2023 WORKS IN PROGRESS SYMPOSIUM

THE UNIVERSITY OF MEMPHIS. | Helen Hardin Honors College

Monday, November 13th | Maxine A. Smith University Center

Welcome to the 2023 Works in Progress Symposium

The Helen Hardin Honors College is proud to sponsor the 2023 Works in Progress Symposium. This annual event provides a means for undergraduate students throughout the University to share their research with the general University community and recognizes the significant contribution to research by University of Memphis undergraduates.

Providing undergraduates with the opportunity to engage in scholarly research is important to our students' educational experience and professional development. To the faculty mentors who have guided their students along the way, we thank you for ensuring UofM students have every opportunity to pursue undergraduate research.

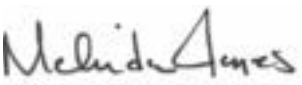
Thanks also to the faculty evaluators, who kindly provide feedback to the student presenters to better prepare their research projects for submission to professional conferences. We also thank our moderators for their assistance and support.

A special thanks is due to the incredible, hard-working Honors College team, without whom the planning of such an event would be impossible: Jonathan Holland, Assistant Director; Chetana Wilson, Coordinator of Recruitment and Engagement; Chasitee Monger, Administrative Assistant; the Honors College Student Ambassadors; and Heri Yusup, Doctoral Student in English who designed the Works in Progress Symposium program book.

Finally, to the student presenters, congratulations for the quality research you have accomplished and for your participation in the Works in Progress Symposium. I hope you will consider submitting your research to *QuaesitUM*, the University of Memphis undergraduate research journal.

Welcome to the 2023 Works in Progress Symposium. We hope you will enjoy the conference and the students' presentations. Best wishes to all faculty, staff, and students who make this event possible.

Sincerely,



Melinda Jones, Ph.D.
Director

Acknowledgments

Faculty Mentors

The Helen Hardin Honors College gratefully acknowledges the following faculty sponsors whose mentoring has contributed to the research produced by the student presenters:

Amy Abell, Biological Sciences
Zachary Abramson, St. Jude Children's Research Hospital
Jennifer Barker, Architecture
Debra Bartelli, Public Health
Jeffrey Berman, Psychology
Gary Bowlin, Biomedical Engineering
Brianna Butera, World Languages & Literatures
Zack Corpus, Music
Amy Curry, Biomedical Engineering
Mohammadreza Davoodi, Electrical & Computer Engineering
Nathan DeYonker, Chemistry
Frank Fazio, St. Jude Children's Research Hospital
Lindsey Feldman, Anthropology
Yuan Gao, Mechanical Engineering
Alexandrea Golden, Psychology
Joy Goldsmith, Communication & Film
T.J. Hollingsworth, Biological Sciences
Kathryn Howell, Psychology
Stephanie Ivey, Civil Engineering
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Philip Kohlmeier, Biological Sciences
Deranda Lester, Psychology
Scott Marler, History
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Emily Puckett, Biology
Melissa Puppa, Health Sciences
William Robertson, Anthropology
Jaime Sabel, Biological Sciences
Jameliah Shorter-Bourhanou, Philosophy
Nicholas Simon, Psychology
Daniel Smith, Philosophy
Sharon Stanley, Political Science
Moniruzzaman Syed, Physics & Material Science
Jia Wei Zhang, Psychology
Lan Zhang, World Languages & Literatures

Acknowledgments

Faculty Evaluators

The Helen Hardin Honors College thanks the following faculty members for providing feedback to the student presenters:

Brian Andrews, Architecture
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Josh Bush, Biomedical Engineering
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Nicole Detraz, Political Science
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Stephanie Ivey, Civil Engineering
J. Amber Jennings, Biomedical Engineering
Roger Kreuz, Psychology
James Murphy, Psychology
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Jaime Sabel, Biological Sciences
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Aaryani Sajja, Biomedical Engineering
Amanda Lee Savage, History
Robert Seals, Psychology
Ron Serino, Interdisciplinary Studies
Jameliah Shorter-Bourhanou, Philosophy
Nicholas Simon, Psychology
Emily Srisarajivakul, Psychology
Will Thompson, World Languages & Literatures
John Williams, Biomedical Engineering

Session Moderators

Thank you to the following individuals for serving as session moderators:

Felicia Roddy Jackson, Fogelman College of Business & Economics
Elizabeth Langston, Admissions
Ron Serino, Interdisciplinary Studies
Deborah Thompson, Hospitality & Resort Management
Dale Williams, English
Dionne Ballinger, Admissions

Design and Publication

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THE UNIVERSITY OF MEMPHIS

Presentations (12:00 - 2:30)

	Memphis A	Memphis B	Poplar
12:00	**Draven Holland** Exploring the Intersection of AI and Architecture: Curiosity in Academia and Practice Mentors: Jennifer Barker and Jason Jackson, Architecture	**Steven Go** Optimization of Lentiviral Production for CAR T-Cell Therapy Mentor: Frank Fazio, St. Jude Children's Research Hospital	
12:30	**Jazz James** Elucidating Degenerative Mechanisms of Inherited Retinal Dystrophies Using the BXD32 Polygenic Mouse Model Mentor: TJ Hollingsworth, Biological Sciences	**Jalyssa Smith** Identification of the Influence of TMS Coil Type and Orientation on Induced Electric Field and Volume of Activated Cortical Tissue Mentor: Amy Curry, Biomedical Engineering	**Sophie Nieder** Evaluating the Performance of 2CP, an Antibiofilm Drug Loaded in Chitosan Nanofiber for Wound Dressing Mentor: Jessica Jennings, Biomedical Engineering
1:00	**Logan Longo** Examining Factors that Influence the Accuracy of Stereotaxic Surgeries Mentor: Deranda Lester, Psychology	**Omar Alyousef** Printed Electrode on Soft Materials for Wearable Electronic Device Mentor: Yuan Gao, Mechanical Engineering	**Henry Franks** Social Reward and Mesolimbic Dopamine Release Mentor: Deranda Lester, Psychology
1:30	**Myahkia Watson** Breaking Barriers: Navigating Public Regard, Psychological Well-Being, and Internalized Racism in Black Students at PWIs Mentor: Alexandrea Golden, Psychology	**Joseph Perry, Angelin Favorito, & Shoaf Robinson** A Low Cost, Semi-Autonomous Phenotyping Cart for Late Growth Stages of Tall Crops Mentors: Eddie Jacobs and Mohammadrez Davoodi, Electrical and Computer Engineering	**Alexandria Kerr** Characterizing the Hollow Medulla Hair Trait Mentor: Emily Puckett, Biological Sciences
2:00	**Dylan Thompson** Stereoscopic Vision Disambiguates Size-Distance Uncertainty Among Pediatric Oncologic Surgeons Mentor: Zachary Abramson, St. Jude Children's Research Hospital	**Zachary Baker** Building the Third Way: The Transformation of the Democratic Party in the 1970s and 1980s Mentor: Scott Marler, History	

Presentations (12:00 - 2:30)

	Ballroom A	Ballroom B	Ballroom C
12:00	**Adeline Nordmoe** Touch Spinning Polydioxanone Bioresorbable Vascular Gratfts Mentor: Gary Bowlin, Biomedical Engineering	**Stephen Nelson** An Ethnography Study of Citizens for Better Service and their Challenges to MATA Mentor: Joy Goldsmith, Communication and Film	
12:30	**Olivia Remak** An Analysis of Traditional Secondary Band Pedagogical Practices and their Benefits and Detriments to Individual Performers Mentor: Zack Corpus, School of Music		
1:00	**Rosalia Nwaobi & Haleigh Sisson** Developing Software to Effectively Denoise Flourescent Microscopy Images Mentor: Chrysanthe Preza, Electrical and Computer Engineering	**Maria Le & Blake Robinson** Self-Compassion in the Classroom: A Correlational Study of Self-Compassion and Academic Behavior Mentor: Jia Wei Zhang, Psychology	
1:30	**Luis Lopez-Games** Usage Frequency of Prestige Levels of 'Spanglish' amongst Memphis' Second-Generation Hispanic Latino Community Mentor: Brianna Butera, World Languages and Literatures	**Lauren Mitchell, James Ter-Burgh, & Kristofor Walicke** Identifying Best Strategies for Overcoming Barriers in State DOT Research Implementation Process Mentor: Stephanie Ivey, Civil Engineering	
2:00	**Anna Crichton** Developing a Novel Task to Measure Descision-Making with Immediate vs Delayed Risk of Punishment Mentor: Nicholas Simon, Psychology	**Mia Nance** Applying Critical Race Theory to Normative Interpretations of Law Mentor: Jameliah Shorter-Bourhanou, Philosophy	

