PROGRAM AND ABSTRACTS

Wichita State University

Eighteenth Annual

UNDERGRADUATE RESEARCH AND CREATIVE ACTIVITY FORUM—URCAF

APRIL 6, 2018
Rhatigan Student Center
2018 URCAF

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SCHEDULE

9:00 am – 9:30 am: Registration, Second Floor
9:30 am – 12:00 pm: Oral Presentations
  • Social Sciences and Humanities, RSC, Rm 265
  • Natural Sciences and Engineering, RSC, Rm 266

10:00 am – 12:00 pm: Poster Presentations
  • Natural Sciences and Engineering, RSC, First Floor
  • Social Sciences and Humanities, RSC, First Floor

11:30 am – 12:00 pm
  • Exhibition/Performance, RSC, Rm 266

12:00 – 1:30 pm: Lunch, RSC, First Floor
1:30 – 2:00 pm: Awards Ceremony, Harvest Room 142
Photo Usage: By attending the Undergraduate Research and Creative Activity Forum (URCAF), you give Wichita State the right to take photos and use your image in future promotional materials.

## Social Sciences and Humanities Oral Presentations

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Rhatigan Student Center, First Floor

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WHAT DRIVES SUCCESS: AN ANALYSIS OF SUCCESS FORCES IN NEPALESE AND ETHNIC-AMERICAN MINORITY CULTURES

Abstract: There is a joke that surfaced in recent years: no matter how good you are at something, there is always an Asian that is better than you. If Asians/Asian-Americans, and comparable minority counterparts are more successful than the average American, what really contributes to this increased upward social mobility? Amy Chua, a second-generation Chinese-American and a controversial writer, illustrates in her book The Triple Package, the three traits of ethnic groups that seem to account for their success. In this research, I have analyzed the three traits from the perspective of an (international) student, bringing some perspective of Nepal into the mix as well. Various published articles and personal experiences have been the primary source of data in my article but what really strikes is that Chua’s suggestions make a lot of sense considering the competitive society we partake in. The analysis article will suggest that while there will not be one certain cluster of traits that make any group, minority or not, successful, these suggested arching traits do play a big role in placing immigrants, minorities, and the poor, at a better possibility of reaching the ‘top’.

ABUSING BIBLICAL TEXT TO JUSTIFY SEXUAL ASSAULT

Abstract: This work was conducted to determine biblical text being used to justify sexual assault and exploitation of women. The work also addresses the impact personality and experiences have on the implementation of the biblical text. Due to personal and social pressures, people address biblical verses and stories as justification for offenders to act on their impulses. Sexual assault victims face blame against them, lack of support, and inability to address the issue within Christian churches. In conclusion, research supports the correlation that past experiences, pressure from society, and personality traits increase the likelihood of people implementing biblical context or position to justify sexual assault for the offender.

ECONOMIC GROWTH, POLICY UNCERTAINTY, AND FINANCIAL MARKET VOLATILITY: CASE STUDY OF CHINA

Abstract: Since “Reform and Opening Up” in 1980s, China’s economy has gone through incredibly rapid growth for over twenty years. Meanwhile, side effect of irregular growth within the short period has resulted in housing bubble, volatility of stock market, fluctuations in exchange rate, and even systematic financial risks. Such kind of side effect has been becoming increasingly serious after 2012 when the economic growth slows
down in China, and it is bringing people’s concerns regarding the uncertainty on its economy and governmental policy.

This research will analyze the relationships between economic growth, policy uncertainty, and financial market volatility. Furthermore, the research focuses on three questions.
(1) Does policy uncertainty appear more frequently when a country enjoys rapid economic growth, or in an opposite way?
(2) Does rapid economic growth somehow cause financial market more volatile?
(3) Does positive correlation exist between policy uncertainty and financial market volatility? How do they interact on each other?

To both qualitatively and quantitatively solve those questions, related data like GDP growth and policy uncertainty index will be collected and imported with quantitative statistical methods including granger causality test, co-integration, and multiple regression. Some other supplemental analysis will also be provided for rigorous proof. The outcome and conclusion of this research will eventually help us have some insights about how each of the three sectors (economic growth, policy uncertainty, financial market volatility) interacts on each other.

Kaitlin Fox
Faculty Mentor: Dr. Dinorah Azpuru
Fairmount College of Liberal Arts & Sciences
Social Sciences & Humanities Oral Presentation

A MORE REPRESENTATIVE DEMOCRACY: CULTURAL FACTORS CONDUCIVE TO THE ELECTION OF WOMEN

Abstract: There is a large gender gap between the number of women in America and the number of female legislators serving in state legislatures and Congress. Often, legislation reflects this divide and leads to the implementation of policy that fails to address the wants and needs of women across the country. The effects of primarily male-led legislative bodies has been strongly seen after the 2016 election, producing a record number of women running for office in the midterm elections. Thus, the aim of this study is to analyze what cultural factors are the most conducive to the election of women by answering the question of why some states elect more women to their state legislatures and to Congress. Based upon the literature that has been reviewed, the concept of culture ranges from traditional to moralistic, and to explore these classifications more in-depth this study will analyze factors that shape culture, such as religiosity, and the levels of education in the state, alongside control variables such as the percentage of women in the state, and the main ideology prevalent in the state. To test these variables, an SPSS dataset was built from operationalized survey data obtained from the Pew Research Center, and linear regressions were ran to determine the causal relationships between cultural factors and the number of women in the legislature from each state. Analyzing these results will work to provide a better understanding as to why there are state-by-state discrepancies in the gender gap occurring in legislative bodies across America.

Joshua Green
Faculty Mentor: Dr. Mythili Menon
Fairmount College of Liberal Arts & Sciences
Social Sciences & Humanities Oral Presentation

CHESH KAFO: CONSTRUCTING A LANGUAGE
**Abstract:**
Constructing a language from a prompt: When constructing a language for a film or book, it is essential to begin with a concept which we can build upon. Here, Dr. Mythili Menon provided a short science fiction prompt. From this I began to work on filling in the gaps of the backstory to create a concept with an alien race that would require use of an intelligible language.

Phonemes, morphemes and syntax: The first step in designing a language is to select sounds. The story requires that both humans in an alien body and vice versa should be able to quickly pick up their respective foreign language. This means that they will need similar respiratory anatomies so that they do not both need to completely relearn all new sounds. Limiting ourselves to human sounds we can easily begin creating words and designing morphologies based on the culture created for the alien race, and eventually compiling a dictionary of words and rules.

Results: The results of these considerations is Hachesh, the language of the Heb. They are a nomadic and scientific people, ideas that are present in their language. For example, consonant sounds may only travel forward across a word, and movement toward something is vital to the Heb and their creation of words and ideas.

Summary: The creation of a language brings out some of the deeper insights into language and culture. What we may consider foreign, alien, brutish or “uncivilized” is deeply rooted in the sounds and concepts readily adopted by western languages. These become apparent when working in reverse: creating a language from a culture and ideas.

Kyle Kopecky  
Faculty Mentor: Jen-Chi Cheng, Ph.D.  
W. Frank Barton School of Business  
Social Sciences & Humanities Oral Presentation

**WHY A NOBEL PRIZE WINNING ECONOMIST IS WRONG ABOUT U.S. INFLATION POST-GREAT RECESSION**

**Abstract:** Inflation is something that silently impacts all of us if not properly controlled and monitored. Paul Krugman, a Nobel Prize winning economist wrote an article on January 23, 2018 believing that the Fedâ€™s unconventional monetary policy of Quantitative Easing (QE) had no major pricing effects in terms of inflation for the U.S. economy. Krugmanâ€™s point-of-view is very superficial. When further analyzing inflation in the U.S. economy after post-Great Recession, there was in fact signs of inflation as a result of QE. The U.S. experienced deflationary pressure once QE was initiated for a short period of time before rebounding to inflationary levels almost as high as pre-Great Recession. This type of inflationary response from QE in the U.S. economy is in-line with what monetary economists such as Milton Friedman propose happens when a large influx of dollars is put into the economy. In the short run, QE provides a temporary boost to an economy. However, in the long-run the economy experiences an increase in inflation as demand outpaces prices. This is evident in the data I collected and analyzed. It was concluded that the rise in Real GDP compared to the Potential Nominal GDP from QE’s inception to Q4 17’ was statistically significant, meaning that there was a larger change in nominal GDP relative to real GDP. In addition, there was a period of time from 2009 to 2010 where the U.S. CPI was growing at a faster rate than the U.S. Wages and Salaries Growth rate. In conclusion, the U.S. experienced inflationary effects as a result of QE in the long-term.
Emily Posson  
Faculty Mentor: Mythili Menon  
Fairmount College of Liberal Arts & Sciences  
Social Sciences & Humanities Oral Presentation

KOREAN COLOR TERMS

Abstract: My senior thesis is on the expression of Korean Color Terms and looks at the usage of Korean native roots of color and borrowed Chinese roots for color expressions. My hypothesis states that borrowed Chinese color terms are undergoing replacement by English color terms, and there will be a confirmation of the “gru” phenomenon.

