CUNY | Office of Research

CUNY Celebration of Undergraduate Research 2023

Wednesday, May 31
Borough of Manhattan Community College
190 West Street, New York, NY
9:00am – 3:00pm

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City University of New York
Undergraduate Research Celebration Day
May 31, 2023

Borough of Manhattan Community College (BMCC)
190 West Street, New York, NY 10013

TIME	EVENT	LOCATION
9:00 am to 10:00 am	**Registration / light breakfast**	**Theatre One**
10:00 am to 11:15 am	**Welcome addresses** **Dance performances** ***Queensborough Community College*** ***Queens College*** **Music performances** ***Borough of Manhattan Community College***	**Theatre One**
11:30 am to 12:30 pm	**Poster Session A**	**Gymnasium**
12:30 pm to 1:30 pm	**Lunch**	**Gymnasium**
1:30 pm to 2:30 pm	**Poster Session B**	**Gymnasium**
2:30 pm to 3:00 pm	**Closing remarks** **Music performances** ***Borough of Manhattan Community College***	**Gymnasium**

SPEAKERS AND PERFORMACES

OPENING REMARKS

CUNY Office of Research: Research Programs Director, Ron Nerio

WELCOME ADDRESS

Executive Vice Chancellor and University Provost, Wendy F. Hensel

MORNING DANCE PERFORMANCES

Queensborough Community College

Piece 1: Created and performed by Zarina Medwinter (faculty Mentor(s): Nicole McClam)

Piece 2: Created and performed by Aliyah Morris (faculty Mentor(s): Aviva Geismar)

Piece 3: Created and performed by Bridget Chirinos (faculty Mentor(s): Aviva Geismar)

Piece 4: Created by Emily Berry (faculty mentor) in collaboration with the performers: Bridget Chirinos, Kymani James, Nyale Jenkins, Brandon Lee

Queens College

Daniela Hernandez, *QUERENCIA*
With Jesseca Sutherland, Lenora Guillaume-Sam, Ezekiel Edwards, Amy Seto, & Isabella Giglio

MORNING MUSIC PERFORMANCES

Borough of Manhattan Community College with Prof Andrew Boudreau**,** *pianist*

The Daisies by Samuel Barber
Helena Rosasco, *mezzo-soprano*

Nobody from *Wasteland, Baby!* by Hozier
Theodore Mankiewicz, *bass* and *guitar*

Girl by Robert Owens
Ashley Turcan, *soprano*

Feeling Good from *The Roar of The GreasePaint – The Smell of The Crowd*
by Leslie Bricusse and Anthony Newley
Jaime Andres Diaz Granados Almanza, *baritone*

Rise Up by Cassandra Monique Batie and Jennifer Decilveo
Ashley Wagner, *alto*

The Road Home by Stephen Paulus
Ashley Turcan, *soprano*
Helena Rosasco, *mezzo-soprano*
Ashley Wagner, *alto*
Jaime Andres Diaz Granados Almanza, *baritone*
Theodore Mankiewicz, *bass*

AFTERNOON MUSIC PERFORMANCES

Borough of Manhattan Community College

Performers:
Terra Greer – *voice*
Jasmin Daley – voice
Jordan Ellis – *bass & guitar*
Amaree Bowen – *bass & guitar*
Michael O'Donnell – *guitar*

Work Song/ Sunny Mashup by Nat Adderly & Bobby Hymn
(Jasmin Daley, *voice*; Terra Greer, *voice*; Michael O'Donnell, *guitar*; Jordan Ellis, *guitar*; Amaree Bowen, *bass*)

At Last by Etta James
(Jasmin Daley, voice; Michael O'Donnell, *guitar*; Jordan Ellis, *guitar*; Amaree Bowen, *bass*)

Hand On The Pulse by Amaree Bowen
(Amaree Bowen, *guitar*; Michael O'Donnell, *guitar*; Jordan Ellis, *bass*)

Real Love by Clean Bandit
(Terra Greer, *voice*; Michael O'Donnell, *guitar*; Jordan Ellis, *guitar*; Amaree Bowen, *bass*)

Dancing Queen by Abba
(Jasmin Daley, *voice*; Terra Greer, *voice*; Michael O'Donnell, *guitar*; Jordan Ellis, *guitar*; Amaree Bowen, *bass*)

MEMBERS OF THE CUNY UNDERGRADUTE RESEARCH COUNCIL

Advanced Science Research Center (The Graduate Center)	Joshua Brumberg
Baruch College	Kathy Pence
Borough of Manhattan Community College	Odaelys Pollard
Bronx Community College	Neal Phillip
Brooklyn College	Lisa Schwebel
College of Staten Island	George Vachadze
Guttman Community College	Jihyun Kim
Hostos Community College	Andrea Fabrizio
Hunter College	Chris Braun
John Jay College	Bettina Muenster
Kingsborough Community College	Farshad Tamari
LaGuardia Community College	Rejitha Nair
Lehman College	Alice Augustin
Macaulay Honors College	Lisa Brundage
Medgar Evers College	Mohsin Patwary
New York City College of Technology	Hamid Norouzi
Queens College	Dan Weinstein
Queensborough Community College	Urszula Golebiewska
School of Labor Studies	Anna Zak
The City College of New York	Claude Brathwaite
York College	Ruel Desemero

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PARTICIPATING FACULTY MENTORS

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Victoria	Sanford	Lehman College	B14	41
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Shane	Snipes	Borough of Manhattan Community College	A12	5
Laura	Spinu	Kingsborough Community College	A67	31
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STUDENT POSTER ABSTRACTS

MORNING SESSION: POSTER SESSION A

BARUCH COLLEGE

English Translation of "Los Movimientos Sociales y la Política de Hoy: Una Mirada con Perspectiva Histórica" by Gabriel Boric Font

Mary Abdelmassih

Mentor(s): Professor Esther Allen
Baruch College

American journalistic coverage of Chilean politics is not vast, and this article provides a resource in English coverage of Gabriel Boric Font's sociopolitical stance as of 2018. It is important for English speakers to be exposed to this article as Boric's points of discussion parallel the values of liberal movements in the United States and other countries around the world. Chile's incumbent president Gabriel Boric Font led the movement for free quality public education as the president of the University of Chile Federation of Students. Before being elected as the youngest president in the history of his country, Boric worked in politics as a member of the Chamber of Deputies for two terms during which he wrote this article in 2018, discussing the purpose and effects of social and political movements in Chilean society, noting issues centered around indigenous inclusivity, class disparities, and government socioeconomic neglect of lower class Chileans. I translated this article from Spanish to English, finding the English translation of Spanish legal and political jargon by researching American scholarship on the Penguin Revolution. As Chile begins a new page, re-evaluating its laws and rebuilding itself with a liberal president, the English-speaking world can better understand where their leader's ideology stems from and the translation of this article is the first step in that direction.

