Sixth Annual Student Scholars Symposium

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Students' Abstracts

Paper Presentations

Graduate Students Oral Presentations

The Effects of Deazaflavin induced TDP2 inhibition with etoposide treatment in MDA-MB-231 cell culture

Sara Windham and Bonny Millimaki, Biology

TDP2, or tyrosyl DNA phosphodiesterase 2, is a molecule that is active during transcription that hydrolyzes the 5'tyrosyl DNA adducts that are created from topoisomerase 2 double stranded cleavage. This prevents further DNA replication due to increased damage. Etoposide is a cell-cycle specific chemotherapy drug that prevents Top2 from releasing a strand of DNA and therefore increasing DNA damage and induces apoptosis. Previous studies have shown that TDP2 inhibitor administration with etoposide can be more effective when treating cancer. However, etoposide has been shown to have clinical toxicity at high dosage levels. In these experiments we observe the effects of using less etoposide in combination with TDP2 inhibition. In the near future we plan to look at the effects of these treatments in a zebrafish xenograph model by microinject MDA-MB-231/RFP cells at 24 hpf into zebrafish. We will treat the xenograph model at 30 hpf with the same etoposide/deazaflavin concentration from the MDA-MB-231/RFP treatment. This could prove to be a powerful model with which to test future cancer treatments.

The utilization of the COX2 prostaglandin synthesis pathway for novel therapeutic approaches to endocrine and chemotherapy resistant breast cancer

Katherine Ray and Beth Conway, Biology

The Cyclooxygenase 2 (COX2) functions as an inflammatory- associated enzyme within a prostaglandin synthesis pathway that has been associated with aggressive breast cancers. The COX2 prostaglandin synthesis pathway initiates cellular proliferation, metastasis, immune evasion, and cancer stem cell- like phenotypes in breast cancer. When COX2 produces Prostaglandin E2(PGE2), it functions as a G protein coupled receptor able to interact with receptors E1, E2, E3, and E4. Specifically, increased interactions with receptors E2 and E4 occur in aggressive breast cancers and promote cellular proliferation. This Review focuses on the COX2 pathway and its role in Triple Negative Breast Cancer/normal-like (TNBC) and breast cancers which function independently of estrogen. These breast cancer subsets are clinically relevant because of their lack of therapeutic options. In fact, TNBC lacks estrogen receptors (ER), progesterone receptors (PR), and human epidermal growth factor 2 (HER2), which prevents molecular therapies for these receptors from being effective. Also, breast cancers associated with ER independent signaling hinder traditional therapeutic intervention that involves thwarting either estrogen synthesis or interaction with the ER receptor. Both genetic and epigenetic expression of the components provide new therapeutic targets for these endocrine therapy and chemotherapy resistant breast cancers.

Chimeric Antigen Receptor T-Cell Therapy for Acute Lymphoblastic Leukemia

Jennifer Ritchie and Jon Lowrance, Biomolecular Sciences

Chimeric antigen receptor T-cell (CAR T) therapy is a novel treatment that uses the natural immune process of the body to fight off infections. CAR T cells are made of single-chain variable fragments from a monoclonal antibody, making them able to target specific antigens within the body. The underlying molecular mechanism of CAR T cell therapy is particularly attractive for treating B cell malignancies, since CD19 can be used as a target antigen that is specific to B cells. This review will explain the molecular mechanisms of CAR T therapy and summarize how CAR T therapy is currently being tested as a potential treatment for acute lymphoblastic leukemia.

Highly Invasive Breast Cancer Cell Lines Show a Greater Sensitivity to MAPK Inhibitors by Decreasing Proliferation and Invasion

Mehdi Chaib and Beth Conway, Biomolecular Science

Invasive Breast Cancer is the second most common cancer in women, and the second cause of cancer-related deaths. Identification of novel regulators of breast cancer could lead to the identification of new biomarkers and potential therapeutic targets. Neprilysein is a cell surface enzyme that cleaves and inactivates a number of substrates like endothelin-1 that has been implicated in breast cancer. From previous studies published in our lab, neprilysein hypermethylation correlated with decreased epithelial expression. Furthermore, neprilysein negatively regulated endothelin signaling including mitogen activated protein kinase (MAPK) signaling, and breast cancer cell invasion. Therefore, we hypothesized that breast cancer cell lines with hypermethylated neprilysin (MDA-MB-231) would be more sensitive to MAPK inhibition in proliferation and invasion assays than cell lines with less neprilysin methylation (MCF7 cells). We also reasoned that if neprilysin primarily regulates breast cancer invasion through MAPK signaling, neprilysin over-expression and MAPK inhibition will not synergistically inhibit invasion and proliferation. The MCF7 cell line did not show a sustained, statistically significant decrease in proliferation after PD98059 treatment, neprilysein transfection, or both; while the MDA-MB-231 cell line showed a decrease in proliferation and invasion. These findings support our hypothesis that cancer cells with hypermethylated neprilysin may be more sensitive to MAPK inhibition, but similar experiments in additional breast cancer cell lines are needed to fully test this. If further experimentation validates our hypothesis, neprilysin methylation could eventually serve as a therapeutic biomarker to identify patients that might respond to MAPK inhibitors.

The Use of Ad Hoc Networks in Home Security

Tyler Davis, Aron Mebrahtu, Chris Simmons, Creighton Brown, and Alfa Nyandoro, College of Computing and Technology

According to the FBI, in 2016 there were an estimated 327,374 robberies in the United States. That number equates to one robbery every 13 seconds in the United States. With the recent rise in home invasions, the need for advanced security and monitoring systems has become even more prevalent. Local officials look for evidence in which to apprehend the assailant, whether it be video capture within the victim's location or another close proximity location that may have captured the suspect in another video angle. Unfortunately, in many instances of burglary, footage has been destroyed. Therefore, it is imperative to create a fail-safe video storage solution to assist law enforcement with capturing the suspect in the event footage is destroyed during the crime. Ad hoc networks were created as a way for the military to communicate among devices when there were no set infrastructures available. In the 1990s, with the increased popularity of personal computers, the commercial ad hoc community was born. Ramanathan and

Redi (2002) confirm the rapid expansion of visible inexpensive wireless devices and network community. In this paper, we propose the use of ad hoc networks in home security surveillance as a way to share information and video footage not only with other users, but with local authorities. We implement this solution with aspiration to prevent the loss of data in the case of a break in or systems being tampered with. Our solution is a community-wide initiative that leverages wireless technologies (such as WiFi) to create redundant storage of the pertinent information without necessarily using subscription based (and therefore costly) technologies like 4G networks.

A Data Science Strategy to Classify Cancerous Lesions in the Lung, Supporting the Nation's Cancer Moonshot Initiative

Carl Lordo and Todd Gary, College of Computing & Technology

Early detection is critical to offer cancer patients the best chance of survival. Yet some cancer detection systems have a high rate of wrongly identifying cancer when it does not exist. These false positives can be as high as 25% in lung cancer and cause patient anxiety and unnecessary intervention treatments. This is unfortunate since lung cancer is a serious global and U.S. problem requiring more accurate early detection. Worldwide, lung cancer results in 1.69 million deaths. In the U.S., about 1 out of 4 cancer deaths are from lung cancer, which is more deaths than colon, breast, and prostate cancers combined, costing over $12 billion in healthcare. To improve early detection of lung cancer, Kaggle is hosting an online international competition for the development of a more accurate prediction system. The winning entry will receive funding from the Laura and John Arnold Foundation. This competition is possible because the National Cancer Institute has made public a data set of thousands of high-resolution scans of patients' lungs for training and testing a model classifier system. This release supports the bold new national initiative, the Cancer Moonshot, established to accomplish a decade's worth of progress in cancer prevention, diagnosis, and treatment within five years. Contributing to the analysis effort, this presentation describes our approach to analyzing the image data set, constructing an algorithmic model to avoid false positives, while still providing early identification. Benchmarking, proficiency, and validation of our model will be determined by the Kaggle community. Comparison to other competitors' entries will also be presented.

The Opportunities, Challenges and Impacts of the Internet of Things on Environmental Sustainability

John Plunkett and Emily Stutzman, Institute for Sustainable Practice

There are now more devices, sensors and systems connected to the internet than people. These "things" are communicating and collecting a plethora of data in real time on the places and environments they operate in including buildings, vehicles, homes, farms, oceans and many other locations across the planet. This growing internet of things (IOT) presents a tremendous opportunity for environmentalist and sustainability advocates to dramatically change the way we see, understand and manage our limited precious resources and protect our environment. These new data sources provide a way of seeing our planet and how we as humans interact with it as never before possible. This paper and presentation will define this emerging technology and explore the challenges, impacts and opportunities associated with this new technical capability. It will also provide a model for how this technology could be adopted by organizations around the world to achieve positive impacts on the environment.

The effects of whey and pea protein on body composition, muscle architecture, and performance in CrossFit athletes

Amy Banaszek, William David Bender, William Vantrease, Dr. Autumn Marshall, Dr. Kent Johnson, and Jeremy Townsend, Kinesiology

This study examined the effects of pea and whey protein supplementation on muscle thickness, body composition, and exercise performance in CrossFit athletes. Fifteen resistance-trained participants were enrolled in this study: 8 resistance-trained men (38.6 ± 12.7 y, 1.8 ± 0.1 m, 87.7 ± 15.8 kg) and 7 women (38.9 ± 10.9 y, 1.7 ± 0.10 m, 73.3 ± 10.5 kg). Participants completed an 8-week CrossFit training program which consisted of 4 training sessions per week. Participants consumed 24g of either whey or pea protein before and after exercise on training days, and in between meals on non-training days. Before and after the program, participants underwent ultrasonography muscle thickness measurement, bioelectrical impedance (BIA) body composition analysis, two benchmark WODs (workout of the day), 1-Repetition Maximum (1RM) squat and deadlift testing, and Isometric Mid-Thigh Pull (IMTP) performance. A significant main effect for time for 1RM back squat ($p = 0.006$) and deadlift ($p= 0.008$) was found with both groups experiencing increased strength. There was no significant main effect ($p > 0.05$) for type of body composition, muscle thickness, peak force, rate of force development, or performance in either WOD. There was a significant time by group interaction ($p = 0.044$) for WOD with the pea protein group finishing significantly faster. We conclude that ingestion of whey and pea protein produce similar outcomes in measurements of body composition, muscle thickness, force production, and strength. However, pea protein may result in improved WOD performance compared to whey.

An In Vitro Characterization of Meperidine N-Demethylation by Cytochrome P450 Enzymes

Jessica Murray and Klarissa Jackson, Pharmaceutical Science

Meperidine is an opioid analgesic indicated for moderate to severe pain. Accumulation of the neurotoxic metabolite normeperidine can cause agitation, tremors, and seizures. Normeperidine is formed via N-demethylation by cytochromes P450 (CYP) 2B6, 2C19, and 3A4; however, the relative enzyme contributions are not well established. The goals of this project were to define the roles of these P450 enzymes in meperidine N-demethylation, and evaluate the effect of P450 polymorphisms on normeperidine formation. Various reaction phenotyping experiments were performed to determine the relative contribution of individual P450 enzymes to normeperidine generation. Normeperidine was quantified using liquid chromatography-tandem mass spectrometry. Meperidine was incubated with a panel of recombinant P450 enzymes which generated normeperidine in the following order: CYP2B6 > CYP2C19 > CYP2D6 > CYP1A2 > CYP3A4. These experiments indicated that not only are CYP2B6 and CYP2C19 involved in meperidine metabolism as observed in previous experiments, but that CYP2D6 and CYP1A2 are also capable of normeperidine formation. To confirm these findings, meperidine was co-incubated with a panel of P450-selective chemical inhibitors in pooled human liver microsomes (HLM). Collectively, these data provide insight into the P450 enzymes most responsible for generating normeperidine. Future experiments will elucidate the kinetics of normeperidine formation to assess the catalytic efficiency of each relevant P450 enzyme. Further analysis of CYP2C19-genotyped HLM will also provide insight into the impact of P450 polymorphisms on normeperidine generation.

Targeting Topoisomerase II: Synthesis and Evaluation of Halogenated Podophyllotoxin and Etoposide Analogs

Matthew Murphy and Susan Mercer, Pharmaceutical Sciences

The anticancer agent etoposide targets topoisomerase II and results in strand breaks that in some patients lead to the development of translocation-induced leukemia. One hypothesis is that metabolites of etoposide are formed preferentially in the myeloid progenitor cells where these translocations occur. Previous studies suggest that halogenation of the C-2 position of etoposide reduces the formation of etoposide metabolites. For this reason, we sought to design and synthesize etoposide analogs that are halogenated at the C-2 position and elucidate its activity against human topoisomerase II. Halogens were introduced into the C-2 position by electrophilic aromatic halogenation. The reagents N-bromosuccinimide, N-chlorosuccinimide and tetra-n-butylammonium fluoride afforded a series of desired compounds (LUCOP 48-53) with halogens in the C-2 position. Halogenation reactions were performed on etoposide and the natural products of its derivation, 4'-demethylepipodophyllotoxin and podophyllotoxin. Based upon enzyme activity assays with purified human topoisomerase II alpha, LUCOP 48-50 and 52-53 did not increase DNA cleavage. In contrast, LUCOP 51 showed enhancement of topoisomerase II-mediated DNA cleavage in a concentration dependent manner. In addition, LUCOP 48, 49, and 52 showed no significant inhibition of topoisomerase II-mediated DNA relaxation. In contrast to results with DNA cleavage, LUCOP 50, 51, and 53 all display variable ability to inhibit DNA relaxation. Implications: The activity observed with these halogenated analogs demonstrates that modifications to the E-ring are tolerated by topoisomerase II alpha. These results provide support for complete characterization of the present analogs and synthesis of additional halogenated analogs.

HU-331 and Oxidized Cannabidiol Stabilizes the Closed Clamp Conformation of Topoisomerase II

Cole A Fief and Joe Deweese, Pharmaceutical Science

The enzyme family of topoisomerases function in the regulation of DNA topology. Specifically, topoisomerase II is a well-known and characterized pharmacological target of anticancer therapy. It has been observed that an increasing number of natural compounds and products appear to have an impact on the functionality of topoisomerase II. Previous studies have found that HU-331, a derivative of cannabidiol, has effects of catalytic inhibition against topoisomerase IIa. As a result, cannabidiol and oxidized forms of cannabidiol became important to assess for potential inhibitory activity on topoisomerase IIa. One form of catalytic inhibition involves disruption of the sequential gated mechanism of topoisomerase II. In this form of inhibition, the N-terminal clamp of topoisomerase II closes around DNA and is unable to open. Based upon analysis using filter-binding assays, we propose that HU-331 and oxidized cannabidiol inhibit the function of topoisomerase IIa by stabilizing the N-terminal clamp of the protein and preventing DNA strand passage. Our evidence indicates that this clamp is highly salt stable and is disrupted only by SDS or digestion of the topoisomerase enzyme by proteinase K.

Oxidized Products of Cannabidiol Inhibit Topoisomerase IIα

James T. Wilson II, Cole A. Fief, Klarissa D. Jackson, Susan L. Mercer, and Joseph E. Deweese, Pharmaceutical Sciences

Cannabidiol is a significant phytocannabinoid component of cannabis that lacks psychotropic effects. It is critical to understand both the pharmacologic and toxicologic properties of this compound and its derivatives as a matter of public health. The cannabidiol derivative, HU-331, inhibits topoisomerase II, which is a known anticancer drug target. We set out to examine whether cannabidiol inhibits the catalytic activity of topoisomerase II & #945. Additionally, we explored whether human liver microsomes could metabolize cannabidiol into HU-331. We performed in vitro assays with cannabidiol and oxidized cannabidiol species to examine DNA cleavage, DNA relaxation, ATP hydrolysis, and DNA binding activities of topoisomerase II & #945. Further, cannabidiol was incubated with human liver microsomes and metabolites were analyzed using mass spectrometry (LC-MS/MS). Oxidized species also formed non-enzymatically in solution as confirmed by LC-MS/MS. Our studies showed that only oxidized cannabidiol inhibits topoisomerase II & #945; relaxation activity and ATP hydrolysis at 50-100 &#956M. Both oxidized cannabidiol and HU-331 appear to reduce enzyme-DNA binding. These compounds also display the ability to stabilize the N-terminal protein clamp of topoisomerase II. Metabolism of cannabidiol in human liver microsomes revealed that cannabidiol is oxidized to form products with the same mass as HU-331. Only oxidized cannabidiol inhibits the ATPase, relaxation, and DNA binding activity of topoisomerase II & #945. Microsomal oxidation of cannabidiol generates oxygenated metabolites that are still being studied. Taken together, our work provides a basis for further exploration of the therapeutic and toxicologic properties of cannabidiol and the application of cannabis in anticancer therapy.

Immanuel Kant and Existence as a First-Order Predicate in The Ontological Argument

Chet Duke and John Mark Hicks, Theology

This paper explores Immanuel Kant’s problem with a major apologetic argument of classical theism: the ontological argument. In the ontological argument specifically a Cartesian or Leibnizian version, Kant finds the primary pitfall of other analytic arguments concerning the existence of God: existence as a first-order predicate. A predicate is a quality or property utilized in defining some subject. Kant proposes that existence cannot rightly be a predicate of some subject because it is not a concept which can be added to a subject, but is instead presupposed in any language concerning that subject and its properties. If Kant is correct, then the ontological argument amounts to tautology. The first section of this paper is devoted to the ontological argument itself, which originated in the thought of Anselm of Canterbury, and has been modified throughout the history of philosophy by thinkers such as Descartes and Leibniz. The second section concerns Kant’s combative responses to the ontological argument and how they coalesce with his larger epistemic project. The third section addresses some contemporary replies to Kant, including Alvin Plantinga's proposal of a modal ontological argument. The conclusion is that Kant's objection to the argument may not be the final word on the ontological argument.

A Sacramental Reflection on Exodus 19-24 and the Formative Life of the Church.

Colin P. Fagan and Philip Camp, Theology

This paper aims to show that, first, Exodus 19-24 can be viewed as having a sacramental quality to it allowing Israel to participate in the life and way of God for the sake of the world. The second aim is to show how that view informs the New Testament use of the virtue tradition and image of the Church as a community of formation for the sake of the world. The foundation of this position draws on Hans Boersma's development of a sacramental ontology. He states that a sacramental ontology insists that not only does the created world point to God as its source but that it also subsists or participates in God (Boersma, Heavenly Tapestry, Loc 293 ebook). Therefore, Israel's acceptance of the Law as seen in Exodus 19-24 presents the Ten Commandments and communal ordinances as sacramental agents bringing about God's aim to form them into a kingdom of priests and holy nation. This is crystallized in the communion portion of chapter 24. This framework undergirds an important feature of the Christian life: that the worship of the Church, its liturgical practices and virtues, are sacramental means allowing God's people to both commune with him and form them for how they are to be in the world. Like Israel, these form the Church to be an embodied sign and foretaste of God's continuing work of reconciliation and healing in the world (Kenneson, Blackwell Christian Ethics, 60).

Undergraduate Students Oral Presentations

Sex and the City and the Corinthian Church: A Look at 1 Corinthians 6:12-20

Lauren Brewer and Mike Williams, Bible

This paper is an exegetical investigation of 1 Corinthians 6:12-20. In this passage, Paul must address a situation in which the Corinthians are reveling in their newfound freedom, and as a result have severely undervalued the role of the physical body in the believer's life of faith. Paul discusses their practice of uniting with a prostitute as an example of this fundamental misunderstanding of the body, and responds by highlighting the implications of the union between Christ and the believer. His fundamental argument is therefore one of religious allegiance and identity, entirely rejecting the quasi-Platonic dualism of the prevailing culture.