There are two primary goals: The first is to look for instances of the “gru” phenomenon, where the concept of green and blue are merged into one word, in Korean. The second is to examine the use of color loanwords from English and Chinese in Korean. For example, the word for 'pink' has historically been borrowed from Chinese (bunhong-sek) and recently there has been a rise in the use of the English derived term (pinku-sek).

The expected outcome is to find a confirmation of the “gru” phenomenon, and to see a tendency towards replacement of loanwords from Chinese with loanwords from English. My research will be useful for future study in this area and could have ramifications for the way loan words are regarded in languages. Even further, as a result of this study there could be evidence requiring future research for the theory that Korean lacks an adjective category.

The methodology involved in gathering the data to confirm my hypothesis is an online acceptability judgement study, using Qualtrics survey. Monolingual Korean Participants will be shown 20 questions and asked to respond on the usage of certain color terms in response to visual images.

Henry Postoak  
Faculty Mentor: Dr. Mythili Menon  
Fairmount College of Liberal Arts & Sciences  
Social Sciences & Humanities Oral Presentation

LOCAL IDENTITY AND THE LANGUAGE OF CRAFT BEER

Abstract: As consumer tastes have increasingly eschewed the convenience of mass-market uniformity in favor of greater variety and local authenticity, a byproduct of neolocalism, craft brewing has grown into a means through which consumers construct a sense of local identity and community (Schnell & Reese 2003, Rojack & Cole 2015, Moore, Reid & McLaughlin 2016). The alignment that small craft beer producers called microbreweries create with their local community and in relation to the beer industry at large, which is dominated by what are contrastively called ‘macro-breweries,’ is represented in the types of appeal reflected in their bottle labels. In this preliminary research, the text of 5 micro- and 4 macro-brewery labels was linguistically analyzed through aspects such as word count, and references to location. These were qualitatively coded as descriptive, concerning production, ingredients, or flavor; autobiographical, telling the brewery’s story; or worldbuilding, evoking imagery rather than providing information. We found that micros repeatedly named their location, telling stories from local history to connect their product to local culture while macros more often cited historicity as a means of emphasizing the tradition of mass-production. Further research will include text from over fifty labels and will involve additional methods of linguistic analysis.

References
Moore M.S., Reid N., McLaughlin R.B. (2016) The Locational Determinants of Micro-breweries

Amanda Purcell
Faculty Mentor: Enrique Navarro
Fairmount College of Liberal Arts & Sciences
Social Sciences & Humanities Oral Presentation

THE STRUGGLE BETWEEN THE HOMELAND AND NATION IN THE WORKS OF JUAN RULFO

Abstract: Juan Rulfo was a talented artist in literature and photography known for his dedication to symbolism. This analysis looks at the works of Juan Rulfo in his photography and the short stories ¡Diles que no me maten! (1951) and No oyes ladrar a los perros (1953) to examine the struggle between the homeland and nation in post-revolutionary Mexico. The works of Juan Rulfo show that in the closed framework of a new country, the post-revolutionary life was difficult for people due to the struggle between the fatherland and the nation.

Daniel Saunders
Faculty Mentor: Susan Castro
Fairmount College of Liberal Arts & Sciences
Social Sciences & Humanities Oral Presentation

TOO MUCH ASSEMBLY REQUIRED: LATOUR AND THE PERSISTENCE OF SOCIAL STRUCTURES THROUGH TIME

Abstract: In philosophy of social science, one of the longest running disputes concerns whether social scientists should try to explain social phenomena solely in terms of the behavior of individuals or whether they should cite social entities like structures, institutions or groups in their explanations. Bruno Latour argues social scientists should stop treating ‘social’ like a special type of substance and instead prioritize studying the particular networks of relations between individuals. He claims that theorists who think of the social world as being composed of a series of structures are unable to explain the persistence of those structures through time. This paper argues his critique is only persuasive if you presuppose his ontology of momentary actants and networks. If one doesn’t buy his underlying picture of metaphysics, then they shouldn’t buy his critique of structural social science, either. This paper further argues one should reject Latour’s ontology on the grounds it makes causal interactions between entities inexplicable, a far more serious problem than the one he raises about substances. Beyond the assess of Latour’s work, this paper is also valuable because it illustrates how abstract debates in the metaphysics of time and causation can influence practical activity, like researching the causes of social injustice.
Inneke Vargas  
Faculty Mentor: Dr. Amy Chesser  
Fairmount College of Liberal Arts & Sciences  
Social Sciences & Humanities Oral Presentation

**ASSESSING HEALTH LITERACY AND STROKE SYMPTOMATOLOGY IN OLDER ADULTS**

**Abstract:** ASSESSING HEALTH LITERACY AND STROKE SYMPTOMATOLOGY IN OLDER ADULTS  
Participants: Inneke L. Vargas  
Affiliation: Department of Public Health Sciences Aging Studies and College of Health Professions

Abstract: Stroke is the leading cause of disability and fifth leading cause of death in the elderly population. Sixty percent of stroke related deaths occur outside of the hospital and studies show when treatment is delayed it is due to failure to recognize stroke symptomatology by patients, family, and general bystanders. This lack of knowledge significantly slows access to care. The purpose of the research is to increase recognition of stroke signs and symptoms and educate on the importance of calling 911. The study is comprised of four phases: consenting the participants and administering a pre-test to determine stroke knowledge, administering the treatment, and administering a post test to determine absorption of material. There will be a six week follow up to assess long term retention. The results of the pre-test, post test, and follow up tests will be compared to measure the impact of the treatment. The research is currently being conducted, no definitive findings or conclusion are available at this time.

David Elzinga  
Co-Author: Shelby Stowe  
Faculty Mentor: Dr. Leland Russell  
Fairmount College of Liberal Arts & Sciences  
Natural Sciences and Engineering Oral Presentation

**MODELING CONTROL METHOD COMBINATIONS TO MANAGE THE SYLVATIC PLAGUE IN BLACK-TAILED PRAIRIE DOG TOWNS**

**Abstract:** Black-tailed prairie dogs (Cynomys ludovicianus) are keystone species of short-grass prairie ecosystems and are essential to the success of efforts to re-introduce endangered black-footed ferrets (Mustela nigripes). The bacterium Yersinia pestis is the foundation of the sylvatic plague, an infectious disease that causes epizootics in black-tailed prairie dogs. These epizootics prove dangerous for black-tailed prairie dogs as well as for the survival of species that depend upon them. Previous research has sought to understand and compare transmission routes of the plague, in particular the common vector, the prairie dog flea (Oropsylla hirsuta). We present a model to determine optimal control methods to sustain a black-tailed prairie dog town against the plague, including the implementation of a recently developed and tested vaccine. For our host submodel we create a Susceptible, Exposed, Infectious, Vaccinated model, and for our vector submodel we create a Susceptible, Exposed, Early-Stage Infectious, and Late-Stage Infectious model with questing and on-host vectors. Both submodels operate using a hybrid ordinary differential equation and difference equation model with respect to the phenology of black-tailed prairie dogs. Our model suggests the optimal control method combination includes a vaccination plan of vaccinating multiple times per year and must be started at least one year before the arrival of plague.
Danielle Gauna  
Co-Authors: Sarah Myose and Saniya Ahmed  
Faculty Mentor: Dr. Amy Chesser and Dr. Nikki Keene Woods  
College of Health Professions  
Natural Sciences & Engineering Poster Presentation

ASSESSMENT OF STUDENT PERCEPTIONS OF INFLUENZA INFORMATION

Abstract: Title: ASSESSMENT OF STUDENT PERCEPTIONS OF INFLUENZA INFORMATION  
Participant(s): Faculty Advisors: Amy Chesser, PhD, MA; Nikki Keene Woods, PhD, MPH  
Affiliation: Department of Public Health Sciences, College of Health Professions  
Text: The goal of the study was to investigate how students obtain health information on current topics and what they know generally about public health and influenza prevention. The research question is entitled: Does higher level of influenza knowledge correlate with a higher likelihood of practicing influenza prevention methods? Methods: Participants included any student enrolled at Wichita State University during the Spring 2018 semester. A cross-sectional survey was developed based on questions from the Centers for Disease Control and Prevention. The survey included 41 questions and was administered online through Qualtrics. Participant consent was completed prior to administration of the survey. The survey included questions on students’ knowledge of health literacy, influenza (the flu), prevention methods of influenza, and flu vaccinations. Snowball methods were used data collection. This was a pilot study. Survey participation was incentivized with $10 gift cards. The data will be summarized using descriptive statistics and cross tabulations. Findings: Data collection is still in-progress. Anticipated conclusions: student knowledge of the flu and access to health information could be used to implement an improved health communication method (such as a course or newsletter) that provides students with knowledge of the flu. This would make students more aware of who is at risk of contracting the flu and what precautions they should take if they know they, or others are infected.  
Link to survey: https://wichitastate.co1.qualtrics.com/jfe/form/SV_cJiJNyJDNmmRQ0d

Abdul-Mannaan Giles  
Faculty Mentor: Diana Cochran-Black  
College of Health Professions  
Natural Sciences and Engineering Oral Presentation

PROFILING MIRNA WITH PROTEIN METABOLITES EXPRESSION IN PLASMA AS A DIAGNOSTIC AND TREATMENT BIOMARKER FOR EARLY STAGE ALZHEIMER’S DISEASE.