Climate Anxiety, Hopefulness, and Education

Marina Alduk, Judah Duke, & Hyosik Shin

Mentor(s): Professor Mindy Engle-Friedman
Baruch College

The projected impacts of climate change on NYC are expected to affect living and work conditions. These climate change projections can be disconcerting to CUNY undergraduates as they plan for the future. The extent to which CUNY students and Baruch undergraduates in particular experience anxiety about climate change is unknown. Likewise, aspects of resilience in the face of climate change, including feelings of hopefulness and optimism, have yet to be fully captured. Lastly, students' perceptions of the role faculty play in preparing students for climate change impacts and resilience have not been assessed until now. This study seeks to both understand climate anxiety, hopefulness, and optimism among Baruch students, as well as to explore students' perceptions of faculty members' responsibility for educating them about climate change. Participants (n=435) completed the online Sustainability Assessment (approved by Baruch HRPP/CUNY IRB) to satisfy their course research participation requirement. Preliminary data analyses found that regarding climate change: 90.6% believe it is a serious problem and 83.9% believe it will affect their future well-being. Over 95% indicated a fear that natural disasters are getting worse, with 94.7% worrying natural disasters are putting their lives at risk. However, 88.1% indicated they believe their actions combined with others will make a difference in reducing climate change and 55% were hopeful climate change can be controlled. Concerning faculty, 83.3% believe educators have a responsibility to combat climate change, 79.6% indicated willingness to discuss environmental sustainability in the classroom and 77.3% indicated willingness to participate in a college-wide project to promote sustainability. This study helps us understand students' climate anxiety, hopefulness, and need for educational support from their faculty members. Such interactions with faculty may lead to greater student hopefulness and engagement in climate resilience and innovation and an overall reduction in students' climate anxiety.

From Whale Waste Product to Perfume: A Theoretical Study of $^1O_2$ Oxidation of the Natural Product Ambrein

Emma Fetman

Mentor(s): Professor Edyta Greer
Baruch College

Foul smelling compounds exist in waste products from sperm whales due to the secretions they produce to surround the indigestible parts of their prey. A potential air-ocean interface photooxidation of these waste products convert the natural product ambrein to volatile breakdown products ambrox and ambrinol. In contrast to their original odor, these products have a pleasant smell, and are therefore desirable in the perfume industry. Our introductory density functional theory (DFT) studies point to $^1O_2$ oxidation of ambrein in an 'ene' reaction with further decomposition steps. The results of these DFT studies, including the decomposition steps, will be discussed.

Comparative Gene Expression in Water Buffalo

Michelle Fridburg & Michael Bellido

Mentor(s): Professor Zachary Calamari
Baruch College

Most research on genetics of hoofed mammal horns focuses on fetal or adult animals from species commonly raised for food, like cattle, sheep, and goats. Early-post natal development, however, is less studied. Our research focuses on the differences in early post-natal horn gene expression between male and female water buffalo (*Bubalus bubalis*) in comparison to common domesticated species. We hypothesized that male horns will have significantly different gene expression than females at this early stage, due to differences in developmental timing of the onset of horn formation. Using linear models, we assessed which genes are differentially expressed in one-month-old horn buds relative to skin unrelated to horn formation from another area of the skull (overlying the occipital bone). Our results show intersexual differences in multiple key genes linked to cranial appendage development in cattle and deer, such as RXFP2, MYOC, and ALX1. This research gives us greater insight into genes that contribute to the development of horns, increasing the species and age diversity for which data are available. Cranial development is a complex process and comparing how genes guide the process in different species can lead to insights into basic bone development for many species, including humans.

Accountability is the New Black: Exploring how a Philosophical Approach to the Fashion Industry Will Reduce its Environmental Impact

Darion Gibbs

Mentor(s): Professor Elizabeth Edenberg
Baruch College

The fashion industry accounts for about 8% of all carbon dioxide emissions. It is the third largest contributor to pollution globally, behind only oil and agriculture. It accounts for one-fifth of the plastic produced annually. The only authentic way to make sustainable purchases is by not purchasing anything. So how is this trillion-dollar industry able to get away with so much? Who is the primary gatekeeper of sustainable labels in supply-chain capitalism? How does a global industry decide who is responsible for the policing and accountability in the fashion industry's part in climate change? I am investigating the environmental impact of the fashion industry through the lens of global distributive justice. I will find out how to hold this industry accountable for its contribution to climate change. I intend on tackling these tough questions using the frameworks of international and domestic environmental justice and will apply philosophical frameworks to the fashion industry. More specifically, my research will tackle how the fashion industry became one of the biggest polluting industries.

The Contemporary "White Trash" Memoir in Literary, Social and Political Contexts

Ursula Hansberry

Mentor(s): Professor Michael Staub
Baruch College

This senior thesis is about class in the United States, as expressed and represented in three critically and popularly successful memoirs published by white working-class writers between 2005 and 2018. My thesis explores how these memoirs and their critical and commercial reception demonstrate a profound shift in cultural and social representations of white working-class upbringings in the United States, although not in any simple or obvious way. While readers intuitively grasp that a memoir is not the truth in a directly literal sense, but rather a document that is constructed, edited, framed, shaped, and dramatized, readers and critics at the same time presume that these memoirs can and do provide a deepened understanding of what individuals from impoverished and troubled backgrounds really experience – and both authors and commentators also often suggest that more general policies and politics may be derived from these experiences. The evolving reception of these texts has shaped their meaning.

My argument is threefold. First, that a shift in white working-class memoir represents a new turn in class consciousness in American nonfiction/ autobiographical writing. Second of all, and crucially, this shift represents a rupture from a past linkage between working-class literature and leftwing politics that the term "proletarian writing" so often exemplified. Rather, what we are seeing in the trajectory from Walls (*The Glass Castle*) to Vance (*Hillbilly Elegy*) to Westover (*Educated*) is far more confusing to locate politically. Thirdly, then, and regardless of their political standing, these memoirists implicitly and explicitly cite education as the catalyst for their escape from their "white trash"

Disparities in Gender Inequality Across Pakistan

Zara Khan

Mentor(s): Professor Carla Bellamy
Baruch College

Women in Pakistan face discrimination in most aspects of their lives. For many of them, it is a simple fact of life. In some ways, they have been conditioned to view their lack of autonomy as a natural phenomenon that is inevitable due to the biological differences between men and women. This, as well as the influence of material conditions, patriarchal interpretations of religion and culture, and various ethnicities adhering to their own unique ways of life result in the type of deeply rooted gender norms found in Pakistan. This study seeks to investigate the easily observable and more subtle ways in which gender inequality manifests throughout the country, how it varies between ethnic groups, transcends income brackets, and is the culmination of several complex or unpredictable variables. The research assumes the hypothesis that greater economic prosperity and education access for women does not significantly impact gender discrimination in Pakistan because the patriarchal norms in the country are rooted in intermixed cultures and religions as well as historical events dating back many centuries.

Additionally, it sheds light on how potential solutions to these issues require a methodical approach that addresses the root of the patriarchy and accounts for ethnic diversity. To achieve this, the study takes a quantitative and qualitative approach in exploring the relationships between the various factors that impact gender inequality in the country--utilizing statistical computing tools, survey data, historical and economic context, and on-site/video interviews with women from a wide range of backgrounds to conduct a thorough analysis.