Presentations (2:30 - 4:30)

	Memphis A	Memphis B	Poplar
2:30	**Madiha Syeda**	**Alexander Snyder**	**Yamekia Fair**
	Fabrication and Characterizations of Alumunum Doped Cadmium Oxide (CdO: Al) Thin Film Using Sol-Gel Spin-Coating Method	Mechanical Characterization of Near Field Electrospun Fiber Alignment Angles dor Bioresorbable Vascular Grafts	Development of Acylated Nano-fibrous Chitosan Membranes for Pre-Hospital Wound Coverage, Infection Inhibition, and Pain Mitigation
	Mentor: Monirruzaman Syed, Physics and Material Science	Mentor: Gary Bowlin, Biomedical Engineering	Mentor: Jessica Jennings, Biomedical Engineering
3:00	**Calvin Robinson**	**Ava Walker**	**Bailey Kersey**
	Examination of the Role of MPAK Activity on Placental Formation in Vitro Using Stem Cells	MBRP Project	Externalizing Problems in Children: Examining the Role of Caregiver and Child Adversities, and Parental Involvement
	Mentor: Amy Abell, Biological Sciences	Mentor: Jessica Jennings, Biomedical Engineering	Mentors: Kathryn Howell (Psychology) and Debra Bartelli (Public Health)
3:30	**Zaid Hadidi**	**Stephanie Bigham**	**Khawlah Almurisi**
	Improving the Construction of QM Cluster Modeling using FSAPT Interaction Energies	How Diet and Sex Impact the Development of Metabolic Syndrome	Predicting F-SAPT Interaction Energies from MM/PBSA Analysis for Chorismate Mutase Enzyme
	Mentor: Nathan DeYonker, Chemistry	Mentor: Melissa Puppa, Health Sciences	Mentor: Nathan DeYonker, Chemistry
4:00	**Mackenzie Austin**	**Jackson Simmons**	**Christopher Higgins**
	Perceptions of Therapist Notetaking	A Call to Evil: The Radical Embrace of Evil as the Genesis of Virtue	Examining Factors of Social Reward in Male and female Mice
	Mentor: Jeffrey Berman, Psychology	Mentor: Daniel Smith, Philosophy	Mentor: Deranda Lester, Psychology

Presentations (2:30 - 4:30)

	Ballroom A	Ballroom B	Ballroom C
2:30	**Donovan Ross** A Dance of Doctrines: The Erosion of Stare Decisis and the Ascendancy of the Major Questions Doctrine Mentor: Sharon Stanley, Political Science	**Elizabeth Matlock-Buchanan** Fatty Acid Signalling Molecules Inhibit Biofilm on Polymeric Biomaterials Mentor: Jessica Jennings, Biomedical Engineering	
3:00	**David Adaway & Chinonso Okoli** Using ImageJ to Improve Flouresscence Microscopy Images Mentor: Chrysanthe Preza, Electrical and Computer Engineering	**Blake Acree** Droplet Generation in Microfluid Devices Mentor: Yuan Gao, Mechanical Engineering	**Cierra Dennis** Language Outcomes of Dyslexia on Mandarin Chinese Mentor: Lan Zhang, World Languages and Literatures
3:30	**Sedra Sous** Understanding the Experiences of Black/African Americans in a Biology Major Mentor: Jaime Sable, Biological Sciences	**Macy Clanton** Mixed Methods Ethnographic Analysis of Health, Care, Stigma, and Sexuality as Experienced by Individuals in Reentry Mentors: William Robertson and Lindsey Feldman, Anthropology	
4:00	**Elmira Umarova** Transgenerational Maternal Effects on Cold Adaptation in the Drosophila Melanogaster Mentor: Phillip Kohlmeier, Biological Sciences	**Edith Razo** Evolution of 2CP-loaded Hydroxyapatite for Coating Titanium Dental Implants as as Approach Prevent Biofilm-Associated Infection Progression Mentor: Jessica Jennings, Biomedical Engineering	

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EDUCATION

Language Outcomes of Dyslexia on Mandarin Chinese

Cierra Dennis
Mentor: Lan Zhang, World Languages and Literatures

Currently, research for dyslexia is more common in languages that use alphabets and are without tones than that of languages that use ideographs or logographs and are tonal in nature like Mandarin Chinese. Dyslexia is a complicated, multifaceted learning condition with a variety of manifestations that can differ for each individual while also proving to be a consistent source of difficulty for language comprehension and interpersonal communication. Previous research shows that for some individuals, dyslexia can present challenges in one language while not in another. The challenges affect all four major areas of language in both categories of input and output: (1) listening, (2) reading, (3) speaking, and (4) writing. Through a multi-pronged research approach using (a) interviews with specialists such as linguists, psychologists, Mandarin Chinese instructors, and dyslexic education specialist instructors, (b) analyzation of previously published official research, (c) individual accounts and findings from learners of Mandarin Chinese and individuals with dyslexia, and (d) observations from several dyslexia specialized educational institutions, this research will present findings of the evident and potential effects that dyslexia has through the lens of Mandarin Chinese. The findings presented in this research will show that regarding input, such as listening, dyslexia presents a slight negative impact, and for reading, considering comprehension a moderate negative impact. Regarding output, such as speaking, there is a slight negative impact and regarding writing there is a moderate negative impact.

Understanding the Experiences of Black/African Americans in a Biology Major

Sedra Sous
Mentor: Jaime Sable, Biological Sciences

To understand Black/African American students' experiences as they progressed through the biology major, we conducted semi-structured interviews to determine why students either progress or leave the biology major at the University of Memphis. Students were asked about their experience as a biology major; their classroom environment; experiences related to diversity, equity, and inclusion; their persistence or departure from the biology major, and their sense of belonging with students and faculty in the program. My work focused on understanding the factors that caused students to feel like they had a sense of belonging within the biology major. We used open coding to identify what causes students to feel a sense of belonging or lack thereof. Results varied from student to student however they all fell under several common themes. To some students, a sense of belonging was having peers to lean on during times of difficulty. Some students expressed that they had external factors that inhibited them from developing a sense of belonging. Others noted that their relationship with their instructors either caused or inhibited them from developing a sense of belonging. And lastly, we found a theme of neutrality within some students where they feel like they had more neutral experiences within the department. Overall sense of belonging in students is influenced by many different things and recognizing and understanding these factors can cultivate a more profound sense of engagement and foster an enriched learning environment.

ENGINEERING

Droplet Generation in Microfluidic Devices

Blake Acree
Mentor: Yuan Gao, Mechanical Engineering

Microfluidics is a relatively new field in science that involves the design and use of microscale chips to manipulate fluid streams to accomplish tasks, typically for biomedical applications. A subgroup of microfluidics is droplet-based systems which involves the use of these chips to generate droplets of one fluid in the flowing stream of a second. These droplets have numerous uses in biomedical research including drug encapsulation and targeted drug delivery. Although useful, generating these droplets comes with significant challenges in both production of chips and control of fluid characteristics that impact the generation. The geometry of the chip has a significant influence on the behavior of the fluids. There are 2 methods for generation of droplets. Active generation involves the manipulation of the fluid with a mechanical device whereas passive generation only allows the fluid to be pumped through the chip. Each has multiple sub-methods which are dictated by the chip design and in the case of active generation, the method for fluid manipulation. This research is currently focused on passive generation using the flow focusing method. Dictating the flow of the fluid are friction forces coming from the chip, the flow rate of each fluid, and the viscosity of the continuous

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phase fluid. The viscosity and flow rates are the easiest factors to adjust while any change in the geometry of the chip requires the fabrication of a new prototype.