Abstract: Alzheimer's disease (AD) is the most common age-related dementia. Since current fluid diagnostic methods for AD are invasive and expensive, it is important to identify additional molecular signatures in other body fluids that can characterize early stage AD. Microribonucleic acids (MiRNAs), which are non-coding sequences from our DNA have become a target of interest because they can regulate expression of protein metabolites, and are aberrant in plasma of neurodegenerative disorders such as Parkinson’s disease. This study illustrates that miRNA and protein metabolites are characteristically aberrant in the plasma of AD samples. Using quantitative reverse transcriptase-polymerase chain reaction (qRT-PCR), chromatography, and other assay techniques, we are sequencing plasma miRNA and protein metabolites in AD samples compared to their aged matched controls. Preliminary findings show a wide range of miRNA sequences being upregulated compared to healthy cohorts. The proteins that these miRNA sequences control, are also abnormal in concentration, suggesting a pathological protein-miRNA feedback mechanism that potentially is signature in AD persons. Further testing is being done on other plasma samples, along with statistical analysis. Final results obtained from this investigation will add to the growing data and power of blood based biomarkers being used as a diagnostic and therapeutic tool for early stage Alzheimer’s disease.
**IMAGE SEGMENTATION TECHNIQUES FOR IMPROVED FIBER ORIENTATION DISTRIBUTION MEASUREMENTS IN INJECTION-MOLDED DISCONTINUOUS FIBER REINFORCED COMPOSITES**

**Abstract:** Current fiber orientation techniques rely on high-resolution optical or electronic imaging of polished samples to reveal the elliptical cross sections of inclined fibers on the image plane. The accurate identification of individual fiber cross sections is critical for the measurement process. Due to the close proximity between two or more elliptical fibers, the image analysis tool often identifies bundles of unseparated fibers as single fibers. Is there an image segmentation technique which could identify individual fiber cross sections more accurately than the current developed method which is the watershed segmentation technique? How would the algorithm to segment the image of fiber lengths be established? Image processing was studied to learn of the aspects involved in image segmentation and researching of papers and publications regarding image segmentation techniques was carried out. On the side of fiber orientation distribution, after exploring various segmentation techniques, a more accurate identification than the watershed method was not found. However, a step in the current image segmentation technique causes over and under-segmentations and a manual correction of these errors is required to improve the accuracy of the measurement. In order to separate large fiber bundles from successfully segmented fibers, the area of individual fibers was used as a threshold, and this allowed the user to manually correct the under-segmented fiber bundles with more ease. An open-source software called CT-FIRE was learnt as it could perform image segmentation on the length of fibers with the manipulation of various parameters. In conclusion, the step of manual correction in segmenting fiber orientation was made user-friendly and using CT-FIRE on real fiber length samples shall be carried out next.

**Lauren Martinez**
Co-Author: Angela Rangel
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College of Fine Arts
Natural Sciences & Engineering Oral Presentation

**COLORED SLIPS AND APPLICATIONS IN CERAMICS**

**Abstract:** Statement of Research Questions:
What will colored clay slips made with mason stains look like at 10% fired to Cone 6 (2232°F)?
What will 2 types of colored clay slips made with mason stains at 10% look like in a line blend?

Statement of Study Methods:
For preparation, we extruded a stoneware clay body to create our test tiles. Then, we individually tested a variety of slips with mason stain colorants added at 10% using those test tiles. We fired them at Cone 6 to find what the colors would look like by themselves at that temperature. Next, we created line blend tests between two colorants, in which the amount of one colorant is increased at the same time the total of the other colorant is decreased using 10 tiles.

Findings and Interpretations:
We have found that these mason stains are vibrant at this temperature. Using only 2 mason stain colorants, we have discovered a variety of slip hues.

Conclusion:
We both use colored clay slips in our bodies of work. With this information, we now have several colors of slip for our use. We are also aware of the appearance of the colorants at Cone 6.

Gabi Mostrom  
Faculty Mentor: Silvia Blemker  
College of Engineering  
Natural Sciences and Engineering Oral Presentation

STATIC MRI MEASUREMENTS AND ANALYSIS OF THE HEALTHY LEVATOR MUSCLE IN THE SOFT PALATE

Abstract: STATIC MRI MEASUREMENTS AND ANALYSIS OF THE HEALTHY LEVATOR MUSCLE IN THE SOFT PALATE

Gabi Mostrom, Katie Pelland, Silvia Blemker  
Systems Bioengineering, University of Virginia  
Cleft palate deformity is one of the most common birth defects in the US and 25% of cleft palate repair surgeries fail for unknown reasons. Computational modeling of muscles in the soft palate would allow for better insight and a physiological explanation to further improve the outcome of cleft palate repair surgery. A previously developed MATLAB line segment model of a healthy levator veli palatini muscle in the soft palate was created to predict muscle shortening. This geometric model’s predictions are based on input lengths from static MRI measurements of six healthy subjects. The first aim of this research project was to validate the static MRI measurement accuracy between multiple users. I performed four sets of measurements for each subject and I had four separate volunteers perform the same measurements on Subject 1. The variances between my measurements and the volunteers’ measurements were minimal and the most sensitive measurement parameters only altered the MATLAB muscle shortening predictions by up to 4%. The second aim of this research project was to compare the MATLAB model predictions to the newer, more accurate dynamic MRI measurements taken by graduate student Katie Pelland. The difference in percentage of muscle shortening between the static and dynamic data ranged from 6% to around 16%. The data collected from this second aim shows room for improvement in the MATLAB model. In conclusion, the current MATLAB model does a good job of explaining the theoretical reason of the levator muscle involvement but there’s still areas of improvement. As we work towards improving the model, the static data and the dynamic data will only become more accurate and closer to one another.

Bernardo Villafana-Ibarra  
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Natural Sciences and Engineering Oral Presentation

DEVELOPING NON-INVASIVE SENSORS FOR OPPORTUNE DETECTION OF CUTANEOUS MELANOMA
Abstract: Cutaneous melanoma (CM) is the deadliest type of skin cancer and one of the fastest growing cancers in the United States and worldwide. Current methods of detection are visual inspection and histopathology. However, the accuracy of detection depends on the skill of the clinician, atypical tumors features, skin conditions, and different pigments of skin, which can delay diagnosis and even misdiagnose. Previous studies on breast cancer have shown that, when polarized by an electromagnetic field, malignant tissue and non-malignant tissue possess different dielectric properties. The objective of this study was to determine the operational frequency range at which Radio-Frequency (RF) resonant sensors would differentiate the dielectric properties from malignant and non-malignant skin tissue. To attain this objective, three RF square spiral resonant sensors of different dimensions were made and tested on two phantom tissue blocks resembling the dielectric properties of malignant and non-malignant skin tissue. Each sensor was placed on top of a phantom block for five trials and data was taken simultaneously to find the characteristic resonant frequency. A one-way ANOVA among the resonance frequencies per trial per sensor was performed to find the statistical significance of the change in signal responses produced from malignant and non-malignant tissue. The results showed that the optimal frequency range varied with sensor size and that the corresponding p-values of the one-way ANOVA were largely statistically significant (p < 0.01 for the smallest sensor; p < 0.001 for the next larger sensor; and p << 0.0001 for the largest sensor). These results suggest that RF resonant sensors are promising for detecting the changes in dielectric properties associated with malignant and non-malignant skin tissue. Further development could allow detecting changes in non-phantom tissue and benefit those who are at a risk of an underdiagnosed CM.

Derek Vonarx
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Natural Sciences and Engineering Oral Presentation

SYNTHESIS OF 3-ETHYL-4-CYANOPYRAZOLE AND CORRESPONDING METAL COMPLEXES

Abstract: A chemical compound containing a metal is called a metal complex and consists of the metal ion and organic molecules called ligands. These interacting ligands vary widely in structure. One such ligand is called pyrazole. It is comprised of a 5-membered ring of three carbon atoms and two adjacent nitrogen atoms. The significance of this compound is that it can easily interact with the metal ion to form a bond through the nitrogen atom. Furthermore, the pyrazole ligand has a similar structure to the amino acid histidine. Therefore, metal complexes that contain pyrazole can serve as models for those involved in biological processes. In addition, the pyrazole ligand can be substituted, meaning that different elements can replace others. These substitutions can have unique and defining characteristics that will significantly alter the resulting metal complex. One such substitution is a cyano group, carbon triply bound to a nitrogen (C=N). In my research project, I successfully synthesized 3-ethyl-4-cyanopyrazole. This is a disubstituted pyrazole in which an ethyl group (CH2CH3) and a cyano group (C=N) are directly attached to the ring. This ligand was characterized by infrared and mass spectroscopy. This ligand was reacted with two metal salts, copper chloride and cobalt chloride, to produce metal complexes. The cobalt complex was successfully synthesized and characterized by mass spectroscopy and x-ray crystallography. The copper complex will be explored and characterized to further understanding its properties.
QUANTIFYING FORCE TRANSMISSION AND MORPHOLOGICAL VARIATION IN POPULATIONS OF ENDOTHELIAL CELL CLUSTERS