DNA Barcoding of Fungi in NYC

Loralye Montalvo

Mentor(s): Professor Helene Eisenmann Barbour
Baruch College

The objective of this research is to promote biodiversity by using DNA Barcoding to identify different fungi in New York City. Biodiversity are the different organisms in an area that work symbiotically to maintain balance and support life. The variety is essential for the processes that support all life on Earth. Understanding and researching fungi are important, because of their decomposing and recycling capabilities. This can be done by identifying, characterizing, and conversing fungal bioresources. It may take generations of research, but with this research scientists will be able to predict the ecosystem cycling and evolution of epidemiology of fungal diseases. To conduct this project, samples were collected from various NYC parks and analyzed in a lab. The specimens are vouchered using a social network, iNaturalist.org to temporarily identify species. In the laboratory, DNA was extracted from the specimen with sodium hydroxide and prepared for PCR. This DNA was amplified using a PCR machine and underwent gel electrophoresis. Lastly, the gel was stained and viewed under a UV light to examine the fragment sizes and distances. The DNA of top-quality specimens was submitted to a gene sequencing company. The data and DNA were compared with DNA public databases to correctly identify the fungal specimens. To finalize the project, the proper identification of the specimens will be posted onto a public database. With this data, species of fungi can be correctly classified within their different phylum. Overall, this research is important because discovering new species helps researchers advance in their studies of biodiversity.

Volatility Spillover Between U.S. Treasury and Latin American Government Bond Markets

Jairo Reina

Mentor(s): Professor Sebastiano Manzan
Baruch College

In an increasingly financially integrated world, volatility shocks in one financial market can impact markets internationally. The spillover of volatility between markets does not always exhibit uniform characteristics as the nature of the shock will determine direction and persistence. Factors such as the financial integration of economies, political and economic conditions, and the type of market have an impact on the dynamics of market volatility. However, there is little research on the transmission of shocks between the U.S. Treasury bond market and Latin American government bond markets. In this study, I employ a multivariate Dynamic Conditional Correlation GARCH (DCC-GARCH) model to capture the volatility spillover between Latin American, Brazilian, Chilean, Colombian, Mexican, and Peruvian bond market indexes, and the U.S. Treasury market. I find that there are significant, but differing levels of spillover between the US Treasury bond market and Latin American government bond markets. The differences most likely stem from the proximity and level of financial integration of the markets. These results can provide greater context to investors and policymakers towards Latin American bond market stability during periods of high volatility or financial crisis.

The Two Front War: Vietnam and Equality

Jose Tirado

Mentor(s): Professor Katherine Pence
Baruch College

This paper will show that women reporters in Vietnam faced extra hardships because of sexist male leadership, their actions being deemed "unladylike," and the fact that their male counterparts treated women differently. This paper takes place during the Vietnam War from 1955-1975. The paper focuses on

the experiences of Denby Fawcett, Catherine Leroy, and Edith Lederer among other female reporters. Books by Elizabeth Becker and nine female journalists laid out a lot of information regarding the treatment of women journalists during the Vietnam War. Becker was also a journalist who covered the war in Cambodia. Sources like articles from the time, as well as an archive that featured letters from Catherine Leroy, give accounts of the feelings and experiences of female war correspondents. Also, an interview with four women reporters during the Vietnam War, recorded in 2015, allowed them to talk about their experiences and how they were able to overcome sexism. Within my findings, I found that some reporters, like Leroy, were ridiculed for swearing and smoking, while others were seen as too fragile for war. The findings exemplified that female journalists were treated differently by the top of leadership than individual reporters and soldiers. What I'm expecting my findings show is an expansion on how not too long ago women were still being mistreated. Nowadays there are many pushes to get women into leadership positions, and in the field of journalism, it wouldn't have been possible without the perseverance of these women journalists.

BOROUGH OF MANHATTAN COMMUNITY COLLEGE

Detailed Statistical Analysis on Breast Cancer Abstract

Marcus Benoit & Valeria Gromova

Mentor(s): Professor Chiaki Yanagisawa
Borough of Manhattan Community College

In the literature of machine learning (ML) applications for medical research, there are numerous examples of comparing different algorithms using mediocre statistical analysis if any. Often the average accuracy is used to compare among different machine learning algorithms, and the best algorithm is claimed to be one that is most accurate without considering statistical significance. We have conducted a statistical analysis to estimate 1) the uncertainties associated with statistical metrics such as true positive ratio and false positive ratio, as well as 2) the uncertainties associated with the differences in metrics with two machine learning algorithms. We use a dataset made of characteristic features of nuclei of cells extracted from suspicious lump in the patient's breast using Fine Needle Aspiration (FNA) technique. This small dataset is publicly available with 30 features of the nuclei of the sample cells (malignant and benign). Most of the studies involving this dataset did not perform proper error analysis for the small statistics of the data of malignant and benign cells (212 vs. 357 samples, respectively). The purpose of this study is to explore the following machine learning algorithms:Random Forest, Adaboost, XGBoost, and Support Vector Machine (SVM), with the goal of demonstrating the effectiveness of the algorithms with proper error analysis practices and evaluating the FNA technique in detecting breast cancer. For example, there is an overlap of possible accuracy values within one standard deviation between SVM and Adaboost. When examining the distribution of the difference in the accuracy of the SVM and Adaboost, there is actually a 87% vs (5%) chance that Adaboost vs (SVM) is better. Currently with our conducted statistical analysis, the decision tree based model known as Adaboost is the most accurate model.

Impact of Micromobility Usage in Ocean Hill, Brooklyn

Carlene Hunte-Nelson

Mentor(s): Professor Shane Snipes
Borough of Manhattan Community College

The rise of sharing and gig economies has increased the prevalence and demand for micro mobile, or "micromobility" devices within cities. Micromobility typically includes rental and user-owned bikes, e-bikes, and e-scooters. However, riders of these devices must share city streets, and often sidewalks, with traditional users of urban spaces, such as motor vehicles and pedestrians. This report investigates the opinions and experiences of this intersection among a small sample of predominantly African American residents in the Ocean Hill community of Brooklyn. The study utilizes interviews, a survey, and naturalistic observations. Both quantitative and qualitative findings reveal a need for engaged stakeholders to promote safety education and legal device usage, as there is currently no ownership of

safety education in the community. These findings also suggest that this community may be disproportionately affected by any escalation in enforcement activities related to safety or legal device usage without proper support.

