

33rd Annual Student Research Forum



Virtual Presentation March 2021

Hosted by the Graduate School, Helen Hardin Honors College and the Graduate Student Association.

Sponsored in part by the Campus Community Funds.

For more information: memphis.edu/srf.



March 16, 2021

Dear Student Researchers,

Thank you for contributing to the 33rd Annual Student Research Forum. It is our pleasure to attend this event and learn of the interesting research our students are doing. One of the most critical goals of higher education is to encourage intellectual inquiry and critical thinking. Research provides significant hands-on experience in these areas as you've discovered in your own projects. Whether you pursue a research-related career or not, the skills you have learned in carrying out your projects will serve you well. Research skills are valuable life skills in our increasingly information-rich world. The ability to define a question, to collect and organize information relevant to that question, and to evaluate and ultimately use the new knowledge will be useful in many facets of your lives.

Congratulations on your achievements. Your project is a testament of your hard work, determination, perseverance, and commitment, and a monument to the dedication of your faculty mentors. We hope you enjoy this year's research forum and wish you continued success.

Sincerely,

Robin Poston, Ph.D.
Dean of Graduate School

Melinda Jones, Ph.D.
Director, Helen Hardin Honors College



March 16, 2021

Dear Judges,

On behalf of all those involved in organizing and presenting this year's Student Research Forum, and on behalf of the students participating in this year's event, I'd like to thank all of you for giving so graciously of your time and expertise.

The judges for this forum come from a wide variety of disciplines and scholarly traditions. One of the advantages of an event such as this is the opportunity it provides for students to interact with faculty and gain valuable feedback on their projects. Hopefully this experience will also be beneficial to you by providing you with exposure to the wide range of interests pursued by students at The University of Memphis, and by giving you a preview of the future of your respective fields and disciplines.

Again, thanks to each of you for participating in this year's Student Research Forum. Without your cooperation, support, and enthusiasm, our students would miss a wonderful opportunity to interact with and learn from the highly skilled faculty here at The University of Memphis.

Sincerely,

Robin Poston, Ph.D.
Dean of Graduate School

Melinda Jones, Ph.D.
Director, Helen Hardin Honors College

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Undergraduate

EDUCATION

Exploring Undergraduate Chemistry and Biology Students' Understanding of Enzyme Structure and Function

Emma Micer (Biological Sciences and Chemistry)

Undergraduate students in introductory biology and chemistry courses tends to have superficial understanding about enzymes and lack the ability to think about the functionality of enzymes in a visually representative way. We are using an activity based on Dr. Nathan DeYonker's NSF CAREER grant-funded website, RINRUS, to increase student understanding of enzymes. We tested the assignment in a graduate student pilot study and collected data about knowledge of enzymes from students in introductory biology and chemistry courses. We found that this assignment would best complement General Biology I, and this presentation will explain how we determined this.

Evidence-Based Strategies for Special Education Literacy Instruction for a Student with Intellectual Disabilities

Taylor Shive (Education)

Beyond the scope of an entire semester, the focus student will be taught through direction instruction using specific evidence-based strategies to deliver special education instruction to teach literacy skills to a student with a disability. This process will determine the effects of least-intrusive prompting paired with a task-analysis and constant time delay on vocabulary identification and comprehension. The results of this will therefore create this research-based manuscript for the Student Research Forum this Spring.

ENGINEERING

Assessment of cis-2-decenoic acid and local anesthetics for synergistic antimicrobial and biofilm reduction effects.

Emily Coleman (Biomedical Engineering)

Traumas involving the musculoskeletal system are painful and also at risk for infection, which are most often treated with antibiotics. However, this treatment can have reduced efficiency because of local vasculature damage and biofilm formation. Previous studies showed that Cis-2-decenoic acid (C2DA) disperses and inhibits biofilm, and some local anesthetics (LA) have reported antimicrobial properties in addition to their pain reduction. We tested the antimicrobial activity of LA combined with C2DA at varying concentrations against bacteria. Assays revealed that select combinations of LA and C2DA reduce both planktonic and biofilm-associated bacterial growth for *S. aureus*, *P. aeruginosa*, and *A. baumannii*.

Affordable, Precise Tactile Stimulator Device for Functional MRI Brain Mapping

David Hale (Biomedical Engineering)

Brachial plexus injury is a common injury that can affect the range of motion and strength of the arm, and pain is commonly associated with the nerve damage. The long-term goal of this study is to use fMRI to observe neurological differences in those who suffered brachial plexus injury at various ages to determine potential changes in efferent nerve activity and attempt to understand why those injured in childhood achieve superior outcomes. The objective of this study is to create a low-cost, MRI-compatible device for pneumatic, tactile stimulation of finger and facial skin.

Modifying Chitosan Membranes with 2-Decenoic Chloride to Determine its Effectiveness for Biofilm Inhibition

Alexis Johnson (Biomedical Engineering)

The aim of this experiment is investigating local drug delivery systems for 2-decenoic acid (2DA) utilizing the covalent attachment of 2DA to electrospun chitosan membranes. Major topics necessary to be investigated in this field is exploring elution and anti-biofilm activity using microbiological assays. 2DA is a natural fatty acid bacterial signal to disperse biofilms. 2DA chloride was produced using 0.15mol thionyl chloride and 0.1mol 2DA with chloride reflux reaction. Our findings support evidence of covalent attachment between 2DA and membrane surface. An elution study from modified membranes proceeds in two stages: release profile in PBS and PBS loaded with bacterial lipase.

Elution of bupivacaine from acylated chitosan-mannitol paste for treatment of Staphylococcus aureus infection.

Bharat Jothilinga, Brittany Spencer (Biomedical Engineering)

Musculoskeletal trauma are painful and have a high infection rate, which results in osteomyelitis due to the formation of biofilm from pathogens such as Staphylococcus aureus. Studies have shown that both the local anesthetic bupivacaine and fatty acid 2-decenoic acid (2DA) have antimicrobial activity against S. Aureus. In this study an injectable chitosan-mannitol paste was loaded with bupivacaine and 2-decenoic acid analog. We tested for the drug released daily for 7 days from the paste and sponge. Results showed that bupivacaine was released over the course of 7 days for both paste and sponge, though less was released from paste.

Evaluation of the Anti-microbial Properties of Acyl-modified Chitosan Membranes

Omar Mohamed (Biomedical Engineering)

Chitosan membranes provide an antimicrobial barrier that supports wound healing and stimulates tissue growth. Chitosan membranes nanofibers were stabilized in aqueous media by acylation with chlorides. An antimicrobial study was performed on the acyl-modified membranes using *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The bacteria grown on the membranes were placed in Tryptic Soy agar plates and the colonies formed were counted the next day. The sponge control group for both bacteria had a significantly higher CFU count than rest of the groups. The gauze control had similar CFU counts to the hexanoic treated membranes while the CFU counts for decanoic and 2-decenoic was significantly less.

Design and Testing of An Experiment to Measure Aerosols and Particulates Emitted by Speech

Eric Pillow (Department of Mechanical Engineering)

Human-to-human transmission of upper respiratory diseases such as COVID-19 is primarily driven by the dispersion of virus-laden droplets and aerosols that are expelled from the nose and mouth. A lack of data exists concerning the extent of exposure to aerosolized particles in ecologically relevant, non-intrusive scenarios. This research aims to meet this need by investigating the quantity, concentration, and distribution of particles exhaled while speaking, singing, and breathing. Data will be collected using laser sheet imaging and image analysis software. Conclusions will then be drawn about the volume and behavior of aerosolized particles associated with various vocal activities.

Measuring the Concentrations of Bupivacaine and Cis-2-decenoic Acid Eluted from Electrospun Chitosan Membranes

Lydia Ross (Biomedical Engineering)

Burn wounds are caused by radiation, heat, or friction. Burn wounds are painful and could lead to infection or tissue necrosis. In this study, electrospun chitosan membranes were acylated and loaded with the local anesthetic bupivacaine and the antibiofilm Cis-2-decenoic acid (C2DA) to reduce infections. An elution study was conducted on membranes by sampling at time points of 3, 6, 9, 12, 24, 36, and 72 hours. High-Performance Liquid Chromatography (HPLC) was used to measure concentrations of bupivacaine and C2DA. Chitosan membranes loaded with bupivacaine and C2DA may serve as wound dressings that prevent infection and improve wound healing.