Community and Unity at the Table: A Study of 1 Corinthians 11:17-34

Lauren Anderson and Mike Williams, Bible

This paper is an exegetical investigation of 1 Corinthians 11:17-34. In this text, we find that the Corinthian church has neglected the communal nature of the Eucharist meal, and Paul seeks to correct them and recreate the place of equality and unity that Jesus intended. The very nature of this meal solicits active participation in the community that Jesus gave his life for. They have taken the table from the Lord by deciding who is worthy of a seat at the table, and Paul is reinstating Jesus's rightful place as host at the table. The community meal has been so misconstrued that Paul contends that it is no longer worthy to be called the Lord's supper. Paul restores the true identity of this meal by tearing down the barriers of social stratification that are plaguing the church and bringing into perspective the grander vision of the kingdom: where the lowly are lifted up and given a place at the table.

Identification of Candidate Therapies to Enhance Regulatory T Cells to Reverse Type I Diabetes

Lauren Brewer and Beth Conway, Biology

Immune-mediated tissue injury is a primary mechanism through which many diseases threaten human health. As a prototypical example of autoimmunity, Type 1 diabetes (T1D) results from lymphocyte-mediated destruction of insulin-producing islet beta cells. In healthy individuals, the destructive power of the immune system is restrained by specific regulatory T cells (Treg), but these cells fail to protect individuals with T1D. We hypothesize that this Treg failure results from cell signaling processes that can be targeted with small molecules. Using splenocytes from healthy C57BL\6 (B6) and autoimmune diabetes-prone Non-Obese Diabetic (NOD) mice, we performed an in vitro screen of clinically relevant small molecules via high throughput flow cytometry to identify compounds that enhance Treg activation. We initially isolated a subset of small molecules that had a measurable effect on biomarkers of Treg activation. I am presently extending this screening assay to identify additional candidates. In addition, I am validating the most promising initial candidates by dosing them to NOD and B6 mice in vivo and measuring their effect on Treg activation. Based on these results, I will determine whether biologically plausible compounds can work to prevent or reverse T1D. Overall, my approach will lead to new understanding of the pathways involved in regulatory T cell activation and new pre-clinical approaches for correcting immune regulatory defects by accelerating our discovery of safe, individualized therapies that restore normal regulatory function to the immune system.

JAK2 may be the pathway responsible for immunoproteasome activation in the presence of TNF-a

Mason Forchetti and Amanda Williams, Biology

Immunoproteasomes play a pivotal role in the adaptive immune response through the degradation of endogenous antigens into peptides. The freshly cut peptides can then be loaded onto MHC I and delivered to the cellular surface, presenting an opportunity for subsequent interaction with a CD8+ T-cell. Our lab is interested in determining how immunoproteasomes are activated in the presence of various cytokines. We have previously shown that Janus kinase 2 (JAK2) is a protein tyrosine kinase which is responsible for activation of the immunoproteasome in the presence of IFN-g. We hypothesize that JAK2 also plays a role in the formation of an immunoproteasome in the presence of TNF-a; hence, blocking the JAK2 pathway in the presence of TNF-a should lead to a decrease in immunoproteasome subunit expression. To test the theory, siRNA inhibition of the JAK2 pathway was carried out in JAWSII Dendritic Cells, followed by TNF-a treatment and Western Blot analysis. These experiments will give us more insight into immune activation, and could potentially lead to better treatments against infectious intracellular agents.

Preoperative Indicators of Index Hospitalization Death in LVAD Patients

Morghan Jameson and Florah Mhlanga, Biology

To ensure optimal success of the left ventricular assist device (LVAD), it is essential to identify predictors of poor outcomes. In this study variables correlated to hospitalization death post LVAD implantation were assessed. Through the Vanderbilt Advanced Heart Failure Registry data from 234 patients implanted between April 2009 and May 2015 who either died during index hospitalization (index: n=26, 11%) or did not (other: n=208, 89%) was retrospectively assessed. A multivariable logistic regression analysis was performed to assess the impact of several variables on index death. Pre-specified covariates included age, INTERMACS score, and creatinine level. Through a univariate analysis, several pre-operative, operative, and post-operative correlations were identified. Lower body mass index (BMI) was correlated with higher incidence of index death (index: 27.10, 4.49; other: 29.68, 5.54; p=0.017). A higher Lietz-Miller score (index: 9.54, 6.06; other: 6.33, 5.03; p=0.01) and lower right ventricular stroke work index (RVSWI) (index: 466, 279; other; 560, 250; p=0.034) were the only two risk scores that proved to be significantly different between groups. Matthews, KORMOS, and INTERMACS scores did not prove to be significant (all p >0.05) in univariate analysis. A multivariable analysis identified lower INTERMACS score (p=0.0157) and increased age (p=0.0430) as significant predictors of index hospitalization death after adjusting for covariates. After analyzing the results of this study, we recommend increasing patients' BMI through better pre-operative nutrition, optimizing liver and kidney function, optimizing right ventricular function, and decreasing the weight of decision making on Matthews and KORMOS scores.

Just How Time Sensitive Are Genes Related to Neurological Development in Early Zebrafish Growth

Aaron Anderson and Bonny Millimaki, Biology

Our lab has been doing ongoing research to determine the role of Topoisomerase 2 beta in regards to early neurological development in *Danio rerio*. While attempting to replicate a past project, it was noticed that ever so slightly changing the administration time of our drug of interest would have major effects on the observed phenotypes just a short 24 hours later. *Danio rerio* develops very quickly, from a single cell to a functioning organism in 24 hours, but could the inhibition of an enzyme a few minutes early or a few minutes later than our planned time point give significantly different phenotypes? My goal is to answer this question, and possibly a few more along the way. By inhibiting the enzyme Topoisomerase 2 beta, our lab has proven that negative effects are eminent, but can these effects be varied by introducing the embryos to our Topoisomerase inhibitor 30 minutes early or 30 minutes late? Developmental biologists have proven that throughout evolution gene timing has played a major role in development, thus it seems very possible that these few moments could be making all the difference. I plan to determine just how time sensitive embryos are to the inhibition of Topoisomerase 2 Beta, as well as determine if these affects are reversible.

The Rio Grande Bridge

John M. Ray, Mariah Vinson, and Todd Lynn, Civil Engineering Department

One of Lipscomb University's civil engineering senior design teams had a unique opportunity to design a pedestrian bridge over the Rio Grande River in Olancho, Honduras. The span of the bridge is one of the largest the Peugoet Center for Engineering Service has ever designed, spanning around 206 feet. The process of designing the bridge was broken into three different teams that worked interrelated with one another: hydrology, substructure, and superstructure. The hydrology team was in charge of determining the max flow rate and water height of the river in a 50-year storm for the surrounding basin. The substructure team was set out with a task to build a concrete foundation that was capable of not only holding the forces applied by the superstructure but also the forces applied by the surrounding soil. The main purpose of the superstructure team was to design a structure that met the requirements set forth by the client while also abiding by local and foreign design standards. As a result of this bridge being designed and constructed, houses and families on the north side of the river will now have access to the south side of the river. This new access will allow for children to safely cross the river and attend school.

Journalism During the Pinochet Era, Chile

Lauren Borders and Paul Prill, Communication

On September 11, 1973, a military coup took over the country of Chile, resulting in the death of their president, Salvador Allende, and the establishment of a junta led by General Augusto Pinochet, a right-winged extremist. This regime was in power for almost twenty years, eventually ending in 1990. During the Pinochet Era, the military junta committed a number of human rights crimes in more than one thousand torture camps across the nation. 38,254 people were murdered or disappeared, most of them in unbelievably gruesome ways. Journalists imprisoned for exposing these wrongs were also among those victims. To be published, journalists were forced to conform to severe censorship from the government. However, many resisted these restrictions by creating alternative press to expose the atrocities committed by Pinochet and his administration. Consequently, there were two warring personalities to journalism: publications that submitted and were used as governmental instruments and publications that sought to express dissent. This presentation, a summarization of a fifteen-page research paper that I completed as an independent study

explores topics of military propaganda, underground press, victim accounts, American involvement, censorship, and how these influence the current industry. Research for this presentation comes from over twenty-five online and print sources, as well as two interviews from Chilean experts in this area of study.

Mizzou Riots: To Cover or Not to Cover

Rebecca Risley and Sarah Gibson, Communication and Journalism

Racism continues to run rampant throughout the United States. Rights are threatened and taken away. People are harmed and left for either death or the unfairness of the American judicial system. No second chances and no do-overs. This paper explores the happenings on the campus of the University of Missouri in November of 2015. It discusses how freedom of speech relates to free press and how the two work best alongside one another. After months of documentation and reports of racial slurs, violence, and unjust behavior, and after hearing nothing in response from the administration, students hosted a campus-wide sit-in on Nov. 9, where students and teachers gathered on the quad in tents and skipped classes. This came after the university president attempted to define systematic oppression by blaming the black community. The sit-in gained maximum national attention. Among the journalists present at the scene was student journalist and ESPN contract photographer Tim Tai. He refused to leave the scene after being asked to do so by faculty and students present on the quad. The faculty claimed he didn't have a right to be on campus to photograph the event, violating his right to free press while attempting to cover their expression of free speech. This paper explores the ethical dilemma of whether or not Tai should have left the university after being asked to do so, or if he was right to stay.

A System for Determining Persons of Interest through Communication Network Reconstruction

Justin Draughon, Brian Woodward, Eddy Borera, and Chris Simmons, College of Computing and Technology

Insider fraud impacts several major organizations each year. A report released by Kroll Global Fraud Report 2015-2016 shows 75% of organizations experienced insider fraud and 81% of those companies experienced the fraud through an inside perpetrator. Insider fraud can have a tremendous impact on a company's financial posture and public reputation. In 1985, two natural gas pipeline companies were merged into Enron. By 1992 Enron became the largest seller of natural gas in North America. The top executives of this company concealed the true nature of their entire financial status. In many instances an inside perpetrator has communicated with various people internally and externally when committing fraudulent acts. Therefore, Persons of Interest (POI) is a method that can be employed in insider fraud, which is an essential practice currently used in law enforcement and terror labeling across different sectors of domestic and foreign government. In this work, we develop a persons of interest system in an Enron like environment to analyze internal communications. We use information from a public Enron dataset that contains over 500,000 e-mails between approximately 150 employees. An analysis of communication is possible to reconstruct a visual network to extrapolate what types of connections exist between members of an organization. Upon proper determination of connections in the network that require monitoring, the system then analyzes the content of those communications for suspicious activities. This method can also be applied to other types of organizations such as terrorist groups and drug cartels.

Titanic Survival Analysis

Charles Humphreys, Lauren Gardiner, Nayeli Anaya-Hernandez, and Timothy Wallace, College of Computing and Technology

Machine learning techniques provide a powerful solution to prediction problems. To explore these various models, we applied them to two survival prediction problems: 1. Titanic and 2. AIDS Clinical Trial. The survival of Titanic passengers is a classic machine learning problem, which aids itself to exploration of machine learning models. To prove the applicability of the developed model, we adapted our model to work with another survival dataset, AIDS Clinical Trial Data. Techniques explored include logistic regression and gradient boosted decision trees. Our best model yielded an accuracy rating of 79.9%. In order to allow users to explore and understand the data, a web application has been built. The data visualization component of the web application enables users to sift through data collected from user inputs and/or historical data, as well as dynamic interaction with the data before and/or after the model(s) execution.

English and Modern Languages

Connecting Through Effective Communication

Julie Sarvak and Jan Harris, English

Though communication can be tricky, communication skills allow conversational partners to connect and support each other. By becoming an effective communicator, clarity increases, and conversations become more beneficial. The four keys of good communication allow speakers to become clear communicators. In How Language Works, David Crystal examines the unspoken rules of conversation. A conversation's success depends on acquired communication skills which unlock efficient dialogue. By developing confidence, speakers gain the strength they need to successfully carry out learned conversational skills. Clear communicators can transmit information and language in concise ways that allow a listener to fully understand their meaning. Empathy comes from participating in careful listening, which helps a communicator develop better understanding. Occasionally commenting and asking questions is a method of active listening which allows speakers to feel understood as they speak. Even conflict can be overcome through careful listening, responding, and strong speaking ability. By employing good communication skills, successful conversation is unlocked.

Death's Fascination with Color in The Book Thief

Kaylee Newland and Jan Harris, English and Modern Languages

Markus Zusak's 2005 novel The Book Thief uses Death's perspective to explore how Nazi ideology negatively impacted Germany society. Due to the morbidity of Death's profession, he uses the observation of colors as a distraction from the human world, and in personifying Death, Zusak filters images of World War II through a screen of colors. Through the prologue of The Book Thief, Zusak introduces the relationship between Death and color as he describes Death's interactions with the main character, Liesel Meminger, in three colors: white, black, and red. Each color not only represents an interaction with Liesel but also signifies a facet of Nazi Germany. The white, black, and red colors overlap to form the Nazi flag, and the experiences associated with the colors amalgamate into Death's understanding of Nazi Germany.

Shakespeare in London

Jenna Phipps and Jan Harris, English and Modern Languages

Bill Bryson synthesizes modern scholarship about William Shakespeare in his Shakespeare: The World as Stage. He provides the history of Shakespeare's life like many other biographers, but unique humor and sarcasm enhance his writing. Bryson delves into the lives of other playwrights in Elizabethan times and the little-known life and career of Shakespeare. Throughout the biography, Bryson lays out the development of Shakespeare's career as a famous playwright and as a linguist. Much of Shakespeare's contribution to modern culture was the way he developed language. Bryson says, "His real gift was as a phrasemaker". Shakespeare contributed to transforming English language while it was still fighting Latin as the most esteemed language in England. Bryson demonstrates Shakespeare's linguistic prowess, but he also is aware of Shakespeare's shortcomings as a playwright. Nonetheless, Bryson claims Shakespeare's genius had to do not really with facts, but with ambition, intrigue, love, suffering, things that aren't taught in school. By compiling the different pieces of Shakespeare's life and illustrating the history of Elizabethan theatre, Bryson makes the study of Shakespeare both interesting and insightful.

Lily Briscoe: The Space Between the Binary

Morgan Beers and Jan Harris, English and Modern Languages

In "To the Lighthouse", Virginia Woolf explores the idea of the androgynous artist through the character of Lily Briscoe. Lily is an artist looking to reconcile her inner struggle of identity in a way that maintains the objective qualities that great artists possess, but as Woolf discusses in A Room of One's Own, to be a truly great artist, one must be able to harness both the masculine and feminine sides of themselves. Lily's struggle between her masculine and feminine identities finds its embodiment in Mr. and Mrs. Ramsay, each models of their respective Victorian gender roles. Throughout the novel, Lily must work to find a deeper understanding of these two seemingly contradictory characters and personalities to create a balance within herself and unite the other characters through her art.

The Anglicization of Scottish Gaelic

Sterling Bishir and Jan Harris, English and Modern Languages

Scotland's native Gaelic language is dying and being replaced with English. Despite existing in such close proximity to one another, English and Gaelic possess different histories and developments. Throughout England's long history of conflict with its northern neighbor, the English came to believe that the only way to truly control the Scottish Highlands was to eliminate the Gaelic language and to replace it with their own. Through various attempts, including specialized schools and religious requirements, the English propagated the idea that Gaelic was the language for the private domain and English was for the public domain. Because of their sociological history, Gaelic and English were not mutually influenced as could be expected. Unlike in its interactions with other languages, English was only marginally affected by Gaelic, while Gaelic, lacking its own power center for reinforcement, failed to thrive. Despite having found a niche within Scottish culture, Gaelic continues to decline and be replaced by English.

Education's Impact on Society and Dialects

Amy Hall and Jan Harris, English and Modern Languages

Dialects develop due to settlement patterns, and reflect how the needs of speakers vary in different locations. After dialect differentiation occurs, societies choose a Standard Dialect, which becomes the power/prestige dialect and is the preferred dialect of the language. Often, speakers of a Nonstandard Dialect feel pressure to learn the Standard Dialect and may even feel that their dialect is lesser. Education plays a large part in the perception of dialects and the proliferation of Standard dialects. Schools have traditionally provided instruction in the Standard Dialect, which can harm students' participation, as well as their self-identity. Many Nonstandard speakers train themselves to code switch, due to social perception of their dialect. Speakers of a Nonstandard Dialect tend to feel excluded in education, leading them to feel the need to change their way of speaking. Change in the way schools teach about dialects will allow speakers of a Nonstandard Dialect to stop feeling marginalized.

The Trail Narrative: How Narrative Built The Appalachian Trail

William Mathis and Jan Harris, English and Modern Languages

Language has had a massive impact on the Appalachian Trail, one of the most beloved hiking trails in the world. This essay intends to show readers how narrative, and specifically narratives of individuals, helped to garner the support needed to build the Trail. This work centers around research into individual experiences with the Trail, including an introspective evaluation of experience, as well as resources on the campaigns and methods used to garner support by Trail founders. An examination of how the support for the trail was garnered revealed that creating narratives about the Appalachian Mountains with which people could connect was pivotal. This essay will also explore what exactly pushes people to connect with something, specifically what causes them to connect with a place so much so that they are willing to support its construction and preservation without ever having been there.

They are Me: Looking at How Community Shapes the Individual Within Nella Larsen's Quicksand

Stefan McClure and Sonya Green, English and Modern Languages

In Deauthenticating Community: The Passing Intrusion of Clare Kendry in Nella Larsen's Passing, written by Josh Toth, he states that individuality adheres to certain fixed communities of being to which [one] ostensibly belong[s]. I will use what Josh Toth says about Clare Kendry in Passing and apply it to Nella Larsen’s Helga Crane in Quicksand in order to study the effect a community can have on an individual. I will look closely at Larsen’s novel to study the various communities Helga Crane comes in contact with. After analyzing these communities, I will potentially take what I discover from my research and look at other novels written by minorities. By focusing on these various perspectives on community, I hope to present a stronger understanding, not only of Larsen novel but also of perspectives and cultures that may not be one’s own.

The Aesthetics of Oppression in Yawar Malku

Lisa Moser and Ted Parks, English & Modern Languages

The typical model for filmmaking in the United States is to portray the middle and upper echelons of society in a narrative that ends happily. Latin America, particularly during the 1960s and 70s, rejected this model in a movement known as Third Cinema. Revolutionary themes inform third-cinematic films, putting the importance on the masses instead of the popular few. Rather than serving solely as entertainment, these films focus on social issues and shed light on oppression. Jorge Sajin’s, a Bolivian director and screenwriter,

contributes to the Third Cinema movement with his film Yawar Mallku, translated into English from its original Quechua title as The Blood of the Condor. The film takes place in a Bolivian village and depicts the tension between the indigenous population, the wealthier Bolivians, and the Americans who arrive to help the native people. Sanjin's narrative structure, editing, and musical choices contrast the varying levels of class and reveal the strife between the privileged and the oppressed. The cinematic language often speaks more loudly than the dialogue and gives the viewer a window into the minds of the Bolivian people. Though the ending does not bring resolution, it challenges the hegemony of the upper class and puts power in the hands of the masses.

Charlie's Lament

Ricky Finch and Jan Harris, English and Modern Languages

The non-fiction piece, Charlie's Lament, integrates a commuter's daily bus ride to campus with an exploration of grief. As the narrator travels from stop to stop, the reader of the essay travels with him through a series of memories. Each stop, each memory, allow the reader to witness the narrator's progress through Kubler-Ross's seven stages of grief. The characters who board and exit the bus route, and the characters who appear as reflections and memories of the narrator highlight moments of anger, shock, and acceptance. Originally written as a travel essay, Charlies Lament reveals the intersection between the routines we pursue in our daily lives, and the deeper impressions we carry in our memories. Charlie's Lament reminds readers how the circular process of grief transitions from pain to empowerment.