Examining the Socio-Economic and Health Conditions of Afro-descendants in Costa Rica

Josephine Inpanya

Mentor(s): Professor Shruti Sharma
Borough of Manhattan Community College

In Costa Rica, Afro-descendants suffer from social invisibility and exclusion from national culture, lack of government acknowledgment, and underestimation of census numbers. In turn, this undermines their economic mobility. In the Fall of 2022, our group of 12 researchers from BMCC's Black Studies Across the Americas Project set out to ascertain the socioeconomic and health conditions of Afro-descendants in Costa Rica. However, the 2011 Census of the National Institute of Statistics and the Census of Costa Rica may have increased the number of categories for reporting ethnic identity since its last census. However, we could not find data on socioeconomic variables disaggregated by ethnicity. Ultimately the aim of this research is to enhance the visibility of Afro-descendants in Costa Rica. An additional aim of this research is to produce Open Educational Resources in line with the pedagogical mission of Black Studies Across the Americas Project. We began by researching the demographic composition of Costa Rica using various data sources, including census data. We then studied the differences in educational and employment outcomes (unemployment, labor participation, and economic dependency rates) between Afro-descendants and the rest of the population. Finally, we studied the health conditions of Afro-descendants in Costa Rica by considering indicators of disabilities and access to medical insurance. We arrived at several findings that reveal disparities in the socioeconomic status and health conditions of Afro-descendants in Costa Rica: there are disparities in education, Afro-descendants have a higher labor participation rate than other ethnicities and a higher unemployment rate, residents of Limón have mainly been employed in the Agricultural sector- a trend that has not changed since 2000, and residents of Limón have poorer health outcomes than the average Costa Rican resident, with higher disability rates and more inadequate insurance coverage. Together, these findings suggest that economic mobility and income growth opportunities for Afro-descendants in Costa Rica are low and point to the need for welfare policy attention and recognition in this population. As for our second aim, we designed lesson plans from this project and implemented them on the OER. These educational materials were released under an open license. They can be used, reused, and often remixed and customized by other educators around the globe that do not traditionally incorporate Black Studies. There need to be concerted efforts toward reducing racial disparities in socioeconomic and health conditions. It was challenging to recruit Afro-descendants to conduct interviews, participant observation, and surveys with us. This difficulty impacted our data collection since we could not gather data on the lived experiences of our population. Most of our data was based on census data, UNESCO data, United Nations Development Programme (UNDP) reports, and academic journals. Future studies might look into the challenges of recruiting participants for qualitative research in this population.

Potential Antioxidant, Cytotoxic, Antiviral, and Antibacterial Activities of Extracts from Three Species of Piper, a Pepper

Abigail Meyer with Salmah Akbar, Drusilla Sheridan, Haley Cogburn, José A. Fernández Romero, Brian Rafferty, Adolfina Koroch, and Christine Priano

Mentor(s): Professor Christine Priano
Borough of Manhattan Community College

Peppers of the genus Piper are commonly used as spices and traditional medicines. The aim of this study was to identify total phenolic content and antioxidant, cytotoxic, antiviral, and antibacterial activities of extracts from seven commercial sources of P. nigrum, P. guineense, and P. borbonense. Crude extracts were prepared in different solvents from dried crushed seeds for each sample. Total phenolic compounds and

antioxidant capacities were determined using the Folin-Ciocalteu assay and the 2,2'-azino-bis -ABTS assay. The cytotoxicity in different cell lines and viral entry inhibition by aqueous extracts were explored using the XTT colorimetric assay and the SARS-CoV-2 Delta variant pseudoviral model. Antibacterial activity was determined by growing Escherichia coli and Bacillis subtilis in microplate cultures in the presence or absence of each aqueous extract and monitoring growth by spectrophotometry. Variations in total phenolic content and antioxidant capacity between samples and extraction solvents were observed. Samples with high total phenolics exhibited the highest antioxidant capacity. The SARS-CoV-2 Delta variant pseudoviral model in HeLa ACE-2 cells showed half-maximal effective concentrations (EC50 values) between 0.7 and 3.7 mg/mL. The half-maximal cytotoxic concentration and EC50 ratio (selective index) showed promising viral entry inhibition in four of seven extracts with selective indexes between 8.2 and 14.9. Aqueous extracts from P. borbonense showed the best antiviral selectivity. The cytotoxicity in Caco-2 cells showed that most of the aqueous extracts did not decrease cell viability, with no dose-response observed. Whereas the extracts inhibited growth of B. subtilis, there was no activity observed against E. coli. Differential results are possibly due to differences in bacterial cell wall structure. Samples of P. borbonense that exhibited the highest suppression of *B. subtilis* growth had relatively high phenolic content and antiviral activity. The data collectively support a scientific basis for traditional health benefits of *Piper* extracts.

BRONX COMMUNITY COLLEGE

Microanalysis of Iron Concentration Using a Colorimetric Method

Lily Ameling

Mentor(s): Professor Sunej Hans
Bronx Community College

Photometric methods of testing are known for producing rapid results with a high degree of sensitivity, making them ideal for analytical applications. The purpose of this research is to use photometric methods to analyze iron at a microscopic level and establish a calibration curve for accurately detecting trace amounts of iron in samples associated with neutrino experiments. The methods employed in this study involved preparing and analyzing samples with known iron concentrations ranging from 0.01 to 2 parts-per-million (ppm) using a colorimetric reagent which produced a violet complex. Ultraviolet–visible (UV-Vis) spectroscopy was performed to measure the absorbance of the samples at 565 nm and a calibration curve with a correlation coefficient (R2) of 0.9998 and an equation of y = 0.4969x was obtained. The observance of a strong linear relationship between concentration and absorption indicates that the photometric technique used in this research is capable of accurately detecting trace amounts of iron in samples at the microscopic level. These findings have significant implications, as they suggest that this method can serve as a reliable tool for determining unknown concentrations of iron in samples.

Mapping Air Pollution on a Microscale in Mumbai, India

Carolina Perez

Mentor(s): Professor Neal Phillip (BCC), Professor Paramita Sen (BCC), Professor Brian Vant-hull (CCNY)
Bronx Community College

India is one of the most polluted countries in the world. Several Indian cities are listed as some of the most polluted cities in the world, particularly Mumbai, a mega city with over 18 million residents. There have been 13,444 deaths related to air pollution in Mumbai alone over the past 5 years. Making India have one of the world's worst air quality. For one month during December 2022 and January 2023, a team of CUNY students and researchers spent a month mapping air pollution in areas of Mumbai with marginalized populations. The team used specially designed air pollution mobile sensors to map pollution on a micro-scale, literally block by block in the city. These sensors collected temperature, relative humidity, particulate matters (0.1-10 μm), NO_2, SO_2, CO and CO_2. Pollution sources were also documented as the CUNY team walked through the neighborhoods. The air pollution data was analyzed using Google Maps and then color inverted using Python to present the

data visually. The analysis of the data for walks through Dharavi slum and the Santa Cruz neighborhoods in Mumbai is presented here.