Chitosan Acylation with 2-decenoic acid for biofilm-resistant materials and applications

John-David Ross (Department of Biomedical Engineering)

2-decenoic acid (2DA) and its analogs have antimicrobial properties, particularly in inhibiting and dispersing bacterial biofilm. In this study, we developed methods to covalently attach 2-decenoic acid to electrospun chitosan membranes through acylation of fibers. Electrospun chitosan fibers were reacted with custom-synthesized 2-decenoyl chloride in the presence of pyridine to stabilize the membranes. Fourier Transform Infrared Spectroscopy (FTIR) was used to confirm the acylation of chitosan membranes treated with 2DA and to determine the formation of ester bonds. The acylation treatment was validated by an absorption peak around 1750 cm⁻¹ representing the acyl group and ester bonds.

Evaluating the Effect of Flavanoids on Neutrophil NETosis in Wounds

Kian Ziai (Biomedical Engineering)

I am currently investigating the ability of several flavonoids found in honey to reduce the degree of neutrophil NETosis via their scavenging of intracellular ROS. There is evidence that honey has the ability to provide wound cleaning and healing. During wound healing, white blood cells called 'neutrophils' perform an activity called NETosis which involves the releasing of DNA-composed nets in order to trap and kill bacteria in the wound. However, too much NETosis results in fibrosis which can prevent tissue growth onto an implant. I will be finding out whether the honey's flavonoid component is the reason for this reduction.

LIBERAL AND FINE ARTS

"Standing in the Doorway:" German Immigrants' Identities Along the Southern Mississippi River, 1830-1873

Sophia Rouse (Department of World Languages and Literatures)

There no comparative study about German immigrants in Memphis, New Orleans, and St. Louis, despite their common location on the Mississippi River, a vital artery for transportation and commerce, especially during the mid-1800s. I contextualize my research in a theoretical framework informed by current publications in migration studies and primary documents to understand how German immigrants integrated into communities between 1830-1873 and the physical and societal borders they encountered. German immigrants integrated into political discourses, social fabric, and commercial activities of their new home cities while maintaining connections to their home country.

LIFE AND HEALTH SCIENCES

Synthesis of amino acid derivatives for metal coordination in hydrogels for tissue regeneration

Darwin Ramirez Alvarez (Biomedical Engineer)

Biocompatible metal ions such as copper and magnesium contain properties that aids the human body to produce essential biochemical reactions. The purpose of this project is to develop hydrogel implants incorporating metals and drugs that can be delivered to a target area. Amino acids like methyl ester histidine and methyl ester cysteine were synthesized to study its interaction with these metals. This study investigates the loading efficiency and controlled release of metals and coordinated drugs using an amino acid linker. This will be useful for future tissue regeneration applications.

PHYSICAL AND APPLIED SCIENCES

Synthesis and Characterization of Rhodium-Aluminum and Iridium-Aluminum Heterobimetallic Complexes Bridged by 5-Hydroxyquinoline

Michael Chaney (Chemistry)

This project is aimed to serve as an intermediate step towards the final goal of creating a heterobimetallic complex capable of tunable catalysis. The heterobimetallic complex used for demonstration will consist of a variant of the Graves' Complex and Vaska's Complex, bridged by 5-hydroxyquinoline. The Graves' Complex will act as the metaphorical gear shifting mechanism, using localized redox reactions. The Vaska's Complex will act as a substitute for the future catalyst. The carbonyl group located on the Vaska's Complex will be observed with each redox reaction using IR spectroscopy, with the goal of ascertaining whether electrochemical activity is altered.

Experimental Validation of Structure-Based Pharmacophores: Toward a High-Throughput Screening Tool for GPCR Ligand Discovery

Martin Guerrero (Chemistry)

We have previously developed a protocol for generating structure-based pharmacophores via feature annotation of energetically optimized chemical functional group fragments. Pharmacophores can be used to search databases and identify potential ligands. This work describes experimental protocol validation using the well-studied G protein-coupled receptor (GPCR) dopamine D2 as proof-of-principle. Candidate ligands will be screened using the NanoLuc-based complementation assay (Promega) which is independent of cellular interference. This technology monitors the interaction of the receptor with specific G-proteins and is proven effective as a high-throughput screening tool.

GPR88 Deorphanization Efforts Reveal Problems with Second Messenger Based Assays

Hannah Nelson (Department of Chemistry)

G protein-coupled receptors (GPCR) are the largest class of transmembrane receptors. Activated by ligands, GPCR stimulate cellular responses by activating G proteins leading to the production of secondary messengers. Though mechanisms by which GPCR function are incompletely understood, these receptors are common targets for therapeutics. Lacking an endogenous ligand, the orphan receptor GPR88 has been implicated in psychiatric disorders. Synthetic GPR88 agonists are available tools to investigate GPR88 signaling. Using these tools to validate assays for deorphanization efforts, we show the effect of assay conditions on cyclic AMP response in live cells, highlighting issues that arise from reliance on second messenger assays.

Human Induced Seismicity within Coastal Central California due to Oil and Gas Production Activity

Ryan Williamson (Center for Earthquake Research and Information)

Human-induced seismicity resulting from oil and gas production has been a focus for many seismologists. These seismic events are easily attributed to techniques such as hydraulic fracturing, but can also be associated with wastewater injection. Both activities have been seen to have varied effects between different areas of focus. Thus, narrowed investigations of oil and gas extraction for oil fields in varied geological settings may prove valuable in understanding the factors influencing induced earthquakes. This study focuses on the correlation of 43 years of oil field production data with 45 years of seismic data from California's Santa Maria oil basin.

SOCIAL AND BEHAVIORAL SCIENCE

Software Preference: Familiarity vs Ease-of-Use - Case Study of SPSS and MagicStat

Catey Fortney (Psychology)

Familiarity and inertia facilitate sticking with the current software, whereas if the perceived ease-of-use of different software is sufficiently high, users will be compelled to switch. We present a case study using two statistical software packages: SPSS (high familiarity) and MagicStat (high perceived ease-of-use). Eighteen statistics students completed three statistics tasks in both SPSS (with training, assignments, and feedback) and MagicStat (with no training or instructions). Students were faster and more accurate using MagicStat, and the majority (78%) preferred it over SPSS. These findings indicate that in highly complex, anxiety-inducing topics like statistics, software ease-of-use may be preferred over familiarity.

The Effects of Social Isolation on Behaviors Related to Anxiety in Aged Mice

Olivia Mason (Psychology)

Social isolation has been shown to have a substantial negative effect on mental health conditions, including anxiety and depression. In rodents, we (and others) have shown that social isolation during adolescence increases anxiety-related behaviors and reduces exploratory behaviors (associated with decreased motivation). The present study examines the behavioral effects of isolation on mice from 4 age groups (adolescent, young adult, middle-aged adult, and elderly). The data suggests that age plays a role in determining the degree to which isolation alters behaviors related to anxiety and motivation, with adolescent and elderly mice being the most vulnerable.

Relationships between Coping Strategies, Substance Use and Depressive Symptoms among Emerging Adults experiencing Low-Income

Pamela Pugh, Kaytryn Campbell (Psychology)

Emerging adults are susceptible to significant mental health difficulties, including depressive symptoms. Although substance use and coping strategies have been associated with depression; research is needed on factors contributing to depression among individuals experiencing low income. This study examined substance use, coping strategies (engagement and disengagement), and depressive symptoms among 271 emerging adult college students aged 18-24 who reported experiencing low income. Linear regression modeling indicated that more substance use, less use of engagement coping, and more use of disengagement coping were associated with more depressive symptoms. Future research should explore how other aspects of socioeconomic status relate to depression.