Using ImageJ to Improve Fluorescence Microscopy Images

David Adaway and Chinonso Okoli
Mentor: Chrysanthe Preza, Electrical & Computer Engineering

We use microscopy to make the invisible visible, that is, to see great detail in tiny three-dimensional objects. However, the process of capturing images from a microscope is imperfect. This is due to the lens being unable to focus on the entirety of a three-dimensional volume, which causes blurred output. This project provides a solution to the issue: it uses open-source software to obtain a restored final image from the raw data. ImageJ is an open-source scientific image-processing software program with several features, including cropping, adding noise, blurring, stitching, and the respective inverse functions, some of which are provided by installable plugins. Building upon our previous experience with ImageJ, we used its various functions to process data and conduct simulations. First, we used the RandomJ plugin, which includes several algorithms that add noise to simulate the blurry output from the microscope. We created a macro that uses the built-in Crop function to split images into smaller pieces; doing this minimizes the computational resources required to process them. Then we used the DeconvolutionLab2 plugin, which takes a blurred image and the microscope's point-spread function as input and attempts to output the original image. Finally, we used the MosiacJ plugin to stitch the cropped pieces back together. With these tools, we can replicate, then reverse, the microscopic imaging process, obtaining an output image that better resembles the underlying subject.

Printed Electrode on Soft Materials for Wearable Electronic Device

Omar Alyousef
Mentor: Yuan Gao, Mechanical Engineering

Electrodes fabricated on soft polymeric substrates, namely smart wearables, are of great importance in a wide range of applications in healthcare monitoring due to their lightweight nature, biocompatibility, and ability to conform to curvilinear body shape. Among available electrode fabrication techniques, inkjet printing is a digital, mask-free, material-saving, and fast fabrication technology. This project investigates the fabrication of printing silver nanoparticles (AgNPs) on a soft, thin film substrate, Polydimethylsiloxane (PDMS), using inkjet printing method. The objective is to create a piezoresistive soft material that will have a wide range of applications. The PDMS is spin-coated to create a thin film and then chemically treated to induce hydrophilicity which enhances the compatibility of the material with the AgNPs. An inkjet printer then precisely deposits the AgNPs onto the thin film PDMS substrate. The printed electrode is used to efficiently conduct electrode signals. One practical application of this printed thin film materials is to measure the applied pressure by the change of the electrode's resistance due to strain through the materials, which opens a multitude of possibilities for monitoring and detecting various physical interactions and forces. The simple electrode fabrication process and adaptable nature of the thin film holds promise for many applications, particularly in the domains of wearable electronics, soft robotics, and smart devices.

Development of Acylated Nanofibrous Chitosan Membranes for Pre-Hospital Wound Coverage, Infection Inhibition, and Pain Mitigation

Yamekia Fair
Mentor: Jessica Jennings, Biomedical Engineering

The overall theme of this project is to create wound dressing that is effective and will prevent infections. Some injuries in combat can progress into untreatable infections because of the presence of bacterial biofilm, which is tolerant of antibiotics. In this case, we are evaluating a pain relief and an infection control. The dressing will release antimicrobials and anesthetics that will contribute to the pain relief and infection control. This can contribute to the development of effective dressings for wound dressing. We used decanoic chloride and pyridine for the acylation of chitosan. Cis-2-decenoic acid (C2DA) is a fatty acid and a signaling molecule used by bacteria. We use lab made C2DA to disperse biofilm.

Fatty Acid Signaling Molecules Inhibit Biofilm on Polymeric Biomaterials

Elizabeth Matlock-Buchanan
Mentor: Jessica Jennings, Biomedical Engineering

A solution to anti-microbial treatment resistant biofilm, which in some cases can be deadly, may be to combat the microbes with therapeutics delivered locally for extended

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periods of time using biomaterials such as polymers like chitosan designed by immersion in a fatty acid employed as a Dispersal Signaling Molecule (DSM). After being immersed in the DSM the various polymers are then compared one to another for effectiveness of creating an anti-microbial environment. The DSM in which the polymers are saturated is 10-hydrox-2-decanoic acid, or 10-H2DA. Contemporary materials are sometimes compromised by the appearance of the biofilm, as the capsule is very resistant to anti-microbial treatments currently used. Methods are focusing on 10-H2DA as an effective DSM. After immersion in 10-H2DA, the elution of the fatty acid is measured. The polymers are analyzed for microbial attachment and then determined if the surface is properly functionalized. Future translational research steps could include implant viability and post-surgical reduction of infection or microbial growth.

Identifying Best Strategies for Overcoming Barriers in State DOT Research Implementation Processes

Lauren Mitchell, James TerBurgh and Kristofor Walicke
Mentor: Stephanie Ivey, Civil Engineering

Effective transportation research is fundamental to the success of the transportation industry. As the demand for efficient research implementation processes continues to grow, there is a pressing need to establish a comprehensive set of best practices and recommendations drawn from previous research projects. This study is primarily dedicated to examining past State Department of Transportation (DOT) research reports and related resources in research management and implementation. The goal is to distinguish between research initiatives that have been successfully executed and those that have encountered difficulties through this process. Through this examination, guidelines are developed to facilitate successful research implementation while highlighting previous challenges to be avoided. Drawing on a review of approximately fifty sources, this research has uncovered both commonalities and discrepancies within current State DOT practices. By identifying significant gaps within the transportation research-to-implementation process, this study offers State DOTs a valuable opportunity to enhance their ability to effectively apply research findings.

Evaluating the Performance of 2CP, an Antibiofilm Drug Loaded in Chitosan Nanofiber for Wound Dressing

Sophie Nieder
Mentor: Jessica Jennings, Biomedical Engineering

Traumatic injuries can be severely compromised by bacterial infection especially once the biofilm is formed. Biofilm is difficult to treat and requires very high concentration of antibiotics which could be toxic when systemically administered. This project assesses the efficacy of 2CP, a biofilm dispersing agent loaded in a chitosan nanofibrous membrane against biofilm-forming bacteria. The research questions aim to determine whether antibiotics can be delivered within the therapeutic window and for a desired period of time at the wound site. In this study, Nanofibrous membrane was fabricated via electrospinning, and a soaking method was used to load 2CP in the membrane. The effect of 2CP on the planktonic and biofilm growth of bacteria were measured using BacTiter Glo. Bacterial viability was statistically analyzed using one-way ANOVA and the biofilm formed on membranes were imaged through SEM. This project contributes to the continuing efforts to improve local drug delivery. By advancing the knowledge of local therapeutics to disperse biofilms, future wound dressings may allow for wound sites to be treated for an extended period of time with reduced adverse effects and leading to increased patient satisfaction.

Touch Spinning Polydioxanone Bioresorbable Vascular Grafts

Adeline Nordmoe
Mentor: Gary Bowlin, Biomedical Engineering

Cardiovascular disease is a leading cause of death and global health problem, classified by blood vessel thickening. Surgical implantation of either autologous or synthetic grafts serve as a treatment method to replace damaged vessels. The goal of this study is to create synthetic bioresorbable touch-spun grafts that can hold their shape in the body. A custom-built touch spinning device is used to produce the vascular grafts. The fibers that collect on the mandrel of the spinner are at specified angles in order to replicate the environment of the extracellular matrix. The speed at which the stage spins and the vertical velocity of the mandrel impact the fiber alignment of the graft. To make these grafts, solutions of varying concentrations between 112 mg/mL and 140 mg/mL of polydioxanone and 1,1,1,3,3,3-hexafluoro-2-propanol are made. The solution is then loaded into a 3 mL syringe and placed in the syringe pump with a flow rate of less than 0.1 mL/hr. The grafts are imaged with a scanning electron microscopic to verify the fiber alignment and then they are subjected to mechanical testing such as burst pressure, circumferential and longitudinal uniaxial elongation, and suture retention. Future plans of this project are to integrate different concentrations of Manuka honey in

the polymer solution and compare their mechanical properties of the grafts that do not contain honey.