Looking for Meeps: How Dictionaries Reflect Cultural Trends in Language from Johnson to the Urban Dictionary

Ricky Finch and Jan Harris, English and Modern Languages

In 1755, Samuel Johnsons dictionary, A Dictionary of the English Language, standardized the dictionary as form, but Johnson chose to exclude slang and words deemed vulgar or beneath his station from his catalogue of English words. From Johnson's time until recently, the value of slang words and their contribution to language growth and change have been overlooked. The Oxford English Dictionary brims with word definitions, meanings, and examples of use, but only lately has it flirted with the folly and play of slang. However, through the influence of technology, platforms like Urban Dictionary have emerged. These platforms allow users access to both the denotations and connotations of slang words in current use. A word such as "meep" would not exist in the pages of the OED, but Urban Dictionary defines and provides examples of "meep" and many other words at play in contemporary culture. Societies reveal their values and cultural frameworks through the vocabulary it uses to describe the world. Those vocabularies are often in flux, which often involves the creation of new words and slang words to name new ideas and concepts. Through a fusion of technology and the traditional form of the dictionary, we are creating ways to track language evolution as it emerges. My presentation traces the evolution of the dictionary, an often undervalued literary form, and seeks to address how contemporary iterations of online dictionaries promote growth within the English language, specifically through Urban Dictionary and the use of slang.

In the Time of the Butterflies & the Importance of Female Representation in Latin America

Caitlin Greer and Jan Harris, English and Modern Languages

From his thirty-one-year reign, Dominican dictator Rafael Trujillo remains in the minds of many of his victims as one of the most violent and oppressive leaders in history. To tell the stories of women deeply involved in the revolution against Trujillo, author Julia Alvarez fictionalizes the lives of the four Mirabel sisters, Patria, Ded, Minerva and MariaTeresa who were revolutionaries assassinated for their collaboration against the leader. In Alvarez's novel, In the Time of the Butterflies, she utilizes the sisters to shed light on Latinas in the revolutionary movement against Trujillo, thus showcasing the significance of women in all campaigns of resistance. The distinctive qualities of the four sisters illustrates the different, yet important, roles that the women contribute to the overall narrative. Through the Mirabal sisters, Alvarez's "In the Time of the Butterflies" portrays a range of revolutionary female characters. In Ded and Minerva's narratives, Alvarez expands the conversation about women who are both leaders and victims of political turmoil in Latin America.

The Purpose of Suffering in Viktor Frankl's Man's Search for Meaning

Peggy Miller and Jan Harris, English and Modern Languages

In Man's Search for Meaning, Viktor Frankl introduces logotherapy, a psychotherapy based on his belief that a quest for meaning motivates a person to live. Frankl believed that suffering could help a person find meaning in their life through the way they respond to it. In the first half of Man's Search for Meaning, Frankl outlines his belief that suffering's function includes helping a person achieve meaning. Frankl reflects on his experiences in a German concentration camp to illustrate his belief. Frankl's account of his Holocaust experience focuses on the psychological implications of the camps, rather than the details of the physical suffering. Throughout his book, Frankl supports his revolutionary idea on the role of suffering in a person's life in his analysis of the concentration camps. Man's Search for Meaning contributes to the field of Holocaust literature because Frankl offers us a new view of suffering, a prominent issue in Holocaust studies.

The Fault in Augustus Waters

Kira Dunton and Jan Harris, English and Modern Languages

In John Green's fifth novel The Fault in Our Stars, Hazel Lancaster and Augustus Waters meet in a support group for cancer survivors. The young lovers struggle to form a relationship while they confront the difficulties in their relationship that emerge from their different strategies they employ to cope with their illnesses. Gus creates the persona of Augustus Waters to mask his feelings of vulnerability. Throughout The Fault in Our Stars, Gus attempts to hold onto his idealistic persona of Augustus: someone who does not look sick and who could realize Gus's dream of living and dying for something that matters. As Hazel, the narrator, gets to know Gus, she begins to see behind his facade of Augustus. As the novel progresses, Hazel grows to understand the scared, dying boy she calls Gus falling in love with him slowly, and then all at once. Hazel grapples with the persona versus the reality, Augustus versus Gus, and gradually recognizes the complexity of his character. Through Hazel's narration, Green constructs Gus's bifurcated character: the dream boy and the real boy. Green's development of Gus follows the tradition established by American writers, like F. Scott Fitzgerald, who emphasizes the American attachment to idealism and the cultural importance of choosing your own name.

An Exploration of Truman Capote's Narrative Integrity in In Cold Blood

Cheyenne Gavin and Jan Harris, English

Competing claims surround Truman Capote?s rhetorical intentions in his non-fiction novel, In Cold Blood. The criticism surrounding the non-fiction novel genre, pioneered by In Cold Blood, debates where boundaries should be drawn. One critical concern is how the emerging genre should limit the literary and editorial freedoms of an author. Despite some of the controversy surrounding the novel's journalistic integrity, Capote's pacing and his creation of a unique structure for his novel is intentional. Capote leads his audience to draw unique and surprising conclusions which differ from the accepted societal norms manifested in the court rulings. Capote develops the Clutter family's story by recounting their last day, which leads the reader to feel suspense before the Clutters are murdered. Then, Capote juxtaposes the Clutter's story with the family histories of Dick Hickock and Perry Smith, the men who murder the Clutters. Capote's characterization of Dick and Perry evokes the reader's empathy, and forces the reader to grapple with questions surrounding mental illness, upbringing, the death penalty, and the penal system at large. Capote's manipulation of perspective through characterization and plot reveal how the manner in which a story is told ultimately shapes the audience's response.

The Psychology of the Other in Margaret Atwood's Lusus Naturae

Michaela Rutledge and William Steele, English and Modern Languages

The Other is often discussed in literary criticism as the outsider of a group or of societal norms, but how does the Other react to this position? Lusus Naturae tells the life of a girl who is afflicted with porphyria, a disfiguring and debilitating disease, in a pre-industrial revolution Europe. The protagonist in Lusus Naturae struggles throughout her life to discover her place in society and faces many difficulties from being labelled and treated as the Other because of her condition. Her family decides to fake her death so her sister can move up the social ladder. However, several years later she is discovered by the townsfolk, who, believing she had died, comes to suspect she is a vampire. In this paper I will argue that the main character of Lusus Naturae goes through a cycle of Othering that demonstrates how society affects the main character psychologically by being placed in the position of the Other. With some insight from disability studies and the psychological concept of self and Other, in this paper I will reveal the impact society has on her mind and how the cycle can be used on real and literary Others.

Korean Language and South Korean Social Dynamics

Lila Banach and Jan Harris, English and Modern Languages

The Korean language illustrates the intricacy of language development and how languages reinforces certain values of its speakers. Korean honorifics, a product of Confucian social structures, function uniquely in the language in comparison to English. Language reflects the needs of its speakers, and languages also contribute to certain cognitive and social patterns in the lives of its speakers. After the failures of the Sapir-Whorf hypothesis, relative linguistic theory has been further refined and applied to the study of modern languages, including Korean. Conclusions regarding language's effect on the human experience range from conservative to radical. The more conservative linguists debating this topic state that language reinforces certain aspects of a speaker's culture. While radical linguistics claim that one's language sets the parameters within which human cognition can occur. Scholars have applied relative linguistic theory to the study of the Korean language, particularly its spatial concepts. The Korean language demonstrates the inherent effect that language has on its speakers and how language contributes to how speakers articulate and compartmentalize certain concepts.

The Gold Plated Society in The Age of Innocence

Hannah Grace Holladay and Jan Harris, English

New York Society in the 1870s was glamorous and glittering, and Edith Wharton captures that glamour in The Age of Innocence. The city, the people, and the fashion were all extravagant. Wharton describes the Opera House, the Beaufort's mansion, and other aspects of high society to illustrate the luxury and opulence that characterize the Gilded Age. While Wharton uses beautiful language to describe beautiful things, this society is not as golden as the language suggests. The characters, while appearing to be graceful and polite, are actually vicious and judgmental. The situations and parties may seem like good fun, but are actually strategic games. Using irony, Wharton creates a gold plated society that masks twisted characters and situations by painting the scene with glittering, golden language that is in fact describing tarnished things.

RAFT Writing

McCarley Thomas and Stacia Watkins, English

RAFT writing prompts are incredibly beneficial for students as they progress in their writing. RAFT prompts promote creativity in students, challenge them to think from another perspective, address themes in stories, and become aware of the audience to which they will be writing. The acronym RAFT stands for Role, Audience, Format, and Topic. The students are assigned each and then challenged to think creatively as they construct a narrative within the given parameters. Much of the work is done on one's own in a RAFT writing activity. The student is challenged to be creative and intuitive without a teacher's direct involvement. I used RAFT in my unit plan for The Great Gatsby in order to immerse my students within the story. John Overton High School is the most diverse school in the Metro Nashville District. Using a RAFT allowed for an opportunity for differentiation for a broad range of students who needed it in order to be successful learners.

Theology's Autonomy: The Importance of Free Will to Faith in Charles Williams' Descent Int

Michael McDermott and Jan Harris, English and Modern Languages

Published in 1937, near the end of his published career, Charles Williams? Descent Into Hell is an oddity as a Modernist novel. Though never quite as critically read as his contemporaries like Tolkien and Lewis, Williams is a standout for his use of intense theological ideas and casual injection of the supernatural into a typically grounded literary period. In Descent into Hell, these ideas emerge in the form of Peter Stanhope's selfless choice to carry the burdens of another, referred to as the Doctrine of Substituted Love (itself a manifestation of Williams's personal beliefs). This is contrasted with Lawrence Wentworth's obsessive lust, a destructive love that obliterates him. By creating such stark opposites, Williams establishes a theologically-tinged dichotomy of good versus evil. Through them, he also roots the novel's conflict in the idea of free will, a fundamental concept in Modernist literature. Characters reach salvation and damnation solely through their own choices, whether goodhearted or ill-intentioned; thus, Williams implies that one's relationship with God is as much about Him as it is about how he or she utilizes his or her autonomy.

Framing Nelly as the Antagonist

Layne Collier and Matt Hearn, English

Emily Bront's Wuthering Heights tells the story of emotional and violent characters who are constantly at odds with one another as they fight for love and claim over an estate. The reader mainly experiences the conflicts at the Heights through the narrative perspective of housekeeper Nelly Dean while she recounts the estate's history as it pertains to the Earnshaw and Linton families to a new guest tenant, Lockwood. Throughout the novel, Nelly shapes Heathcliff into a villain, but deeper investigation into Nelly's narrative bias exposes her as the real antagonist. This paper explores Nelly Dean as a villain by examining the layered narrative frames within Wuthering Heights and exposing instances where Nelly manipulates Catherine, Cathy and Linton, thus challenging readers not to trust stories exactly as they are presented. As an outsider the reader cannot know the truth unless they were there to experience events firsthand, and even then each person carries his own bias to their understanding of a character's motivation behind his or her actions and conversations.

The Nuance of Language

Hannah Vaughn and Danielle Walters, English Modern Languages

Translating various prose, poetry and other genres between English, French and Spanish.

Punk Rock in Music City

Johnston Ellis and Jan Harris Caleb Clanton, English Modern Languages

This paper is a creative piece on music venues in Nashville. In this text, I document my own experiences at three venues on or near Elliston Place: The Cafe Coco, the Exit/In, and The End. These three venues have significant value to the local music scene here in Nashville, with the growing number of alternative, indie, and punk rock acts frequenting the locations for their shows. It is because of venues like these that famous acts, from the Police to the Goo Goo Dolls, from mainstream iconic rock bands to influential underground acts, have passed through Nashville, some unnoticed. Today, they stand strong and testify that Nashville is more than just country music, cowboy boots, and acoustic guitars. They declare rock music is well-nurtured here, with distorted guitars, high energy, and dirty clothes. The diversity within allows us to be Music City.

Ballet in Battle: How the Franco-Prussian War Influenced the Lives of Parisian Dancers and Other Women

Shelby Hiter and Howard Miller, History, Politics and Philosophy

Female lives have frequently been cast into obscurity by most historical accounts, but especially in historical accounts of war. The era of history with which my research corresponds is middle to late nineteenth century Paris and the Franco-Prussian War. I focus primarily on women of the middle and lower classes, but specifically ballerinas, and how their lives and careers were affected by the Franco-Prussian War, The Siege of Paris, the Paris Commune, and other related occurrences of the 1870s. Paris was a simultaneously luxurious and volatile locale prior to the war; architecture, the arts, and general wealth increased dramatically in the middle nineteenth century. The life of the Paris Opera dancer at this time especially took on an almost mythical aura of coquettish and controversial frenzy due to the constant presence of male patrons and gossipy reporters. With my research, I question whether or not their relatively

lavish lifestyle could continue in a time of war and starvation that naturally would lessen the quotidian nature of leisurely activities like Opera performances. Numerous historians have researched the Franco-Prussian War, the Siege of Paris, the Paris Commune, French history, bourgeoisie history, and dance history in general, but no secondary sources seem to address all of these issues at once from a female perspective as I intend to do with my project.

How Story Can Change the Way We Live and Heal

Anna Johnson and Chris Gonzalez, Marriage and Family Therapy

Narrative psychology is a somewhat new perspective in the field of psychology, but one that is growing in traction as a sturdy paradigm through which the mind may be understood. This perspective focuses on story as one of the main catalysts of human interaction and human functioning, and narrative therapy takes this same perspective and transforms it into a potential catalyst for healing. By using the lens of narrative and a strong focus on clients as the experts in their own lives, narrative therapy aims to look at an individual's problem and see it in a new light: by externalizing the problem, tracing its history and context, essentially re-writing it, and using types of hands-on storying to further strengthen the new story. This paper will provide a brief, yet concise overview of the field of narrative therapy and its importance and potential growth in the field of psychology as a whole.

The Role of Monasticism in Connecting the Roman Collegia with the Medieval Guild

Nathaniel C Hipsley and Howard Miller, History, Politics, and Philosophy

In the Roman Empire, there were organizations known as collegia that provided social support and burial services in the event of the death of a male member. They often grouped citizens of a certain profession and were sometimes known to influence the local economy for their benefit, most notably in Egypt. From the fall of the Roman Empire until around the 12th century CE and the rise of the trade guilds in Northern Europe, collegial practices all but ceased in the vacuum created by the loss of Rome. However, it is possible that the collegia was kept alive by the medieval monastery in this interim period. This paper begins with an examination of collegia activity in Egypt, along with written accounts of the first monastic organizations in the Egyptian deserts, that suggests early monastic fathers such as Pachomius may have adopted the ways of the collegia. Furthermore, it outlines monasticism's spread to mainland Europe and the development of oblation and specialization combined with increasing interaction between the clergy and the laity that provided a means for the collegia's reintroduction to secular society in the form of trade guilds. Given the proximity of the monastery to secular trade at its fall and at its rise, as well as the structure of a monastery for seven centuries between, this paper makes the case that the medieval monastery is the bridge between two similar institutions, the collegia and the guild.

Engineering Public Policy in Nuclear Technology

Jericho Locke and Joseph Tipton, Mechanical Engineering

The purpose of this paper is twofold. First to answer the question of why engineers should be concerned about public policy issues and they can contribute to the process. Second to propose a public policy initiative that will have a positive, technology-related effect on the American nuclear energy industry. A simple definition of engineering is solving problems, propelling mankind to new technology and better living. A simple definition of public policy is what one does or does not do about a problem. These definitions are naturally complementary: engineers propose solutions to problems while public officials help decide which to take. Engineers can help solve those problems, and furthermore decisions on public policy often determine which engineering projects are undertaken and which are ignored. Engineering expertise is

needed in public policy nowhere more than nuclear policy. The American nuclear system has been slowly fading, representing a substantial threat to the future system of carbon free electricity generation. One of the issues with current nuclear policy is the advanced nuclear licensure system. The only reactors that are currently licensed by the nuclear regulatory commission are over ten years old, and new projects using these reactors still go through a multi-year licensing process. This bottleneck prevents companies from making adequate investment into new reactor technologies and reactors that could be a great benefit to forwarding efficient, carbon free electricity generation.

Utilizing a Bi-directional Transporter Assay to Identify Pgp Substrates?

Haley Scarbrough and Scott Akers, Pharmaceutical Sciences

P-glycoprotein (Pgp) is an efflux pump that uses ATP hydrolysis to transport substrates out of a cell. The expression of Pgp throughout the body can significantly reduce drug exposure and efficacy, this specifically effects drugs that must cross the blood-brain barrier to engage target proteins in the central nervous system. The goal of this project was to evaluate if LUCOP 47 and diphenoxylate are Pgp substrates. The apparent permeability (Papp) of each compound was evaluated using MDCK cells that overexpress human Pgp. The bidirectional permeability of propranolol (non-Pgp substrate) and loperamide (Pgp substrate) were also included as negative and positive controls, respectively. Compounds were tested in triplicate using a bidirectional assay approach, apical-to-basolateral direction (A-B) and basolateral-to-apical direction (B-A). Experiments were conducted at 37 degrees C and samples from both the donor and receiver compartments were obtained at time 0 and 120 minutes to assess initial and final drug concentrations by tandem mass spectrometry. A ratio of the Papp(B-A)/Papp(A-B) was used to calculate an efflux ratio (ER) of each compound to evaluate Pgp-mediated efflux activity (ER > 2.0). Experiments were also conducted in the presence of GF120918 (Pgp inhibitor) to confirm Pgp-mediated effects. The mean ER value for LUCOP 47 was 6.0:1.9 and 1.9: 1.9 in the absence and presence of GF120918, respectively. Diphenoxylate results were inconclusive due to non-specific binding, poor solubility, and low permeability issues. Findings from this study indicate that exposure and efficacy of LUCOP 47 may be limited by its interaction with Pgp.

Revisiting Pascal's Wager: Does the Wager have a Role in Christian Apologetics?

Kayla Ford and Caleb Clanton, Philosophy

17th century Mathematician Blaise Pascal famously argued that it is impossible to base belief in God on reason, thus one must base belief on prudential considerations. His wager holds that it is more prudent to believe in God than to not, therefore one should take steps to believe in God. In this paper, I argue that the only defendable version of the wager significantly weakens it, removing it from the category of Christian apologetics. Using religion for its practical benefits is a popular argument today amongst the religious and nonreligious alike. Practicing religion can foster relationships, community, individual spirituality, and a sense of purpose among other things. It seems more inclusive and less offensive to drop theology and doctrine and just practice religion for the prudential benefits of it. I argue that prudential reasons are not enough to induce true belief in God. After revisiting the many reformulations and attempts to defend the Pascal's wager, I argue that the only viable form of the wager is a significantly weaker version. This weaker version doesn't belong in Christian apologetics, but should be used to encourage believers or should be used as the first step to inducing belief.

Burke's Ireland: The Catholic Question

Caleb Reagor and Alan Bradshaw, Physics

This paper examines the relationship between influential 18th century politician, statesman and philosopher Edmund Burke and Ireland. Recently, scholars have found a renewed interest in Burke's ties to his native country. Several authors have popularized a theory that traces many of Burke's political actions and beliefs to a hidden Irish layer in his psyche. But, these theories do not adequately explain Burke's attitudes and actions towards his Irish homeland. Burke grew up around Irish citizens of many religious backgrounds, including Catholics, Quakers and Protestants. Burke's experiences among these peoples of diverse beliefs provided him with a unique perspective on the religious and political divides in Ireland. His upbringing allowed him to recognize the natural kinship of all Irish citizens. Many of Burke's writings demonstrate that his childhood experiences in Ireland did impact his political viewpoints, especially on the subject of Catholic emancipation. However, Burke always maintained a pragmatic approach to these issues, and his upbringing did not subconsciously drive his actions. Burke modified his views and attitudes towards the conflicts in Ireland to fit a changing political landscape. Throughout his life, Burke reformed his arguments to reflect legislative and social movements in England, Ireland and abroad. Overall, Burke's unique childhood helped him to avoid sectarian rhetoric and reach conclusions consistent with the overarching principles that drove his understanding of prudent government.