Abstract: In the presence of mechanical stimuli, the endothelium dynamically alters its phenotype. While this phenotypic alteration is well established, the details of the force transmission throughout cells, and the corresponding biochemical response is not fully understood. These biochemical responses by endothelial cells are often associated with the development of symptoms relating to cardiovascular disease (CVD). Recently, a promising tool to help understand CVD initiation and development is cell mechanics. Previous cell mechanical models have used either an idealized geometric, or a cell-specific approach to modeling the cell. Neither of these approaches considers the effect of morphological variation within a cell population, which is correlated with cellular functions like mechanotransduction. Mechanotransduction itself is broadly divided into three main functions: (1) mechanotransmission; (2) mechanosensing; and, (3) mechanoresponse. How exactly a cell performs these functions is still being researched. Our research aims to quantify the force transmission throughout realistic populations of endothelial cell clusters by constructing virtual-cells using confocal (fluorescent) microscopy and statistical modeling (principal component analysis). These virtual cells are based on observed variances in cell structures such as the cell membrane, focal adhesion sites, the actin and microtubule skeleton, and the nucleus. These virtual cells can then be used to construct computational models of endothelial cell populations, allowing solid and fluid computational mechanical analysis to be done, determining force transmission within the varying cell populations. By using actual morphological data, a potential link can be established between force transmission through endothelial cells and their respective biochemical responses leading to CVD symptoms.

INVESTING MELANOCYTE DIELECTRIC PERMITTIVITY OF MELANOMA ON SKIN USING A RF RESONATOR

Abstract: Melanoma is an aggressive type of skin cancer. Current methods for diagnosis rely on visual inspections, which are highly subjective and depend on the physician’s ability. The objective of this study was to detect key differences in the dielectric permittivity between normal skin cells and melanoma using a tissue phantom with an electromagnetic skin patch sensor. An oil-in-gelatin skin phantom was fabricated to mimic dielectric properties of skin tissue, melanoma, and subcutaneous fat. An electromagnetic resonant sensor was fabricated as a square planar spiral and placed on the tissue phantom to collect data using a vector network analyzer on both normal cells and melanoma. Frequency sweep data including the S11 reflection coefficient was generated for each measurement. The mean first principal resonant frequency was measured at 757MHz for normal skin tissue and at 710MHz for melanoma, thus indicating a frequency downshift of 47MHz. An ANOVA was performed (p<0.0001) indicating significant changes between normal and melanoma tissue. These changes in resonant frequency suggest that the difference in dielectric properties between normal cells and melanoma could be used to screen melanoma with a novel biosensor. The implementation of a low-cost diagnostic skin patch in melanoma populations may produce a strong cost-effective solution for the melanoma healthcare expenditure of a nation.
Mason Bivens  
Faculty Mentor: Dr. Linda Kliment  
College of Engineering  
Natural Sciences & Engineering Poster Presentation

A SUMMARY OF USAGE DATA FOR CL-415 AIRCRAFT IN SERVICE WITH USFS

Abstract: A SUMMARY OF USAGE DATA FOR CL-415 AIRCRAFT IN SERVICE WITH USFS  
Mason J. Bivens  
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United States Forest Service (USFS) uses a variety of aircraft in their firefighting operations. In this study, flight data for CL-415 aircraft being flown for the USFS is analyzed. A major operational and design difference between the CL-415 and other airtankers is that being an amphibious aircraft, it does not need to land to fill with water; therefore, it performs multiple fills and drops per flight. Data is used from firefighting missions as well as training and ferry flights for analysis. In total, 237 flights files, consisting of 95,228 nautical miles, are analyzed for four CL-415 airframes. The flight data, recorded at 32 Hz, contains channels of navigational, inertial, and air data. The number of channels available in the files varies between 35 and 42, and differs among aircraft and years. Usage data is extracted from each ground-air-ground (GAG) cycle using a FORTRAN code developed specifically for the aircraft. Some data of interest are flight duration and distance, altitudes at which the aircraft is flown, maximum airspeeds and load factors, number of fills and drops per flight, and flap usage. This usage data is then compared against published operational limits as given by the airframe manufacturer in the flight manual. The comparison of usage data with operational limitations set by the manufacturer is used to determine if the aircraft are being operated as they were designed. This data could be used by the FAA to recommend possible design limits and for future aircraft in a similar role. Finally, the operators can use results of this nature to fine-tune their maintenance and inspection periods.

Reed Bowles  
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Natural Sciences & Engineering Poster Presentation

MEASUREMENT OF A NEUTRAL CURRENT PI0 CROSS SECTION IN THE NOVA NEAR DETECTOR

Abstract: The NOvA long-baseline neutrino experiment is attempting to measure properties of subatomic particles called neutrinos in order to discover information about the universe. NOvA is a project based out of Fermi National Accelerator Laboratory and funded by the U.S. Department of Energy. The experiment works by firing an extremely high energy beam of neutrinos through the earth at a 14 kiloton detector located hundreds of miles away. This research focused on studying one specific background to the NOvA measurement called neutral current pion production. The goal of the study is to understand how to identify this type of background and consider it when performing measurements for NOvA. Additionally, a cross-section can be calculated to determine the probability of this type of interaction occurring in the detector.

To understand neutral current pion productions, a preliminary cuts-based analysis was performed by hand to separate them from other interactions in the detector. Next, simulated data was fed into a boosted decision tree algorithm, a very powerful tool for separating neutral current pion production interactions from other interactions. After the initial separation, a sideband study was performed to minimize systematic errors. To determine the cross-section, the efficiency and purity of event selection was estimated, and the sideband study was utilized to calculate the cross-section uncertainty. After calculating a single cross-section, a resolution study will be performed to determine if a differential cross-section can be measured. Using this study, NOvA will be able to consider neutral current pion interactions in its final results.
Modeling Vaccination Strategies to Control White-Nose Syndrome in Little Brown Bat Colonies

Abstract: Since 2006, the North American bat population has been in rapid decline due to white-nose syndrome (WNS), which is caused by an invasive fungus (Pseudogymnoascus destructans). The little brown bat (Myotis lucifugus) is the species most affected by this emerging disease. We consider how best to prevent local extinctions of this species using mathematical models. In 2017, development began on a new vaccine for WNS; we analyze the effects of implementing vaccination as a control measure. We create a Susceptible-Exposed-Infectious-Vaccinated hybrid ordinary differential equation and difference equation model informed by the phenology of little brown bats. We compare the effectiveness of annual, biennial, and one-time vaccination programs for multiple durations of immunity length. We also determine the optimal time to vaccinate, if vaccinating only once, as a function of average duration of immunity. Next, we perform a sensitivity analysis to determine the robustness of our results. Finally, we consider other possible control measures together with vaccination to determine the optimal control strategy. We find that if the vaccine offers lifelong immunity, then it will be the most effective control measure considered thus far.

The Validity of Accelerometers as Inclinometers in Kinematic Studies

Abstract: 1) Research Questions
Can accelerometers provide accurate inclination angle measurements?
Are accelerometers a reasonable alternative to video-based motion analysis methods of measuring angles with respect to a fixed reference frame?
Can accelerometers be validated through comparison with a current video-based motion capture system?

2) Study Methods
To answer these questions, kinematic analysis of six participants performing various arm movements, including abduction and adduction of the arm in the coronal plan, upward shoulder press, bicep curl, and arm rotation (throwing motion) was performed. Six motion capture markers were placed on the dominant arm of each participant: carpal bones (wrist), elbow, acromion joint (shoulder), and the midpoints between the markers on the upper and lower arm. Four Delsys Trigno accelerometers were placed on the arm between each adjacent pair of markers. The angle formed by adjacent pairs of motion capture markers with respect to the ground was compared to the angle calculated from the accelerometer vector components.

3) Findings and Interpretations/Conclusion
Data collection efforts are ongoing. Results and conclusions of the data analysis will be presented at the Undergraduate Research and Creative Activity Forum.

The Effects of Incline and Decline Walking on Lumbar Flexion and Extension Angles
Abstract: Lumbar Spinal Stenosis is a prevalent disease. It encompasses a variety of conditions that all decrease the total area of the spinal canal. The symptom most common to lumbar spinal stenosis is neurogenic claudication, which causes leg symptoms in the buttock, groin, and anterior thigh down the posterior leg to the feet. Neurogenic claudication has a close relation to the patient’s lumbar motions. Through non-invasive physical therapy techniques, lumbar flexion can decrease pain and lumbar extension can increase pain.