Developing Software to Effectively Denoise Fluorescent Microscopy Images

Rosalia Nwaobi and Haleigh Sisson
Mentor: Chrysanthe Preza, Electrical & Computer Engineering

Image processing is an area that deals with extraction of information from images and with enhancement of image quality. This research project aims to use image processing techniques such as, denoising, deconvolution, and deblurring to manipulate images to obtain better visual representations. Often, the system available to process these images restricts the user as there are limitations with the computational resources available to process large images. Hence, our project focuses on creating an alternative yet efficient way to conduct image processing that uses resources efficiently and yields satisfactory results. We proposed a flow diagram that details the steps taken before and after image processing. First, import the images, and crop them; afterward, the desired image processing technique is conducted. My teammate and I developed a MATLAB script to crop the image, process the pieces, and then put the pieces back together to get the original image. Although this code functions as desired, we continue to make modifications to allow a user to input multiple images regardless of their sizes. Subsequently, updates will be made to the written code to consider the changes made to each cropped piece so that when each final image is assembled, there will be no overlap or expansion in dimension. Also, we are planning to do more research, implement a proper stitching algorithm, and machine learning denoiser for fluorescence microscopy images.

A Low Cost, Semi-Autonomous Phenotyping Cart for Late Growth Stages of Tall Crops

Joseph Perry, Shoaf Robinson, Angelin Favorito
Mentors: Eddie Jacobs and Mohammadrez Davoodi, Electrical & Computer Engineering

With an increasing focus on precision agriculture to maximize crop yields and minimize ecological impacts, remote sensing for agriculture has required the deployment of more advanced sensors and processing algorithms. Traditionally, unmanned aerial systems (UAS) have been the primary choice for phenotyping crops, but these systems are limited in endurance, power, payload, and legality. Medium to large, unmanned ground vehicles (UGV), however, are not hampered by these limitations. Previous research in the application of phenotyping UGV for tall crops has been focused on either small systems or very large gantry systems. Described here is a medium sized, low-cost, adjustable UGV that provides a solution by demonstrating the capability to image tall crops into late growth states. The UGV capabilities are analyzed theoretically and practically, including its structural rigidity, handling, and endurance. An overview of parts and assembly is presented to facilitate replication and proliferation of the vehicle. Additionally, the vehicle is primarily constructed using off-the-shelf components. A dual RTK-GNSS system is utilized to control the UGV in a semi-autonomous fashion. Future plans include increasing automation for easier data collection.

Evaluation of 2CP-loaded Hydroxyapatite for Coating Titanium Dental Implants as an Approach to Prevent Biofilm-Associated Infection Progression

Edith Razo
Mentor: Jessica Jennings, Biomedical Engineering

Dental implants have emerged as a revolutionary option for tooth replacement, but biofilm-associated infections pose a major issue. Bio-film formation on dental implant surfaces can cause serious complications such as injury to implants and lead to the spread into deep tissue and bone. This project aims to determine the efficacy of coating titanium dental implants with 2CP-loaded hydroxyapatite as an approach for preventing the spread of biofilm-associated infections into deep tissues and bones. High-performance liquid chromatography was used to analyze elution samples. The amount of 2CP released from the collected samples was measured using the HPLC. SEM imaging of 2CP-loaded and unloaded coupons will be performed, as well as EDX analysis.

Identification of the Influence of TMS Coil Type and Orientation on Induced Electric Field and Volume of Activated Cortical Tissue

Jalyssa Smith
Mentor: Amy Curry, Biomedical Engineering

Transcranial magnetic stimulation (TMS) is a noninvasive procedure that utilizes magnetic fields to study brain function as well as diagnose and treat neurological disorders or diseases, such as strokes. The brain is a complex organ comprised of cerebrospinal fluid and grey and white matter, which have different conduction properties that affect how resulting electric fields (e-fields) are distributed to neurons during TMS. The type

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and orientation of TMS coil that delivers the magnetic pulses also affects e-field distributions and results in stimulation of different regions of neurons. This study aims to identify the effect of the TMS coil type and orientation on the TMS-induced e-field and volume of activated cortical tissue. We used the SimNIBS open-source platform to develop brain simulations to test three different coils, oriented in three different directions, at the primary somatosensory region. We identified strong agreements that the coil type and orientation affect TMS-induced e-fields and volume of activated cortical tissue. Coil orientation changed the e-fields with a maximum difference of 10%, while the volume of activated cortical tissue ranged from 3000-4000 mm^3. An inverse relationship was observed between the volume of activated cortical tissue and magnitude of the TMS-induced e-field. Furthermore, we suggest that TMS parameters should be individualized on a patient-specific basis, given the interactions between coil types, orientation, and brain anatomy.

Mechanical Characterization of Near Field Electrospun Fiber Alignment Angles for Bioresorbable Vascular Grafts

Alexandra Snyder
Mentor: Gary Bowlin, Biomedical Engineering

Cardiovascular disease, characterized by the narrowing of blood vessels, is the leading cause of death worldwide. Current surgical treatment options implement either autologous or synthetic grafts to replace the diseased tissue. However, autografts are not an option for many patients, and synthetic grafts have a high rate of failure within two years. The goal of this project is to create a bioresorbable synthetic graft capable of maintaining its integrity long term through tissue regeneration. A consumer 3D printer was modified to create a near-field electro spinner and programmed to generate fiber alignment angles of 15Â°/75Â° and 30Â°/60Â° to mimic blood vessels' natural fiber alignment. The solution is made using polydioxanone dissolved overnight in 1,1,1,3,3,3-hexafluoro-2-propanol at concentrations of 100 mg/mL. 1 mL of the solution is loaded in a syringe and mounted vertically on the NFES print head, and a voltage of +1.6kV is applied to the needle with a polymer flow rate of 25 ÂµL/h, and an air gap of 1.7 mm. Once samples are generated and fiber alignment is confirmed using scanning electron microscopy, mechanical testing will be performed. The ultimate tensile strength in both the longitudinal and circumferential axes, suture retention, and burst pressure results from each of the graft angles will be compared to the target values from internal mammary artery, using a one-way ANOVA and post hoc Tukey-Kramer analysis with a significance of $p<0.05$ to evaluate differences.

Stereoscopic Vision Disambiguates Size-Distance Uncertainty Among Pediatric Oncologic Surgeons

Dylan Thompson
Mentor: Zachary Abramson, St. Jude Children's Research Hospital

Rendering software provides impressive opportunities to display 3D patient images on a 2D display, though with inherent size and depth ambiguity. The addition of stereoscopy to traditional rendering principles may provide a more accurate conveyance of 3D patient anatomy. Virtual models of varying size and position were presented to pediatric oncologic surgeons using a virtual reality headset with and without stereoscopy. Side-by-side spheres as well as a sphere nested in a larger transparent sphere were presented as unknown virtual objects. The surgeons were asked questions regarding the relative size and distances of the spheres and for a confidence rating in their answer. Three surgeons participated and completed all questions. In the side-by-side test, the subjects were significantly more accurate ($p = 0.014$) and confident ($p = <0.001$) in perceiving size and distance with stereoscopic vision. Similarly, For the nested spheres test, surgeons were both more accurate ($p < 0.001$) and confident ($p < 0.001$) with stereoscopic vision when determining the position of the smaller sphere inside the larger one. The confidence scores of correct and incorrect responses were not significantly different without ($p = 0.268$) or with stereoscopic vision ($p = 0.398$). Surgeons viewing virtual 3D models are often not aware of the inherent ambiguity in the scene. Stereoscopic vision helps resolve ambiguity inherent to virtual scenes containing structures of unknown size and location.