Smallpox at Port Jackson: Modern Perspectives

Caleb Reagor and Alan Bradshaw, Physics

This paper explores the multiple modern perspectives of the smallpox outbreak at Port Jackson in 1789. The article sheds new light on the topic by applying modern epidemiological techniques to the question of deliberate infection. It analyzes the recent literature from Judy Campbell, Craig Mear and Christopher Warren and responds to each author's theories. Using information from the First Fleet journals, it finds the variolous matter in the medical stockpiles of the First Fleet to be the most reasonable source of the outbreak. However, by taking a critical approach to recent literature, it shows that none of the available evidence can prove or disprove whether any certain group of individuals from the First Fleet was responsible for releasing the viral contagion among the native population. Ultimately, it reexamines the primary sources and relevant secondary sources to separate historical and scientific fact from recent speculation.

Ambassadors of the Welsh Tongue: The Tale of Prince Madog Ab Gwynedd

Caleb Reagor and Alan Bradshaw, Physics

This paper reexamines the tale of Prince Madog ab Owain Gwynedd, a 12th century Welsh Prince who purportedly completed a trans-Atlantic crossing in 1170 CE. Madog, disheartened by a cruel civil war between his brothers, left his homeland over the open seas. He supposedly discovered a pleasing and fertile land in the West. Did Madog sail to the Americas? A review of the evidence suggests he likely did. Medieval Welsh bards often wrote of Madog, his voyage, and his disappearance. Furthermore, an extensive oral and written tradition stemming from subsequent 15th century British sources supposes Madog discovered and settled a sparsely populated Western land. Several accounts from 17th Century North American writings support these tales and suggest Madog left the Welsh language in North America with the Doeg tribe of North Carolina. Overall, a plurality of records strongly supports the authenticity of Magog's tale.

Could there be a Brazilian-Mexican War?

Stephen Barba and Susan Haynes, Political Science

Bill Bryson synthesizes modern scholarship about William Shakespeare in his Shakespeare: The World as Stage. He provides the history of Shakespeare's life like many other biographers, but unique humor and sarcasm enhance his writing. Bryson delves into the lives of other playwrights in Elizabethan times and the little-known life and career of Shakespeare. Throughout the biography, Bryson lays out the development of Shakespeare's career as a famous playwright and as a linguist. Much of Shakespeare's contribution to modern culture was the way he developed language. Bryson says, "His real gift was as a phrasemaker". Shakespeare contributed to transforming the English language while it was still fighting Latin as the most esteemed language in England. Bryson demonstrates Shakespeare's linguistic prowess, but he also is aware of Shakespeare's shortcomings as a playwright. Nonetheless, Bryson claims, Shakespeare's genius had to do not really with facts, but with ambition, intrigue, love, suffering; things that aren't taught in school. By compiling the different pieces of Shakespeare's life and illustrating the history of Elizabethan theatre, Bryson makes the study of Shakespeare both interesting and insightful.

Attitudes Towards Refugees in France versus United States

Victoria Stephens and Shanna Ray, Psychology

Throughout history there have been conflicts that result in war, unideal, and/or unsafe living conditions for the people in that area. When those who are affected by these things leave their home and seek safety somewhere else, we refer to these people as refugees. While one would think we would willingly help other humans escape the horrors of these conflicts, especially when it comes to children, the reality is often different. This paper examines the difference in attitudes and actions towards refugees in two different cultures, France and the United States. By examining how history, media, current policies, and social psychology impact the ways in which we deal with refugees, and how these views differ between cultures, valuable insight and potential solutions are examined.

Spiritual Warfare: What's My Role?

Hunter Maerz and George Goldman, Theology and Ministry

Spiritual warfare is a topic that has been debated for centuries, but rarely is it discussed in the pulpit today. Generally, preachers gravitate away from teaching things they don't have a strong grasp on. Spiritual warfare is one of those elusive topics. This paper first exegetes verses pertaining to spiritual warfare. From letters written by Peter and Paul to parables and stories in the gospel, the exegetical process is used to determine what the early church might have thought in regards to what we now call spiritual warfare. The paper then summaries multiple current views on spiritual warfare. These theories are evaluated against the exegetical work done in order to determine which theories are scripturally sound. The application of spiritual warfare is then discussed. Merely thinking about spiritual warfare holds little benefit to the believer. Based off of the exegetical work done and the analysis done on the current spiritual warfare theories, this paper suggests practical applications that can be applied in day-to-day life.

Poster Presentations

Graduate Poster Presentations

Effect of EDNRB3 protein receptor activity on downstream signaling pathways using MCF7 cell line

Ethan Loveless, Hannah Mitchell, and Beth Conway, Biology

The EDNRB3 gene encodes for a G-coupled protein receptor that has been implicated in effecting downstream secondary signaling pathways that cause cancerous tumor growth. However, it's isoforms aren't fully understood and to better do this we used an MCF7 cancerous cell line to analyze the protein's mRNA levels using an Iscript cDNA synthesis kit that was followed by quantitative PCR to analyze the expression levels of the isoforms.

The role of Topoisomerase 2B in neural development in *Danio rerio*

Mary Skrabut and Bonny Millimaki, Biology

Topoisomerases are widely known for their role in relieving torsional strain during DNA replication and repair. One isoform of topoisomerase, Top2B, has recently been indicated to also play a role in neural development. Our lab has performed previous studies using the Top2B catalytic inhibitors, HU-331 and dexrazoxane (DEX) to target the 12-24-hour post-fertilization (hpf) primary neural development period in *Danio rerio* (zebrafish) embryos. These previous experiments have shown that loss of Top2B activity results in embryos that demonstrate distinct behavioral and structural changes indicative of Top2B's role in axon pathfinding. We believe that Top2B activity changes the topology of the DNA in a specific manner, allowing proper gene expression important for axon guidance. We wish to further investigate this hypothesis through cell proliferation assays using BrdU to determine the effect of inhibiting Top2B on cell proliferation and death. This will ensure that our results are caused by the inhibition of Top2B and not by the death of the neural cells. Together our data will help demonstrate a new function of a previously well-characterized enzyme.

Effects of heat and eucalyptus on zebrafish development

Stephanie Kendrick, Macy Cottrell, Sebastian Edwards, and Bonny Millimaki, Biology

Women are told to avoid heat, saunas, and hot water baths during pregnancy. As popularity of essential oil rises so does their use during pregnancy while their safety has not yet been tested. Eucalyptus oil is a popular additive for fragrant and medicinal uses. We are evaluating the effects of eucalyptus oil and heat on zebrafish embryonic development. We are exposing embryos to increasing amounts of eucalyptus oil while maintaining a constant elevated heat, allowing us to simulate these two variables in context to a human fetus. We are examining the overall health of the embryo as well as assaying for normal blood vessel formation. We expect to see an increased rate of development in the heat-only and heat-and-eucalyptus treated groups, while also seeing fetal deformity at high doses of eucalyptus.

Short-Chain Fatty Acid Regulation of Toll-Like Receptor Mediated Inflammatory Pathways in Colorectal Epithelial Cells

Jacob Holley, Jaclyn Corso, and Jon Lowrance, Biology

Short-chain fatty acids (SCFAs) have been shown to be an integral part of maintaining colorectal health via the regulatory effect they exert on the intestinal system through their pro- and anti-inflammatory factors. In recent studies it has been implied that under certain doses of SCFAs, some colon cell lines will significantly upregulate their expression of Toll-Like Receptor-4 (TLR-4), thus leading us to believe that many downstream pathways involved in inflammation and growth may be the key to SCFAs' beneficial effect. Our study seeks to identify the specific inflammatory pathways that are potentially activated by TLR-4's upregulation when exposed to SCFAs, including the pyroptosis pathway leading to Interleukin-18-1 (IL-18/1) cleavage and the activation of Interferon Regulatory Factor 3 (IRF3) leading to the expression of Interferon-γ (IFN-γ). Observing past studies, it is expected that cancerous colon cells lines that have shown upregulation of TLR4 will also show upregulation of these inflammatory factors and that primary cells lines that have failed to show a significant increase in TLR4 will, likewise, fail to show a significant increase in these factors. The primary purpose of this study is to further our understanding of how SCFAs effect colon health, in both cancerous and normal cells, by examining specific inflammatory pathways that could be important in maintaining the wellbeing of colon cells as well as effectively clearing out the bad.

Inventory Control Using K-Means Clustering and Polynomial Regression

Hung Le, Urvish Bhagat, Michael Pigman, and Gray Todd, Computer Science

This paper formulates a method that uses machine learning techniques to improve an inventory management system with a company provided data set and examines scientific literature as a foundation to develop a predictive model that could increase profit by optimizing new and existing inventory management processes. The question for which this project is trying to solve is "Can a predictive model be created to maximize profit by optimizing new and existing inventory with projected sales?" The model is built by applying machine learning techniques to an acquired data set consisting of 36-months of prior sales data involving two hundred thousand different retail products. The product data is clustered into different categories based upon a number of attributes that describe the product. The output is then put into a polynomial regression model to identify which types of products need to be ordered and which types do not. This will improve inventory management and tighten product awareness, resulting in greater profit margins.

Autonomous Drone Flight

Maxfield Thompson and Eddy Borera, College of Computing and Technology

The goal of this project is to hack into a remote controlled drone, take command of the drone via a computer programming interface, and program the drone to execute a series of flight instructions. The specific drone used is the AR Parrot Drone 2.0. The programming language used is javascript specifically utilizing the Node JS library.

The Relationship Between Muscle Thickness and Anaerobic Power

David Bender, Amy Banaszek, Caitlyn Browning, and Ruth Henry, Kinesiology

Researchers have found that aging is associated with loss of muscle mass, atrophy of type II fibers, and/or a decline in muscle force production. Long-term resistance and sprint training may preserve certain muscle characteristics. The purpose of this study was to determine if muscle thickness is correlated with peak power during an anaerobic sprint test. Sixteen males (age = 33.6±19.25 yrs; ht = 177±16 cm; wt = 78.25±18.75 kg) and 14 females (age = 26.6±7.61 yrs; ht = 167±10 cm; wt = 66.5±15.5 kg) volunteered to participate. Muscle thickness of the rectus femoris and vastus lateralis in the right leg was measured via ultrasonography (GE NextGen LOGIQ e). Participants completed a 20-second sprint on a mechanically braked cycle ergometer (Monark 894 E) against a resistance that corresponded with 7.5% body mass. Pearson correlation was used to determine relationship between muscle thickness and peak power. There were significant positive correlations between peak anaerobic power and muscle thickness of both the rectus femoris ($r = 0.6453$, $p = 0.0001$) and vastus lateralis ($r = 0.7351$, $p = 0.0001$). Strong positive correlations between anaerobic power and muscle thickness of quadriceps muscles existed despite age and gender differences, suggesting that anaerobic-specific exercise is characteristic of muscle mass preservation.

UV-C Irradiation on the Quality of Green Tea: LC-MS/MS Quantitation of Catechins

Kevin Flatt and Matthew Vergne, Pharmaceutical Sciences

Ultraviolet (UV-C) irradiation is a non-thermal disinfection method that is an alternative to heat pasteurization of beverages. This study investigated the effect of UV-C irradiation on the polyphenolic content of green tea. Catechins are a class of polyphenols and are the major constituents of green tea. UV-C irradiation doses ranging from 0 to 240 mJ/cm^2 were delivered to green tea, and the catechins were quantified. An LC-MS/MS method was developed to determine the concentrations of the following catechins: (+)-catechin (C), (-)-epicatechin gallate (EC), (-)-epigallocatechin (EGC), (-)-epigallocatechin gallate (EGCG), (-)-gallocatechin (GC), and (-)-gallocetchin gallate (GCG) in green tea. The LC-MS/MS method used a 2.6 micron superficially porous particle C18 column and a gradient elution program to separate the catechins with a 3.5-minute cycle time. The results indicated that UV-C treatment of green tea at relevant disinfection doses did not cause significant degradation of catechins in the green tea. Overall, these results demonstrate the effectiveness of the UV-C technology for treating highly turbid liquids such as green tea.

A pharmacist-led effort to leverage digital health to screen for sleep disorders and identify the impact of medications on sleep

Stacey English, Carl Stepnowsky, Adam Amdur, Jeff Lee, Beth Breeden, and Kevin Clauson, College of Pharmacy and Health Sciences

Poor sleep is associated with increased health-related problems, decreased work performance decreased quality of life, and societal costs. The consequences of poor sleep and the impact of medications on sleep are difficult for pharmacists to measure in most practice settings. Pharmacist-led screenings for sleep disorders in community settings have only been conducted outside of the United States, but have not scaled due to difficulties surrounding sleep data collection. The goal of this study is to leverage digital health technology to extend the role of the pharmacist via screening and referral of patients at risk of poor sleep.

The primary objective of this study is to screen adults for poor sleep by use of the Apple ResearchKit platform via the SleepHealth application (app). The secondary objectives are to characterize the medications negatively impacting sleep via multi-stream sleep data, examine the relationship between poor sleep and medication adherence, and correlate sleep data from self-report with sleep data sourced from wearable devices and smartphone-based apps and sensors. An open-label, observational study will be deployed via Apple ResearchKit. At completion of the study, participants will receive personalized reports of their sleep data and evidence-based behavioral recommendations for good sleep hygiene presented as an in-app personal sleep concierge. Participants with high-risk scores for sleep disorders or indicative of poor sleep will also receive referrals to an area pharmacy and non-specific referrals to a physician to escalate care. Acceptance rate of referrals will be assessed one-month post-study.

Stigma Toward Antipsychotic Medications Among Healthcare Clinicians

Tyler Casey and Lindsey Miller, College of Pharmacy

Patients with mental illness have many barriers to receiving comprehensive and effective treatment. One barrier is the stigma associated with one of the most common classes of medications in mental health, antipsychotics. Despite the frequency in which these medications are prescribed, antipsychotics remain very misunderstood, even among medical professionals. Misconceptions about antipsychotics likely exist, such as their potential side effects, risks and benefits of the drugs, and what type of patient typically takes an antipsychotic. Examples of such misconceptions include; someone taking an antipsychotic must be crazy, antipsychotics make you feel like a zombie, antipsychotics are only useful for schizophrenia, etc.|The objectives of this study are: 1) Characterize the prevalence and types of stigma toward antipsychotic medication among healthcare professionals, 2) Determine association, if any, of level of stigma and different practice settings, professions, and age groups. A 43-question survey was created by the authors to collect data using REDCap TM survey software. The survey has been distributed to physicians, pharmacists, nurses, and pharmacy students throughout the state of Tennessee over a two-month period. Demographic data collected will include age, practice setting, profession, gender, and years in practice. The survey includes Likert-scale, rating scale, and semantic differential scale questions. Survey questions are divided into four subtypes; perceptions of adverse effects, perceptions of indications, perceptions of patients who take an antipsychotic, and effect on clinical decision making. Descriptive statistics will be used to analyze the data collected.

Retrospective review of a pharmacist managed diabetes clinic on hemoglobin a1c

Cindy Kaing and Benjamin Gross, Pharmacy

Over 29 million adults in the United States have diabetes. Many of those affected experience complications such as heart disease, retinopathy, kidney disease, and neuropathy. The healthcare cost associated with diabetes is astronomical, accounting for more than 20 percent of the total cost. From a financial and health standpoint, it is essential that providers and patients work together to optimize care. Clinical pharmacists specializing in diabetes management can provide focused care regarding non-pharmacological and pharmacological management of these patients. Our research will evaluate the impact a pharmacist can have on patients' diabetes outcomes when in direct supervision of their care. The pharmacist-managed clinic functions as a referral system within a medical group for primary care related disease states. This study will include adult patients, 18 years of age or older, diagnosed with diabetes who have previously been or are currently under the care of the pharmacist. Once referred, the pharmacist will operate under a collaborative practice agreement to manage lifestyle and pharmacological changes specific to diabetes-related matters. Lifestyle management will focus on education regarding nutrition and physical activity, as well as goals of therapy. Scope of practice will also include making any necessary pharmacological changes

as it pertains to device and/or medication adjustments. We will monitor each patient's progress with laboratory tests of hemoglobin a1c. Progress will be tracked at baseline and at discharge from the clinic for referral back to the primary provider, if applicable.

The incidence of high-risk patient readmission at a regional medical center following implementation of a transitions of care program by a community pharmacy

Jessica Lampley and Benjamin Gross, Pharmacy

Transitioning a patient between settings is often complex. Major factors that contribute to 30-day readmission rates include lack of communication between institutions, lack of knowledge about the patient's resources outside of the facility, and inadequate medication education causing medication non-adherence. This study will aim to assess the role that community pharmacists can play in educating high-risk patients about their newly prescribed medication and aid in the process of transitioning a patient from the hospital to home. A risk stratification tool, the LACE index, will be utilized to determine patients that are at an increased risk for readmission. Patients with a LACE score > 8 as well as a diagnosis of congestive heart failure, pneumonia, chronic obstructive pulmonary disease, diabetes, myocardial infarction, or atrial fibrillation will be consented. Participants will consent to having their medications delivered to their bedside upon discharge, followed by 30-day follow-up. After consenting, the hospital will fax the patient's new prescriptions to the community pharmacy, along with, their consent, discharge instructions, and any pertinent information. Medications will be filled and delivered to a patient's bedside. The patient will be educated on each of the medications he or she is receiving and provided with an up-to-date medication list. The patient will agree to three additional phone calls occurring at 48-72 hours, 7-14 days, and a final call at 25 days' post discharge. The community pharmacy will provide patient's primary care provider and the facility care manager with documentation of the discharge process, follow-up information, and updated medication list.

Implementing Transitions of Care in Rural Middle Tennessee

James Barker and Ben Gross, College of Pharmacy

Little has been written about providing transitions-of-care services in rural communities where patients are especially vulnerable due to limited access to care. The purpose of this prospective study is to evaluate the impact of clinical pharmacists practicing in traditional community settings on 30-day readmission rates when transitions-of-care is provided in partnership with a small rural hospital on a consulting basis. The pharmacist, employed by an independent community pharmacy, will collaborate with discharge nurses daily, identifying patients for study inclusion. Once identified, the pharmacist will visit patients' bedside, describe the study, and ask for signature of consent. After consent is obtained, patients' medications will be filled at the pharmacy and delivered by the pharmacist to patients' bedside. The pharmacist will counsel patients, emphasizing how each drug is used to manage the patient's condition and prevent readmission. All patients who consent will be enrolled. Patients are only excluded if they are under 18 years old. The primary endpoint is 30-day readmission percentage for all patients. Secondary endpoints include 30-day readmission percentages for congestive heart failure, chronic obstructive pulmonary disease, and pneumonia. We anticipate a sample size of 50 patients yielding meaningful results. Statistical significance for primary and secondary outcomes will be determined using a two-sample t-test comparing 30-day readmission percentage in patients discharged after receiving transitions-of-care services versus 30-day readmission percentage in a control group of patients discharged without transitions-of-care services. A cost/benefit analysis of implementing such a service into individual rural community pharmacy practices is also included.

Nomophobia and sleep in pharmacy students: Is problematic mobile phone use associated with poor quality sleep?