The purpose of this study is to investigate how various angles of incline and decline walking affects lumbar flexion and extension angles. Lumbar flexion will be stimulated by walking uphill and lumbar extension will be stimulated by walking downhill. The CORTEX motion capture system was used to collect kinematic data for ten subjects. Subjects walked at the following conditions: 0 degrees (control), 5 degree incline, 15 degree incline, 5 degree decline, and 15 degree decline. Data is still currently being collected and processed. After the kinematic and position data is collected, it will be imported into a musculoskeletal molding software program (OpenSim v3.3) in which the actual angles will be calculated and analyzed. The incline walking data is expected to show a smaller lumbar angle compared to the control indicating flexion and the decline walking data will show a larger angle indicating extension. This data can be further utilized to improve physical therapy methods for patients with lumbar spinal stenosis, analyzed to determine gait in uphill and downhill walking, and lay the foundation for potential balance studies.

Aaron Hodson
Faculty Mentor: Dr. Nils Hakansson
College of Engineering
Natural Sciences & Engineering Poster Presentation

Fatigue's Effect on Back Angles During Repetitive Lifting

Abstract: Repetitive lifting increases the likelihood of acquiring a back injury. The fatigue caused by the repetitive motion of lifting can lead to changes in the technique used to pick up an object. This study was designed to determine: whether an individual’s back angle changes during the lifting motion as they fatigue, and, if so, to identify possible cues by tracking the back angle that may serve to reduce an individual’s risk of back injury. The research done here will answer these questions, by using data collected that consist of an individual lifting a 50 lb box. The lifting motion consisted of lifting a box off the floor, taking a step forward, placing the box onto a table, lifting the box up and off the table, taking a step back, and placing the box back on the floor. This motion was repeated until the subject felt fatigue or until the observer noticed a motion that would increase risk of injury. During this motion, the Cortex Motion Capture system recorded video data used to identify the x, y, z coordinate position of the subject’s torso, arms, and legs. This research will focus on the individual’s trunk angle as it changes due to fatigue. The sacrum and back position information will be used to create a straight line to find the angle created relative to the anterior section of the horizontal plane. A comparison will be done by determining average range of minimum and maximum angles developed while the subject is not fatigued (approximated by the 1st 1/3 of the total lifts) and comparing it to the corresponding average minimum and maximum angles observed during a fatigued state (approximately the last 1/3 of the lifts). This research will show how the back-angle changes during a lift to adjust for muscle fatigue.

Joseph Karnes
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Natural Sciences & Engineering Poster Presentation

Predicting Fluorine Chemical Shifts in Protein Environments

Abstract: Fluorine nuclear magnetic resonance (NMR) spectroscopy is an incredibly sensitive and useful tool for probing biomolecular structure and dynamics. F-19 NMR also has advantages over C-13 NMR and H-1 NMR in protein studies as a result of a simpler spectrum. However, its use requires incorporation of fluorinated probes.
The purpose of this work is to determine a computational protocol for correctly assigning fluorine chemical shifts to individual fluoro-labeled amino acid residues within a protein structure. The work has been carried out with computational methods, using molecular dynamics simulations of proteins in the Gromacs program. These provide the structure and dynamics of the protein, characterizing the environment around the fluorines. The simulated structure of the fluorolabelled protein will then be compared to the wild-type protein for structural accuracy. Calculations describing the electrons in the system are done in Gaussian09 software; these are required for the fluorine chemical shift calculations. The overall goal is computational assignment of 19-F protein NMR spectra.

The model system used for initial investigations is a galactose-binding protein (GLG-1). It has been selected because the chemical shifts are known. Previous work by Warshel and co-workers on assigning the chemical shifts of galactose-binding protein via computation in the late 90s revealed progress and promise, yet did not correctly predict the entire spectrum. Our approach involves simulating fluoro-labeled protein with MD simulations. Spectral assignment via simulation could provide major strides toward analyzing a variety of protein structure-dynamics-function relationships and attributes via 19-F NMR spectroscopy.

William Marsh  
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Poster Presentation

COMPARING THREE-DIMENSIONAL TO TWO-DIMENSIONAL MUSCLE ANALYSIS TECHNIQUES DURING A DYNAMIC PEDALING MOTION

Abstract: The purpose of this experiment is to determine the advantages and disadvantages of three-dimensional muscle analysis compared to two-dimensional standards. Most of the existing literature on the analysis of pedaling is based on a two-dimensional model. While the cycling motion is mainly performed in the sagittal plane, there may be components of forces outside of the sagittal plane. Current data processing techniques include a computed muscle control algorithm to determine the forces contributed by each muscle based on the geometry of the leg during the cycling motion combined with the force data measured by force pedals (Thelen et al., 2003). This study will compare the results of the computed muscle control algorithm in two dimensions and three dimensions. Ideally, this new model will be able to determine abnormal movement patterns that were previously hidden due to a lack of available data collection procedures. Ten subjects will participate in a simple cycling protocol on a cycle ergometer using six load force pedals. Cortex motion tracking software will track the motion of infrared sensors placed on landmarks of the lower limb. A musculoskeletal computer model of pedaling will be generated by combining the kinematics and kinetics of the lower limb as well as computed muscle control calculations. The differences in the two-dimensional versus the three-dimensional model will be analyzed using OpenSim (Delp et al., 2007) software to determine how the two dimensional data differs from the three dimensional data.

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Poster Presentation

CATIONIC LIPTINS AS CANDIDATES FOR NEXT GENERATION ANTIBIOTICS

Abstract: Considering decreased development and the misuse of antibiotics, bacteria are in the process of depleting the antibiotic arsenal currently possessed. A necessity for producing antibiotics is a target in which bacteria possess, but eukaryotic cells do not. Cationic antimicrobial peptides (CAMPs), which are members of the innate immune system, have been exploiting such a target since the era of multicellular organisms with little resistance. However, CAMPs are currently of limited pharmaceutical use due to their toxicity. This knowledge provides motivation to produce a family of positively-charged small molecules termed “eliptins” which similarly to CAMPs, target phosphatidylglycerol (PG) located in the
cell membranes of bacteria. Selectivity to phosphatidylglycerol is achieved by exploiting its negative charge. While liptins also target PG, they are hypothesized to have a different mechanism of action. Binding studies show that liptins do not permeate or perforate the membrane, but rather complementarily bind to PG. A hypothesis for liptin bactericidal behavior is that by complementarily binding to PG, membrane integrity and fluidity are altered. In addition, it is hypothesized that by introducing positive charge, depolarization of the membrane occurs as well as the disruption of cell membrane protein function. Toxicity studies using various eukaryotic cells show minute toxicity to red blood cells. By synthesizing a multitude of liptins with the same scaffold, but different “arms” that bind to PG, we strive to increase selectivity and effectiveness, while decreasing toxicity to eukaryotic cells.

Grant Milford
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Natural Sciences & Engineering Poster Presentation

DIFFERENCE IN SINGLE LEG BALANCE STRATEGIES BETWEEN THE SEXES AFTER A FATIGUING LIFTING ACTIVITY

Abstract: The aim of the in-progress study is to analyze kinetic and kinematic data to explain the difference in observed center of pressure velocity vectors between men and women during single leg standing when fatigued. Force plate data along with a three-dimensional video-based motion analysis data were collected for 35 subjects, 18 male and 17 female, before and immediately after a fatiguing lifting task in which participants lifted a 30kg box from the ground to a table and then put the box back on the ground until fatigued. Force plates recorded the body center of pressure positions every millisecond. Displacements between center of pressure positions were identified and then differentiated and averaged to calculate mean velocities. A statistically significant difference was found between the two sexes. Using the collected motion capture and force plate ground reaction force data, inverse kinematics and inverse dynamics analyses were performed to identify kinematic and kinetic differences between the balance strategies employed by the male and female participants.

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Natural Sciences & Engineering Poster Presentation

Cryogenic Machining of Inconel 625: Temperature Field at the Chip-Tool Interface

Abstract: The extreme tool temperatures experienced during the machining of high strength alloys, including those typical of the aerospace industry is the main cause of tool wear. Tool wear is a very serious concern for industry and society because of the high costs associated with tool replacement. It is also a major concern for the aerospace industry. From conversations with representatives from the Wichita aerospace industry, we have learned that for every kilogram that goes on an airplane, three kilograms are machined away. Attempts to mitigate tool wear effects have relied on the use of cooling with oil and water mixtures that are very harmful to the environment. More recently, proposals to cool cutting tools with cryogenic substances such as liquid nitrogen have gained some popularity. However, the temperature of the chip-tool interface during cryogenic machining remains unknown. This study is an attempt to close this knowledge gap, by providing direct measurement of the chip-tool temperature, while machining an aerospace-grade Inconel material, under the application of liquid nitrogen as refrigerant. For this purpose, optically transparent yttrium aluminum garnet (YAG) cutting tools have been adapted for cryogenic machining. The tool transparency provided access to the chip-tool interface. The temperature distribution of this interface was measured using a high-resolution camera. It has been observed that the chip-tool temperature remains high during the cryogenic machining, but it is about 100 Â°C lower than without the cryogenic substance. The measurements may be used to feed computer models for the optimization of cryogenic machining.
CORRELATION OF NEUTRINO EVENTS AND GAMMA RAY BURSTS

Abstract: Gamma ray bursts (GRBs) are fascinating and perplexing interstellar events. They are characterized as sudden releases of highly energetic photons as a result of a very high energy cosmic event (e.g. the merging of two neutron stars). Current models of GRBs suggest such events will produce an afterglow that can interact with material in the interstellar medium to generate photons from other regions of the electromagnetic spectrum. Models also predict a possible explosion of baryonic matter. Such matter can interact or decay in transit to Earth and produce a subatomic particle known as a neutrino. The detection of these neutrinos in coincidence with GRBs can allow further knowledge of the possible particles that produced them and create improvements of current GRB models.