MBRP Project

Ava Walker
Mentor: Jessica Jennings, Biomedical Engineering

Burn wounds, infection(s), and pain are the problems being addressed by this project. Novel oxygen-permeable biopolymer membranes made from electro spun chitosan may serve as wound dressings and drug delivery devices to provide effective treatment of burn wounds, infection(s), and pain relief. For my current project, I am imaging histology slides from an in vivo evaluation using BioQuant. After performing a comb scald wound, dressings were placed, and after 3rd and 7th days, the rats were euthanized, and a biopsy was performed. While observing the histology imag-

es, the burn would, in the beginning, was very prominent. The burn wound had a lot of depth, but as the images progressed the depth had decreased, noticeably. Future work will be in measuring and comparing treatment to control as the study progresses.

LIBERAL AND FINE ARTS

Building the Third Way: The Transformation of the Democratic Party in the 1970s and 1980s

Zachary Baker
Mentor: Scott Marler, History

My project is exploring the ideological origins of the shifts that occurred within the U.S. Democratic Party in the final quarter of the 20th century. As early as George McGovern's loss in 1972, a vital movement emerged dedicated to encouraging the party to abandon their commitment to the "New Politics" liberalism of the 1960s and '70s, and instead embrace a philosophy of moderation and centrism. Their efforts paved the way for the formation of the Democratic Leadership Council in 1985 and Bill Clinton's election in 1992. Essentially, I will argue that three distinct political factions were key to transforming the Democratic Party in these decades. One, the techno-utopian "neoliberals" that emerged in the 1970s, who should be understood as slightly distinct from the concept of "neoliberalism" as it is used by academics today. Two, the neoconservative thinkers, or former Cold War liberals who were offended by the excesses of student radicalism and Black Power. Three, the moderate Southern Democrats who eschewed the explicit racism of other Southern politicians, while expressing skepticism toward anti-racist progressivism as embodied by Reverend Jesse Jackson. All three of these groups levelled critiques of the Democratic Party in the realms of domestic and foreign policy. All three took the endeavor to organize against the forces they believed were leading their party astray. All three anticipated the DLC, the Clinton administration, and the policies associated with each.

Exploring the Intersection of AI and Architecture: Curiosity in Academia and Practice

Draven Holland
Mentors: Jennifer Barker and Jason Jackson, Architecture

The authors (a practicing architect, an undergraduate student with a background in information technology, and the director of the architecture program) are interested to explore the relevancy of artificial intelligence (AI) in the iterative process of design, with emphasis on it as a visual teaching tool for design thinking. The authors want to consider how to make use of it now, within architecture education, so that its implications can be considered as early as possible. Given the infancy of AI's direct application, it seems an appropriate time to have many different institutions attempting to integrate it into the curriculum in a variety of ways (for different types of learning, in different areas of the curriculum, at different levels of the program, across national and international contexts). The process for the study will proceed as follows: planning for the course in Fall 2023; execution of the course (act and observe) in Spring 2023; and lessons learned (reflect) from the course in May 2023. The course selected is an appropriate course for this explorative practice because its role within the curriculum is to help students understand generative/iterative practices of design (of which AI is a part). Through this, the authors hope to add to the growing discussion about the perceived strengths and pitfalls of text- and image-based outputs of AI.

Usage Frequency and Prestige Levels of ˜Spanglish" amongst Memphis' Second-Generation Hispanic Latino Community

Luis Lopez-Games
Mentor: Brianna Butera, World Languages and Literatures

Research (Garcia ,1995; Ardilla, 2005; Osorio, 2010; Elias-Olivares, 1995), has been extensively conducted in majority-Latino/Hispanic areas such as Miami, Los Angeles, and other places with similar high-density populations across the United States in regard to the usage of "Spanglish," a phenomenon of language contact between English and Spanish, as well as the impact its usage has on these bilingual communities. However, few research studies have focused their attention on Spanglish in monolingual communities, and none in Memphis, TN. To explore our local Spanish-speaking communities, I am in the process of investigating the connection between different aspects of Spanglish, such as code switching, lexical borrowings, and calques, and the frequency of usage by second-generation bilingual Latinos/Hispanics living in Memphis and the surrounding community. My study also explores what level of prestige Spanglish holds within its community of users. This is being done via both written questionnaires on the participants' attitudes regarding Spanglish as well as oral interviews conducted in Spanish to simulate conditions in which bilinguals incorporate Spanglish. Upon concluding these interviews, transcription of data occurs, in which the speech

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is analyzed for the different components of Spanglish. The initial hypothesis concluded participants would not find Spanglish prestigious and use code switching most often, although more time is required to corroborate these claims.

Applying Critical Race Theory to Normative Interpretations of Law

Mia Nance
Mentor: Jameliah Shorter-Bourhanou, Philosophy

Legal interpretation, particularly studied by Ronald Dworkin, comes to the conclusion judges have the ability to make decisions not cleanly contained in frameworks, set by previous precedents. Dworkin states the difference between normative and descriptive interpretation with a focus on the normative which address law as it should be. He assumes normative law can result in the elimination of an issue alongside judges' interpretations. However, what I address is his lack of the impact of the descriptive. Furthermore, I also incorporate H.L.A Hart's rule of recognition to explain the US Constitution's role in legal interpretation. I reference Kimberle Crenshaw's examination of anti-discrimination law to address the implications of ignoring the descriptive. I will argue Dworkin's view does not consider how to handle immoral, euphemistic laws that directly oppress marginalized groups in the contemporary legal system.

An Analysis of Traditional Secondary Band Pedagogical Practices and their Benefits and Detriments to Individual Performers

Olivia Remak
Mentor: Zack Corpus, School of Music

Certain pedagogical practices present in modern ensemble rehearsal settings overlook individual achievement. This adherence to methods that do not directly benefit individual performers may result in students who are following performance practices not well suited to their specific instrument. This negative impact on a student's sound and technique within a band classroom has the potential to put them at a further disadvantage to those who are able to afford external performance privileges such as private lessons and summer programs and can impact the sound of the ensemble as a whole. An analysis of literature surrounding common band pedagogical practices revealed the relevance of Social Emotional Learning and a learner-centered approach to modern pedagogical approaches. These methods of learning were applied to an analysis of relevant band literature in regard to how this music may provide the greatest impact on individual tone, intonation, air support, and general musicality, regardless of ensemble or individual skill level. To ascertain current qualitative and quantitative data, band directors were surveyed regarding their classroom pedagogical practices and motivating beliefs within their own program. This research further demonstrated that a mindset shift towards a learner-centered approach to pedagogy is vital in the face of shifting classroom environments and a greater need for individual achievement.

LIFE AND HEALTH SCIENCES

How Diet and Sex Impact the Development of Metabolic Syndrome

Stephanie Bigham
Mentor: Melissa Puppa, Health Sciences

Metabolic syndrome is a cluster of conditions that increase a person's risk of cardiovascular disease. One of the more common conditions of metabolic syndrome is diabetes. Diabetes is when there is too much glucose circulating in the blood causing the person to become insulin resistant. In this experiment, we tried to determine how different diets alters the progression of insulin resistance in males compared to females. Mice were fed one of three diets control (20% fat, 20% protein, and 60% carbohydrates (18% sucrose), High Fat (45% fat, 20% protein, and 35% carbohydrates (18% sucrose), or high sugar (60% carbohydrates (60% sucrose), 20% protein, and 20% fat. Glucose tolerance test was conducted at 0 weeks, 6 weeks, and 12 weeks. Fasting insulin was measured in a subset of animals at weeks 6 and 12, and HOMA-IR was calculated. The male high fat diet group at 12 weeks had higher insulin, blood glucose, and HOMA-IR compared to all other groups. HOMA-IR was elevated in the HF males at 6wks, while no change was seen in the HS or female groups. These data suggest that females are somewhat protected from insulin resistance regardless of diet.