Assessment of a Novel, Peer-Led, Video-Based Critical Thinking Motivation Intervention

Anna Pusser (Psychology)

Critical thinking skills are essential for college students to succeed in their courses, future careers, and everyday life. Motivating students to utilize critical thinking skills is important because they do not see them as useful other than for getting a grade in a course. Undergraduate psychology students were invited to participate in a novel, peer-led, video-based critical thinking motivation intervention followed by application questions. Students' demographics, critical thinking skills, and critical thinking motivation were measured, and analyses were conducted to assess the effectiveness of the intervention. This research will inform future instructional methods for teaching critical thinking motivation and skills.

The Effect Of Mitragynine on Dopamine Transmission in the Nucleus Accumbens

Lindsay Ringer (Psychology)

Mitragyna speciosa Korth (*M. speciosa*) is a tree primarily found in regions of southeast Asia, Philippines, and New Guinea. *M. speciosa* is commonly referred to as kratom and is currently legally available for purchase over the counter in most of the US. In other countries such as Thailand and Malaya, Kratom has been used traditionally to treat intestinal infections, diarrhea, fever, pain, morphine dependence, and opium substitute. Mitragynine (MG) is the main psychoactive alkaloid accounting for 66% of the total alkaloid contents extracted from kratom leaves. Clinical reports have shown that lower doses of kratom result in stimulant-like effects, while higher doses result in opioid-like effects. However, little is known about the abuse liability of kratom. Drugs with a high abuse liability either directly or indirectly increase extracellular dopamine in the mesolimbic pathway, specifically in the nucleus accumbens (NAc). To determine the potential abuse liability of kratom, we used *in vivo* fixed potential amperometry to measure real time dopamine release in anesthetized mice before and after administration of MG (1, 15, or 30 mg/kg, *i.p.*) or vehicle (control). Results suggest that MG administration did alter dopamine release patterns over the 90 min recording period, with low dose MG resulting in more dopamine release over time compared to vehicle and the other MG groups (medium and high doses). However, analyses at specific time points revealed no significant dopamine release differences between any groups. The findings indicate that MG does not alter dopamine release in the same way that is observed with typical drugs of abuse, suggesting kratom may not have the abuse liability problems that are associated with dopamine agonists. These findings could have major impacts on public health if kratom proves to be a useful substitute for opioid medications with little risk of addiction.

The Effects of Musical Nuances and Musical Training on Spatial Ability

Wesley Roberts (Psychology)

Research has found contradictory evidence regarding the effects of music on spatial ability, while largely ignoring contributing factors of musical complexity and musical training. The purpose of this study is to establish evidence that musical complexity and musical training will have an effect on an individual's spatial ability. Specifically, it is hypothesized that participants will exhibit improved spatial ability after listening to high musical complexity and that participants with musical training will exhibit improved spatial ability over participants with no musical training.

Examining Socioecological Protective Factors associated with Childhood Depression in Children Exposed to Adverse Childhood Experiences

Rachel Stobbe (Psychology)

Protective factors including resilience, social support, and community cohesion, may be associated with depressive symptoms in children exposed to adverse childhood experiences (ACEs). Participants included 49 children (Mage=10.43, SD=1.57; Black=95.83%) from lower income households in the MidSouth, US. A linear regression was run to assess relationships between depressive symptoms and each protective factor, controlling for ACEs exposure and family income. The model was significant, ($F(5,45)=3.12$, $p=.02$, $R^2=.28$), with higher resilience ($\hat{\beta}=-.40$, $p<.05$) and less ACEs exposure ($\hat{\beta}=1.78$, $p=.04$) associated with fewer depressive symptoms. Interventions should target key resilience components (i.e., recognizing personal strengths, cooperating with others) to reduce child psychopathology.

Graduate**BUSINESS****Does short selling anticipate firms moving in and out of high default risk group?**

Huiyang Li (Finance, Insurance and Real Estate)

Using data for 2007-2018, we study the relation between a proxy for a companies' equity short interest and changes in its expected default risk measured with a simplified Merton distance-to-default model. We find that short interest predicts changes in default risk. Further, shorting predicts a firms' movement into the top default-risk decile. Investors, managers, and regulators can use short interest as an early warning signal for a firm's deteriorating financial health.

Investigating for Whom Promotion Loss Leads to an Expectation of Discrimination

Devalina Nag (Management)

Being offered a promotion is a tangible signal of one's worth and merit from their organization. While past research has examined the psychological implications of receiving a promotion, substantially less work has considered what happens when promotions are lost to similarly qualified coworkers. As such, we integrate principles of Relative Deprivation Theory (RDT) with tenets of intersectionality to explain the anticipated discrimination that marginalized employees may feel when a desired promotion is awarded to a similarly qualified non-minority coworker. Our research is situated at the intersection of race and gender, with the assumption being that racial minority women will report anticipating the greatest discrimination when passed over for a promotion by a White man. Our findings support our theorizing, such that losing out on a promotion to a majority identity status coworker may lead marginalized employees (women, racial minorities, and racial minority women) to expect future discriminatory behavior enacted toward them. We demonstrate that when stigmatized, but similarly qualified, employees lose a promotion to a majority status other – they are likely to experience complex psychological processes that shape their understanding of the organization's treatment of employees who are stigmatized.

Words Matter: A Closer Look at Earnings Calls and Financial Performance

Courtney Peters (Marketing & Supply Chain Management)

Previous research has addressed how personality characteristics of TMT members, in particular the CEO, might impact financial decisions (Chin et al., 2013; Kashmiri & Mahajan, 2017); however, little research has considered how the language prepared in advance by a company may provide signals to stakeholders and, ultimately, impact a company's financial performance. This study employs computer aided text analytics (CATA) to explore the relationship between language used in quarterly earnings calls and financial performance. The preliminary results indicate that promotion focused and authentic language is associated with superior Tobin's Q while concrete and practical temporal language negatively impacts Tobin's Q.

Value Investing Hedging Strategy in S&P using Digital IQ Scores

Priyanka Singh, Fatemeh Kamkar (Business Information Technology)

The proposed strategy to go long on undervalued stocks based on the digital IQ score of a company is built on the premise that the companies which are ranked low on digital IQ are undervalued and generate a difference in average return (Return monthly = 1.48 percent; Return annual = 17.76 percent). Further, stocks with low DIQ are better avenues for investment due to relatively lower trading costs as reflected in lower average spread (Average Spread bottom = 0.497). This strategy is restricted to the stocks in S&P and hence gives ample room for scaling up the positions, thereby incurring a low-price impact.

Are You Drawing Thieves' Attention? A Study of Firms' Digital IQ, System-Visibility, and Data Breaches

Santhosh Srinivas (Business Information Technology)

Digital technologies are reshaping business-strategies, and it is essential for organizations to develop one. Success of Strategy depends on firm's digital-IQ(DIQ), or an organization's ability to manage its systems that embeds technology. It also affects amount of information world (hackers too) have about the company, raising an important concern, how much to reveal? Firms might reveal crucial information of Systems-Process-Information (SPI) to the world, resulting in losing edge and influencing potential data breach. This study addresses these issues and examines the effect of DIQ and SPI visibility on Data breaches. We also propose the said effect is moderated by firm's innovativeness.

Let it Out: The Impact of Vent-Target on Consumer Forgiveness After a Corporate Apology

Jennifer Tatara (Marketing & Supply Chain Management)

Given the growth of online communication, companies can provide consumers an outlet to voice disappointment after a mass corporate failure. Under an attribution theoretical framework, this study suggests that the deliverer of an apology influences consumer forgiveness after venting. Specifically, this

research examines whether consumers experience greater forgiveness after venting to the entity (company-issued apology) versus the CEO (person-issued apology). Moreover, perception of attribution is revealed as the mediating mechanism in which a company vent-target results in higher forgiveness. Findings contribute to the literature by identifying how firms can optimally respond to adverse events in order to increase consumer forgiveness.