Among the numerous facilities worldwide with neutrino detection capability is the Fermi National Accelerator Laboratory funded by the US Department of Energy. One experiment is the NuMI Offline Neutrino Appearance (NOvA) Experiment, which utilizes a beam of neutrinos sent through the Earth towards a 14 kiloton detector. Observing events in NOvA’s Far Detector at time intervals consistent with recorded gamma ray bursts will be the primary method of determining possible correlations between GRBs and neutrino events. Further study of GRB theory will allow for simulation improvements that will create constraints for already existing models.

The study thus far has observed distributions of GRB time intervals, total event energies, and literature of GRB models. Future study goals include calculating correlations between GRBs, neutrino events, and simulation improvements.

The interaction of astrocytes and HUVEC cells in collagen-fibrin co-gel

Abstract: One of the major challenges in the injured spinal cord is the lack of sufficient vascularization. A rapid and stable vascularization at an early stage of transplantation is essential for optimal regeneration of the injured spinal cord. Our objective was to characterize a 3-D in vitro angiogenesis and vascular formation model by culturing human umbilical vein endothelial cells (HUVECs) in conjunction with other types of cells (Dental Pulp Stem Cells or astrocytes) and in different ratios of fibrin and collagen gel combinations, which worked as biomaterial scaffold to enhance the angiogenic potential of HUVECs. To address this, we also studied the role of dermal pulp stem cells (DPSCs) and astrocytes via co-culturing method in collagen-fibrin co-gel to investigate the interaction of DPSCs and astrocyte and the vascular structure formed by HUVECs. Our preliminary results showed that the HUVEC cells formed vascular structure in collagen-fibrin co-gel. However, the DPSCs and astrocytes structures in a collagen-fibrin matrix did not significantly affect the capillary-like tubular structure. These studies showed the interaction of DPSCs or astrocytes with vascular structure formed by HUVEC cells and indicated the potential role of these cells in the vascularization process.

SIMULATION OF MORPHOLOGICALLY VARIANT ENDOTHELIAL CELLS IN ANSYS
Abstract: Cells in the human body can be classified by shape and function. It is believed that variations in a cell’s morphology could be used as an indicator of overall cell health. One variable of interest that has been shown to affect the cell morphology are the mechanical forces. For example, blood flow produces shear stresses on the cells lining the blood vessels (endothelial cells). To study the relationship between fluid shear stress and endothelial cell shape, live-cell imaging and computer simulations can be used. While in vitro, models created by culturing endothelial cells in a controlled fluid flow environment offer similar environmental effects as what would be found in vivo. The trade-off is that most variables of interest must be measured indirectly. In contrast, fluid simulations using finite-element analysis are advantageous because they rely on the simplified abstraction of a complex system. Our aim is to make more realistic simulations of cell mechanical models by using cell morphologies derived from actual cell populations. These simulations will in turn be used to make more informed decisions on how to design live-cell experiments. To do this, we have created a series of simulations in the ANSYS/FLUENT software suite. In it we vary cell morphology and the center to center spacing of a group of cells within an idealized flow chamber. Our results show that the flow velocity profiles and the shear stresses show that the minimum spacing between cells would be approximately equal to one cell diameter in width.

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Natural Sciences & Engineering Poster Presentation

HUVECs on collagen microspheres in fibrin hydrogel as a model for evaluation of vascular structure formation in the spinal cord

Abstract: Trauma to neural tissues, such as spinal cord injuries (SCI), can heavily damage the vascular networks that compose of blood vessels, leading to impaired bodily functions. In order to restore functions, measures should be taken to restore the structures of these components. Fibrin hydrogel serves as an effective 3D matrix that simulates the environment within the body as it allows other cells to bind directly through cell surface integrin receptors. Human umbilical vein endothelial cells (HUVEC) are routinely used to study angiogenesis and other types of vascular structure formations. Astrocytes, support cells of the central nervous system, and their ability to adhere and migrate along HUVEC-formed vascular structures can serve as a model to study vascularization of the spinal cord. To effectively generate and evaluate vascular structure growth, HUVECs were seeded on top of collagen microspheres. The microsphere-carrying HUVECs and astrocytes were stained with different fluorescent dyes and were then co-cultured in fibrin gel along with aprotinin and vascular endothelial growth factor, VEGF. Vascular formations were observed as they sprouted from the microspheres. Our results also show that the astrocytes were associated with the vascular structures. The study suggested that HUVEC-formed vascular structures can serve as a useful model in investigating vascularization in neural tissues.

Vanessa Tran  
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Natural Sciences & Engineering Poster Presentation

DETERMINING DOT PATTERNS FOR MICRO-CONTACT PRINTING

Abstract: Biochemical cues exhibit a strong influence on cell behavior. However, there is evidence that cells respond to their mechanical environment as well. An example of such is using traction force microscopy to determine how cells respond across a given surface; epithelial cells can sense stiffness in the environment and respond by binding to cell surface receptors or the extracellular matrix (ECM). To begin understanding mechanisms in vivo requires experimental techniques in the laboratory setting, such as micro-contact printing of proteins. This type of micro-contact printing is the process of patterning extracellular proteins onto substrates. The goal of this project is to develop a micro-contact printing
system that can be used to calculate cellular traction forces. To calculate traction forces, fluorescent dot markers in a regularized array are patterned on a deformable substrate; the dot markers are then imaged, and the marker displacements tracked as the cell deforms the substrate. For this project, eight different patterns of dots of varying sizes in diameter (1.5 μm and 2 μm) and center-to-center distances (5 μm -10 μm) were designed and fabricated on a silicon wafer or master mold. An elastomeric (PDMS) stamp was then made by casting onto the master mold. Each pattern of dots on the PDMS stamp was imaged under a microscope and analyzed to validate the dots resemblance to the original design. Accuracy will be determined by the percentage of dots that are uniform, fully circular in shape, exact in diameter, and correct in pitch height. The next step of micro-contact printing is to incubate the PDMS stamp with an ECM protein such as fibronectin and print onto polyacrylamide gel. The patterns from the PDMS stamp that are uniform and accurate will have a better chance of succeeding onto next step of the micro-contact printing process.

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Natural Sciences & Engineering Poster Presentation

Halotolerant Bacterial Isolates Grow in Salts Relevant to Mars

Abstract: The recent discovery of water on Mars and the identification of salts from the Phoenix Lander and the Curiosity Rover have opened discussion of the possibility of microbial growth on the planet. Mars tends to be rich in MgSO4 rather than NaCl as on Earth. (Per)chlorates of Na, Mg, and Ca have been discovered on Mars as well. These salts, even at high concentrations, are permissive for growth of halotolerant bacteria. These salts form deliquescent brines and have low eutectic points, remaining liquid on the cold Mars surface. We have tested 18 halotolerant bacteria isolated from the Hot Lake in Washington (saturated with MgSO4), and from the Great Salt Plains in Oklahoma (saturated with NaCl). We measured growth liquid broth media by spectrophotometry with the addition of an iterative matrix of anions and cations including, Na, K, Mg and SO4, Cl, and NO3. The iterative matrix of salts has not yet been complete, but some trends are emerging. Growth has been recorded at 2.75 M NaClO3 and 1 M Mg(ClO4)2, NaClO4, K2SO4, and KNO3. The completion of the matrix, along with statistical analysis and interpretation, will help in the refinement of planetary protection protocols for Mars and the definition of potential habitable regions on the frigid planet. Supported by NASA ROSES PPR and KINBRE NIH NIGMS IDEeA.

