N. Fiorentini
Faculty Project Advisors: Sean R. King and Virginia E. Schwindt
Co-authors Chance H. King, Justin M. Lee, and Kaulin C. Duncan

Objective: Utilize destructive therapy to improve the perceived stress and anxiety of health profession students. *Methods*: This social cognitive theory-based investigation employed a pretest/posttest control group design. Graduate level health profession students participated in a month-long intervention consisting of 60-minute seminars held once weekly for three weeks, and a 10-minute destructive therapy session (n=30). A random sample of students opting not to join the intervention served as the control group (n=32). Comparisons were made between groups for each posttest measure using analysis of covariance, with the corresponding pretest scores as covariate. *Results*: Compared with the control group, significant improvements at posttest were observed in the intervention group on the measures of perceived stress and generalized anxiety (p=.02 and p=.01, respectively). Significant improvements were also observed within the intervention group for self-efficacy (p<.001) and situational perception (p=.01). *Conclusions*: Results suggest this intervention may assist health profession students better manage stress and anxiety. ■

PHYSICS & PSYCHOLOGY

The Randomized Atwood Machine: Software for Generating Physically Consistent Atwood Machine Problems (O)

Presenters: Tabitha Keylon
Faculty Project Advisor: Geoffrey Poore

This project takes the Atwood Machine problem that physics students encounter during Classical Mechanics and generates random yet realistic numbers with the Python programming language. This tool can be useful for instructors, as it allows them to quickly and easily generate numbers for student homework problems. We started by deriving the equations needed for the computer to calculate and restrict randomized values for physical quantities and then learned how to use the SymPy and random Python libraries to implement our derived equations and randomize the physical quantities. The final code generates an Atwood Machine problem that engages users with an interactive element, allowing users to input the gravitational constant as well as the ranges for randomized values. ■

Age and Forgiveness (P)

Presenter: Makenna Tiffany
Faculty Project Advisor: Mollie Carter

The act of forgiveness has been linked to positive effects such as helping mend one's personal relationships. Previous research has found that there are age group differences in forgiveness. The current study aimed to replicate these results to support or refute these age differences in forgiveness among Christian adults. Participants (n=65) participated in an online anonymous survey that measured forgiveness using the Heartland Forgiveness scale. Evidence suggests that there is a group difference in forgiveness based on age and that the middle-aged adults had the highest rate of forgiveness among all the age groups surveyed. ■

SOCIOLOGY AND FAMILY STUDIES

Religious Congregations and Fear of Crime (O)

Presenter: Mary Beth Propes
Faculty Project Advisor: Matt Henderson

While religion and crime have long been interwoven in theory and practice, recent research investigates reasons for this connection. This study will further work with the chosen data set, the National Survey of Congregational Crime and Security (2015). Limited research has addressed the degree of neighborhood similarity between congregations and communities and the subsequent impact on fear of crime. This study evaluates neighborhood similarity by education, income, religion, and race and how they impact fears of violent and property crime. The hypothesized relationship predicts higher levels of neighborhood similarity will lower the fear of crime such that congregations high in neighborhood similarity are less likely to be victimized and will foster higher levels of social connection in their communities. This research seeks to advance the current field by studying the impact of congregational integration in communities, a topic advantageous for religious and criminal justice organizations. ■

THEOLOGY AND MISSIONS

The Security of Salvation in the New Testament: Analyzing Three Debated Passages (O)

Presenter: Daria M. Guthrie
Faculty Project Advisor: Matthew Albanese

The New Testament contains WARNING PASSAGES, which caution believers against falling away from God. Numerous biblical theologians use these WARNING PASSAGES to argue that an individual can profess their faith in Christ at one point but then fall away from God, resulting in their souls being condemned to eternal punishment. Since these theologians base their arguments on Scripture, their points are compelling, for it seems as if these passages suggest the possibility of apostasy. While these arguments appear to be sound, I believe those who affirm apostasy are misguided in their interpretations of these scriptures. In this paper, I analyze several passages often used to support apostasy (Hebrews 6:1-12, 2 Timothy 2:11-13, and John 15:1-17). I argue that these passages are not teaching that a genuine believer can fall away from God, but each passage in its proper context teaches otherwise. I conclude that a genuine believer cannot lose his salvation; instead, he will persevere throughout his life. ■

SYMPOSIUM

TWENTY-FIRST ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

RESEARCH GRANT RECIPIENTS *Fall 2023*

UNDERGRADUATE

Esther Choi and Anna McCredy: "Inhibitory Mechanism of Herbal Extracts on Staphylococcus epidermidis Biofilm"

William Thierfelder and Aubrey Hayes: "Inflammation, Thyroid Hormone Regulation, and Breast Cancer Metastasis"

James Kerfoot and Scout Fluet: "Influence of Native Tropical Seagrass Species to that of a Non-native Seagrass Species"

Mark Bolyard and Adah Davis: "Evaluating Phenotypic Variations in Regenerated Chinese Elm Varieties"

Marc Lockett and Benjamin Smith: "Downstream Effects of Thrombin-Induced PAR-1 Activation in Fibroblast Cells"

Jeremy Blaschke, Megan Walker, and Ngan Kim Dong: "The Diversification of Cricket-Assassin Wasps (Vespoidea: Rhopalosomatidae)"

Jimmy Davis and Grace Beem: "GC/MS Analysis of Cuticular Hydrocarbon Profiles to Identify Cricket Assassin Wasps"

Jay Beavers and Laura Thompson: "Presentation at International English Convention"

April Rowsey and Micah McGee: "Advancing Care Measurement in Organizational Studies Promoting Flourishing Workplaces through Workplace Caring"

Colene Trent and Bella Bianchi: "Investigating the Factors Influencing Attitudes and Beliefs Regarding Financial Literacy in College Students"

Joseph Xu and Micah Winn: "A Strategic Analysis of Dutch Bros' Potential Market Expansion into Brazil"

GRADUATE

Esther Choi and Sidney Heath: "Inhibitory Mechanism of Bacterial Metabolites on Staphylococcus epidermidis Biofilm"

William Thierfelder and Emilee McLean: "Biochemical Pathways Regulating Expression of Deiodinase-3"

James Kerfoot and Andrew Logsdon: "Influence of Interspecific Interactions Between the Native Bluegill and Non-native Convict Cichlid"

Sean King and Collin Fiorentini: "Intervention Based on Social Cognitive Theory: Evaluation of a Health Promoting Method of Destructive Therapy to Assist Graduate Students Better Cope with Stress and Anxiety"

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