August Whipple and Kevin Clauson, Pharmacy Practice

Nomophobia or no mobile phone phobia can include feelings of discomfort, anxiety, or even panic when one's mobile phone is inaccessible. An increased rate of nomophobia has been observed over the last 5 years and younger age is correlated with a higher risk for experiencing nomophobia. Poor sleep quality has also been associated with nomophobia. Pharmacy students have previously been identified as suffering from poor sleep quality, with a subsequent decrease in academic performance observed, and often have risk factors (e.g., mobile phone ownership, age-related cultural expectations of responsiveness via mobile phone) for nomophobia. As nomophobia is associated with exacerbating poor sleep quality, we will endeavor to identify dimensions of this construct (e.g., problematic mobile phone usage) and its association with sleep quality among a convenience sample of pharmacy students. Specific aims of this study are to: 1) identify absence or presence of nomophobia, 2) characterize quality of sleep, and 3) explore correlations between problematic mobile phone use and sleep quality. Two hundred and twenty-five pharmacy students from Lipscomb University will be surveyed via an online 32-item questionnaire over a two-week period. The questionnaire is comprised of validated items from the Nomophobia Questionnaire (NPM-Q) and the Pittsburgh Sleep Quality Index (PSQI). Approaches using the Total Design Method (TDM) by Dillman will be employed to enhance response rate. Approval of the Lipscomb University Institutional Review Board will be secured prior to survey administration. Data will be analyzed using descriptive and inferential statistics and preliminary results will be reported as available.

Managing Clinically Significant Interactions in the Transition from a Locally Developed to Commercially Developed Drug-Drug Interaction Database

Toni Darnell, William Hedges, Bonnie Lewis, Ethan Parsons, and Beth Breeden, Pharmacy Practice

Alert fatigue occurs when healthcare professionals become desensitized to computer, database, or other system alerts. This desensitization can be attributed to large quantities of alerts being shown to healthcare providers that do not carry clinical significance or cause a change in the clinical decision. By ensuring critical alerts are present and by decreasing unnecessary alerts, information systems can decrease the likelihood of alert fatigue, provide robust support to clinicians making decisions, and minimize pharmacy-related rework. Vanderbilt University Medical Center (VUMC) currently uses Enoki, a locally developed and managed system to identify and analyze drug-drug interactions (DDIs) for inpatients. First DataBank (FDB) provides commercially developed and managed content, including DDIs which VUMC uses in the outpatient prescribing systems. By using commercially available content, VUMC has access to the latest and most relevant DDI information without internal content development. Lipscomb University student pharmacists worked alongside informatics pharmacists within VUMC HealthIT to cross-reference major and high-severity DDI reports from commercial FDB content to those generated by Enoki. Alerts were compared to tertiary pharmacy information resources including Lexi-Comp, Micromedex, and product-specific package inserts to assess for appropriateness. This information was used to recommend whether the Enoki DDI content reflected what is commercially available. The review also identified alert mismatches between the systems, which enabled content experts to decide how VUMC would handle those alerts. The final project report will be used to assist in the transition from Enoki to FDB as VUMC transitions to a new electronic health record system later this year.

Developing a model framework to assess the budget impact of Ocrevus (ocrelizumab) in primary progressive multiple sclerosis (PPMS) in an U.S. medicare population.

Brett Stephenson, Ethan Parsons, and Jeff Lee, Pharmacy Practice

Multiple Sclerosis (MS) is an immune-mediated disease in which the immune system attacks the myelin of the nerves in the central nervous system (CNS). MS affects around 400,000 people in the United States and currently has no cure. Patients with MS have average annual direct costs that are approximately $25,000 higher than patients without MS. This difference is likely to increase with the approval of new, effective, and potentially expensive therapies. Current therapy consists of modifying the disease course and managing symptoms. PPMS is a form of MS characterized by worsening neurologic function after onset of symptoms without early relapses or remission. Currently there is no therapy indicated for treating PPMS patients. Ocrevus is an investigational humanized monoclonal antibody that targets CD20 positive B-cells. Because no other therapy has proven to be effective in treating PPMS, payers have not had to consider the financial impact of covering this population. With the impending FDA approval of Ocrevus to treat patients with PPMS, payers will have to evaluate the overall value of Ocrevus in this population and determine whether the estimated budget impact is appropriate based on its perceived value. Payers are increasingly faced with balancing cost-effectiveness considerations with affordability. With this in mind, we developed a budget impact model framework to estimate the future monetary impact of covering Ocrevus for the PPMS population in a medicare patient population at one and three years based on the literature, Ocrevus clinical trials data, and interviews with payers.

Cost-Effectiveness of Extended-Release Levodopa-Carbidopa Versus Controlled-Release Levodopa-Carbidopa in Patients With Advanced Parkinson?s Disease

Connor Whitfield and Jeff Lee, Pharmacy Practice

Parkinson’s disease is a progressive, neurodegenerative disease affecting dopamine levels in the mesencephalon. Newer formulations of levodopa-carbidopa, the standard of treatment, have focused on increasing the dosing interval to increase effectiveness and decrease adverse events. We sought to determine the relative cost-effectiveness of Rytary, an extended-release formulation of levodopa-carbidopa, in comparison to Sinemet CR, a controlled-release formulation of levodopa-carbidopa. and generic CR formulations. From the perspective of a U.S. health payer, we developed a decision model to simulate the direct costs and outcomes associated with each formulation. Adverse events were characterized by type and were related to healthcare resource utilization. All clinical effectiveness data, including probability of therapeutic response and adverse event prevalence, were based on clinical trial data. Cost data was derived from available literature. We evaluated costs over a one-year time horizon and all costs were standardized to March 2016 dollars using the medical component of the Consumer Price Index. The model calculated the incremental cost-effectiveness ratio (ICER) in dollars per amount of off time reduced in hours for our base case scenario. Base case analyses suggest that Rytary dominates brand name Sinemet CR. In comparison to generic CR formulations, Rytary was expected to have an ICER of $3,808.40 per additional hour of off time reduced. The lack of an accepted, clinically-relevant threshold for evaluating cost per reduction in off time complicates the interpretation of this study and should be explored in future research.

Sleep Deprivation, Attention, and Quality of Life in Veterans

Alena Gizdic and Dale Alden, Psychology

The current study aims to investigate the effects of sleep deprivation on attention and quality of life in Lipscomb University combat and non-combat veterans. The goal of the project is to emphasize the importance of sleep deprivation, and also gain knowledge about consequences and impact on attention, in particular, attentional vigilance, and quality of life. It is proposed that combat veterans have lower vigilance due to the sleep deprivation, which results in overall difficulties in education, class performance and lower GPA than non-combat veterans. It was expected to sustain the hypothesis that due to sleep deprivation, combat veterans result in lower quality of life and attentional vigilance than non-combat veterans, which further reflects on their GPA and class performance. The first part of the research paper proved these findings through the literature review and research articles. The second part of the research paper will assess methods of the study and results by using descriptive statistics, multiple regression in order to evaluate the relationship among three variables (PSQI, WHOQOL, TMT-B), within two groups (Combat veterans, Non-combat veterans).

Undergraduate Poster Presentations

Effects of TGFR1 in MCF7 and MDA231 Cell Lines

Gracia Amaya, Morghan Jameson, and Beth Conway, Biology

TGFR1 is part of a complex with TGFR2, which are transmembrane serine/threonine kinases receptors. As the cytokine TGF comes into contact with the receptors, it allows for dimerization and then allows the receptors to phosphorylate and activate. Then the activated receptor 1 starts a downstream cascade signaling pathway that eventually lead to gene regulation of cell cycle, ECM regulation, mesenchymal cell transition and other important cell functions. Some pathways TGFR1 affects are the following: PEDG Induced Signaling, TGF Signaling Pathway, RAs/ Mapk. Therefore, TGFR1 can affect many genes downstream. The genes we will be focusing on downstream of the signaling pathways are GATA3 and Sox4. We began our experiment by using qtPCR to confirm that TGFR1 is upregulated in MCF7 cells when compared to MDA231 cells (MCF7 avg CT=10.318 compared to MDA231 avg CT= 11.0971). With this knowledge we used a TOPO TA vector to insert our isolated TGFR1 into a pcDNA3.1 plasmid. We then ligated our gene of interest and then transformed the vector via electroporation, using electrocompetent E. coli cells. After growing the bacterial cultures on an LB/Amp plate we performed an inoculation and followed a standard mini prep protocol. We plan to use our isolated TGFR1 and transfect it into MDA231 to analyze the downstream effects on Sox 4 and GATA3 when TGFR1 is over-expressed.

Essential or Harmful?

Graysen McConnell, Krishna Patel, and Bonny Millimaki, Biology

For centuries, people have been using herbs and oils to treat a great number medical issues, and holistic medicine has even developed into its own branch of health care. In recent years, essential oils have taken the alternative remedy world by storm. People have turned to little vials of Lavender, Frankincense and Peppermint to heal their ailments. Unfortunately, very little is known about the biological effects of these remedies since they rapidly gained popularity. Because there are many questions circulating around the safety of essential oils, we would like to test the effects of this type of holistic remedy on the developmental process to better inform consumers of the possible effects. We are specifically interested in the potential effects on embryos since a great number of pregnant women are using this type of treatment for nausea, insomnia, migraines, and other pregnancy symptoms. Lavender, in particular, is commonly used by pregnant women due to its perceived calming effects; however, there is almost no research on the effects of lavender oil on embryonic development. Therefore, we are studying the effects of the Young Living Essential Oil lavender on the development of zebrafish embryos. We are specifically looking at effect of lavender oil on neural development, as visualized with a specific antibody, during the pharyngula period. We are also noting any other phenotypical changes that the oil may cause. This data will allow us to draw conclusions as to whether or not lavender oil is harmful to neurological development.

Analysis of Expression of RhoD, a GTPase, in MDA-MB-321 and MCF7 Breast Cancer Cells

Lauren May and Beth Conway, Biology

RhoD is a member of a subfamily of GTPases that are involved in G protein signaling pathways. While not much is known about RhoD specifically, many of these GTPases are responsible for starting signaling cascades that can lead to a variety of gene activations. According to a 2006 paper by Nagaraja, et al, Rho5 is differentially expressed between two major breast cancer cell lines: MDA-MB-231 and MCF7. MDA-MB-231 cells are from an aggressive and invasive ductal carcinoma, and are triple negative cells. MCF7 cells, while also from an invasive ductal carcinoma, are less invasive. The purpose of this project is to attempt to replicate the results presented in the Nagaraja paper; that is, to demonstrate that the GTPase RhoD is downregulated in MDA-MB-231 cells as compared to MCF7 cells through the use of qPCR, cloning, and other methods. The original paper made use of microarray analysis, but our use of qRTPCR provides a more accurate representation of expression differences. Our results have demonstrated that RhoD may not be differentially expressed between the two cell lines, and instead may have different effects on each cell line based upon the downstream products of its signaling cascade.

Polycomb group protein EZH2 interacts with the Promoter Region of sodium channel Gene SCN1a

Bria Harris and Florah Mhlanga, Biology

Ischemic stroke (IS) is one of the leading causes of death in the United States, and it is the third leading cause of death in African-Americans. Efforts to model IS have included artery occlusion in animals and oxygen-glucose deprivation (OGD) in cultured cells. Previous studies from our lab have shown that Polycomb Group (PcG) proteins are increased under ischemic tolerant conditions. PcG proteins are known to be gene repressors, and they regulate a very broad spectrum of genes that are involved with cell differentiation and cell cycle control. The objective of this study was to demonstrate that the PcG protein EZH2 interacts with the promoter regions of sodium channel gene Scn1a thereby regulating the expression of the sodium channel genes. For this study cultured neuroblastoma cells were used and Ischemia was simulated by OGD. In two hours, the OGD cells displayed the IS injured condition. Chromatin Immunoprecipitation Assay was performed to show protein DNA interaction. The work flow of the ChIP Assay included: Crosslinking the PcG protein and promoter region of the gene of interest together, fragmenting the DNA using sonication, using an antibody to isolate the PcG protein that is crosslinked to the DNA fragment of interest, and using PCR to amplify the template. The results showed that EZH2 interacted with the promoter region of Scn1a, near the non-coding exon b. The interaction decreased under ischemic injured conditions in differentiated cells.

The Effects of Tobacco Leaves (Sahdah) on the Embryonic Development of Zebrafish

Denise Torres, Dim Kim, Tina Bashar, and Bonny Millimaki, Biology

Many pregnant women in Southeast Asia follow a custom of either chewing or inserting tobacco leaves between their teeth and spitting the saliva. Despite the warning labels from the company that inform the consumers of the pathological dangers, both women and men continue to use tobacco. The usage of tobacco leaves can be life threatening and can potentially affect embryonic development. In the Burmese culture, there have been a number of babies born with cardiac and neurological problems. In this study, we are using the zebrafish (*Danio rerio*) model to examine the effects of tobacco leaves on the development of zebrafish embryos. We are examining zebrafish embryos exposed to a tobacco solution and assaying for defects in the neural and cardiac development. We hypothesize that neural and cardiac development will be affected

due to the detrimental effects of ingredients found in Sahdah, the specific tobacco formulation used in the Zomi community.

ENSO's Impact on Neotropical Songbird Migration

Reese Wray and John Lewis, Biology

Every summer, thousands of songbirds migrate from Central and South America across the Gulf of Mexico to breed in North America. El Niño Southern Oscillation (ENSO) events are a global phenomenon that cause regional fluctuations of climate, weather patterns, and atmospheric pressure. These fluctuations have the potential to drastically impact the ecosystems and migration behaviors of songbirds. ENSO is separated into 3 phases: El Niño Normal, and La Niña. El Niño events cause cooler and wetter climates during winter throughout the southeastern US, and warmer and drier climates during summer in Central America and northern South America. La Niña is a cooling event that has an opposite impact on both regions. This project observed how ENSO events impacted the populations of seven species of neotropical songbirds during the breeding season. ENSO event years were compared to non-ENSO years from 2000-2015, using birding data from eBird, a database that birdwatchers and scientists use to record visual observations of birds. Using this data eBird creates maps of high bird activity, called hotspots, which can then be referenced by others. The hotspots observed for this study were located throughout Louisiana, Mississippi, Tennessee, and Alabama. The songbird species observed were the Louisiana Waterthrush, White-eyed vireo, Yellow throated vireo, Wood thrush, Gray Catbird, Ovenbird, Kentucky warbler, Yellow breasted chat, and Indigo bunting. These species were chosen due to their similar geographic ranges, and different ecological niches. We characterize these species? abundance relative to ENSO events and hypothesize population.

The Pro-Angiogenic Mechanism, Migration-Neutral Effect of the Di-Peptide LQ

Jonathan Attalla and Beth Conway, Biology

Angiogenesis is a complex process that leads to the formation of new blood vessels from pre-existing vessels and regulates tumor growth and metastasis. Our lab is interested in the activation of angiogenesis by small laminin-derived peptides hydrolyzed by the enzyme glutamate carboxypeptidase II (GCPII). Previous work in our lab demonstrated that GCPII cleaves LQE to produce the dipeptide LQ, which activates endothelial cells and angiogenesis through integrins beta-1, alpha-2 and alpha-3 subunits signaling. Here, we wanted to gain further insight into the mechanism of activation by LQ. Since LQ activates integrin signaling, we hypothesized that focal adhesion kinase (FAK) phosphorylation would be increased in the presence of LQ. We used a colorimetric assay to measure phosphorylated and total FAK levels in human umbilical vein endothelial cells (HUVECs) cultured in the presence and absence of LQ. Results indicate LQ-induced 40% increase in FAK phosphorylation, suggesting that LQ activates angiogenesis through FAK phosphorylation. The activation of the angiogenic cascade in various vascular networks requires the departure of individual endothelial cells from their original differentiated capillaries to extend the capillary branching. We wanted to investigate endothelial cells migration after their LQ-induced activation. We hypothesized LQ to promote directional endothelial-cell migration, besides angiogenesis. We performed in-vitro scratch wound healing assays on HUVEC cells to visualize and quantify their migration behavior in the presence of LQ. Results indicate a neutral LQ effect on endothelial cell migration. In conclusion, our results show LQ to be a pro-angiogenic di-peptide of migration-neutral effect.

Immunoproteasome Expression Levels in Response to Interferon-γ in HEPG2 Cells

Lindsay Davison and Amanda Williams, Biology

Immunoproteasomes, expressed by all nucleated cells, function in the degradation of intracellular proteins of viral origin. The remnants of these degraded peptides are then loaded onto and presented by MHC I to CD4+ T Cells. Previous work in our lab has demonstrated that the JAK/STAT pathway is critical in the production of the immunoproteasome. We hypothesize that the presence of INF-γ, HEPG2 cells mount an increased production of immunoproteasome levels. We tested this hypothesis by treating these HEPG2 cells with a concentration gradient of INF-γ and measured expression of immunoproteasomes by means of Western Blotting. These data will allow for future investigation into the JAK/STAT pathway in HEPG2 cells, in the presence of Hepatitis C virus.

The effect of Top2B inhibition with Hu331 on expression of dcc in *Danio rerio*

Melanie Couch, Amanda Williams, and Bonny Millimaki, Biology

Topoisomerase plays a role in replication by cutting the DNA strand to reduce the tension caused by supercoiling from separation of the DNA during replication. Topoisomerase IIβ has been shown to play a vital role in neural development. Previous research from our lab has shown that Zebrafish embryos treated with the Top2 inhibitor Hu331 form mauthner neurons that do not properly extend their axons across the midline. The molecular cause of this phenotype is not yet understood. Past studies and the literature have shown that chemo-attractants and repellents play a major role in the development of these neurons. We chose to examine the expression of dcc, a Netrin-1 receptor, using qRT-PCR in embryos exposed to Hu331. Dcc plays a vital role in axon guidance and loss of Dcc expression causes a phenotype similar to that observed in Hu331 treated embryos. However, our data does not support misregulation of *dcc* expression as the cause of our Hu331 phenotype, the qRT-PCR results suggest that *dcc* expression is unchanged in Hu331 embryos. Continued replicates and examination of additional factors involved in neural development will further our understanding of the role of Top2 in axon guidance.

Comparing Populations of Neotropical Woodland Migrants and Resident Birds at Edwin Warner Park (Nashville TN) to State and Regional Trends

Emily Phipps and John Lewis, Biology

Many Neotropical bird populations have been declining for some time and Tennessee provides important habitats for many of these species. Several monitoring efforts exist that attempt to quantify these population trends. The MAPS program is a collaborative, continent-wide effort to gather information on landbird populations. We compared 2 decades of data from the Warner Parks MAPS station to state and regional MAPS data to see how trends in population size correlate at different spatial scales. We reference trends in state and regional data collected from the Tennessee Breeding Bird Survey and eBird. We analyzed a subset of 6 woodland species specifically targeted by MAPS because of their decline. Wood Thrush (Hylocichla mustelina), Kentucky Warbler (Geothlypis formosa), and White-eyed Vireo (Vireo griseus) were selected as Neotropical migrants. Downy Woodpecker (Picoides pubescens), Tufted Titmouse (Baeolophus bicolor), and Carolina Wren (Thryothorus ludovicianus) were chosen as resident birds for comparison. Significant differences in trends at the local or state-level may indicate important environmental or habitat issues that are undetectable when examining regional data alone. These data give conservationists a scale-specific goal in preserving habitat and designing monitoring and conservation strategies in order to keep the populations of these important bird species from declining further.

Structural Analysis of Gluten Exorphin B5 by NMR and Computational Methods

Stephen Hemmerly and Kent Clinger, Chemistry

Gluten Exorphin B5 is an opioid pentapeptide (YGGWL) released during the digestion of gluten. Our goal is to determine the three-dimensional conformation of this peptide using spectral data obtained with a Bruker Avance AV-III 500MHz NMR spectrometer. We gathered two-dimensional 1 H-NMR data on two different solutions of the peptide. SPARKY and Bruker's TopSpin software were used to analyze the spectral data. We have assigned the cross peaks on the through-bond spectra and are currently in the process of assigning through-space NOESY cross peaks. After gathering and calibrating NOESY peak volumes, we plan to use the program MARDIGRAS to calculate the structure. In addition, calculated NMR spectra of the pentapeptide were determined by performing a Monte Carlo conformational search using molecular mechanics with the MMFFaq force field. Keeping the 100 lowest energy conformers, we then used these as initial guesses for density functional theory equilibrium geometry calculations with the B3LYP functional and implicit solvent model. Finally, the NMR spectra were calculated at this DFT/SM8 level using the B3LYP functional and 6-31G* basis set for the lowest energy conformer and compared to the experimental NMR results to facilitate interpretation.