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Social Sciences & Humanities Poster Presentation

CAMERA PERSPECTIVE BIAS IN POLICE BODY-WORN VIDEO

Abstract: In videotaped police interrogations, jurors are more likely to judge the suspect as guilty when the camera is focused on the suspect (compared to the officer). This phenomenon is known as the camera-perspective bias. Recently, another type of video footage is becoming prevalent in law enforcement: video from body-worn cameras. Body-worn cameras can be mounted in different locations on an officer (e.g., head, chest). Similar to the camera perspective bias in interrogations, we wondered whether the mounting position of body-worn cameras might affect perceptions of police-citizen interactions. Using a between-subjects design, 180 participants viewed videos of simulated police-citizen encounters from one of three camera perspectives and then answered questions about the appropriateness of the officer's behavior and the distance between the officer and suspect. Results could be used to inform juror decision making and will contribute to our understanding of how viewing perspective affects critical judgments.
AEROBIC EXERCISE SUSTAINS PERFORMANCE OF INSTRUMENTAL ACTIVITIES OF DAILY LIVING IN EARLY-STAGE ALZHEIMER’S

Abstract: Alzheimer’s disease (AD) is a debilitating neurodegenerative ailment that causes brain atrophy and memory loss. Individuals with AD experience progressive loss of independence performing instrumental activities of daily living (IADL). IADLs are those actions that allow an individual to function independently, such as maintaining hygiene, managing money and preparing meals. Thus, it is imperative to identify interventions that support independence, and reduce the economic and psycho-social burden of care giving for individuals with AD. The purpose of this investigation was to examine functional disability and caregiver time in individuals with early-stage AD, and explore if specific exercise regimens could improve these areas. We completed a 26-week trial of aerobic exercise (AEx) vs strength and toning (ST) for patients with early-stage AD. Each AD exercise group was assessed for functional dependence, required caregiver time, and cognition using standard battery assessments before and after their respective exercise regimens. Results showed a stable function in the AEx group compared to significant decline in ST group. This was especially evident in more complex instrumental activities of daily living (such as financial planning). Individuals in the AEx group increased 1% compared to an 8% loss in the ST group over 26 weeks. Negative changes in memory correlated with declining performance of instrumental activities of daily living for both groups. This analysis extends recent work by revealing specific benefits for instrumental activities of daily living for individuals in the early stages of AD and supports the value of aerobic exercise for individuals with cognitive impairment.

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Social Sciences & Humanities Poster Presentation

MUSIC AND MOLECULES: THE EFFECTS OF MUSIC EDUCATION ON ACADEMIC PERFORMANCE

Abstract: The study put to the test the idea that students who are involved in music education classes (either band or choir) perform better in core academic classes. The guiding question throughout the study was: “What is the difference in academic performance between students who are involved in music education and those who are not”? To test the question, students in two middle grade science classes were taught using the same strategies over the course of a two-week unit. A preassessment and a post assessment were given during the two-week interval. Data was compared between the pre and post assessment to determine whole class academic gains. The data could also be used to interpret between gains by students who were also currently enrolled in music education courses. From the data, it was concluded that students who participated in music education classes, generally, outperformed the students who were not music education participants. The reason why music education helped students in core content is outside the scope of this study; however, the results could be beneficial in encouraging students to participate in band or choir classes.
A COMPARISON OF THREE METHODS OF SHORT-TERM NON-ENGLISH VOCABULARY ACQUISITION

Abstract: A COMPARISON OF THREE METHODS OF SHORT-TERM NON-ENGLISH VOCABULARY ACQUISITION
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The purpose of this study was to determine whether the Depth of Processing Theory and Involvement Load Hypotheses apply to short-term lexical abilities. The Depth of Processing Theory suggests concepts encoded using more concentration increases recall ability and influenced the manipulation of modalities of presentation in this study. The Involvement Load Hypothesis proposed operational definitions for levels of concentration in regards to memory encoding. The involvement load was manipulated so that the target word was presented in three formats: direct English translation, pictorial representation of the target word, or context cues in an English sentence containing the target word.

Twenty-two undergraduate students from Wichita State University completed the study in a controlled laboratory setting. Participants were instructed to complete a three-section task: a demographic questionnaire, a series of encoding tasks in one of the three presentation modalities, and recall 44 questions (14 multiple choice, 15 matching, and 15 fill-in-the-blank). Block randomization ensured each participant was only exposed to each word and modality once.

A one-way between-subjects ANOVA was used to test memory accuracy among three modality conditions. There were significant differences in percentage of correct answers among the three modality conditions, F (2, 36) = 5.820, p < .05, η² = .244. A Post Hoc test using the Bonferroni Correction revealed that both translation presentation percentages (M=.5932, SD=0.2868) and pictorial presentation percentages (M=.5932, SD=0.2926) were significantly higher than contextual presentation (M=.5768, SD=0.1600).

The results of this study are not consistent with the prediction from Depth of Processing and Involvement Load hypotheses. One explanation could be that the condition hierarchy was designed considering common cognitive concepts, but has not been verified as a valid categorization method outside the current study. Another is that the order of categories presented could in reality be reversed or otherwise structured in terms of cognitive load for short-term memory.

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MIDWEST IMMIGRATION: ONE SMALL TOWN LAYING TRACKS TO REMEMBER THEIR MEXICAN IMMIGRATION HISTORY

Abstract: Midwestern towns have similar histories as to their origins whether a cowtown, a farming town, or a railroad town. In the case of Newton, Kansas, its identity and history were built upon the railroad. Newton has been historically an undeniably crucial geographical location both by rail. The former Atchison, Topeka, and Santa Fe Railway connected Kansas with both the East and West coasts, creating a “bull’s eye” of the four
cardinal points in the US. The railroad is an integral part of the town which dominates anything from youth sports to the high school official mascot. Not by coincidence the Harvey County Museum, dedicated to the preservation of Newton’s history, holds large archives related to the ATSF railway (Atchison, Topeka, Santa Fe). These include photos, employee logs, routes, track maps and manuscripts, yet a significant portion of the town’s history is rarely mentioned. The omission of the contributions of immigrant workers recruited from Mexico to expand the railroad, not only in Newton but across America.

Based on the analysis of these archives and local church archives I want to demonstrate the connection between Newton’s railway identity and the Mexican labor force that built it, solidifying the tie between the foundation of the town and Mexican immigration.

In acknowledging and embracing the shared history of a town, like Newton, a more inclusive identity can be created which in turn positively benefits the community and lessens racial tensions.

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Social Sciences & Humanities Poster Presentation

Characterization of Peripheral Nerve Derived Multipotent Stem Cells for Bone Repair

Abstract: The use of nerve derived adult pluripotent stem cells (NEDAPS) with injection of growth factor such as bone morphogenetic protein 2 (BMP-2) collected from sciatic nerve of murine has suggested great potential in creating osteoblast for regenerative medicine use. The difficulty with BMP-2 is that it can trigger some morphologic changes within spinal cord and nerve roots that would negatively impact neurologic recovery. Therefore, to better understand the molecular and cellular mechanism of BMP-2 related clinical complications, the objective of this study is to reveal biological changes of peripheral nerve when directly exposed to purified rhBMP-2 (Infuse). NEDAPS cells has proven to unexpectedly express embryonic stem cell markers of KLF4, Sox2, c-Myc, and Oct4 which are referred to as induced pluripotent stem cells (IPCs) that can become differentiated to express osteoblast markers. This study utilizes induced pluripotent stem cells, which are created from adult differentiated cells by using retroviral to induce expression of the four genes indicated above that are not thought to exist in adult mammals. Osteogenic medium (Beta-sodium glycerophosphate; Ascorbic acid; Dexamethasone) is used in the experiment to induce osteoblastic cells after NEDAPS cells were cultured in embryonic stem cell medium for 5 days. Using alkaline phosphatase and immunofluorescent staining after differentiation of the stem cells 7 days later, indicate that the cells express structural and functional properties of osteoblastic cell markers. RT-PCR test also demonstrates that the gene expression of NEDAPS cells clearly show to express markers of osteopontin, osteocalcin, and collagen type I.

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Social Sciences & Humanities Poster Presentation

EVALUATING THE EFFECTIVENESS OF PROGRAM DELIVERY OF LEADERSHIP TRAINING

Abstract: Evaluating Effectiveness of KLC Programs
Statement of Research Purpose
The purpose of this evaluative descriptive research will be to understand how the Kansas Leadership Center (KLC) can improve in both program delivery and the evaluation of trainings. Using existing quantitative and qualitative data collected after leadership trainings, this research will be aimed at program improvements. Through analysis of end of program feedback forms, the investigators hope to learn what ideas have been most useful to participants over the past several years. The research will allow investigators to explore ideas that the participants in the program find helpful or difficult to apply to their own leadership challenges. Recommendations on potential program evaluation process improvements will be submitted to the organization.

**Methods**

This study will deploy descriptive methods to evaluate the KLC trainings. There are 1817 surveys that will be used for this study. Data was collected over the course of 2017 in KLCâ€™s three core programs, You Lead Now, Lead for Change, and Equip Lead.

**Findings, Interpretations, and Summary**

Preliminary quantitative analysis indicates that the Equip to Lead and Lead for Change programs tend to be most helpful to participants in regards to making progress on their leadership challenges. In contrast, the You Lead Now program struggled to reach previous benchmarks set by the organization. These preliminary findings will be used to understand how the organization might capitalize on successes of certain programs while also improving the experience for participants who attend a program at the leadership center.

Addie Roe  
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**AGING WITH A SMILE: AN EDUCATIONAL INTERVENTION OF CERTIFIED NURSING ASSISTANTS TO PROVIDE ORAL HEALTH CARE TO ADULTS IN LONG TERM CARE**

**Abstract:** Current literature indicates that residents in long term care facilities do not receive proper oral hygiene care from facility certified nursing assistants (CNA). CNAs’ have responsibility for oral hygiene in nursing homes, but lack the staff, time, knowledge, protocols, regulations and uncooperative residents make it a low priority. This leads to numerous health problems in the aging population such as unmet dental needs and health care associated pneumonia.