Value Investing Hedging Strategy in S&P using Digital IQ Scores

Kamkar Pankaj (Marketing & Supply Chain Management)

The proposed strategy to go long on undervalued stocks based on the digital IQ score of a company is built on the premise that the companies which are ranked low on digital IQ are undervalued and generate a difference in average return (Returnmonthly = 1.48 percent; Returnannual = 17.76 percent). Further, stocks with low DIQ are better avenues for investment due to relatively lower trading costs as reflected in lower average spread (Average Spreadbottom = 0.497). This strategy is restricted to the stocks in S&P and hence gives ample room for scaling up the positions, thereby incurring a low-price impact.

EDUCATION

Using Physical and Chemical Evaluation of Soil Properties in Science Education

Christopher Bridges (Instruction & Curriculum Leadership)

Secondary science educators often face challenges in linking complex concepts to meaningful experiences for students. Therefore, it is important for instructors to develop new methods of engaging students in science, technology, engineering and math (STEM) fields. This project explores the potential for using the evaluation of soil physical and chemical properties as a means of encouraging student inquiry in the laboratory and subsequent observation of plant growth in the greenhouse. Based upon preliminary analysis of results, great opportunities exist to use soil property analysis to teach important concepts of particle size analysis, density calculation, environmental chemistry and plant nutrient management.

College Choice Determinants: Evidence of Heterogeneous Preferences from the Survey Data

Md Mohsan Khudri (Economics)

This paper identifies the determinants of college choice and investigates how these determinants vary across students' gender, socioeconomic status, prior academic performance, and place of residence. College reputation, entrance standard, and college environment are the most influential determinants of

college choice. I show that different dimensions of college choice include various levels of perceived importance among respondents. Results also suggest that female students are more likely to choose public universities than male students, while students having middle-class backgrounds are associated with a greater likelihood of choosing public universities than those from rich families.

Exploring Self-Determination Theory-Based Motivational Profiles for Exercise Participation among U. S. Line Dancers

Patrick Shipp (Educational Psychology and Research)

Physical activity is important in reducing the number of chronic health conditions within the United States. To promote physical activity participation, motivation is considered a key factor. The primary aim of this study is to identify homogeneous motivation profiles for exercise participation of a sample of U.S. line dancers. A sample of 705 volunteer line dance participants, 682 women and 23 men, aged 18 to 85 years, was recruited from across the United States. The participants represented different U. S. regions: Midwest (26.3%), Northeast (11.5%), South (46.2%), and West (16%). The motivation profiles that emerged are informative for future intervention.

WHY THEY STAY: A PHENOMENOLOGICAL INVESTIGATION INTO THE EXPERIENCES OF EARLY CHILDHOOD CARE EDUCATION PROFESSIONALS

Jessie Tinoco (Adult and Higher Education)

Competent Early Childhood Care and Education (ECCE) professionals are critical to children's welfare as they play a vital role in child development in center-based programs. Members of the ECCE workforce struggle to cope with numerous challenges in and outside of the workplace. Barriers include income levels beneath the standard for a livable wage, which deterrers people from entering or remaining in this field. This session reviews the findings of a phenomenological study on professionals who remain in the profession for more than five years.

Undergraduate Student Perceptions of the Qualities of Effective Online Software Instructional Video

Chelsey Hooper (Education)

Undergraduate university students experience a knowledge gap when required to use unfamiliar software applications without the benefit of direct instruction. As libraries are a principle resource on campus where students can seek additional academic help, library staff can benefit from a study of student perceptions of the effective qualities of online instructional support video for software knowledge development. This basic qualitative study gathered undergraduate students' perceptions of the qualities of effective online software instructional videos through descriptive survey and semi-structured interviews with thematic analysis. Themes discovered revealed positive perceptions of video with recommendations for improved learning.

ENGINEERING**Decoding categorical speech perception from neuroelectric (EEG) brain responses using machine learning**

Md Sultan Mahmud (EECE)

We built a framework to understand the temporal (when in time) characteristics of speech evoked responses that differentiate prototypical vowels (true phonetic categories) from ambiguous ones (lacking a clear phonetic identity). Source derived EEG response features were submitted to support vector machine (SVM) classifier. Whole-brain data provided the best decoding of prototypical from ambiguous speech with an accuracy of 95.16% at 120 ms. Separate analyses using left hemisphere (LH) and right hemisphere (RH) data showed that LH activity was a better predictor of speech categorization as compared to RH (89.03% vs. 86.45% accuracy).

Detecting human vision disease with machine learning and computer vision methods.

Ali Salehi (Electrical and Computer Engineering)

Glaucomatous structural changes are observable non-invasively using optical imaging techniques. Machine learning models can extract information from high dimensional data such as image sequences which may require a lot of training for humans to do. With our trained Deep learning models, we can achieve effective and early detection of glaucoma progression in clinics.

Idk. wA Novel Factor Graph-based Optimization Technique for Stereo Correspondence Estimation

Hanieh Shabanian (Electrical and Computer Engineering)

The 3D architecture of an object or a scene can be estimated from two (stereo) or more views of the scene by determining correspondences among the multiple views of the scene. Dense pixel-level correspondences between images in a stereo pair can be estimated using stereo matching algorithms. In this study, we present a new factor graph model for optimizing stereo correspondence estimates using the sum-product message passing technique. Our new stereo correspondence estimation technique is validated using standard benchmark stereo datasets.

Performance Evaluation of Tunable 3D SIM Using Different Restoration Algorithms

Jules Mohammed (Electrical & Computer Engineering)

In a tunable 3D structured illumination microscopy (3D-SIM) based on an illumination system comprised by a multi-slit array and a Fresnel biprism, the illumination pattern depends on the design of the slit array. Simulations with different illumination designs evaluate system performance by investigating both lateral and axial resolution achieved in the restored images. A 3D star-like object is used in the simulations. Results are quantified using the mean square error (MSE), structured similarity index (SSIM), as well as intensity profiles.

Assessment of White Matter Lesions on Computed Tomography Images using Deep Learning

Utsav Shrestha (Biomedical Engineering)

Cerebral white matter lesions (WML) are common in aging brain and are associated with Alzheimer's disease, dementia and stroke. The purpose of this study is to automate the assessment of WML on computed tomography (CT) images using deep convolutional neural network (DCNN). Our goal is to predict Fazekas score for assessing the severity of WML by DCNN using magnetic resonance imaging (MRI) based Fazekas score as ground truth. A DCNN was constructed (4 blocks, each block with 3 layers) using 218 CT datasets (108 training/55 validation/55 testing) and this produced training/validation/testing accuracy scores of 1.0, 0.45 and 0.38 respectively.

Numerical Evaluation of Surficial Non-liquefiable Soil Layer Impacts on Liquefaction Surface Manifestation

Hamed Tohidi (Civil Engineering)

Due to the dynamic loading of earthquakes loose saturated sands lose shear strength and liquefaction occurs which causes serious damages. As part of a seismic and liquefaction hazard mapping project for western Tennessee granted by HUD to the University of Memphis, the non-liquefiable soil layer's impact on liquefaction surface manifestation has been analyzed. Liquefaction hazard maps show significantly different results due to the non-liquefiable soil layers effect. The goal of this study is to develop a procedure for evaluating liquefaction potential that considers the impact of non-liquefiable soil layers on the surface manifestation of liquefaction based on finite difference methods.

LIBERAL AND FINE ARTS

Keep me safe: An approach to transitional housing for post disaster recovery.

Sadikshya Bastola (Architecture)

The increasing frequency of natural disasters has raised a need for developing temporary and permanent housing solutions. As people are trying to rebuild their houses and the built environment, their human state is most vulnerable. It is essential to understand the needs of a community to create shelters for the displaced population keeping in mind the options available. When people are provided a comfortable dwelling with safety, security, and privacy, a healing process can begin in their lives. This project focuses on designing a shelter that allows designs to transform into a permanent dwelling and strengthen community reforming relationships, sustainable intervention for people struggling to rebuild their lives. This is not a “one-design fits most” community program shipped to each site after a disaster. A successful disaster relief project is adaptable for various physical site conditions with sustainable characteristics and locally available materials. The research begins by studying current recovery strategies followed by a series of case studies to clarify the disaster’s nature in terms of the devastation level for the built environment and concentrated problem that needs to be addressed. Then, it continues with a design solution that focuses on transforming temporary structures into a permanent dwelling and strengthening relationships for community reforming. The research concludes with site-specific approaches that include sustainable building systems and contextually responsive materials, allowing the design to nurture the site’s growth.