Ion Contributions to the Gulf of Mexico Dead Zone from Pensacola Beach Tributaries

Tricia L. Lynch and Linda Phipps, Chemistry and Biochemistry

The Dead Zone in the Gulf of Mexico is one of the largest in the world. Hypoxic conditions mean that it is unable to support aquatic life, which has a huge impact on the environment and fishing industry in the Gulf. The area is hypoxic because excess nutrients, mainly from fertilizers, promote algal growth, which upon decomposition sink and deplete oxygen. These nutrients enter waterways from neighboring crop fields. They flow from streams to creeks and rivers, creating a compounding effect before depositing in the Gulf of Mexico. This experiment was focused on contributions from waterways through Pensacola, Florida, into the Gulf of Mexico. The contribution of fertilizers was determined by analyzing the concentrations of certain ions that are components of fertilizers, as well as other naturally-occurring ions. Ion concentrations were determined by ion chromatography. Ammonium and nitrate concentrations were also measured by ion specific electrodes. Sulfate, potassium, and calcium ion concentrations showed a correlation with distance to the Gulf. In addition, nitrate and ammonium showed elevated concentrations with geographic trends. These ion concentrations are indicative of fertilizer contamination and comparable to those observed in the Mississippi River, which is a known contributor to the Gulf's Dead Zone.

PROGRESS ON THE STRCTURAL DETERMINATION OF 1,1-DIHALO-2,2,3,3-TETRAMETHYLCYCLOPROPANES

Andrew Sweeton, Margaret Veers, Christina Thurman, and Kent Clinger, Chemistry and Biochemistry

A series of dihalocyclopropanes are being synthesized through dihalocarbene addition to alkenes. 1-bromo-1-chloro-2,2,3,3-tetremethylcyclopropane was synthesized in 0 C pentane by reacting tetramethylene and dibromochloromethane in the presence of sodium tert-butoxide. GC-MS data were collected from the pentane solution and evidence of 1-bromo-1-chloro-2,2,3,3-tetramethylcyclopropane were observed. As more results are obtained, the structural analysis of this dihalocyclopropane will be compared to the crystal structures of the 1,1-dibromo- and 1,1-dichloro-2,2,3,3-tetremethylcyclopropanes which have been previously determined.

Silicone Acrylate Coatings as a Model System for Predictive Surface Free Energy Analyses

Rachel Brooks, Anna McCain, and Brian Cavitt, Chemistry

Silicone acrylates allow for efficient observation of structural properties because of how the surface of a coating interacts with applied solvents. The Oss-Chaudbury-Good (OCG) thermodynamic approach was utilized to examine the Lifshitz-van der Waals and Lewis acid/base interactions present in the tested relationships. Silicone acrylates were obtained from Siltech, UV-cured, and measured using the OCG approach to determine the surface free energy profile of the silicone acrylates. This measurement was performed using contact angle measurements when a single drop of solvent was in contact with the silicone acrylate surface. Solvents used were a-bromonaphthalene, dimethylsulfoxide, and water. Using the information gathered, Cassie's Equation was then used to predict the contact angle at the interface of one such multicomponent formulation. Thus, silicone acrylates in coatings can be utilized as a model for future instances of predictive surface free energy analysis.

Antagonistic effects of green tea on cancer chemotherapy: Computational and experimental investigation of epigallocatechin-3-gallate/sunitinib interactions

Kelsey Jones, Kevin Flatt, Matt Vergne, and Austin Privett, Chemistry and Biochemistry

Sunitinib is a chemotherapy drug used to treat metastatic renal cell carcinoma and gastrointestinal tumors. A case study showed that Sunitinib became inactive in vivo when the patient drank high concentrations of green tea. Epigallocatechin gallate (EGCG), a catechin in green tea, aggregates in vivo with Sunitinib to form an insoluble precipitate, rendering Sunitinib inactive. The molecular reason behind this is currently being investigated using computational chemistry to understand the interaction between Sunitinib and EGCG. Computational chemistry and molecular dynamics will be utilized to understand the molecular interactions that produce the aggregate. These results would provide insights into pharmaceutical drug changes to minimize aggregation of chemotherapy drugs with catechins in the body to further the success of such drugs.

Pegram TN, Flood Remediation Project

David Lowery, Nathan Curtis, Abby Queen, Cody Glenn, and Chris Gwaltney, Civil Engineering

The city of Pegram, TN sent a request to the Civil Engineering Department at Lipscomb University to provide engineering services to assist with flooding issues at the 500 block of Highway 70, Pegram TN. Flooding at this location occurs multiple times a year, typically incurring property damage. Because the flood area is commercial, business is disrupted and often drives business owners away. It is also reported that the flooding will overtop Highway 70 in a large storm, therefore creating safety issues. In response to this request, the Lipscomb senior design team proposed to research and analyze the extent of the problem, design conceptual solutions, and report back to Pegram with our recommendations on the best course of action. Our final deliverables to Pegram include: Existing Conditions Report and Schematic Design Recommendations. In addition to these deliverables to the town of Pegram, we also are delivering completed construction drawings of the recommended solution to the college of Civil Engineering in order to fulfill the requirements for the senior design project.

The Rio Grande Bridge

John M. Ray, Mariah Vinson, and Todd Lynn, Civil Engineering

One of Lipscomb's civil engineering senior design teams had a unique opportunity to design a pedestrian bridge over the Rio Grande River in Olancho, Honduras. The span of the bridge is one of the largest the Peugoet Center for Engineering Service has ever designed, spanning around 206 feet. The process of designing the bridge was broken into three different teams that worked interrelatedly with one another: hydrology, substructure, and superstructure. The hydrology team was in charge of determining the max flow rate and water height of the river in a 50 year storm for the surrounding basin. The substructure team was set out with a task to build a concrete foundation that was capable of not only holding the forces applied by the superstructure but also the forces applied by the surrounding soil. The main purpose of the superstructure team was to design a structure that met the requirements set forth by the client while also abiding by local and foreign design standards. As a result of this bridge being designed and constructed, houses and families on the north side of the river will now have access to the south side of the river. This new access will allow for children to safely cross the river an attend school.

The Effects of the Whirling Phenomenon on Mechanical Systems

Daniel Steines, William Sisson, Ranine Haidous, Bridgette Steiner, and Dr. Weeden-Wright, Electrical Engineering

The whirling phenomenon, commonly found in rotating shafts, is used in the field of mechanical engineering to determine critical speeds and avoid imbalances inducing machine failure. For example, in the automotive industry, drive-shafts run continuously at high speeds impacting vehicle operation. If these shafts experience excessive whirling forces, their connections are torn apart, damaging surrounding components. A whirling vibrations device has been designed to visually and analytically demonstrate the whirling phenomenon. By rotating thin rods at high speeds, the machine will visibly deflect the rod so that the viewer can visualize the damaging effects of whirling forces on a shaft. The machine was also designed with interchangeable rods of varying diameters and lengths to show the resulting impact on the whirling effect. The mechanical design consisted of determining key variables like optimal shaft length and diameter ranges, shaft and mounting materials, motor specifications and type of enclosure in order to maximize the visual experience and the safety of the viewer. The electrical design consisted of monitoring the vibrational force of the shaft on the bearings using an accelerometer as well as speed of the motor in real-time using NI instruments data acquisition tools and software. These data acquisition tools are integrated into a Matlab graphical user interface (GUI) to provide user friendly control and real-time data acquisition for students. The whirling phenomenon demonstration device will highlight the necessity of understanding vibrational analysis in operating rotating machinery safely and reliably.

IEEE Robotics

Kristina N Johnson, Brandon Smith, Nate Hamilton, Will Knight, Rashmeet Ladhar, and Gregory Nordstrom, Electrical and Computer Engineering

Robotics is an exciting field, one that Lipscomb Engineering would like to become more closely involved with. In order to accomplish this, a multidisciplinary senior design team has been established to compete in this year's IEEE SoutheastCon Hardware competition. The team has two major goals: to successfully compete this year, and establish a more long-term robotics presence here at Lipscomb University by partnering with Junior and Sophomore students who will be a part of future competitions. By the time of this year's Scholars Symposium, this team will have completed and competed with a student-designed robot, and will be able to demonstrate the full extent of its functionality. The hope for this team is to pioneer and help establish a new way for engineering students to apply the knowledge they gain in school to activities outside the classroom, and enhance their experience at the University.

Revolving Stage: Low-Profile Drive System and User Interface

Elizabeth Woytach, JJ Shankles, Ryan Luttrell, Graham Sears, Ryan Trebendis, and John Pettit, Electrical Engineering

The theatre department at Lipscomb University conducts multiple productions each year of varying degrees of complexity regarding the stage and the set. The department would like to add a revolving stage to their list of available set pieces to use in productions, but commercially available units are very expensive. The theatre department has partnered with the Raymond B. Jones College of Engineering to create a cost-effective stage that they can use in their productions. Last year, another senior design team took on this project, designing the stage and its drive and control systems. Their stage was driven by an external friction wheel, so the gear box, motor and wheel were positioned next to the stage. This was not aesthetically pleasing for stage productions and it also presented a trip hazard. The control system for last year's stage did not function well, so the theatre department could not control the stage's rotation or position. This year's team was tasked with improving the previous year's drive and control systems while keeping the same stage. They designed a concealed drive system that is made up of a ring and pinion gear set that transfer torque from the motor and gear box to the stage. They also designed a control system that allows the user to move the stage to specific angular positions at preprogrammed speeds and also to rotate to arbitrary locations with a switch that rotates the stage only when activated.

Pansexual Pantheon: Marginalization and Empowerment in The Wicked & the Divine

Michael McDermott and Jan Harris, English and Modern Languages

In all of contemporary media, few forms of literature carry as negative a stigma against inclusivity and diversity as comic books. Because of the medium's difficult past with acceptance of outside voices, popular culture continues to view comics as a field for the stereotypical misogynistic nerd, casting aside the potential literary value of comic books and graphics novels as a whole. Though mainstream comic publishers like Marvel and DC are working to end that stigma, lesser-known publishers like Image have been promoting diverse works full of themes and prose commonly found in the contemporary literary canon. Recently, author Kieron Gillen and illustrator Jamie McKelvie have joined forces to create The Wicked + The Divine, an ongoing dark fantasy series that celebrates and promotes a diverse cast. The series is overwhelmingly populated with characters of color and LGBTQ characters (with a great deal of overlap), leaving minimal room for the archetypical straight white males and females of contemporary fantasy. The cast's races, genders, and sexualities influence the overarching struggle for power throughout the story, decentralizing

the white narrative of power especially present in comics and refocusing that power on characters of color. Alongside research and textual support, this presentation provides a visual representation of the series's cast to illustrate Gillen and McKelvie's use of queer coding, through which they create diverse characters that the average reader can easily identify as queer outsiders.

The Real Face of Homelessness in Nashville

Hannah Vaughn and Paul Prill, Honors College

Researching causes and effects of homelessness in Nashville. Comparing Nashville's homeless population, including the causes and effects, to those other cities of similar size from around the United States and abroad. Talking to people in Nashville who experience homelessness in order to fully understand what it means to be homeless. Investigating what other programs cities have implemented to help their homeless populations. Proposing possible solutions to combat and decrease homelessness in Nashville based on the research.

The Benefits of Waster Waster Treatment for Renewable Energy

Kyle Smith and Emily Stutzman, Sustainability

Wastewater treatment has been said to be the single most important health advance of the last century. Through treatment, we are able to provide clean drinking water and release fresh water to nearby waterways. Instead of exclusively cleaning wastewater to discharge it downstream, wastewater, through the processes of capturing biosolids, can be used as a renewable energy source. This has the capability to provide local economic development to municipalities while providing maximum environmental benefits at the least possible cost. The goal of this research is to provide viable solutions and planning for a city such as Nashville, Tennessee to incorporate such practices to resident livelihood. The largest inquiries that face the market that is wastewater treatment for renewable energy stems from different economic dispositions such as strained utility budgets, venture capital searching for faster and safer returns, and skyrocketing capital competing for every dollar. Through research of the economics of wastewater treatment, data specifically related to Nashville, and exploration into innovative technology in the field, we will be able to grasp a better understanding of what makes wastewater treatment a competitive form of renewable energy that will start to turn many eyes and opinions.

Sustainability & Education- Forward from today

Frank Carter and Emily Stutzman, Institute for Sustainable Practices

Since 1867 with the formation of a federal office providing oversight to education through today, our country and its Presidents have directed the emphasis of a national education plan in response each societal challenge or emerging threat. Sustainability and its triple bottom line: People, Planet, Profit (Society, Environment, Economy), touch (or can be reinforced in) every academic discipline, yet, Sustainability is electively taught as reduce, recycle, and reuse. As our world population increases, consumption of resources increases, but education in sustainable practices is not required from the earliest of grades through the entirety of high school. Each child in America, for 12 years, regardless of race, creed, color, or social status learning the fundamental ethic of giving more than one is taking and applying it to society, the environment, and within our economy. Sustainability is not a single source action, but rather a multifaceted approach to achieving balance. We do not stop reading once we learn how nor should we continue to consume resources at a rate forty-three times greater than another human. Our children are more likely to learn about sustainable practices from within the home/family member, through clubs (FFA, 4-H), and non-

government offices (NGO's) or non-profits than they would be from an approved, science based curriculum. Findings to be discussed.

Environmental Concerns and the Media: How media portrayal impacts public understanding of environmental issues

Anna McClure and Emily Stutzman, Institute for Sustainable Practice

The purpose of this research is to determine how journalistic principles, such as the desire to gain greater readership, directed the way climate change was addressed in print media from the 1970s until now, and if this media coverage improved or lessened the general public's belief that climate change is an environmental concern. Drawing from an undergraduate education in Journalism and New Media, I analyze how historic events and advances in technology altered the course of climate change reporting and what forms of reporting proved most effective in raising awareness through unbiased means. This research was conducted through the study of various academic articles and interviews with a veteran journalist and a Vanderbilt environmental science professor. Results and analysis to follow.

How do Western countries' economic investment in African countries undermine the environmental and social sustainability of African citizens?

Ellory Overcast and Emily Stutzman, Institute of Sustainability

Africa's natural resources are the draw for many Western countries to economic investments in Africa. While these investments benefit Western countries, they often leave African communities compromised. The indigenes experience detriments to their community's stability: Africans' social structure is often undermined because their cultural values have been ignored, or destroyed, and their environmental ecosystem services are decreased because of foreign use, leaving the indigenous Africans' way of life and quality of life destabilized and damaged. Through research of current literature, I explore how Western countries' economic investments in Africa negatively impact the environmental and social sustainability of African citizens. Data and results will be discussed.

Salinity levels effect on the function of vegetation to emit and filter greenhouse gases in temperate wetlands

Madeleine Zahn and Emily Stutzman, Institute for Sustainable Practice

In recent years, wetland restoration has become an interest worldwide. As wetland restoration aims to restore biodiversity, it is important to take into account the salinity of freshwater ecosystems. Plants absorb nutrients through their roots and, in cases of a high intake of salt, stress hormones are released within the plant causing a disruption in the plant's growth. This can affect wetlands sourcing and sinking of carbon and other greenhouse gases (GHGs). Temperate wetlands, in particular, are dominated by diverse species of plants that contribute to the production of CO2, CH4, and N20 during their seasonal decomposition. Wetland vegetation also sequesters GHG through natural functions like photosynthesis. The plants that produce these GHGs are susceptible to risk when they take in high amounts of saline from the water in their environment from lack of freshwater flow to move nutrients. The increase of salinity in these plants can lead to a decrease in the plant's quality of life, which can also affect their ability to filter GHGs in the wetland. Overall, this research examined the role of vegetation in temperate wetlands in regards to GHG emissions based on the salinity intake of the vegetation. Results and analysis will be discussed.

Maybe we can end world hunger...

Callista Pascarella and Emily Stutzman, Institute for Sustainable Practices

Animal agriculture accounts for half of the worldwide greenhouse gas emissions. Livestock covers almost half of the earth's total livable land, and it takes anywhere between 2-5 acres of land to support just one cow. Animal agriculture also demands 1/3 of the earth's fresh water supply to either grow crops for feed or direct animal consumption. Animal agriculture is also the leading cause of rainforest deforestation and species loss due to clear cutting for livestock grazing. How does the demand for animal products, moreover the animal agricultural sector, disproportionately demand our planets' resources? Research supports human dietary requirements for animal products are far less than what is currently consumed, primarily in developed countries. Therefore, reducing demand will shrink the negative impacts of the animal agricultural sector and significantly reduce the human carbon, water, and land footprints. Comparisons between consumption of animal products and direct impacts on the environment will be displayed. Worldwide, we are currently growing enough plant-based food to feed 10 billion people, but almost half of that is going to feed livestock instead of humans in need. The goal of this research is to analyze and display data and information supporting the reduction of animal product demand in developed countries to increase resources and food available for underdeveloped countries.

Green Construction Materials

Spencer Sanderlin and Emily Stutzman, Institute for Sustainable Practice

The use of green construction materials is a practical and efficient way of constructing buildings and homes. Leadership in Energy and Environmental Design (LEED) is a well renowned third party rating system that recommends construction materials. What are the benefits of Green Construction Materials as opposed to common, non-green options in the construction field? Mineral wood is one of the major products in green construction materials. One of the most common names in commercial mineral wood is Comfortboard. LEED certified Comfortboard helps reduce the amount of hazardous ingredients used in the creation of the wood. As opposed to the use of regular wood, it is a better material for insulating a building or home. Access Control Locks are another key use in the green contrition market. They are a low power use object and are very cost efficient. Regular locks are fairly damaging to the door and frame of the home, so a smoother and safer lock is a better choice for the consumer. They decrease CO_2 emission and do not produce hazardous material when made or destroyed. The production of textile composite flooring comes from the breaking down of old carpet and the combined use of the recycled fabric. The goal of this research is to demonstrate that use of green materials is reliable and more cost effective than the older ways of construction while also positively impacting the environment.

Social and Economic Barriers for the Adoption of Solar Renewable Energies for Residential Purposes

Daniel Cardenas and Emily Stutzman, Institute for Sustainable Practice

The renewable energies provided by solar power have experienced remarkable development in recent years, especially in European countries. Despite the exponential growth of solar renewable energies, the adoption of this tool in the United States is far behind Europe and even Australia, particularly when it comes to residential use. The following study collects different researches from different parts of the world to analyze social behaviors and economic factors that could help to determine the barriers for the acceptance of solar renewable energies for residential purposes in the United States. The first research for this study was conducted by Adam Faiers and Charles Neame from Cranfield University in the United Kingdom. The

research divides the population in two categories each with different predispositions towards solar renewable energies and analyzes the participants' reasons for purchasing or not purchasing solar renewable energies. Xueliang Yuan, Jian Zuo and Chunyuan Ma from Shandong University in China and the University of South Australia, conducted a similar research study that used quantitative data to determine the level of social acceptance of solar water heater and solar photovoltaic for the average Chinese citizen. The last paper breaks down levels of acceptance into three distinct categories: socio-political acceptance, community acceptance and market acceptance. The results from these three studies are very similar, showing that there is a generally positive attitude towards solar renewable energies and that the problems rely mostly on a lack of knowledge about new technologies and the ways they can improve everyday lives.