Applications of Machine Learning Models on PDAC Diagnosis

Robert Rivera

Mentor(s): Professor Jorge Pineiro
Bronx Community College

Pancreatic ductal adenocarcinoma is amongst the most common, and deadly, forms of pancreatic cancer. Up until now, the standard method for diagnosing PDAC has been via imaging. However, by the time an image can be seen, it has likely become metastatic due to its asymptomatic nature, with patients having a 9% survival rate past 5 years after diagnosis. In 2020, a group of 16 researchers published their work in PLOS Medicine, detailing their use of a biomarker panel, extracted from blood and urine, and a data model(the PancRisk score), to test the viability for possible early diagnosis. The results from their research was an accuracy rate of over 80%, with a dataset of less than 600 patients. Our goal is to establish a classification model which can emulate their results and be easily scalable to larger and more complex datasets, through the use of artificial neural networks. Using fundamental principles in feature engineering, we simplified the original biomarker panel to test the results of various feature combinations, and also to remove large amounts of missing data, which would otherwise increase the risk of false positives/negatives. Composed of a control, benign, and malignant group, we trained several versions of the dataset in an Artificial Neural Network(ANN), which can utilize large amounts of complex data and is key to the scalability of the machine model. Such a model would allow for future increases in the amount of patient data for training, and benefit from larger datasets with more complex parameters.

BROOKLYN COLLEGE

Does the Purpose of Touch Between Male Friends Differ as a Function of Masculine Contingency?

Daniel Carlson

Mentor(s): Professor Cheryl Carmichael & Professor Ricky Granderson
Brooklyn College

Men are lacking the intimacy that they desire in their homosocial friendships. More specifically, recent research shows that men desire more affectionate touch in their male friendships than they get. This study explores whether the purpose of touch between male friends differs based on the extent to which a man's perception of self-worth is dependent on his masculinity (i.e., masculine contingency). Five-hundred one men provided written responses to the question: “In your opinion, what purpose does physical touch serve in men’s friendships with other men?” and completed a measure of masculine contingencies. A team of five researchers carried out a thematic analysis to code responses and identify emergent themes. Chi- Square analyses were employed to examine whether there were differences in the purpose of touch identified by men who scored high versus low in masculine contingency threat (MCThreat; i.e., the degree to which self-worth is threatened by failure to perform masculinity), and high versus low in masculine contingency boost (MCBoost; i.e., the degree to which self-worth is bolstered by successful performance of masclinity). Results showed that men who scored high in MCThreat were more likely to cite touch as unimportant or state personal restrictions in touch with their male friends. Men who scored lower in MCThreat were more likely to endorse touch as a means to generate or signal closeness, explore relationship boundaries, and provide the context surrounding their homosocial touch experiences. Men higher in MCBoost more frequently reported touch being used for emotional disclosure and socially proving masculinity, while men lower in MCBoost more often endorsed touch as a means to generate or signal closeness. These findings advance knowledge about the barriers that are obstructing men from

attaining the fulfilling affectionate homosocial relationships they desire.

Exploring the Effect of Aurora Kinase Inhibitors on Growth Suppression in a Yeast Model of ALS

Gabriel Cruz

Mentor(s): Professor Mariana Torrente & Professor Emilio Gallicchio
Brooklyn College

Amyotrophic Lateral Sclerosis (ALS), or Lou Gehrig's Disease, is a fatal neurodegenerative disease characterized by the degeneration of motor neurons. Neuronal death results in muscle atrophy, loss of motor control in the limbs, and paralysis. Currently, ALS has no cure, and FDA-approved treatments fail to control symptoms. ALS is associated with various genes, most notably chromosome 9 open reading frame 72, or *C9orf72*. Hexanucleotide repeat expansions in the *C9orf72* gene are the most common cause of ALS. These hexanucleotide expansions result in dipeptide repeat proteins, which aggregate into inclusions in the motor neurons of ALS patients.

Exploiting a yeast ALS model overexpressing the dipeptide repeat protein PR_{50}, comprising 50 repeats of the dipeptide Proline-Arginine under a galactose-inducible promoter, we have previously discovered that overexpression of PR_{50} is associated with an increase in the phosphorylation level of Histone H3 on Serine 10 (H3S10ph). Furthermore, we previously found that knockdown of Ipl1, the yeast homolog of Aurora B Kinase responsible for H3S10ph in yeast, leads to a decrease in the levels of H3S10ph and growth rescue in yeast overexpressing PR_{50}.

Histone modifications are highly accessible targets for pharmaceutical intervention. Therefore, with the aim of preventing H3S10 phosphorylation increases and ameliorating PR_{50} toxicity without the need for genetic manipulation, we investigated the effects of chemical inhibition of the yeast aurora kinase Ipl1 in cell survival in the context of PR_{50} overexpression. We performed serial dilution growth assays on PR_{50} yeast in the presence of the Aurora B Kinase inhibitor drug Barasertib at varying concentrations. After the chemical inhibition of Ipl1, we performed western blot analysis to observe changes in H3S10ph. Through inhibition of Ipl1 and growth rescue of PR_{50} yeast, we aim to establish the significance of epigenetic drugs in the treatment of neurodegenerative disease

Long-COVID Neurologic Mechanism and Risk Factors

Nancy Deng

Mentor(s): Professor Theodore Muth & Professor KC Johnson
Brooklyn College

The purpose of this research is to explore neurologic changes underlying long-COVID symptoms and identify trends and possible risk factors for developing these symptoms. SARS-CoV-2 is a highly transmissible and pathogenic coronavirus that emerged in late 2019 and is responsible for the COVID-19 pandemic. In some cases, the effects of COVID-19 disease linger even after the infection has resolved. These chronic symptoms, which may last from weeks to years, are known as long-COVID symptoms. Neurologic abnormalities such as loss of taste or smell, difficulty concentrating, and memory impairment are common long-COVID symptoms. However, the mechanisms underlying these symptoms are unknown. There is also a lack of screening, so many cases may be undiagnosed. Given the high number of COVID-19 cases, long-COVID may have substantial implications for productivity loss and people's quality of life. My research consists of statistical analyses of CDC datasets on long-COVID and COVID-19. Long-COVID trends based on sex, age, and disability status were analyzed. I then examined COVID-19 trends in deaths, cases, and vaccination status based on the sex, age, and disability status of COVID-19 patients. The findings of this study show that long-COVID is more prevalent in females, people with pre-existing disabilities, and younger individuals. Additionally, long-COVID is less prevalent in older populations even though they are at greater risk. Based on COVID-19 trends, females may be at increased risk for long-COVID due to higher levels of COVID-19 cases. Younger individuals may be at higher risk of developing long-COVID due to lower vaccination rates and higher levels of COVID-19 cases. Although long-COVID

symptoms are common and pose a challenge to public health, relatively little is known about this illness. The findings of this study will support identifying at-risk populations, directing outreach and allocating resources, and developing screening and therapeutic options for these individuals.

From Big Screen to Small Screen: Exploring the Key Differences Between Film and Social Media Product Placements and their Effects on Children's Perception

Carrie Ebbin

Mentor(s): Professor Barbara Lewis
Brooklyn College

Product placement in film and social media is an effective advertising technique because it aims to "deliver subtle affective associations" instead of a "rational or factual message" that obviously aims to sell a product (Nairn and Fine 448). This "blurring of advertising and entertainment" affects audiences, especially children, in "some preconscious way" because of their limitation in distinguishing between the selling message and the narrative material (Hudson et. al 291).