The Sustainable behavior of Individuals - A study to analyze the reasons for sustainable behavior

Laura Bente (MALS)

My research will determine, how and why people behave or decide when it comes down to sustainability. I want to know the reasons why an individual behaves a certain way and if it is connected to external factors or internal factors. Is it education, social status, laziness or other factors. With this research we will be able to adjust things to make this city / country more environmentally friendly.

Trouble in Mind: A Lighting Journey into Entertainment's Systematic Racism

Natalina DeFusco (CCFA -- Theatre and Dance)

As part of my graduate education last Fall, I created a lighting design for a play that was part of the Department’s season. The play takes place in a theater in the late 1950’s with a diverse cast. As part of my design process, I conducted visual and historical research that ultimately shaped the environment I wanted to create: a reality that is subtly harsh but ever-present; a reflection and a reaction to the setting the characters were living in. There were moments where the “magic of theatre” emerged, but never for long.

How Cardi B's W.A.P Music Video Uses Visuals to Express Sexual Liberation and Agency

LaTunya Evans (Journalism)

In August 2020, Cardi B and Megan Thee Stallion released the song and music video for the song "Wet Ass Pussy" or "WAP". While "WAP" was successful, it was criticized for being overly sexual and a cameo appearance by Kylie Jenner. This study argues that the artists used "WAP" to emphasize sexual liberation and sexual agency through visuals. This study also argues that Jenner's cameo was important in supporting sexual liberation and sexual agency. These findings further explore how being a woman and wife have transformed as they began to own and embrace their sexual agencies and liberation.

Transnational Feminism: On Being a Woman of Color Within A Utopian Ethos of Difference

Noor Ghazal Aswad (Communication and Film)

In this paper, I explicate the coloniality of transnational feminism through an interrogation of two of its celebrated key-terms, namely the discursively dominant "woman of color" and "muslim feminist." By examining the situated practice of feminist discourse, I illustrate the tendency of these terms to subsume difference across the spatial, temporal, and cultural histories of women, arguing they have not always acted as neutral or positive descriptors in feminist praxis. In probing the ingrained reductionism of these terms, I argue they truncate formative experientiality in their commitment to a unifying feminist project based on sameness. These rhetorical terms cement fixity, fetishizing women's identities while calcifying their constitutive complexities. Transnational feminist discourse must transcend the theoretical buttressing of normative western feminist paradigms towards a utopian ethos of difference. In conclusion, I advocate for alternate rhetorical constructions enveloping the epistemological and ontological experiences of women towards a more authentically feminist discourse.

An examination of teaching artist self-efficacy related to their arts entrepreneurial attributes

Cordara Harper (School of Music)

The purpose of this study was to examine teaching artists' self-efficacy related to their entrepreneurial attributes. Subjects in this study (N = 15) were solicited to volunteer in a Likert-scale survey on the self-efficacy of entrepreneurial attributes. The subjects (N = 15) specialized in music, theatre, visual arts, and dance ranging from 4 to 47 years of experience as a teaching artist. The study was basically exploratory in nature and was highly limited in the amount of information it attempted to uncover, however; the results created some new direction in which future research in entrepreneurial attributes of teaching artists' can be implemented.

The Urban Oasis; How Architecture can integrate Nature into the Urban Fabric

Joseph Murphy (Architecture)

In the 21st century not including 2020, because it has been an unprecedented year, the average person wakes up, drives to work, drives to lunch, back to work, then back home, sleeps, and repeats it five days a week, fifty weeks out of the year. The apartments that they live in, workplaces they work in, and restaurants they eat in are designed to make the building owner the most money possible. That means the majority of a person's life is spent in spaces that aren't designed for the user. This means the health and well-being of the user plummets. 2020 is the easiest place to look at the examples of this. Globally people had to stay inside, quarantine, and so distance themselves from each other. People need nature, fresh air, and living things. This project brings biophilia, nature, and experience into each aspect of a person's life, and potentially could be the future of urban design and development.

Schizophrenia and Leadership: Does having a mental illness set leadership skills apart?

Kimberly Beth Neely (College of Professional and Liberal Studies)

Schizophrenia is a serious and often disabling disease. It is sometimes related to Autism. Some researchers would put good leadership, such as emotional intelligence, on the opposite end of the Autism spectrum. However, through research, people with Schizophrenia possess a great gift of creativity which increases organizational commitment and employee performance. Emotional intelligence only increases commitment. Just because someone lives with a mental disability does not mean they are useless. It could be what sets them apart.

Monsters/ Ghosts/ Killers: Analysis of Horror Films and Hidden Meaning

Anthony Presley (Fine Arts)

Horror films have been used to exploit our basic emotion of fear. Using audio, visual, and timing, the genre stimulates multiple senses of the viewer to create a fight or flight emotional response. On the surface, horror can give the illusion of being unrealistic forms of entertainment and is often viewed as "low brow" art to the average movie goer. However, these films are often composed of subtexts and implement symbolism to represent different communities and cultures. By looking at the history of horror films, there is a proven connection between reality and the monsters onscreen.

Green With Envy: Teaching Theatrical Lighting Design on a Virtual Platform

Jennifer Propst (Theatre and Dance)

The author will present a theatrical lighting design project suitable for undergraduate and graduate students. The project was created and adapted during the COVID-19 pandemic. Many universities have been offering classes remotely and do not have the luxury of hands-on class experiences. The author created an experience that explores the use of monochromatic colors and how color effects mood and emotion. The project utilized at-home lighting equipment such as clip lights, desk lamps and flashlights along with traditional color media to design creative lighting environments while also allowing exploration of monochromatic principles of light.

Sound design in The Women of Lockerbie to aid in catharsis and healing

Jennifer Propst (Theatre and Dance)

The author will describe how they used theatrical sound design to aid in the storytelling of the University of Memphis production of *The Women of Lockerbie*. The author utilized the idea of distorted and unclear sounds to show the progression of grief to healing through the stories of the characters on stage. By using strange and uncomfortable sounds, the actions onstage and the extreme grief the characters were experiencing was heightened. As the play progresses, sounds became clearer, and music was harmonious which paralleled the stages of grief and acceptance the characters were experiencing.

The Need for Humanities Training for Public Health Practitioners Who Work with Refugees.

Nicholas Rummell (College of Professional and Liberal Studies)

The world is currently witnessing the highest levels of refugees on record. Many of these refugees are arriving in the United States and attempting to restart their lives, while suffering from a myriad of health issues. Unfortunately, public health practitioners who work with refugees often do not have the training or the resources to properly treat these patients. In order to forge deeper connections, and provide better treatment to refugees, sensitivity to social and cultural determinants of health is a necessity. One of the most effective way of introducing this sensitivity is through Humanities training for public health practitioners.

Architecture of Mindfulness: How Architecture Can Engage the Five Senses

Farnaz Sadeghi (Architecture)

Today's digital world has made people more isolated from themselves, resulting in more mental and physical illness for human beings. Modernity, also, has caused a big shift from the fundamentals of human experience in space. As a result, mindfulness (mind consciousness), which happens with the aid of body awareness, has become dramatically important for maintaining personal well-being. This thesis explores the idea of presence (mind consciousness) in the moment and how architecture can play a role. It investigates the ways architecture can engage the five senses with the advantage of form, material, light and shadow, and connection to nature.