Optimization of Lentiviral Production for CAR T-Cell Therapy

Steven Go
Faculty Mentor: Frank Fazio, St. Jude Children's Research Hospital

Chimeric Antigen Receptor (CAR) T-Cell therapy is a rapidly im-

proving cancer treatment known throughout the literature. In this process, T-cells are taken from the patient and reprogrammed to express chimeric antigen receptors. Once these cells are proliferated, they are reintroduced to the patient to target the cancer cells and eliminate them. This study focused on the reprogramming step through method of transfection and lentiviral vector. Furthermore, the aim of this work sought to optimize the conditions of this transfection through use of different cell lines, media, and cell culture conditions. These findings are advantageous for the large-scale manufacturing of CAR-T cell therapy at St. Jude Children's Research Hospital that takes yield, scalability, and cost efficiency into account.

Elucidating Degenerative Mechanisms of Inherited Retinal Dystrophies Using the BXD32 Polygenic Mouse Model

Jazz James
Mentor: TJ Hollingsworth, Biological Sciences

Inherited retinal dystrophies (IRDs)is a term encompassing a set of congenital blinding diseases caused by mutations in genes affecting retinal development, structure, and function, specifically the rod and cone cells. In order to better understand the degenerative phenotype, pathogenesis, and genetic factors associated with IRDs, mouse models have become a staple in IRD research. The purpose of this work is to elucidate the genetic, cellular, and molecular mechanisms regulating the IRD phenotypes of a novel polygenic model of IRD, the BXD32 mouse. Using electroretinograms (ERGs) shows a loss of proper retinal function with an early onset at 2 weeks of age and a rapid rate of progression with most of the photoreceptors lost by 6 months. Thinning of the photoreceptor layers of the retina is shown via optical coherence tomography, and pigmentary/vascular anomalies via funduscopy/fluorescein angiography. In addition, using fluorescentimmunohistochemistry (fIHC) show that while the photoreceptors are degenerating, the neurons downstream maintain relatively normal function and appearance. fIHC also show a loss of proper expression of multiple proteins associated with photoreceptor morphogenesis and upregulation of proinflammatory signaling. Finally, using transmission electron microscopy show the cellular and molecular mechanisms of the pathogenesis: improper ciliary axoneme and disc formation. These conclusions will aid in a better understanding of the degenerative phenotypes found in humans.

Characterizing the Hollow Medulla Hair Trait

Alexandria Kerr
Mentor: Emily Puckett, Biological Sciences

Polar bears (Ursus maritimus) have undergone numerous adaptations to live in the Arctic environment. A particularly enigmatic adaptation is that their fur is "hollow" and filled with air. Moreover, there are protrusions from this hollow area that extend through the cortex, referred to as "air pockets." Studies of the evolutionary history between polar and brown bears (U. arctos) show unidirectional gene flow from polar bears into brown bears. In Southeast (SE) Alaska, the proportion of polar bear ancestry in brown bears ranges from 5-8%. We discovered the hollow hair trait in the SE Alaskan brown bears, and hypothesize it occurs due to introgression from polar bears. Using a collection of 206 individual brown bears, we characterized the trait by examining individual hairs (n = 3) under compound microscopy. Specifically, we measured the length of individual hairs with either the wildtype (i.e., normal) or hollow trait, then calculated proportions along the hair. Within the SE Alaskan population, 33% of animals had some degree of the mutant hollow hair trait. We are using population genomics to identify shared introgressed genomic segments among brown bears with the hollow hair phenotype.

Examination of the Role of MAPK Activity on Placental Formation in Vitro Using Stem Cells

Calvin Robinson
Mentor: Amy Abell, Biological Sciences

Mitogen-activated protein kinase kinase kinase 4 (MAP3K4) phosphorylates and activates several MAP2K (mitogen-activated protein kinase kinase) enzymes, including MAP2K3, MAP2K4, MAP2K6, and MAP2K7. Upon activation, MAP2K3/6 phosphorylate p38, MAP2K4/7 phosphorylate JNK, and MAP2K1/2 phosphorylate ERK. We hypothesized that the activation of these enzymes promotes placental and fetal maturation, prompting examination of these pathways. This study investigated wild-type and MAP3K4 kinase-inactive mouse cells in vitro in multiple biologically independent experiments. Trophoblast stem (TS) cells were treated with either DMSO (-) or 3 ÂμM CHIR 99021 for 96 hours. We measured the activity of p38, JNK, and ERK using polyacrylamide gel electrophoresis and Western blotting. We found that the p38 and JNK mitogen-activated protein kinase (MAPK) pathways were induced during differentiation of wild-type TS cells to SynT-II cells. In contrast, activation of the ERK MAPK pathway was reduced upon differentiation.

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MAP3K4 kinase inactivation resulted in a failure to activate JNK or p38 MAPKs and the inability to form SynT-II cells. Together, these data suggest a key role for MAP3K4 activation of JNK and p38 in the formation of the SynT-II cells of the placenta. Future studies will assess the activation of MAPK signaling in vivo during placental development.

Transgenerational Maternal Effects on Cold Adaptation in the Drosophila Melanogaster

Elmira Umarova
Mentor: Philip Kohlmeier, Biological Sciences

Biological life is impacted by global climate change which strongly affects ectothermic animals, e.g., insects, as their metabolism depends on temperature. Maternal effects, in which mothers induce phenotypic adaptations in offspring, has been suggested as a powerful trait to buffer temperature fluctuations. However, empirical data supporting maternally induced temperature adaptations are scarce. We use Drosophila to assess whether maternally induced temperature adaptation exists and whether the induction of these maternal effects is under the control of the mother's thermosensory neurons. We first demonstrated that larvae of mothers grown at warm temperatures recovered faster from a cold shock than larvae of mothers raised at cold temperatures. To test whether temperature perception by the mother's nervous system is involved in modulation maternally induced cold adaptation, we are currently using flies in which heat- or cold-perception pathways were genetically silenced. First data indicate that silencing of cold-sensing neurons in mothers had no effect on larval cold adaptation whereas silencing heat-sensing neurons induces cold adaption even if their mothers were kept at warm temperatures. At this stage these findings suggest that the regulation of larval cold adaption is not a passive biochemical process but under active control of the mother's nervous system and that cold adaptation in offspring is suppressed if the mother's nervous system senses hot temperatures.

PHYSICAL AND APPLIED SCIENCES

Predicting F-SAPT Interaction Energies from MM/PBSA Analysis for Chorismate Mutase Enzyme

Khawlah Almurisi
Mentor: Nathan DeYonker, Chemistry

Our group uses molecular modeling and quantum chemistry to quantitatively understand the interactions between amino acid residues and enzyme substrates. A unique and power enzyme catalyst, chorismate mutase is an established model for probing enzyme mechanism and has been a frequent case study both in the community and in our group. We have been investigating Functional Group Symmetry Adapted Perturbation Theory (F-SAPT), a new technique that can accurately calculate amino acid-substrate interaction energies. However, F-SAPT is very time-consuming, requiring days of computational effort. MM/PBSA (molecular mechanics/Poisson-Boltzmann surface area is a versatile and extremely inexpensive method used to calculate protein-substrate free energies. Combined with molecular dynamics simulation, we compute protein-substrate interaction energies of the chorismate mutase enzyme at one-picosecond intervals with MM/ PBSA. The long-term aim is to train a function that can predict F-SAPT interaction energies from the electrostatic and van der Waals (dispersion) terms of the MM/PBSA analysis, with much less computational effort.