In my qualitative analysis, which includes a review of existing literature and contemporary visuals, I consider the impact of social media product placement on the consumer child psyche and explore its divergence from traditional cinematic product placement. The research concludes that while product placement in film is effective and widely utilized, advertisers are shifting their focus to social media product placement to exploit the influencer-audience relationship, the alleged authenticity of social media influencers, the purported expertise of influencers, the social media amplification of peer pressure, and the convenience inherent in social media. Advertisers can maximize their impact by capitalizing on the nuances of each platform. Research into the psychological impact of social media product placement on children is critical to ensuring their safety online.

Breast Cancer Bioinformatics: Untangling the Roles of Nucleolin and BRCA1 in Dysregulated DNA Repair

Nitu Farhin

Mentor(s): Professor Shaneen Singh
Brooklyn College

Nucleolin (NCL), a major RNA binding protein (RBP) and the breast and ovarian cancer susceptibility gene (BRCA1), a tumor suppressor protein have defined roles in homologous recombination (HR) and non-homologous end joining (NHEJ) DNA repair pathways, and colocalize in breast cancer. However, the mechanisms of how NCL and BRCA1 collaborate in mobilizing the DNA repair mechanism under stress conditions remain unclear. To address this, we analyzed the protein-protein interactions between NCL and BRCA1 using various databases (NIH PPI Database, IntAct, STRING, BioGRID, GeneMania, PrePPI, and Mentha). Our analysis revealed an overlapping interactome of 47 proteins that interact with both NCL and BRCA1. We conducted further analysis of the domain architecture to locate a set of proteins that have common domains that interact with NCL in breast cancer and commonalities within GO functional annotations. Our research revealed that the BRCT 1 and 2 domains exist in BRCA1, MDC1, NBN, TP53, and may interact with NCL. These four proteins are known to play a role in DNA repair. We also modeled the full length model of NCL to provide a complete structural representation of the protein and present predicted interaction scenarios and a detailed description of the interaction interfaces between NCL and proteins involved in DNA repair processes identified in the subset of overlapping interactome of NCL and BRCA1. Our previous research has successfully modeled the RNA-binding domains (RBD) of NCL and delineated the binding interfaces between NCL-RBD and miRNA specifically dysregulated in breast cancer using in-silico approaches. This preliminary research provides a basis for creating in-silico models to further understand the protein complexity of damaged DNA and identify candidates that can be targeted in breast carcinoma. Our findings highlight the potential role of NCL in the DNA repair pathway and identify candidates that can be targeted in therapy for breast carcinoma.

C9orf72 Dipeptide Repeat Proteinopathy in Yeast is Accompanied by Alterations in Histones H3 and H4 Post-Translational Modifications

Chaim Janani

Mentor(s): Professor Mariana Torrente
Brooklyn College

Amyotrophic lateral sclerosis (ALS) and frontotemporal dementia (FTD) are incurable neurodegenerative disorders that are on a clinical continuum. While most cases have no known genetic component, the most common genetic cause for the disease is an accumulation of hexanucleotide repeat expansions in the *C9orf72* gene, which lead to the production of dipeptide repeat proteins. Among these, a proline and arginine (PR) repeat leads to cytotoxicity. To better understand how these dipeptide repeats affect the epigenome, specifically histone post-translational modifications (PTMs), we characterized modification levels on various lysine residues on histones H3 and H4 in the context of a yeast PR_{50} overexpression model. We find significant increases in the levels of H3S10ph and H4K16ac, as well as an increase in the acetylation of H3K9, H3K14, and H3K27. Acetylation levels on other sites remain unaffected. The acetylation changes point to increased activity of the histone acetyltransferase GCN5. In addition, we found significant increases in the levels of H3K4me1, H3K36me2, H3K36me3, and H3K79me3. These methylation changes, along with the acetylation changes, are suggestive of increased gene transcription by RNA polymerase II. We show that some of the changes linked to PR_{50} proteinopathy in yeast is recapitulated in a *C9orf72* patient-derived fibroblast cell model. Through a better understanding of the epigenetic mechanisms at play in ALS/FTD, we can begin to determine the essential links that lead to disease and illuminate potential therapeutic targets for these and other neurodegenerative diseases.

The Windows and Mirrors in our Neighborhood: The Beauty and Evolution of Black Representation in Children's Public Television

Jesse Morales

Mentor(s): Professor Lisa Brudage and Professor Logan McBride
Brooklyn College

The Public Broadcasting Service (PBS) deserves funding because throughout its entire history, through Sesame Street and Mister Rogers' Neighborhood, they have delivered thoughtful and intentional diversity to children. Both shows have roots in the Civil Rights Movement of the 1960s that bred PBS and these programs. In order to see the importance of PBS, we need to analyze how these shows have presented black representation and how they've taken criticism and evolved. We see that in characters like Roosevelt Franklin from Sesame Street's early days,which through a coded design, present him as a black child, to recent characters like Wes and Elijah, which become one of the first explicitly black muppets. Even Mister Rogers' Neighborhood, which took a political stance through the inclusion of Officer Clemmons as the first recurring black character on television and Daniel Tiger continued that trend with Miss Elaina, who has an episode starring her that tackles race. I analyzed the effectiveness of their representation through Rudine Sims Bishop's "Windows and Mirrors" theory that describes certain characters as windows into other cultures or mirrors that validates a child's experiences. These characters are prime examples of the thoughtfulness behind each series and the biggest barrier behind these valuable pieces of media from reaching more eyes is the lack of accessibility that would be remedied with more funding and more understanding of the importance of PBS and its works.

Teaching Mathematics Using Children's Literature: Exploration in 1st Grade Classrooms

Elysia Richards-Durham

Mentor(s): Professor Laura Ascenzi-Moreno
CUNY Brooklyn College

This study aims to explore the impact on students' mathematical achievement and interest when we integrate children's literature into math instruction. As teachers, it is our job to supply our students with the knowledge and means to understand the things we teach. Math is a subject that students tend to fall short of. Rather, the way math is being taught has not yielded the results we would expect given the resources at educators' disposal. The current focus on STEM only heightens the significance of this issue. While math concepts are an integral part of our daily life, math anxiety deeply impacts our students. Students believe that they are not good enough to understand math, so they do not like it and disregard it all together. However, with proper resources and guidance, we all can do what we put our minds to. Combining literature, a subject we know holds students' interest, with mathematics may be fruitful. Literature offers real-life connections, creative storytelling, a meaningful platform to pose mathematical concepts, and so much more. This research explores if the combination of children's literature with math instruction will increase students' achievement and interest.

This research will take on a combined quantitative and qualitative approach to determine the impact integrating children's literature and mathematics. I have designed units of study which integrate children's literature with first grade math content standards. Students will learn 1-2 topics over the course of 1 month. Students will complete pre and post assessments at the beginning and end of the research period. There will also be interviews after each topic to gather data about students' interest and achievement levels in mathematics as the study progresses. Teachers will be surveyed at the beginning and the end of the study about their students' learning outside of sessions.