From “Angelegenheit Großdeutschlands” to “Österreichische Abende”: Programming the 1945 Salzburg Festival

Rachel Scott (Music)

Österreichische Abende, or Austrian Evenings, were a series unique to the 1945 Salzburg Festival. These six solo recitals, five of which featured singers, highlighted Austrian musical culture by recruiting Austrian performers to perform Austrian music in an Austrian setting. For the first time since the Annexation in 1938, Salzburg Festival administrators had the opportunity, albeit with limited resources, to assert an identity separate from Germany. By leveraging available resources, collaborating strategically with occupiers, evoking nostalgia, and providing a sacred space, these small-scale recitals were integral to the first post-war season of the Salzburg Festival and its subsequent revival.

You meme I'm not alone: How individuals with eating disorders use Instagram for social support

Rachel Stark (Journalism and Strategic Media)

Eating disorders are some of the deadliest psychiatric illnesses that we know of. Because the internet has been used to communicate and has formed online communities, some people with eating disorders have grouped themselves together to form their own community. This has historically been seen as a negative thing. This study seeks to understand the complex reasons that individuals with eating disorders use Instagram and if it is also negative. This study found that the individuals observed in this study used Instagram in a variety of ways. As it relates to social support theory, people with eating disorders who use online communities may use them to feel more connected and less lonely. This research found that this can trigger positive behavior as well as negative.

Disorienting Dilemmas in Architecture: Using Recycled Materials in the Built Environment to Foster Critical Consciousness

Brock Terwilleger (Architecture)

This project examines the use of disorienting dilemmas in architecture to affect behavior change. A concept from the field of education, disorienting dilemmas are moments that cause people to reassess their world view. The research aims to find ways to trigger disorienting dilemmas in the built environment that lead to more environmentally and socially responsible consumers. The project is a sustainable clothing store located in the South Main Historic District made of recycled materials. The goal is to use consumer goods in building materials to make people question the impact of their values and consumer behavior on the world.

LIFE AND HEALTH SCIENCES

Auditory cortex susceptible to lexical interference during speech categorization decisions under informational versus energetic masking

Jared Carter (Communication Sciences & Disorders)

Speech perception requires grouping acoustics into phonemes via categorical perception (CP). This study was conducted to determine whether linguistic interference influences the acoustic–phonetic conversion process inherent to CP. We measured source-level, event related potentials from auditory cortex and inferior frontal gyrus as listeners categorized phonemes presented in quiet and in forward (informational masker) and time-reversed (energetic masker) 2-talker babble. We hypothesized a differential effect of informational versus energetic masking on categorization. We found informational masking weakens phoneme identification beyond energetic and AC is susceptible to lexical interference. These findings provide evidence for top-down influences on acoustic–phonetic grouping.

Relationships between sound acceptability, emotional reactivity, and personality in normal hearers

Rachel Huber (Communication Sciences and Disorders)

Many hearing aid users have difficulty accepting amplified sounds in daily listening. It is not clear how personality and emotional reactivity are related and impact sound acceptability. This research aimed to clarify these relationships for normal-hearing young adults. Fifty-three normal-hearing young adults participated. The survey included demographics, tests of personality and emotional reactivity, and a listening task. Some personality traits were related to emotional reactivity. Agreeableness and negative emotional reactivity related to sound acceptability outcomes. In a predictive model, these traits accounted for a small, significant amount of variance in some acceptability ratings. These findings provide rationale for further investigation.

Give Them What They Want: Evaluating Perceptions of Hearing Devices

Jacqueline Kim, Ashley Morgan (Communication Sciences and Disorders)

At least 37.5 million Americans report trouble hearing, yet only approximately 17% of those adults wear hearing aids. As affordable alternatives to traditional hearing aids and services arrive on the market, it is of interest to understand public perceptions surrounding these devices, and what factors might impact an individual's willingness to use or recommend one type over another. This study looked at these questions. What are perceptions of some current hearing devices on the market when cost is not provided? When approximate costs were considered, which devices would people recommend or purchase? What influenced these decisions? What factors affected a person's reason to use or recommend a traditional versus a non-traditional hearing device?

Obesity and Overweight vs. COVID-19 Confirmed Cases and Deaths in the United States

Ehsan Momeni, Isbah Ali Farzan (Earth Sciences)

Obesity and overweight are common and serious chronic diseases in the United States. Obesity/overweight puts people at more risk of many other diseases including diabetes, heart diseases, and certain cancers. This study explores the relationship between the percentage of obese/overweight population and COVID-19 confirmed cases/deaths per 100,000 population at a county level over the U.S. Statistical analyses show that counties with more percentage of obese/overweight population significantly experienced more COVID-19 confirmed cases/deaths determined by ANOVA ($F(3,3103) = 77.188, p = .000$ and ANOVA ($F(3,3103) = 109.626, p = .000$ for cases and deaths, respectively).

Dichotic listening deficits in amblyaudia are characterized by aberrant neural oscillations in auditory cortex

Sara Momtaz Bokharaei (Communication Sciences and Disorders)

Amblyaudia (AMB) is a subcategory of APD characterized by abnormally large ear asymmetries in dichotic listening tasks. Here, we examined frequency-specific neural oscillations and functional connectivity via electroencephalography (EEG) in children with and without AMB during passive listening of nonspeech stimuli. Inter-trial phase-locking (ITPL) maps of these "brain rhythms" revealed stronger phase-locked beta-gamma (~35 Hz) oscillations in AMB participants within bilateral auditory cortex for sounds presented to the right ear, suggesting a hypersynchronization and imbalance of auditory neural activity. Our results reveal abnormally large auditory sensory encoding and an imbalance in communication between cerebral hemispheres in AMB.

Do patient traits predict post-amplification changes in hearing-related quality of life?

Lipika Sarangi (School of Communication Sciences and Disorders)

Research has demonstrated that use of hearing aids (HAs) can significantly improve patients' Hearing-related Quality of Life (HRQoL); however, inter-individual outcomes vary substantially. Although patient traits might mediate perceived benefits from amplification, the effects of these variables on perceived HRQoL are unclear. This research sought to determine the degree that traits such as age, hearing ability, working memory, and personality might predict perceived post-amplification changes in HRQoL. Results of regression analyses demonstrated that hearing ability is the most significant contributor of HRQoL. Also, Agreeableness and Neuroticism personality traits, when used in tandem, might mediate the prediction of changes in HRQoL.

A Study Based On How Metacognition Develops In Undergraduate Students

Kendra Wright (Biology)

Metacognition is the awareness of one's own understanding. Students who are aware of their understanding and how to regulate their metacognitive skills are more receptive to changing their studying method. We examined changes students made to their studying as they progressed through the major. We concluded students do not have set studying skills in introductory biology courses. As students reach upper division courses, they start to narrow their studying methods. However, many students require additional support to achieve academic success. Students who exhibited signs of actively engaging in metacognition were more likely to adjust their study method.

From Boss to Influencer: Lessons on Nursing Leadership Amid a Global Pandemic

Julie Young (Graduate; Nursing)

Background: In March of 2020, health care professionals around the United States began facing additional challenges in health care delivery during the Covid-19 global pandemic. Influencers emerged from nursing leaders who responded to the call for action. As guidelines changed almost daily, these influencers elevated themselves from traditional leadership roles to fulfill the safety needs of their patients, communities, co-workers, and families. **Purpose:** This literature review will explore parallels between the qualities found in the book "Influencer" and those exhibited by nursing leaders who navigated the unknown healthcare landscape during the beginning months of the Covid-19 pandemic. **Methods:** A qualitative review of literature from various academic and professional journals paralleled by the best selling book "Influencer." **Findings:** Nursing leadership has evolved dramatically in the short amount of time since the beginning of the pandemic. Using the principles of the book "Influencer," a framework for assisting new leaders can be developed as today's healthcare climate changes. **Conclusion:** Antiquated methods of nursing leadership are diminishing rapidly, and as the nursing leaders of the future, our goal should be to influence rather than boss our teams.