The goal of this educational intervention is to educate CNA’s at Attica Long Term Care Facility on screening new residents’ oral care abilities; assisting residents with oral care; or providing total oral care for residents. To accomplish this goal, three objectives were set:

- Increase CAN’s ability to screen new residents on their ability to accomplish oral care  
- Improve the CAN’s ability on assisting residents with oral care  
- Improve the CAN’s ability to provide total oral care, including cleaning of dentures

There was a total of twelve CAN’s who participated in the pre-test. One CNA tested with a 90 percent, one with an 80 percent, five scored 70 percent, two scored 60 percent, and three scored 40 percent.

There was a total of eight CAN’s who participated in the post-test. Three CAN’s tested with a 100 percent, one with a 90 percent, two with an 80 percent, and two scored 70 percent. These test results are an indication that the educational intervention was successful, as post test results improved.

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Social Sciences & Humanities Poster Presentation
CAN PERFORMANCE VALIDITY TESTS DETECT A MILDLY SUPPRESSED NEUROPSYCHOLOGICAL PERFORMANCE?

Abstract: The use of performance validity tests (PVTs) for criminal justice psychological evaluations have become a major concern because attorneys have been accused of coaching their clients to pass these tests and hence undermine the evaluation. In this study, we will determine if subjects participating in PVTs can suppress their cognitive scores while evading PVT detection. In other words, can people be coached to fool the test? Students will either perform the tests under a “œbest effort” scenario, or perform under a well-coached simulated malingering scenario. This study will help determine if the PVTs will identify the students under the coached scenario. With this, we will have a better understanding of the utility and effectiveness of PVTs which will inform the scope of the use of these tests in criminal justice and other psychological evaluations.

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INTER-RATER RELIABILITY OF SATIC CODING EDUCATION PROFESSIONALS

Abstract: In education, the ability for teachers to reflect and construct feedback are critical for student success. However, feedback may not always be equal between two individuals and lead to improper information. SATIC coding is a method developed to record and rank teacher-student interactions. By having a universal coding device, proper feedback can be given to an educator with trust. In this study, two recorders will observe the same individual educators. Educators will be selected through TIMSS video study. Each individual educator will be SATIC coded for the first 25 interactions of their lesson. The field will include various educators from the United States in different education studies. Since the basis of this study is on the recorders, content differences are negligible. The comparison of the two recorders observing will be based on individual interactions. The goal of this study is to prove that inter-rater reliability can be achieved by using a SATIC coding sheet to evaluate educational practices. A reliable, fair way to give proper feedback is necessary to further the field of education and the growth of its teachers.

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Collaboration of Speech Language Pathologists and Music Educators

Abstract: Music and speech share features including pitch, timbre, and timing (Kraus, 2009). Literature indicates that music could be beneficial to speech and language development (DegÃ©, 2011; Gromko, 2005; Hobson, 2006; Moreno, 2011). However, literature does not address the current use of music in therapy by speech-language pathologists. The study provides important new information about the current interdisciplinary practices involving music in speech-language pathology. The research questions were as follows:
1. How often do SLPs use music in their practice?
2. Is music seen as a positive addition to SLP work?
3. Is there a difference between veteran SLPs (15+ years) and newly practicing SLPs(5 years or less) with regard to their use of music in their practice?
Speech-language pathologists (N = 75) from a Midwestern urban school district were administered a survey at a monthly professional development meeting regarding their use of music in therapy sessions and/or their collaboration with music educators. The results were coded and recorded in a Microsoft Excel spreadsheet along with any demographic data provided by the subjects. The results indicated that speech-language pathologists from the school district used music minimally in therapy. There was no significant difference between the two subgroups of SLPs regarding their use of music in therapy. More research should be conducted to learn more about the current use of music by SLPs in practice.

References:

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Social Sciences & Humanities Poster Presentation

GENDER DIFFERENCES IN MALADAPTIVE PERSONALITY TRAITS AND EXPRESSION OF PSYCHOLOGICAL DISTRESS

Abstract: The three personality constructs, Machiavellianism, narcissism, and psychopathy are brought together in the overall concept of the Dark Triad. While these traits have been linked to negative behaviors and risks of concern, this area of research has received less attention over the years. Further, social expectations of college students are related to increased psychological distress. It is therefore imperative to further understand the relationship between maladaptive personality traits and psychological distress and how it differs based on gender.

This study aimed to assess how maladaptive personality traits (i.e., Machiavellianism, narcissism and psychopathy) and psychological distress (i.e., depression, anxiety, and stress) differ as a function of gender in a sample of college students. The Short Dark Triad (SD3) and Depression Anxiety and Stress Scales (DASS) were administered to a sample of 112 female and 68 male college students. Basic demographic information was also collected.

Replicating the standard scoring methods employed by the original researchers, a set of T-test comparisons were used to determine gender differences in the two traits measured in the study, and the composite score achieved from each scale was analyzed. A Bonferroni Correction was employed to correct for familywise Type 1 error.

Results showed that the rate of psychological distress and the personality trait of narcissism did not differ significantly between men and women. However, gender differences were found for the traits of
Machiavellianism and psychopathy, with male participants endorsing higher levels of the manipulative personality traits for both these personality traits on both scales used. These findings align with previous research conducted in this area and could help establish a more focused treatment population when developing effective forms of psychotherapy. They could also help identify the sources of stress in social relationships, come up with earlier interventions to address issues in gendering, as well as inform future research in related areas.

Max Thompson  
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College of Health Professions  
Social Sciences & Humanities Poster Presentation

**ORAL HEALTH CARE OF A WORK RELEASE POPULATION: AN EDUCATIONAL OUTCOME**

**Abstract:** The oral health of prisoners is generally poor and are likely to have extensive caries and periodontal disease. In a study in 2008, it was found that inmates had a higher percentage of unmet dental needs than did employed adults in the U.S. population (Treadwell & Formicola, 2008). In the Eighth Amendment of the Constitution, it establishes the prisoner’s rights to health care. Our goal for this project was to provide oral health and prevention education to former inmates who are in a work release outreach program through Sedgwick County.

Our objective was to provide information on the benefits and necessity of oral health care. Topics that were discussed included the most common oral diseases, specifically caries and periodontal disease. Preventive health was also presented which included proper oral hygiene at home and routine dental checks. Other significant oral health information discussed was tobacco cessation, oral cancer, and nutritional influences on oral health. The participants included twelve work release subjects. After the educational presentation, a post assessment was implemented.

The post assessment consisted of a verbal questionnaire. We asked a series of questions to measure what they learned from our presentation such as “How many times a day is recommended for brushing and flossing?” “How many people will seek dental care after learning about oral hygiene.” Approximately 90% of the inmates responded correctly to the post questions indicating the project was successful. Future presentations will occur on a larger sample of this population with additional data.

Natalie Ashbrook  
Faculty Mentor: Sabrina Vasquez  
College of Fine Arts  
Exhibition/Performance

**THERE, HER**

**Abstract:** Title: THERE, HER  
Participants: Natalie Ashbrook, Haydee Carlson, Aviance Battles  
Affiliation: College of Fine Arts, Dance Department

This work is a choreographed dance duet. The premise of the work is the choreographer’s own struggle with an anxiety disorder, in a way to encompass the experience of someone with this mental health problem. This piece was not only created to bring the concept of mental illness to light but also to put it in a way that the audience can understand how anxiety feels in the mind. Another major theme of the work is the difference between being unmedicated for this issue and being able to have control over anxiety with the help of medication. And despite the fact that medication can aid in functioning with it, anxiety is a part of someone. The process of creating this work was a method of therapy for myself. As the choreographer, I had to come to terms with accepting that this was how I have to live, but that it does not incapacitate me. Most of the inspiration during the process was that one half of the duet is the anxiety and the other is the person who suffers
from it, so it was necessary to work in a lot of partnering work. This is any kind of movement that involves lifts and weight sharing, to evoke feelings of being pressured or controlled. The participants worked very hard with me to find a balance between the two of them so that the movement looks sudden but has the control and power on both sides of the choreography. The piece comes to a conclusion with carrying this weight but not being weighed down by it.

Ruth Vernon  
Faculty Mentor: Kerry Jones  
Fairmount College of Liberal Arts & Sciences  
Exhibition/Performance

TOO TIGHT: DAYS OF NIGHT

Abstract: TOO TIGHT: DAYS OF NIGHT  
Ruth Vernon  
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This creative work is a selection of poetry on the theme of mental health. Mental health is something I am passionate about. I look to incorporate an aspect of confessional poetry without over-exploiting the form; I hope to relate to young adults dealing with similar issues by shedding light on a topic that is oftentimes hushed and overlooked. I wish to convey my truth on the matter and show that while there are dark and scary aspects of being sick, there can always be light if one looks hard enough. Humor is important to think about in regards to hard-to-talk-about issues because it can show that even though the subject matter is serious, people can still find ways to enjoy life and make the most of what is being given to them. My time spent at Prairie View is reflected in this work, as well as things I witnessed and conversations I have had with others surrounding mental health. This is not reflective of everyone dealing with mental health issues, but can be translated to each person’s own journey of self-discovery. Most of these poems were crafted during the fall of 2017 and have been worked on since then, with peers and family.