The Connections Between Sound and Our Environment

Daniel Collier and Emily Stutzman, Institute for Sustainable Practice

This research explores the connection between sound and our environment, and considers aesthetics within sustainable practice. The aspects explored touch on Ecomusicology, soundscapes within our environment, the potentials of music and why one should care. Previous research concerning these topics has focused on encouraging the consideration of sound and music as a part of nature as something that can inform cultural understanding of the environment. Doing so can contribute to improving environmental education and to addressing the environmental crisis in general. John Luther Adam's book "The Place Where You Go to Listen" recounts Adam's transformative experiences of listening to the world around him, and how he wants others to have such experiences. Given the social and environmental problems that plague the planet, Adams believes that striving for such Ecology of Music is necessary not to change the world but rather to change the quality of our attention to the world. Environmental crises require the entire intellectual, political, scientific, and cultural resources we have to confront them, and by taking steps to consider the ways music can contribute to learning about the natural world, an interdisciplinary approach combining sciences with the arts and humanities can contribute to sustainable endeavors. The goal of this research is to find ways to bridge disciplines in creative ways in hopes of better educating the public regarding humans? interaction with the Earth.

Addressing Potential Policies to Impact Consumer Decisions at the Preacquisition Stage in Order to Reduce Food Waste in the United States

Courtney Christl and Emily Stutzman, Institute for Sustainable Practice

Food waste presents one of the biggest worldwide challenges of the 21st century due to its connections to other complex issues such as climate change, global trade, sustainability, food security, and hunger. The United States in particular suffers paradoxically from both a massive food waste dilemma and a nationwide obesity epidemic at the same time. As a result, the problem of food waste in the U.S. and approaches to reduce it have created debate among industries, lawmakers, and consumers alike. We know edible food is lost at all points of the aggregate food marketing systems from production to distribution to consumption. This study focuses on food waste at the pre-acquisition stage, or the point of purchase. This stage is where supply meets demand, where consumer meets producer, and therefore the best leverage point to create specific policies that impact consumer decisions and contribute to the reduction of food waste. In this study, we examine some of these potential policy points and their capacity to reduce food waste in the United States with consideration to the nuances and complexities of human psychology, economic trends, and market standards. Results and analysis to follow.

Divided America

Joel Clinger and Gary Hall, Mathematics

When people look at the exit polls of this election, they see what the current demographics think. It does not really show where she lost voters but where she could have done better. The only way we can see where she lost voters is to look back. I looked back into last election and compared the demographics to see who changed their minds and decided to vote for someone other than the Democratic party. I chose to focus on gender, age, race, race within gender, education, income, religion, opinion on government, place size, marital status with gender and party I.D. Obviously, the people vary, but the percentages of those questioned are very similar. One thing is clear. Clinton lost this election due to losses in large demographics.

World Series Statistical Analysis

Sarah Lavoie and Gary Hall, Mathematics

For my Advanced Calculus class, we each did individual research projects. For my project I did a statistical analysis comparing the results of the World Series with the two team's regular season record. I looked at if there were any trends in which team won the World Series and which team had the better regular season record. I also looked at the difference between the regular season records of the two teams and how many games the World Series ended up going (between 4 and 7). My research includes data of the team's regular season records and the results of the World Series, and how many games the World Series went. I have multiple graphs showing trends between certain sets of data and confidence intervals and r-values showing the strength of the trends among the data sets. I also have about a ten-page write-up on the analysis of all the data that I will be condensing in order to present it on a poster along with the graphs and data.

Monte Carlo Tree Search Algorithm for Card Game Analysis

Matthew Naveiras and Gary Hall, Mathematics

When playing a strategical game such as chess, Pokémon, or even tic tac toe, usually the winner will be the player capable of visualizing the various outcomes of the game, playing off of not only the opponent's current moves but also considering the potential sequences of moves the player and opponent can make in the future. To maximize a person's chance of winning a game, the player should consider as many outcomes as possible to make the best decisions whenever a choice is required. The purpose of this project was to design a Python program to play a simple card game of my design named Pendragon by using a tree search algorithm. By using such an algorithm, the program would decide what move to make by analyzing a certain number of branches (possible outcomes of the game) that could result whenever it made a certain choice, and determining which choice resulted in the highest probability of victory. By analyzing the program's percentage chance of winning over a large number of games, it was possible to determine how the number of branches analyzed for each choice influenced the program's chances of winning.

Education Trends of Top CEOs

Mary Perry, Madeline Enderle, and Gary Hall, Mathematics

The main goal of our project was to determine if a correlation existed between CEOs and college majors. We analyzed one-hundred CEOs in conjunction with what colleges they attended, their college majors, and highest degree earned. We chose our CEOs based upon Fortune 500, and their list of the top companies. The reason we chose this list was because these companies are the most financially successful companies in the world. Moreover, our goal coalesced to determining if there was a correlation between college majors and the most successful CEOs. We found that a large number of CEOs majored in fields that were irrelevant

now to their current line of work. We concluded that most CEOs who did not major in fields that were business related, later went onto receive their MBA. The data we analyzed, we compiled into an excel spreadsheet and categorized majors, colleges, highest degree earned, along with other factors by color. This data lends insight into the ideal university preparations to take in order to have a chance to become the CEO of a major company. Pleased with the majority of our work we found some correlation; however, the findings were not necessarily as powerful as we would have hoped. We still believe that further research on this topic could lead to conclusions bearing more statistical weight. However, it is interesting to note, that no matter what your college major is, anyone with the right drive and resources could go onto manage a successful company.

An Evaluation of the Lipscomb Capstone Assessment

William Sisson and Gary Hall, Mathematics

Every 10 years Lipscomb University undergoes a reaccreditation process. The process requires an evaluation of class to confirm that students are adequately learning through their coursework. The Engagements course, an upper level general education class, is evaluated by a ten question test administered to students that have completed the course. The purpose of this research is to determine the effectiveness of the test in gauging student learning through the completion of the general education coursework. An identical test was provided to freshmen during their Lipscomb Seminar class, the start of the general education program. The results of the test were then compared to the existing results for the upperclassmen. Using data analysis, the test was evaluated to determine if it is a suitable metric for student learning.

Alternative feeding

Ayotunde Haya and Gary Hall, Mathematics

For My research presentation, I will be working with Sodexo catering to test the feasibility of growing a portion of food produce on campus grounds in the form of raised beds and greenhouses. My research will focus firstly on what kind of crops can be grown on campus and whether there is any demand. Next, I will check the feasibility and scalability of the program using mathematical models which will bring it in line with my program requirements. My research will also include a cost and labor analysis. Anchoring this research will be an ethical and moral argument for sustainable farming as both a teaching and ministry tool. Studying at Lipscomb, one thing that has been emphasized is the idea of a better way of life. To truly impact students at Lipscomb to lead healthier, more socially and environmentally responsible lives our institution must model this behavior in a visible manner. Visible raised beds and accessible greenhouses would provide an opportunity for students to see, touch, smell and ultimately get a feel of an alternative way of living they can take with them upon leaving college.

Little Hands, Big Hearts Adaptive Playground

Benny Richardson, Logan Shade, Jacqui Payne, Muhammad Musharaf, and Joseph Tipton, Mechanical Engineering

Little Hands, Big Hearts is a Christian ministry in Trujillo, Honduras that works to serve the needs of physically and intellectually handicapped children and their families in an impoverished community. These children range in age from 6 months to 15 years and are affected by a diverse variety of handicaps. In 2013 the organization introduced indoor physical therapy as a part of helping the children's physical development, but they have expressed a desire for an outdoor adaptive playground park to complement the current indoor motor skill development. The Lipscomb Engineering team is assisting in the design of a bridge and treehouse acting as the main components of the playground along with equipment to aid in touch sensory development, vestibular and balance development, and a tunnel to serve as an escape for over-stimulated children.

Design and Analysis of a Cooling System for the Barkley Dam Cable Tunnel

Matthew Martinez, Coleman Gaines, Hunter Printz, Riley Putman, Troy Barr, and Kirsten Dodson, Mechanical Engineering

The U.S. Army Corps of Engineers has begun major renovations on Barkley dam in Kentucky. The dam supplies power for thousands of homes using Lake Barkley's nearly 58,000 surface acres of water. As part of the renovation, the dam's four generators are being replaced to increase the power generation by over 43%. The increased power generation requires the dam's medium voltage cables to be upgraded. The new cables will generate more heat than the original cables, thus requiring a cooling system to prevent overheating. The U.S. Army Corps of Engineers has asked our team from Lipscomb University's engineering program to design this system. The tunnel is required to remain under 104 F to abide by NFPA 70, the National Electric Code. The cables themselves are to remain below 221 F to prevent cable degradation. Our analysis shows that under normal conditions, the cables will not reach their maximum operating temperature. Therefore, the design focuses on maintaining the tunnel temperature below 104 F. The design team is presenting two options for mitigating heat in the tunnel. The first option is a standard exhaust fan to generate airflow through the tunnel. The second option is a water-source heat pump which will use a raw-lake water to absorb the heat from the tunnel. Our team presents these two designs as viable solutions based on our analysis for the Army Corps? needs at Barkley dam.

Do asthmatic children with mothers who consumed tobacco during pregnancy have an increased risk at developing asthma versus asthmatic children whose mothers did not consume tobacco during pregnancy?

Emily Trovillion, Jenna Harper, Taylor Mitchell, Susie Clark, Kennedy Potts, and Jennifer Weber, Nursing

Do asthmatic children with mothers who consumed tobacco during pregnancy have an increased risk at developing asthma versus asthmatic children whose mothers did not consume tobacco during pregnancy? It is estimated that 250,000,000 women throughout the world smoke on a daily basis. There are at least 400,000 infants who are exposed to smoke every year in the United States, and twelve percent of women smoke during their pregnancies in the United States. Tobacco use throughout pregnancy has been known to cause an increased risk for asthma in children. This literature review was conducted to assess the potential complications of smoking during pregnancy. The methods chosen to conduct this literature review include

a pooled analysis, experimental study where the participants received either a placebo or nicotine during the gestational period, surveys, data collection, studies, and a retrospective observational hospital-based birth case-control study. The sources were obtained through Lipscomb University's online library resources. The conclusions of these research studies suggest smoking during pregnancy does in fact cause asthma.

In preterm infants, what is the effect of skin-to-skin care on their physiological and social aspects in comparison to conventional neonatal care within the hospital setting in the first year of life?

Claire Schmittou, Emily Claiborne, Christopher Hale, Hannah Weller, Amy Potts, and Jennifer Weber, Nursing

Preterm infants have potentially fatal physiological and cognitive deficits that can greatly decrease their quality and quantity of life. Healthcare providers are using financially taxing technological interventions to improve the life of preterm infants, but have dismissed some basic life-changing interventions, such as Skin-to-Skin Care(SSC). Due to of the lack of access to adequate healthcare worldwide, the prevalence of preterm infant deaths is potentially preventable if providers consider the implementation of non-technological interventions. The objective is to assess whether or not current findings on SSC support it as an effective intervention to decrease the mortality rate in preterm infants as well as decrease the prevalence of comorbidities. Our team searched for reliable, scholarly sources that contained adequately populated samples, and peer reviewed articles published after 2012. The databases in which information was obtained through include: Cochrane, National Center for Biotechnology Information, and Elsevier; with specific findings from various other academic journals and publications. After reviewing articles on SSC, the overall effect of this intervention was an improved mother-infant attachment. Infants experiencing SSC have subjectively scored less on pain experience scales. Physiologically, studies have also shown improved respirations, temperature, heart rate, and oxygen saturation rates in newborns, thus improving mortality rates; as well as decreased stress-related hormonal levels, lengthened infant sleeping times, decreased hospital-acquired infections, improved cerebral blood flow and head circumference, and decreased hospital readmission rates. Further research is needed to assess contradicting findings from these studies.

Relationship Between Various Aspects of Staff Hygiene and Nosocomial Infection

Caroline Sutton, Jenny Phelan, Graylin Brock, Josh Gutierrez, Kaleigh Ligon, and Jennifer Weber, Nursing

The relationship between various aspects of staff hygiene and nosocomial infectious agents was reviewed. Nosocomial infections are infections that are transmitted and contracted within the confines of an inpatient setting and are known to lengthen the stay and increase complications. Healthcare workers encounter patients numerous times throughout their stay, which raises the question: are patients treated by healthcare workers who have poor hygiene habits more likely to develop nosocomial infections compared to patients who are treated by healthcare workers who have strict hygiene patterns? Healthcare centers are persistently working to reduce the quantity of these bacterium within their facilities, but at times, it is overlooked how much bacteria are carried on the health care workers themselves. Many studies showed a positive correlation between number of interactions with staff and infection development. Patients in the hospital on contact precautions were found to be less likely to experience nosocomial infections than those who were not. The review specifically looks at the links between contaminated stethoscopes, cell phones, nursing uniforms, and worker hand hygiene with the spread of infection. There is proof of higher rates of spread of infection due to lack of cleanliness among medical staff. The implications of the review show a need for hospitals to monitor the hygiene of staff before they come to work.

The Effects of Added Sugar on the Incidence of Adolescent Obesity

Lauren Haley Haggard, Ashlee Taylor, Ashley Mannel, Rachel Caldwell, Jessica Polk, and Jennifer Weber, Nursing

Given that obesity is a rising epidemic in Western civilization, it is important to address causative factors like the consumption of added sugars. The purpose of this review is to determine the direct effect of added sugar consumption on the incidence of adolescent obesity. Databases were searched for articles published within the last five years, and they are as follows: CINAHL, ScienceDirect, and GALE. Research identified studies that explored the relationship between the intake of added sugar and/or total sugar and obesity. Data extracted for this review include association between sugar consumption and obesity, magnitude and direction of the association, sample size and population, assessment methods, and funding. Of the 6 studies consulted, all found a positive correlation between added sugar consumption and incidence of adolescent obesity. There is a positive correlation between the intake of added sugar and the incidence of adolescent obesity. However, the strength of correlation in the individual studies varies, which may be attributed to population, sample size, and research methods. Clinical significance is evident throughout the studies, but to varying degrees of magnitude.

Are pregnant women who consistently sleep five hours or less are at risk for greater complications during pregnancy compared with pregnant women who sleep eight or more hours during their duration of pregnancy?

Emma Paul, Hannah Grimes, Karina Beltran, Jena Starkweather, Lauren Kubat, and Jennifer Weber, Nursing

This study examines whether pregnant women who consistently sleep five hours or less are at risk for greater complications during pregnancy, compared with pregnant women who sleep eight or more hours during their duration of pregnancy. Most women during pregnancy have experienced sleep disruption due to frequent urination and difficulty finding a comfortable sleeping position. Research suggest that sleep deprivation and hormonal changes can cause health concerns for the pregnant population, such as premature labor. A lack of sleep has been strongly associated with decreased cognitive functioning in healthy individuals, nevertheless in pregnant women. Women categorized as having poor sleep are more likely to have an unplanned caesarean births and experience a longer delivery than those who consistently sleep more than seven hours. Therefore, health care providers should prescribe a minimum of eight hours sleep throughout pregnancy to assure a decreased risk of unpredicted labor type and duration. Research suggests sufficient sleep is necessary for fetal wellness and development. Current research studies were chosen that reflect a population of pregnant women. Future studies are recommended to include differing socioeconomic statuses and ethnicities among pregnant women for the economic or cultural effects on sleep and pregnancy. Additionally, longitudinal studies are recommended that focus on the long-term effects of sleep deprivation during pregnancy on childhood development and transition into adulthood.

Regarding Nonpharmacological Treatments for Alzheimer's Dementia, Does Music Therapy Reduce Symptoms more Effectively than other Nonpharmacological treatment options?

Raj Patel, Sheona Gozmao, Adrienne Corr, Allison Meyers, Rabab Jambi, and Jennifer Weber, Nursing

This research study evaluated the effectiveness of nonpharmacologic interventions commonly used to manage the symptoms of dementia. Alzheimer's disease, the most common type of dementia, is a progressive, degenerative disease that impairs the brain's structure and function. The exact etiology of Alzheimer's disease is unknown. Although it is not considered a normal part of aging, this disease primarily affects individuals over age 60, making age a primary risk factor. Patients with Alzheimer's dementia experience impaired cognitive function. Common clinical manifestations include frequent forgetfulness, confusion, difficulty performing familiar tasks, disorientation, impaired judgement, misplacing things, poor judgement, and loss of initiative (Lewis, Dirksen, Heitkemper, Bucher, 2014). Therefore, to determine commonly used treatment methods research was conducted on non-pharmaceutical studies regarding Alzheimer's dementia found in the academic databases PubMed, CINAHL, EBHOST, and the National Center for Biotechnology Information (NCBI). Several therapies were reviewed such as music therapy, light therapy, aroma therapy, and touch therapy. After reviewing and comparing these studies, it was determined that music therapy was the most significantly effective in treating symptoms of Alzheimer's dementia in the evaluated patient population. In conclusion, the recommendations for further research includes larger sample populations of both genders to evaluate non-pharmacological treatments regarding Alzheimer's symptoms. Studies solely using non-pharmacological treatments without the use of pharmacological interventions are also needed.

Are college students taking illegal stimulants more likely to have improved academic performance compared to the academic performance of college students who are not taking illegal stimulants?

Betsy Scheibe, Matt Mulch, Keyonna Wilder, Michelle Garcia, Ellen Holland, and Jennifer Weber, Nursing

College students often misuse nonprescription stimulants as a gateway to improve overall academic performance including better tests scores, time management, motivation, and success. This study seeks to unravel the common belief that stimulants improve overall academic functioning. Through various literature, this study also seeks to identify the minimal knowledge of these college students using non-prescribed stimulants. Research review on this topic was done using CINAHL and Elsevier ClinicalKey databases. Qualitative studies do support this theory, however, quantitative studies are contradictory to this theory. This is apparent when the GPA of college students using nonprescription stimulants is studied and no change is noted. On the other hand, the results of interviewed college students are highly suggestive of satisfactory results in improved academic performance. Furthermore, of the sampled college students, whom were questioned about correct use of these non-prescribed stimulants, most were uneducated about correct dosing, medication management, and risks for negative outcomes (de Souza, 2015). In conclusion, studies have shown that use of nonprescription stimulants were unsatisfactory in expected result of improved academic performance.

How does the availability of nutritional education of school aged children in impoverished communities affect the predisposition of chronic illness as an adult compared to the nutritional options in school-aged children in other socioeconomic communities?

Elizabeth Cross, Audrey Davis, Ayesha Harris, Katie Horton, Aubrey Moss, and Jennifer Weber, Nursing

Although one of the most developed countries in the world, there is a current disparity in access to health care for children in impoverished communities in the United States. This lack of access is caused by many factors such as insurance limitations, inadequate health care literacy, obstacles in transportation, or just a general lack of knowledge. The goal of our research was to highlight the disparities in nutritional education for school-aged children in impoverished communities and how it impacts the predisposition for chronic illnesses in later adulthood. Statistics show that the extent to which people understand their health status has an effect on their compliance with health regimens and their efforts in further preventative care. An effort to educate and equip low-income families with the knowledge basis and health measures they should take could greatly improve the overall health status and quality of life in the children of these communities.

Malnutrition in Today's Hospital Patient

Leah Davenport and Autumn Marshall, Nutrition and Kinesiology

Malnutrition is a prevalent but often undiagnosed condition that affects 33-50% of hospital patients today. While six types of malnutrition have been clearly defined, a 7th type - sarcopenic obesity is most prevalent and characterized by loss of muscle mass and physical function. Sarcopenia often goes unnoticed and undiagnosed in overweight and obese patients. There have been many advances in the documentation, standardization, and definition of malnutrition since the joint Consensus Statement of the Academy of Nutrition and Dietetics and ASPEN, which was published in 2012. Such advances include malnutrition education toolkits for healthcare professionals and the establishment of new ICD-10 diagnostic codes, including one for sarcopenic obesity. Yet, several challenges contribute to lack of identification, diagnosis, and intervention for malnutrition in today's patient. Low practitioner knowledge, malnutrition as a secondary or missed diagnosis, and low dietitian staffing ratios are key contributing factors. Furthermore, no established standardized universal malnutrition screening tool exists - the large number and diversity of these tools can lead to confusion or missed identification of malnutrition. Consequently, the prevalence of malnutrition-related consequences, including infections, pressure ulcers and wound breakdown, falls and fractures, mortality, increased length of hospital stay, and readmissions occur more frequently. Overcoming these barriers to better quality care requires improving provider knowledge and awareness, adapting screening tools for today's overweight and obese patients, increasing the usage of the Consensus six clinical characteristics of malnutrition for diagnosis, and advancing dietitian order writing privileges.