MATH AND COMPUTER SCIENCES

Characterization of Hermitian projections on spaces of bounded operators

Priyadarshi Dey (Department of Mathematical Sciences)

We say that a projection P is a Hermitian projection if e^{itP} is a surjective isometry for every t in \mathbb{R} . One of the main problems is to give an explicit description of the Hermitian projections on different Banach spaces. It has been well studied for many Banach Spaces and for algebras as well. In this presentation, forms of such projections will be mentioned for important Banach spaces. Also, in specific, the form of such projection on the space $B(H, K)$ for distinct Hilbert spaces H and K will be presented. This is a joint work with Fernanda Botelho & Dijana Ilisevic.

Building Indoor Point Cloud Datasets with Object Annotation for Public Safety

Mazharul Hossain, Tianxing Ma (Computer Science)

An accurate and reliable model of building interiors with detailed annotations is critical to protecting the first responders and building occupants during emergency operations. In collaboration with the City of Memphis, we collected extensive LiDAR and image data for the city's seven buildings. We will present how we have been collecting data, challenges in data collection and processing. We will also demonstrate the process we use to create the comprehensive 3D indoor space database with color data and annotations. Like, the application of machine learning techniques to automatically detect and classify safety-related objects in the 360-degree image dataset, merge both datasets, stitch the point clouds, and geo-referencing the stitched datasets.

Forensic Analysis of Crypto Ransomware using Hybrid Multi-level Profiling Approach

Subash Poudyal (Computer Science)

Crypto ransomware being the most prevalent form of modern malware has affected various industries, demanding a significant amount of ransom. Various static and dynamic analysis techniques exist, but these methods become less efficient as the malware writers continuously trick the defenders. In this work, I developed an AI-powered hybrid approach to detect ransomware using multi-level profiling which captures the distinct features at DLL, function call and assembly levels. The experimental result shows that multi-level profiling can better detect ransomware with higher accuracy and low false-positive rates.

WikiMorph: Learning to Breakdown Words into Morphological Components using GPT-2

Jeff Yarbro (Cognitive Science)

Learning to breakdown words into morphemes, the smallest meaning-carrying units within a language, has been shown to increase the rate of vocabulary development and positively correlate with reading ability. Unfortunately, acquiring large-scale morphological data requires expensive annotations or the usage of morphological segmentation tools. To address this issue, we introduce WikiMorph. WikiMorph is a GPT-2 based model that uses data extracted from Wiktionary to automatically generate complex word breakdowns for learning applications. These breakdowns consist of morphemes, etymological compounds (i.e., morphemes from root languages), and definitions for each component.

PHYSICAL AND APPLIED SCIENCES

Computational Ligand Discovery Efforts to Identify Chemical Tools to Study GPR52

Paige Castleman (Chemistry)

GPCR are highly sought-after drug targets involved in cellular signaling. The first step in any drug discovery study for proteins with limited known information is ligand discovery. With the prohibitive costs of ligand discovery studies, computer-based efforts are one way to reduce costs. Here, we used computational modeling methods previously benchmarked in this lab group to target GPR52, a GPCR thought to be a potential therapeutic target for Huntington's disease. Our computational ligand discovery efforts have resulted in a prioritized list of candidate ligands to serve as chemical tools or drug leads to later be experimentally screened.

A multidisciplinary approach to analyzing the 1541 Hernando de Soto expedition in eastern Arkansas

Rachel Clark (Earth Sciences)

In 1541, Hernando de Soto met the chief of the Casqui chiefdom near present-day Parkin Arkansas. Conversation centered on the chief's request for de Soto to use his powers to summon rain to relieve Casqui's people from the recent drought. Through a multidisciplinary research perspective, employing archaeology, ethnohistory, and climate studies, it is possible to gain a better understanding of the world into which the expedition stepped. I present a multifaceted approach to better appreciate the interaction of the de Soto expedition with the indigenous people of eastern Arkansas through paleoclimate data linked with ethnographic accounts and archaeological evidence.

Hydrophobic Surface Patch Disruption to Produce Water-Soluble G-Protein Coupled Receptor Analogs

Christy Dyer (Chemistry)

G-Protein-Coupled Receptors (GPCR) are the largest group of pharmaceutically targeted membrane proteins, yet only ~16% of all known GPCR are drug targets. Studying membrane proteins is complicated by their hydrophobicity, instability when removed from membrane, and difficulties with expression, purification, and crystallization. Informatically-driven disruption of hydrophobic surface patches is hypothesized to produce water-soluble analogs of target GPCR. Dopamine receptor 2, adenosine diphosphate receptor, and cannabinoid receptor 1 will be used as proofs of concept. Sequences optimized for E. coli codon usage are being subcloned into bacterial vectors with a green fluorescent protein folding reporter for expression and characterization.

Quantifying Diffusible Signal Factor Degradation using Negative-ion Liquid Chromatography Electrospray Ionization Mass Spectrometry (HPLC-ESI-MS)

Brian Hoffman (Chemistry)

Diffusible signal factors (DSF) are fatty acids known for their potential as anti-biofilm agents. The prevention and eradication of biofilms is an important measure to fight bacterial infection and antibiotic resistance. Only the less stable of the 2-decenoic acid isomers, C2DA, is an effective DSF antibiofilm agent. To study the delivery and stability of C2DA, methods have been developed in which the isomerization/degradation of C2DA can be quantified over time. C2DA and its more stable cyclopropyl analogue (2CP) have been tested in a short-term stability study against oxidative pressure. This study has successfully demonstrated 2CP has greater stability than C2DA.

Investigating uranium hexafluoride gas and organic surface interactions: filling in gaps at Argonne National Laboratory

Kristin Knight (Chemistry)

Uranium hexafluoride (UF₆) gas has been used in uranium enrichment for over 80 years, but little is known about UF₆ reactions with organic surfaces. To help elucidate these reactions, our UofM-led team designed a unique apparatus to safely react UF₆ with organic surfaces. The chamber was built at Argonne National Laboratory and is equipped to characterize surface reactions in real-time, principally using reflection absorption infrared spectroscopy. We first focus on well-behaved "model hydrocarbon surfaces" - alkylthiolate self-assembled monolayers - and report how these surfaces respond to UF₆ attack as UF₆ adsorbs to the surface and disrupts the carbon chains.

Groundwater quality impacts of infiltration galleries as a managed aquifer recharge strategy in northeastern Arkansas

Alex Sharp (Earth Sciences)

The Mississippi River Valley alluvial (MRVA) aquifer is the primary water source for crop irrigation in the Lower Mississippi River Basin. Overexploitation of the MRVA in eastern Arkansas has resulted in critical groundwater areas. Managed aquifer recharge using infiltration galleries (IG) is being investigated as a strategy for sustaining groundwater resources. On-farm storage reservoir water will be injected through the IG and 30 m of unsaturated zone, which will provide a sand and gravel filter to remove sediment and other particles. This study compares reservoir and groundwater quality to understand potential chemical reactions and changes in water quality of concern.

Designing Cheminformatics-based Enzyme Quantum Mechanical Models: A Catechol-O-methyltransferase Case Study

Thomas Summers (Chemistry)

In order to accurately simulate an enzyme active site, the reactive species must be included in the model along with any important residues, solvent, or coenzymes interacting with the reactants. To design these models more rationally, our lab has been developing the Residue Interaction Network Residue Selector (RINRUS) toolkit to utilize interatomic contact information to automate residue selection and model construction. In this work, RINRUS constructed over 500 quantum mechanical cluster models of catechol-O-methyltransferase, and the predicted free energies of activation and reaction were used to evaluate model convergence. RINRUS-designed models with only 200-300 atoms are shown to converge.

A novel method of automated, score-based pharmacophore generation using Multiple Copy Simultaneous Search

Gregory Szwabowski (Chemistry)

Pharmacophores represent three-dimensional arrangements of molecular features required for biological activity and are often used in virtual screening efforts to prioritize ligands likely to bind a target biomolecule for experimental screening. G protein-coupled receptors (GPCR) are integral membrane proteins of considerable interest as targets for drug development. Pharmacophore models are traditionally ligand-based and are constructed via the identification of structural commonalities between known bioactive ligands. However, this method is inapplicable to those GPCR targets that lack known ligands. Thus, work discussed herein describes a novel method of structure-based pharmacophore generation applicable to ligand discovery for GPCR lacking ligands.