Improving the Construction of QM Cluster Modeling using FSAPT Interaction Energies

Zaid Hadidi
Mentor: Nathan DeYonker, Chemistry

A fundamental tool in drug discovery is to understand the mechanism of how a substrate interacts with an enzyme. One focus of the DeYonker lab is the design and application of computational enzymology, specifically using Quantum Mechanical-cluster models. My project is to use the chorismate mutase enzyme as a case study extending the results of qualitative contact-based Residue Interaction Networks (RINs) with quantitative interaction energies from functional group symmetry adapted perturbation theory (F-SAPT). We analyzed various types of QM-cluster models from F-SAPT interaction energies based on how far away the amino acid fragment is from the substrate. We built off a qualitative interatomic contact-based model by extending the model from five to thirty additional fragments, added in multiples of five. We will investigate using both a representative frame from molecular dynamics simulation and the X-ray crystal structure. Additionally, we are studying how the energy decomposition of F-SAPT into electrostatic, induction, and dispersion terms is correlated with the residue fragment distance from the TSA. Preliminary results show that side chains of charged residues outside of the contact-based RIN have total interaction energies greater than 20 kcal/mol, even when > 7 Angstroms away from the TSA. Our focus

needs to be on how the uncharged side chain fragments impact the model.

Fabrication and Characterizations of Aluminum Doped Cadmium Oxide (CdO: Al) Thin Film using Sol-Gel Spin-Coating Method

Madiha Syeda
Mentor: Monirruzaman Syed, Physics & Material Science

Aluminum-doped Cadmium Oxide (CdO: Al) thin films are deposited on quartz silica substrates by the sol gel spin-coating method as a function of the spin coater's rpm (revolution per minute). Cadmium Acetate Dihydrate and Aluminum Nitrate have been taken as the precursor materials and a source of Al-dopant respectively. CdO:Al thin films are characterized by X-Ray diffraction (XRD), Field Emission Scanning Electron Microscopy (FE-SEM), Energy Dispersive Spectroscopy (SEM-EDX), Ramen Scattering, Fourier Transform Infrared (FT/IR), XRD result indicates the highest crystallinity at 6000 rpm with a crystallite size of approximately 31.845 nm, cubic phase formation, and strain of ~1.6 X10^-2. FE-SEM/SEM/EDX shows the well-faceted homogeneous surface structure at 6000 rpm having an average particle size of 130.05 nm. Ramen Scattering results show strong peaks at ~933-935 cm^-1, indicating the presence of CdO:Al. The peak intensity strengthens with increasing rpm. FT/IR also confirms the presence of CdO:Al in the film with the peak position shifting to higher wavenumbers respective to increasing rpm.

SOCIAL AND BEHAVORIAL SCIENCES

Perceptions of Therapist Notetaking

Mackenzie Austin
Mentor: Jeffrey Berman, Psychology

This study attempts to further the research on whether a therapist taking notes during a therapy session affects the observer's perception of the therapist. Notetaking is often a part of therapy, yet there are few studies on how it affects therapy. The studies that do exist each reach different conclusions on the effect of notetaking on perceptions. The current study will attempt to determine if perceptions of the therapist's credibility/expectancy and empathy are affected by notetaking. Videos of graduate student therapists are paired with audio from APA therapy sessions to provide an authentic therapeutic experience. The data will be analyzed with a one-factor repeated measures ANOVA. The results will be used to make inferences on how notetaking affects client perceptions. The results will provide information on whether the therapist's notetaking affects how observers perceive the therapist.

Mixed Methods Ethnographic Analysis of Health, Care, Stigma, and Sexuality as Experienced by Individuals in Reentry

Macy Clanton
Mentors: William Robertson and Lindsey Felman, Anthropology

This presentation will summarize the preliminary findings of a mixed-methods ethnographic project centered on the experiences of individuals reentering society from prison. This project is a collaborative effort involving students from multiple disciplines and The Haven, a local nonprofit organization that teaches a sex education class as part of reentry programming. Thus far, our project has drawn on data collected from observation, surveys, and interviews to examine the intersections of health, carcerality, stigma, and care as experienced by formerly incarcerated individuals participating in The Haven's programming. My role as an anthropology student has involved the development of data collection instruments, especially qualitative interview questions, and interview data analyses. My presentation will focus on how experiences of care are shaped by gender/sexuality and will examine how The Haven's queer- and trans-affirming sex education helps to de-stigmatize issues of sexual health care.

Developing a Novel Task to Measure Decision-Making with Immediate vs Delayed Risk of Punishment

Anna Crichton
Faculty Mentor: Nicholas Simon, Psychology

For effective decision-making, it is necessary to learn about the adverse consequences of each potential decision. The ability to accurately evaluate punishment is impaired in several psychopathological disorders. Therefore, it is critical to develop preclinical models of punishment-driven decision-making. However, the majority of previous preclinical research utilizes punishment that occurs immediately after a choice. This does not accurately model real-world scenarios, as many consequences do not occur instantaneously, but after a long delay. To address this, our lab developed the Delayed Punishment Decision-making Task (DPDT). While

this task improves upon previous models, it utilizes punishment that occurs 100% of the time, whereas punishment is often uncertain during real world decision-making. To this end, I am developing a new task, Delayed Risk Task (DRT), which introduces the variable of risk to DPDT. In brief, adult male and female Long-Evans rats will choose between a large and small pellet reward and the larger reward will be accompanied by a 50% risk of foot shock. As the task progresses, the delay preceding the foot shock will increase, allowing assessment of preference for rewards associated with immediate versus delayed risk. For experiment one, rats will be trained in DRT to determine if rats underestimate delayed risk during decision-making. For experiment two, the same rats will train in DPDT to enable comparison between the two tasks.

Social Reward and Mesolimbic Dopamine Release

Henry Franks
Mentor: Deranda Lester, Psychology

Deficits in social behavior, such as a loss of motivation and social avoidance are key symptoms in several psychiatric disorders. The mesolimbic dopamine system plays a critical role in mediating reward-seeking and motivation but is more researched in association with drug reward than social reward. The current experiment examined the relationship between social preference in mice and mesolimbic dopamine release (before and after an injection of cocaine) using in vivo fixed potential amperometry. Data revealed a negative relationship between the dopaminergic effect of cocaine and social preference, indicating potential dopaminergic differences in social vs drug reward. These findings aid in the overall understanding of neural properties that mediate social reward.

Examining Factors of Social Reward in Male and Female Mice

Christopher Higgins
Mentor: Deranda Lester, Psychology

Identifying patterns in social behavior are key elements when studying and diagnosing psychiatric disorders. While social interactions are generally rewarding for both rodents and humans, deficits in communal behavior such as reduced social motivation, social avoidance, and social cognition are key signatures of various neurodevelopmental and psychiatric disorders. Further characterizing alterations in social behavior associated with disorders may play a role in facilitating more productive treatments. The purpose of this study is to examine factors that influence social reward in mice. Specifically, whether or not the quality of social interactions is related to the rewarding value of the social interactions, and whether this differs between male and females. We will use conditioned place preference testing, a common behavioral task for assessing the rewarding value of stimuli, to measure social reward, and we will quantify the quality of the social interactions during conditioning days by measuring the number and duration of social approaches that occur between mice. Pearson correlations will be used to examine the relationship between the degree of social interaction and social reward preference in male and female mice. Additional research in this area serves to better understand the factors that drive social rewards.