Framing a Killer: A Moral Natural Language Processing Study of Online Conversation

Levi Satter

Mentor(s): Professor Ana Gantman
Brooklyn College

Stories allow people to engage with immoral minds. Yet, to be associated with an immoral actor is psychologically "threatening" because of the fear of being seen as immoral oneself. In everyday experience people distance themselves from immoral actors to remain unassociated with them; however, fictional narratives create enough psychological distance to allow people to identify with, and explore, the motivations of immoral actors. It is unclear whether this psychological distance occurs with stories about real-world individuals who commit extreme moral transgressions (i.e., serial killers), or whether it affects the characteristics of surrounding discourse. The current study examined whether people engage with "true crime" documentaries versus fictionalized narrative retellings of the very same story differently. This was done by scraping Reddit communities (r/Dahmer and r/DahmerNetflix) for comments regarding two different representations of the same Jeffery Dahmer narrative, one documentary (n = 143 comments) and one fictionalized account (n = 856 comments). The data were quantified using the natural language processing techniques of Linguistic Inquiry and Word Count (LIWC) and Distributed Dictionary Representations (DDR). These techniques are computer programs that make text or spoken words comprehensible and thus usable to computers. They are also used in the social sciences to statistically compare linguistic data. LIWC measured the sentiment of the comments and people's overall engagement with the topic using relative frequencies of relevant words. DDR assessed the moral content of the comments by mapping word usage onto multidimensional probability space. No differences were found in sentiment, overall engagement, or moral content; however, undisclosed limitations were found, corrected, and documented in the DDR source code. Deriving psychological conclusions from novel natural language processing techniques reflects the complexity of language itself, and requires an

interplay of understanding between the source code and the psychological construct of interest.

Allocating Blame within Corporations through the Mind-Body Problem

Ankita Sharma

Mentor(s): Professor Ana Gantman & Professor Robert Johnson
Brooklyn College

My project explores how individuals allocate blame across corporations and how viewing responsibility through the "Mind-Body Problem" influences this blame attribution. Blaming and the desire to punish are common aspects of human nature and behavior. But while someone may want to blame a finance company for a financial crisis, it is harder to assign responsibility to a whole corporation, which typically contains many people with varying specialized roles. This issue is addressed through Intuitive Dualism, which explains that the mind and body are separate but exist in a single entity, allowing corporations to be viewed as intentional agents and single entities that can be easily blamed. As a CEO is typically at the top of the corporate hierarchy, they would be the “mind” that controls their “body,” or their employees. To test who people blame when corporations are viewed through this mind-body structure, participants were provided with fictional scenarios demonstrating ethical failures committed by CEOs and employees. Some participants read scenarios where CEOs were the “mind” and willed an employee to commit wrongdoing while other participants read scenarios where this role was not maintained. They then completed a survey where they had to gauge each agent’s moral responsibility. The findings demonstrated that CEOs were more blamed when they were the “mind” and maintained the expected qualities of their role. However, when employees took on a larger role in wrongdoing, blame was shared between CEOs and employees. These findings suggest that considering the roles of individual people in a group is crucial and the mind-body structuring of a corporation allows these roles and individual responsibility to be considered. Following this research, future studies can explore how participants would punish these agents after considering their roles in wrongdoing, as well as focus on other agents involved in a corporation.

COLLEGE OF STATEN ISLAND

A Misinformation Pandemic: What Were the Effects of Audience Fragmentation on the Validity of Cable News Reporting During Critical Points in the COVID-19 Pandemic?

Louis Adorno

Mentor(s): Professor Cindy Wong
College of Staten Island

This project attempts to understand audience fragmentation by analyzing the discursive flow of misinformation regarding the COVID-19 pandemic from social media to mainstream cable news. Theories and speculative claims in contradiction to official CDC guidance emerged on social media and online communities from the onset of the coronavirus outbreak in the United States. Much of the posts were widely circulated within fringe online communities outside of legacy journalism. Following shifts in official guidelines, treatment developments, and government restrictions, the most prominent theories within these fringe communities influenced discourse on mainstream cable broadcasts. Focusing on five COVID-19 misinformation keywords: #Scamdemic, #FauciLied, #DeepState, #ChinaVirus, and #Hydroxychloroquine, this study tracks the prevalence and context of these same keywords on the Fox News channel. Beginning with a literature review on the cultural flow of misinformation from online to legacy media, this project analyzes three major points during the pandemic: the onset of COVID-19 Lockdowns in the U.S., Emergency Use Authorization of the Pfizer vaccine, and the implementation of the coronavirus vaccine mandate in New York City. We also include qualitative findings from interviews with partisan media consumers to provide context to the logic behind source credibility assessments.

The Neurological Effect of per- and Polyfluoroalkyl Substances

Presenters: Ayotunde Anidugbe & Eden Bishop

Mentor(s): Professor Shiryn Sukhram
College of Staten Island

Per- and polyfluoroalkyl substances (PFAS) exposure is a global public health problem that affects millions of people every year. PFAS are potentially neurotoxic and human exposure could affect neurological structures that may have harmful effects on the central nervous system (CNS). Experimental studies have examined the impact of these chemicals on mental health effects in humans. PFAS are unique synthetic chemicals known for their use in products universally utilized by consumers and industries. They are toxic pollutants that are long lasting in the environment due to their carbon-fluorine backbone, which accounts for their chemical stability, makes them impervious to degradation, and strengthens their persistence in the environment. The extensive use of PFAS in terrestrial and aquatic habitats has yielded adverse effects to humans. Research indicates high levels of PFAS in benthic macroinvertebrates from the Hudson River stream pathway, resulting in bioaccumulation in the tissues of fish and wildlife. Long chain compounds like perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) are the most abundant PFAS and significantly associated with adverse health effects. The blood brain barrier and dopaminergic areas embedded within the CNS are highly susceptible to infiltration by PFAS, such as the brain stem, hypothalamus, cerebellum, and cortex. To address this global concern, this study aims to identify associations between PFAS exposure and psychosocial risk factors on neurological outcomes in adults. Public health awareness of the adverse effects of PFAS should be promoted among high-risk populations.

Investigating axo- glial Interactions Between Midbrain Dopamine Axons and Oligodendroglial Cells in the Corpus Callosum

Vanessa Ayo- Jibunoh, Colin Alarcon, Xin Yan Zhu Jiang, Megan Caldwell, Zahid Hassan, & Elizabeth Fiore

Mentor(s): Professor Leora Yetnikoff
College of Staten Island

Experience-dependent myelination is a recently discovered phenomenon where neural activity changes patterns of existing myelination or induces ‘de novo’ myelination by regulating oligodendroglial cells. Because myelin helps determine action potential conduction rates, changes in patterns of myelination have important functional consequences for brain function and synchronization of neural activity across various regions. However, we know little about which neurons are capable of regulating experience-dependent myelination. The goal of our study was to investigate the possible role of midbrain dopamine neurons in experience-dependent myelination of the corpus callosum, the largest white matter tract of the brain.