Modular synthesis of diffusible signal factor analogs for the study of antibiofilm action

Rachel Wiley (Chemistry)

Biofilms are composed of bacteria and biomolecules, and contribute to microbial antibiotic resistance. According to the Centers for Disease Control and Prevention, at least 2.8 million people are affected by antibiotic-resistant infections yearly in the US. Biofilm formation/dispersal is regulated, in part, by diffusible signal factors (DSF). One highly studied DSF is cis-2-decenoic acid (C2DA) which has been shown to disperse biofilms and prevent formation. We have synthesized a more potent C2DA analog, heptylcyclopropane-1-carboxylic acid (2CP). Herein we describe a modular synthetic approach to create 2CP analogs with varied head/tail groups for structure activity relationship and mechanism of action studies.

SOCIAL AND BEHAVIORAL SCIENCE

Factors Associated with E-cigarette Quitting behavior among Adolescents in the United States

Nikhil Ahuja (Social and Behavioral Sciences)

Encouraging adolescents to quit e-cigarettes is one of the public health priorities. This prospective observational study examined the association of individual, interpersonal, and environmental/policy factors with e-cigarette quitting behavior among US adolescents. We utilized data (n=243) from the Population Assessment of Tobacco and Health (PATH) study conducted among adolescent e-cigarette users. Data was analyzed using multivariate logistic regression analyses and structural equation modeling. Results suggest that harm perception and e-cigarette use at home/by important people play a significant role in determining adolescents' ability to quit e-cigarettes. Public health education campaigns should target individual and interpersonal factors in encouraging US adolescents to quit e-cigarettes.

Noise levels in the OR and their impact on job performance and speech perception

Caroline Bourgeois, Hannah Sherman (CSD)

This study evaluated sound levels in the operating room and their impact on communication and job performance during various stages of surgery. Sound levels were measured throughout pediatric orthopedic spinal surgeries, and the consequences of noise on speech communication and job performance were evaluated.

Song Properties and Familiarity Affect Speech Recognition in Musical Noise

Jane Brown (Communication Sciences and Disorders)

We used popular songs to probe the effects of familiarity and different properties of background music on speech recognition. Participants performed a sentence recognition task in the presence of popular music maskers comprised of the full unprocessed song, isolated instrumentals, or isolated vocals. Songs were categorized as “familiar” or “unfamiliar.” We found that recognition performance was worst in the song condition, and there was an overall negative effect of familiarity. Additionally, task performance was poorer only in the song and instrumental conditions. Our results show familiar background music hinders speech perception, especially when listening to full songs or instrumental versions.

Identification of Neural Signals in Orbitofrontal Cortex Underlying Risky Decision-Making

Daniel Gabriel (Psychology)

Excessive risky decision-making is a central characteristic of addiction. Identifying neuronal mechanisms and biomarkers underlying such addiction-relevant behaviors is necessary for precision medicine to target aberrant decision-making processes endemic to sufferers of drug addiction. I utilized single-unit electrophysiology in rats to record extracellular neuronal activity within the orbitofrontal cortex, a brain region involved with risky decision-making. I identified specific neuronal populations that signal distinct aspects of the risky decision-making process. Furthermore, unit responsivity prior to reward choice and outcome anticipation changed upon introducing risk of punishment. These data provide promising avenues for therapeutic targets of precision medicine in addiction treatments.

Disenfranchised Losses: Grief and Personal Growth in Non-death Loss Events

Mae-Lynn Germany (Counseling, Education Psychology, and Research)

Dynamics related to the global COVID-19 pandemic and political unrest over the past 15 months have resulted in myriad non-death losses (NDLs) for individuals and communities, making fuller understanding of NDLs more important than ever. These losses are typically not seen as grieveable events, as such, receive scant social support, resulting in disenfranchised grief. We examined loss experiences associated with NDL events, and factors that predicted grief intensity and personal growth. Results indicate that common predictors within bereavement literature, specifically event centrality, meaning made, and social meaning, are also relevant predictors in models examining grief and personal growth reactions within NDL events.

Skin Tone of Monsters has Paradoxical Effects on Emotion and Perceived Eeriness

Jillian Johnson (Computer Science)

Skin color in images of monsters and androids interacted to affect eeriness ratings and emotional responses to those images. Natural skin color in monsters elicited higher eeriness ratings and more negative emotional responses than unnatural color. For androids, this difference was reduced for emotion and reversed for eeriness.

Basolateral Amygdala and Orbitofrontal Cortex Regulate Sensitivity to Delayed Punishment

Anna Liley (Psychology)

Negative consequences that occur later in time are typically undervalued during decision-making. We tested the role of orbitofrontal cortex (OFC) and basolateral amygdala (BLA) on the rat Delayed Punishment Decision-making Task, which measures preference for delayed vs immediate punishment during reward seeking. Reversible pharmacological inactivation of either OFC or BLA reduced choice of delayed punishment without affecting sensitivity to immediate punishment, suggesting that these regions mediate the underestimation, or “discounting”, of delayed consequences. These regions may serve as therapeutic targets in psychiatric disorders characterized by compulsive choice of options associated with delayed negative outcomes, such as substance use disorder.

Effects of Isolation on Mesolimbic Dopamine Release in Aged Mice

Megan McWain (Psychology)

Mesolimbic dopamine transmission is associated with reward-processing, motivation, attention, and mood. Dopamine release is altered by social isolation, specifically during adolescence when dopaminergic pathways are still developing. Adults seem to be less vulnerable to the effects of isolation; however, few studies have examined these effects in older adults. The present study examined the effects of isolation on dopamine release using in vivo fixed potential amperometry in mice from 4 age groups: adolescents, young adults, middle-aged adults, and elderly adults. Results suggest that social isolation impacts dopamine release at all age groups, with adolescents and elderly adults being the most vulnerable.

That’s Why I Smoke Weed: An Analysis of #StonerMom Discourse on TikTok

Madison Mullis (Journalism and Strategic Media)

This research utilized Manning’s symbolic framework to gain a deeper understanding of the #StonerMom phenomenon. A textual analysis was used to examine 55 videos extracted from the “Discover” page on TikTok. The results found that the symbolic framing of drug use on TikTok draws on discourses of social inequality, subsequently reinforcing historical associations between marijuana and POC. #StonerMoms construct marijuana use as a parent-friendly activity through their social media discourse by utilizing the race-neutral term “cannabis” and by framing marijuana as a stress suppressant that helps them be more patient and attentive towards their children. As a result of privileged normalization, #StonerMoms have become complicit in the gentrification of marijuana.

Investigating Alignment of Nonverbal Behaviors in Individuals with Traumatic Brain Injury

Megan Parsons (Communication Sciences and Disorders)

Research has shown that the ability to align one's speech rate with conversational partners (CP) is impacted after a traumatic brain injury (TBI). This can lead to negative social outcomes, including perceptions of decreased social connectedness and decreased willingness of CP to engage in conversation. Despite these negative outcomes, researchers have yet to discover a therapeutic technique to increase speech rate alignment, and in turn, create positive social outcomes during conversation. This study proposes the use of Speech Entrainment therapy, which involves real-time mimicking of an audiovisual model, to unconsciously train individuals with TBI to align speech rates with CP.

The role of verbs in symbolic and embodied semantic processing

John Hollander (Psychology)

How do we derive meaning from arbitrary language? Modern theories of human semantic processing suggest that word meaning is derived from an integration of two types of encoded information: symbolic (i.e. statistical, linguistic), and embodied (i.e. perceptual, grounded). Such integrated theories have been empirically supported by laboratory experiments which typically employ nouns as stimuli. Verbs are more difficult to utilize in such experimental paradigms and have been neglected as a result. In this talk, I will describe an experiment conducted to test symbolic-embodied integrated theories of language processing, specifically adapted and extended to include verbs.

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