Externalizing Problems in Children: Examining the Role of Caregiver and Child Adversities, and Parental Involvement

Bailey Kersey
Mentors: Kathryn Howell (Psychology) and Debra Bartelli (Public Health)

Exposure to adversity in childhood contributes to heightened externalizing behavior problems in children. Few studies have taken a multi-informant approach to concurrently evaluate how adversity-related factors and parenting are associated with children's externalizing problems. Guided by Bowen Family Systems Theory, the current study examined how child gender, exposure to adversity, and caregiver and child report of caregiver's parenting practices were related to child externalizing problems. Participants were 66 caregiver-child dyads recruited from the Midsouth, United States. Youth aged 6-12 years primarily identified as Black or African American (95%) and male (55%; 45% female). A hierarchical linear regression model was conducted; the overall model was significant ($F(2.55) = 1.96$, $p=.02$). Results showed a significant association between caregiver exposure to adversity during childhood and child externalizing problems ($B=1.50$, $p=.007$); more caregiver adversity was related to higher child externalizing problems. These findings underscore the impact that caregiver adversity has on child functioning and suggest that interventions targeting child behavior should include an assessment of parent's history of adversity. Future research should explore mechanisms that may explain this intergenerational relationship to help identify modifiable factors that may inform treatment.

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Examining Factors that Influence the Accuracy of Stereotaxic Surgeries

Logan Longo
Mentor: Deranda Lester, Psychology

Stereotaxic surgeries are common in clinical and preclinical research. This technique is used for positioning electrodes, cannula, and other objects into specific brain regions. Stereotaxic surgeries require skill and precision, and the electrode placement must be confirmed post-procedure. Our lab uses stereotaxic surgeries to implant electrodes into the brains of anesthetized mice for dopamine release measures using in vivo fixed potential amperometry. The purpose of this project is to determine potential variables that may influence correct electrode placement during the surgery. We plan to use cryostat sectioning and stereological analysis to histologically examine brain tissue of mice that have undergone stereotaxic surgery for dopamine measures. The factors that we are examining (independent variables) are: the experience of the researcher performing the surgery, the stereotaxic station (our lab has 4), sex of the mouse, age of the mouse, and weight of the mouse. The dependent variable that will be measured is the accuracy of electrode placement based on 3 planes as described in the mouse atlas. We hypothesize that accuracy of electrode place will be altered by the experience of the researcher and the age of the mouse. The findings from this study may lead to improvements in our technical accuracy and, consequently, the internal validity of surgeries in our lab, while potentially providing insight for other researchers who commonly utilize stereotaxic surgeries.

An Ethnography Study of Citizens for Better Service and their Challenges to MATA

Stephen Nelson
Mentor: Joy Goldsmith, Communication & Film

Engaging in an ethnographic study was not my intention when I attended my first Citizens for Better Service meeting a few months ago. The meeting was an attempt to engage Memphis Area Transit Authority (MATA) in conversations about their poor bus service here in Memphis. I was encouraged to attend by several MATA drivers and one of the security guards. The reason I was persuaded is because I have been a rider for years and know those people personally. They knew that I was in school and struggled with transportation back and forth. They thought I might be curious about what was and was not happening in those meetings. I have more at stake than those individuals realized as I am disabled and live in a disenfranchised area in Memphis. I spent the summer reading and researching topics to write about despite not having a class. I spoke at that meeting detailing my own and other rider's complaints and suggestions. The idea of an ethnographic study began to manifest in my brain. I began then to recruit individuals to interview that had a variety of different interests in public transportation. I have been to two of those meetings and yesterday (10/19/2023) attended a public MATA meeting detailing new bus route. I spoke again and afterwards was recruited by two other community groups, Rider's Union and MICAH (Memphis Interfaith Coalition for Action and Hope) to be involved with their organizations. I have a unique perspective as a health COMM major, and personally being affected by MATA due to health disparities of my own. I am going to continue to attend meetings, cultivate individuals to interview, speak out when opportunities arise, and otherwise be involved while also simultaneously doing valuable research.

Self-Compassion in the Classroom: A Correlational Study of Self-Compassion and Academic Behavior

Blake Robinson and Maria Le
Mentor: Jia Wei Zhang, Psychology

Self-compassion is sympathy extended toward the self when one is faced with difficult experiences (Neff, 2003). Self-compassion consists of three facets: Self-kindness, common humanity, and mindfulness. This research extends previous literature to study whether self-compassion is associated with academic behaviors. 285 undergraduate students at UC Berkeley (M = 21 years old, SD = 3.72, 75% female, 45% Asian, 35% White, 19% multiracial, and 2% of other) reported their self-compassion, self-esteem, class participation, belongingness, and help seeking via an online survey. We found a positive correlation between self-compassion and class participation, suggesting that students who practiced self-compassion tended to be more actively involved in class activities. This positive correlation was similarly observed in the relationships between self-compassion and self-esteem, help-seeking behavior, and a sense of belonging. The reverse relationship is plausible; students with a strong sense of belonging may also show higher levels of self-compassion (r >= .25). When controlling for self-esteem, self-compassion remained correlated with the outcome measures (r >= .0.12). Limitations are that we only measured for correlation not causation and that our sample only included college students. Future research can expand on our study by using a wider, non-convenience sample with different cultures and researching the causation of

self-compassion and self-esteem on academic behavior.

A Dance of Doctrines: The Erosion of Stare Decisis and the Ascendancy of The Major Questions Doctrine

Donavan Ross
Mentor: Sharon Stanley, Political Science

A Dance of Doctrines: The Erosion of Stare Decisis and the Ascendancy of The Major Question Doctrine, examines various cases heard by the United States Supreme Court in the mid to late 20th and early 21st century to unveil the reduction in power and extent of stare decisis alongside the increase in scope and potency of the major questions doctrine. Both of which, as I will show, are phenomena symptomatic of the cynicism and nihilism rife within American political thought. By demonstrating the degree to which cynicism and nihilism exist within the decisions of the court I call into question popular notions of the separation between law and politics. Drawing from different critical thinkers of political and legal theory, I explain the concept of legal indeterminacy and how the false pretense of law and politics inhabiting separate spheres dismisses how law is and has always been necessarily imbued with political will and thus how cynic and nihilistic political thought cycles into legal reasoning at the Court. I conclude that certain kinds of legal indeterminacy do indeed have particularly pernicious effects that might awaken cynic and nihilistic consciousness and argue that in order to seek more equitable legal frameworks, we must champion a new form of legal thought that acknowledges the inseparability of law and politics while simultaneously being able to draw distinctions between positive and negative indeterminacy.

A Call to Evil: The Radical Embrace of Evil as the Genesis of Virtue

Jackson Simmons
Mentor: Daniel Smith, Philosophy

This study delves into the unexplored interrelationship between evil and virtue, challenging the traditional moral dichotomy. Utilizing frameworks from Jungian psychology and Kantian ethics, we employ integrated introspection and behavioral analysis as dual lenses to scrutinize how darker tendencies can be the crucible for authentic virtue. Through philosophical examination coupled with empirical methods, we aim to redefine ethical paradigms and develop actionable tools for societal and individual change. Investigating evil's neural pathways, evolutionary origins, and behavioral manifestations, this research proposes a revised moral compass that promotes enlightenment via the transcendence and understanding of human dualities.

Breaking Barriers: Navigating Public Regard, Psychosocial Well-Being, and Internalized Racism in Black Students at PWIs

Myahkia Watson
Mentor: Alexandrea Golden, Psychology

This research seeks to investigate the complex interplay between public regard, psychosocial outcomes (perfectionism and imposter syndrome), and internalized racism among Black college students attending Predominantly White Institutions (PWIs). Two primary research questions guide this study. First, I will explore the relationship between public regard and psychosocial outcomes, specifically perfectionism and imposter syndrome, among Black college students at PWIs. Second, I will examine how this relationship varies/is moderated based on the level of internalized racism within this demographic. This research recognizes the critical importance of understanding the unique psychosocial experiences of Black college students at PWIs, given the pervasive disparities and challenges they often encounter within predominantly white academic environments. Findings from this study may contribute to the development of more intentional support mechanisms and interventions to address the psychosocial well-being of Black college students. Additionally, shedding light on the role of public regard and internalized racism in this context may help inform strategies for fostering an inclusive and equitable learning environment in PWIs, ultimately benefiting the broader educational community.