Sunitinib Metabolism and Implications for Drug-Induced Liver Damage

Gracia Amaya and Klarissa Jackson, College of Pharmacy

Sunitinib is an oral anticancer agent, and it is a multi-targeted tyrosine kinase inhibitor. This drug is used to treat renal cell carcinoma and other types of cancer. However, a small percentage of patients who take sunitinib suffer from idiosyncratic severe liver damage to liver failure. The mechanisms of this toxicity are unknown. We hypothesized that conversion of sunitinib to a reactive metabolite may play a role in inducing the liver toxicity. The purpose of this project was to identify the pathways of sunitinib metabolism, and determine which enzymes are involved. Sunitinib metabolism was studied by metabolic incubations with human liver tissue fractions (microsomes) and individual recombinant cytochrome P450 (CYP) enzymes. Glutathione (GSH) was used as a trapping agent to detect reactive metabolite formation. Samples were

analyzed by liquid chromatography-mass spectrometry to identify drug metabolites. The primary metabolites identified were N-desethyl-sunitinib, hydroxy-sunitinib, defluorinated sunitinib, and GSH conjugates of a reactive quinoneimine metabolite. Results from studies with recombinant CYP enzymes indicated that CYP3A4 was the major enzyme to form N-desethyl-sunitinib, and CYP1A2 was found to be the main contributor to formation of hydroxy-sunitinib, defluorinated sunitinib, and reactive metabolites trapped as GSH conjugates. These data provide insight into the metabolic pathways of sunitinib. Further studies are needed with enzyme-selective inhibitors and human liver microsomes to confirm the enzyme contribution to sunitinib metabolism. Future directions will focus on understanding how genetic variations and environmental factors may impact the risk of sunitinib-induced liver damage.

Quantitation of Anthocyanins in Cranberry Juice

Mallory Burns and Matthew Vergne, Pharmaceutical Sciences

Anthocyanins are a member of the flavonoid group of phytochemicals, known for providing the rich red and blue hues in common fruits. Cranberries are rich in anthocyanins. Due to the health benefits of anthocyanins, UV treatment is an alternative disinfection method to pasteurization. Cranberry juice samples were irradiated using a continuous-flow reactor with the fluid pumped around a central low-pressure mercury UV lamp emitting irradiation at a wavelength of 254 nm. A liquid chromatography mass spectrometry (LCMS) method was developed to identify and quantify anthocyanins in UV- treated cranberry juice. The LCMS method will be used to determine the concentration of anthocyanins in cranberry juice after UV treatment.

Quantitation of drugs in rivers and lakes in Middle Tennessee

Andew Sweeton, Christine Nguyen, Yuchen Han, Wenting Wei, and Matthew Vergne, Pharmaceutical Sciences

Analysis of drugs of abuse in river water near effluent from wastewater treatment plants may be used to monitor community drug use. For this study, the concentrations of codeine, cocaine, and cocaine metabolite, benzoylecgonine, were determined in surface water samples collected at sites around Middle Tennessee. A rapid and robust liquid chromatography tandem mass spectrometry (LC-MS/MS) method was developed to determine the concentrations of the drugs. For chromatography, a 2.6 micron superficially porous particle C18 column (5.0 X 2.1 mm) was used with gradient elution with a 2.5-minute cycle time. Selected reaction monitoring was used as the mass spectrometry method. For calibration, the range of standards was 10 to 1000 ng/mL of each drug. For sample analysis, the water samples were filtered, and 50 microliters of filtered water were injected onto the column. A few samples collected at Percy Priest Lake and the Harpeth River in Franklin contained cocaine or benzolecgonine in the range of 10 to 50 ng/mL. These amounts are comparable to similar studies of surface water in various regions in the United States and Europe. The drug concentrations in other samples were below the limit of detection.

The Wandering Jew: Inception 19th Century

Caleb Reagor and Alan Bradshaw, Physics

Following the collapse of Jerusalem in 70 CE, a legend arose among the Christians of Europe of a Jew who taunted Jesus on the way to his crucifixion. According to the legend, Jesus cursed this unrepentant, sinning Jew to wander the earth until his second coming. Whenever the Jew reaches 100 years of age, says the legend, he returns to the age he was when Jesus cursed him. Through the following two millennia, the Jew took on many names: Joseph, Ahasversus, Buttadeus, and numerous others. The legend of the Wandering Jew became intrinsic across the cultures of Europe. This project will examine both primary and secondary sources such as Old and New Testament biblical passages, early Christian and European writings, and Medieval and Early Modern literature to show the legend of the "Wandering Jew" gradually arose from the common notion of a cursed, wandering Jewish people first propagated through the story of Cain and Abel and later drawn from further biblical passages and pagan legends, all the while evolving to reflect popular opinions of the Jews and religion.

Diversionary War Theory and the Iraq War

Rebecca Golden and Susan Haynes, Political Science

The decision of President George W. Bush and his administration to go to war with Iraq has remained one of the most controversial policy decisions to come out of his time as president. Present-day, the American public's opinion of the Iraq War has become increasingly against the decision to go to war with Iraq, though public opinion is still highly polarized. Due to the majority of Americans viewing the Iraq War as an unnecessary war, the motivations for this war must be scrutinized. Why did President Bush go to war with Iraq considering this decision would be viewed unfavorably? In evaluating this question through the means of counter-factual analysis, I hypothesize that the Bush administration started a diversionary war to distract from two factors. The first of these factors was the stagnant war with Afghanistan and the public's negative sentiments towards the war. Starting another war would divert attention from the deficiencies of Afghanistan. Secondly, a war with Iraq would avert the public's attention from the United States failure to protect its citizens from the large-scale attacks on 9/11. In consideration of the fruitless war in Afghanistan, the close diplomatic ties between former President George H.W. Bush and Saddam Hussein, and the failure of the United States to protect its people from the 9/11 attacks, President Bush used war with Iraq as a distraction from these aforementioned factors.

Improving Response Rates for Satisfaction Surveys Administered to Physicians

Kelly Harper, Emily Gittings, Maxim Turchan, David Charles, and Kate Watkins, College of Professional Studies

The Vanderbilt University Medical Center (VUMC) Telemedicine program began in 2012 to address a shortage of specialist physicians across Tennessee. The mission of the program is to provide high-quality primary and subspecialty care to underserved patients in community-based settings using telemedicine, the remote diagnosis and treatment of patients by telecommunications technology. Through affordable technologies and software platforms, we connect VUMC healthcare providers to community-based practitioners and patients to deliver the best care, in the most efficient manner, and in the lowest-cost setting. VUMC Telemedicine's most mature service line is the teleneurology program. Using handheld technology, VUMC neurologists collaborate with healthcare providers from partner hospitals to quickly examine patients in nine community-based hospitals, allowing 87% of approximately 3,000 patients to remain close

to home while being quickly evaluated and treated for various emergent neurologic conditions. The efficiency and effectiveness of the teleneurology program are measured by Physician Satisfaction Surveys, monthly surveys that query physicians from community hospitals who have requested a consultation for their patient. One challenge with the Physician Satisfaction Survey is the low response rate (12%). To increase the response rate, VUMC redesigned the survey. This presentation will report the methods of administering the new survey and the discovered outcomes.

Planting Seeds for Environmental Literacy at Lipscomb Academy Elementary School

Ginger Reasonover and Kate Watkins, College of Professional Studies

Lipscomb Academy Elementary School (LAES) began their environmental program 15 years ago with recycling. The program has grown to incorporate recycling, water conservation, land use, energy, and hazardous waste. Students at LAES have participated in countless number of service hours, recycled over 400,000 plastic bottles and aluminum cans and diverted tons of waste from landfills. As a result of these endeavors, students have been able to expand their efforts to help non-profit community agencies locally and abroad. Examples include: purchasing a biogas converter for Made in The Streets, purchasing water filters for a Lipscomb University mission trip to Honduras, purchasing trees for Reforest the Rainforest, donating food, money, clothing and supplies to Room in the Inn and more. LAES is considered a school that is environmentally conscious. The students learn at an early age about becoming environmental stewards as well as leaders in their community. Students are taught that environmental literacy is not only making the right environmental choice but also being able to explain and defend that choice when necessary. Research suggests that activities students learn early in life will translate into practice as adults. At LAES, students are well on their way to becoming environmentally active adults in our society. The proposed poster for the symposium will highlight some of the accomplishments of LAES while introducing possible ways to involve other students at LAES and throughout the community.

Comparison of Novel Actigraphy Endpoints to Polysomnography Measurements of Sleep Disturbance in Children

Megan L. Alder, Beth A. Malow, and Christin Shatzer, SALT Scholar Project

One of the limitations of standard actigraphy analysis is defining discrete movement events during sleep. We present a method for defining these using novel mathematical endpoints to analyze the actigraphy data without any assumptions about sleep/wake status. Nighttime movement events (n = 541) were scored in 15 healthy children who wore AW2 Spectrum Actiwatches (Philips Respironics) for one night while undergoing polysomnography and video recording. The PSG and the video data were scored to identify times of movement, a subjective assessment of movement intensity and whether the subject awoke during each movement. These events were then compared to the actigraphy data to determine whether they were detected by descriptive statistics of the actigraphy signal and peaks that remained after smoothing the data with moving windows of increasing length (S1-S5). The algorithm includes an objectively optimized threshold value (T-optimized) to help separate the Active from the Rest periods. The peaks are quantified by counting the number of times during the night they cross an activity's S-threshold that can be set at any fraction of T-optimized. Discrete nighttime movement and awakening patterns can be detected with actigraphy endpoints using a new algorithm that provides precise and objective mathematical descriptions of the actigraphy signal.

Challenging Unjust Censorship: An Evidence-based Advocacy Process

Daniel Schwanke and Cayce Watson, Social Work

The mission of the social work profession is to pursue social and economic justice and uphold human rights and quality of life for all persons with particular attention to diverse and vulnerable populations (CSWE EPAS, 2015). Central to this mission is the commitment by social work practitioners to use their expertise to engage in political processes to influence legislation impacting these populations. Additionally, social workers are ethically bound to use evidence as the basis for social reform and uphold the core values of the profession (NASW, 2008). In fall of 2015, the state of Tennessee engaged in a review of the education standards for social studies courses in the public school system, specifically a plan to remove only the Islamic World Section from the curriculum. Censorship of the Islamic section is discriminatory and continues to perpetuate a narrative of fear and misunderstanding towards a peaceful religion and its people. It is also detrimental to future generations attempting to engage in a diverse and culturally competent workforce in a global society. The purpose of this poster is to present the implementation of a social worker's advocacy process which includes identifying the issue of censorship related to inclusion of diverse curriculum in schools and possible religious discrimination. The effective use of research to persuade an elected official to change positions will be highlighted. Finally, a compelling argument using the core values of the social work profession as the ethical basis for reasoning and engineering social policy change will be examined.

Documentaries

Hacer Discipulos

Katie Bianchini, Kendra Weitz, and Sarah Gibson, Communication

The mountain stood still. The statue of Jesus Cristo el Redentor loomed in the distance. The telefrico car drifted silently on its wire, carrying passengers. Six students:Austin, Ryan, Brooke, and Katie, from Lipscomb, and Ranger and Nene from Manna stood at the bottom of the mountain, full of hope and a sense of adventure. They viewed the hike differently, approaching it from unique cultures, worlds apart. Yet, they looked into each other's eyes with trust, knowing each one of them would play a role in reaching the top. In Matthew 28:19-20, Jesus commands his followers to go and make disciples of every nation. Thousands of years later, Lipscomb Track Missions and Manna Global ministries hold tightly to that commission with the goal to disciple students in the United States and Dominican Republic (DR). On trips to the DR, Lipscomb and Manna students spend time together, living into the discipleship ministry. In working together, they encounter trials and obstacles just like the ones on the hike. At every wrong turn, poisonous jungle plant, and mudslide, they look to God and each other for support. Eventually, they come around the corner to solid footing and see the statue of Christ that was once a speck in their vision at the bottom. Though 1,500 miles apart for most of the year, their lives are forever connected through their time together. This documentary is their story.

Make A Move

Rebecca Risley and Sarah Gibson, Communication and Journalism

Chase after what makes you who you are. This film tells the story of one aspiring musician that took his small-town talent and moved to Music City to make a name for himself. Kirby Bland first bought a drum set when he was in middle school and, according to his mother, has yet to stop banging on it. After years of playing in his own bands, falling in and out of love, and trying to break out of the small town life, Bland made the move to Nashville in December 2015. Coming from a small town in Arkansas, there's a stigma attached that musicians don't amount to much, if anything at all. Bland rejects this stigma entirely and has focused on beating those odds for as long as he's been a drummer. The film observes Bland telling his story and invites the audience into his journey as he recounts where he came from, who makes up the community around him, what he hopes to do musically in the future, and much more.

The Other Side of the Sound

Erin Turner and Sarah Gibson, Communication and Journalism

This mini documentary shows what the other side of the sound looks like through the work of Grammy award-winning producer, engineer and mixer Chuck Turner. The film begins in Turner's roots in Little Creek, Virginia. Explaining how he came to Nashville and focused on the career he has today, the audience gets to walk through a day in the life of a recording studio. Turner also touches on the importance of making artists comfortable when recording, something that any person in the music industry can resonate with. To end, Turner shows just how fulfilling being on the other side of the sound is for him. Special thanks to John Carter Cash and the Cash Cabin recording studio.

Performances

Unlovely People

Mary Ashley Arendsee and Jan Harris, English and Modern Languages

Mary Ashley Arendee's collection of poems, Unlovely People, reminds readers of humanity's inherent flaws and the redemptive power of love. Drawing themes from nature, Christian sacraments, and Greek mythology, she invites readers to consider the pitfalls of intimacy between broken people and the liberation that can only be achieved in the thin space between self and soul. Through her poetry, Arendsee creates space for unmitigated gratitude, while inviting readers into a conversation about the risks of real empathy and the hope that can be found when one chooses to peek beneath the crafted layers of life and find beauty in imperfection.

Other Loud Noises

Hannah Fleming and Jan Harris, English

Finally, they don't see what I see displays the message that all unique features should be uplifted even if not seen from the same viewpoint. I hope that my collection inspires others to see that until unique differences are celebrated no one can be treated the same. One thing that cannot be silenced is a person's voice. Writers have the ability to empower the quiet voices. My original poetry collection, "Other Loud Noises", reflects my personal experiences as someone whose voice as a minority has oftentimes been over-powered. The first of the flagship poems is "Descriptions of me" which draws on how racial differences can lead to negative comments and how those comments can teach someone to be proud of themselves. Not everyone sees racial differences as something that should be celebrated. However, everyone also wants to be treated the same. Equality focuses on the social dissonance created through stereotypes. Saturday is hair day brings back the nostalgia of childhood and how a simple act of getting hair done can make a lasting memory. These memories then become how we perceive ourselves and think that's how the world does as well.

Observations

Colleen Casner and Jan Harris, English and Modern Languages

The poems in the collection Observations examine the spectacular elements of everyday settings such as an empty movie theater, a classroom, and a winter forest. Descriptions of color, sound, and emotion shed light on seldom-noticed aspects of the settings. In the first poem, "Afternoon Screening in a 1925 Theater", the speaker connects with the ghosts of former audiences at a historic movie theater while waiting for a modern-day screening to start. "Listen" takes the speaker to a classroom where she comments on the ignored beauty of music playing in the background. In "Silence", the speaker tells of a falling tree's attempt to break the silence of a winter forest. The poems show that people can find great beauty in the commonplace if they remember to observe carefully.

Terrestrial

Philip Grimsley and Jan Harris, English

Probing topics like robotic life, origin stories, space travel, and desire, the Terrestrial collection plays with hypotheticals as the speaker navigates fanciful environments and his connection to the real world. The speaker's experiences and questions are examined from a speculative perspective slightly disassociated from day to day reality. In a location caught somewhere between the earthbound and the cosmic, whether the red planet or the frozen continent of Antarctica, the speaker expresses feelings of loss, hopelessness, and a confused empathy for the strangeness of the world around him. Terrestrial bridges the gap between the uncanny and the nature of reality experienced by human beings. The speaker and the reader are both terrestrials, inhabitants of Earth whose shared experiences on this planet create the space for these poems to interrogate the subtleties of inner and outer exploration.

Underneath

Jeremy Williams and Jan Harris, English

The natural word sends human beings messages through unlikely vehicles. In Ghana, a grove of mango trees whispers to anyone who will sit and listen to the knowledge that can be discovered in light and darkness, and how to survive in both places. The Mango Trees explore the dark path we must travel in order to find our own light. The Mango Trees and its speaker encourages the reader to find the mango grove that gives them an understanding of their goodness, a goodness that only reveals itself to reader if they continue to search for it. Through allusions to fairy tales and magical realism, this collection leads its audience on a journey through the forest where the speaker must find the light within herself to reach the mango grove. She will emerge like a phoenix rising from the ashes, reborn of fire and wisdom, to brighten the world. Despite the many challenges the reader and speaker may face, and even when these challenges seem like they could crush their victims as a python does it prey, if one listens to the mango trees, they will find their way to the light.

Slow Ascent

Kira Dunton and Jan Harris, English and Modern Languages

The speaker of Slow Ascent struggles with different forms of loss in her life. Through waiting rooms and short poems that function as afterthoughts, the speaker comes to terms with her friend's suicide and her father's abandonment. She wrestles with a fear of being left behind, so she contemplates leaving as well, even though that would prove that she is more like her father than she wants to be. She searches for her identity after the loss of close relationships, and in the end she must reestablish herself in the absence of others.

The Preludes of Claude Debussy

Jeriel Jorguenson and Jerome Reed, College of Entertainment and the Arts

Claude Debussy (1862-1918) is the hallmark composer of the Impressionist period, and his music is filled with color and variety. The 12 preludes in his second volume, for solo piano, have their own spirit and the potential to impact every listener in a different way. As effortless as these pieces may sound, their subtlety requires a great deal of work on the part of the performer. Debussy's intentions are often masked, and only the skilled performer can extract the musical jewelry hidden in these works. My presentation will focus specifically on the fifth prelude in this volume, entitled "Bruyres" (Heather). The images evoked in this work, named for a lavender-colored flower, take the listener to the quiet, peaceful highlands of France. This pastoral prelude is filled with nostalgia and loneliness and is awash with color. The dual simplicity and emptiness of nature are the focus of this piece, and Debussy calls back to his French roots wonderfully in this piece. At the conclusion of my presentation, I will perform Bruyres in order to show the listener Debussy's style and allow them to experience the feelings and perhaps see the colors he is painting. This piece is one of the most beautiful in the entire volume, and I hope to show how the piano can be used as a vehicle for emotional expression.

American Gospel Music in World War II

Katharine DeVore and Donna King, Music

In 2015, Lipscomb unveiled the Stribling-Brock collection. This collection shares the message of loving one's enemy, told by the story of friendships made between German POW and those who held them captive. Martha Jewell, one of the last living people to have direct interaction with the POW camp, performed for the prisoners and was heavily involved in the music culture of Lawrenceburg, Tennessee. An interview with her shines a light on the importance of gospel music to her family, to the culture of Lawrenceburg, and to the South during World War II.