In a first series of experiments, we examined whether dopamine axons are present in the corpus callosum of adult wild-type mice using immunofluorescence for tyrosine hydroxylase (TH), the rate-limiting enzyme in the synthesis of dopamine. While these experiments revealed TH+ axons in the corpus callosum, we could not definitively conclude whether these axons were dopaminergic since TH is also expressed in noradrenergic neurons. Thus, in a second set of experiments we used a cre-dependent EYFP viral strategy in adult DAT-cre mice. These mice received an intra-cranial injection of AAV-EF1a-DIO-EYFP into the ventral tegmental area in order to specifically label with EYFP neurons that had an active promoter for the dopamine transporter, and one month later were killed and their brains prepared for analysis. Immunofluorescence for EGFP revealed EYFP+ axons in the corpus callosum, confirming the presence of midbrain dopamine axons in this white matter tract. These experiments hold important implications for understanding the mechanisms underlying experience-

dependent myelination. Future experiments will investigate how modulating midbrain dopamine neuron function alters myelin in the corpus callosum. Because dopamine-related neuropsychiatric diseases, such as schizophrenia and Parkinson's disorder, are also associated with altered myelination, this work may help refine therapeutic interventions in these diseases.

Regulation of Clustered Protocadherin Trafficking Student

Zeinab S. Cisse

Mentor(s): Professor Greg Phillips & Professor Nicole LaMassa
College of Staten Island

Clustered protocadherins (Pcdhs) are a family of ~60 cell adhesion molecules expressed in the nervous system. These proteins are thought to generate a unique barcode on the surfaces of individual neurons that allow neuronal processes to recognize themselves and other cells helping guide the proper pattern of connectivity. The activity of Pcdhs in cells is somewhat ambiguous. Unlike typical cell adhesion molecules, Pcdhs seem be found most often in an intracellular pool that corresponds to endosomes with relatively less expression at the cell surface. We hypothesize that proteins involved in intracellular trafficking regulate the activity of Pcdhs through intracellular interactions with the Pcdh cytoplasmic domain. We have found that Pcdhs are strongly colocalized in cells with proteins that control endocytosis, including clathrin and intersectin and have mapped the portion of the Pcdh cytoplasmic domain that mediates this colocalization. Here we now study the colocalization of these proteins with short cytoplasmic fragments, called stubs, that lack the extracellular adhesive domain as well as the common cytoplasmic portion common to all Pcdhs. These studies will shed light on the regulation of adhesion through Pcdh intracellular trafficking.

Dopamine Receptor Transcript Expression by Oligodendroglial Cells in the Corpus Callosum

Josue Criollo Mendoza & Shelby Louis

Mentor(s): Professor Leora Yetnikoff & Professor Megan Caldwell
College of Staten Island

Myelination is a process in which oligodendrocytes produce a lipid-rich material which enwraps neuronal axons, improving the transmission of action potentials between neurons. It is known that axon myelination is plastic, wherein daily life experiences can alter patterns of myelination through changes in neural activity, a phenomenon termed experience-dependent myelination. However, much remains to be understood about which neurons are capable of communicating with oligodendroglial cells to regulate experience-dependent myelination. Research from our lab has demonstrated that midbrain dopamine axons are present in the corpus callosum, the largest white matter tract of the brain, implicating dopamine neurons in experience-dependent myelination. However, whether dopamine neurons communicate with oligodendroglial cells is still unknown. In this study, our goal was to address this question by determining whether oligodendrocyte lineage cells in the corpus callosum express dopamine receptor transcripts. To investigate this, we obtained coronal brain sections containing the corpus callosum from adult male and female mice and used RNAscope, and advanced microscope analysis software (IMARIS) to investigate the expression of dopamine d1 and d2 dopamine receptor transcripts by oligodendrocyte precursor cells (OPCs) and oligodendrocytes in the Corpus Callosum. Our findings demonstrate that ~40% of OPCs express d1 and d2 dopamine receptor transcripts, whereas ~20% of oligodendrocytes express d1 and d2 receptor transcripts. These results lend support to our hypothesis that midbrain dopamine neurons participate in experience-dependent myelination of the corpus callosum and suggest that at least one mechanism may involve communication with OPCs and oligodendrocytes. Future research will investigate the role(s) of dopamine D1 and D2 receptors in the proliferation and differentiation of OPCs and in the survival of oligodendrocytes in the

corpus callosum. Understanding the role of midbrain dopamine neurons in experience-dependent myelination may lead to the refinement of treatments for dopamine-related neuropsychiatric diseases, which are also frequently associated with altered myelination.

Meta Analyses of Differential Gene Expression of the PI3K Oncogenic Pathway and Patient Overall Survival in a Small Panel of Cancers

Alice Mensah, Nawalagedona Senanayake, Fatima Kamara, and Karam Afaneh

Mentor(s): Professor Nancy Liu-Sullivan
College of Staten Island

Despite progress made, cancer remains a national and international health concern. Cancer treatment has also come a long way. In this group presentation, we describe targeted cancer therapy by focusing on the well-characterized receptor tyrosine kinase (RTK) cancer signaling network. We focus on key components of a key pathway consisting of PIP3, Akt, and mTOR which play a pivotal role in promoting cancer biogenesis, proliferation, and metastasis. We describe findings on how gene expression levels shape overall cancer patients' overall survival (OS) as well as cancer drugs that target these components with specificity in a small panel of cancers including breast cancer, ovarian cancer, gastric cancer, and lung cancer. The findings provide insights to differential effects of the same components in different cancer types. This information also helps shed light on more efficacious mutation-specific and cancer type-dependent treatment strategies.

Observing Differences in Traditional Early Intervention and Start Play

Isra Tahir

Mentor(s): Professor Sarah Berger & Professor Michele Goncalves Maia
College of Staten Island

Early intervention (EI) is a support and educational system available to babies and young children with developmental delays and disabilities that aims to improve child and family development. EI can have a positive impact on children with delayed development because motor skills typically developed during the first few years of life subsequently serve as a framework for their interactions with other people and objects. There are many different approaches to EI therapy however, a new form called *Sitting Together and Reaching to Play* (START-Play) was created in 2015 by a group of professional physical therapists (PT) who recognize the importance of cognitive, social, and motor development. In Start-Play, PTs collaborate with families to provide rigorous, personalized daily activities that help infants improve their reaching and sitting abilities through gradual increases in difficulty and assistance. The aim of the study was to design and test whether there were differences between the two types of interventions (traditional EI therapy and Start-Play) regarding opportunities for infants to explore toys and their postures. Archival Start-Play data set was obtained and included six infants who were learning how to sit during their physical therapy sessions; three of which participated in traditional physical therapy and three that participated in Start-Play therapy. A code was developed to document the number and duration of opportunities to explore (whether a toy is in reaching distance and seen by the infant), duration of exploration (how long an infant played with a toy), and category of posture (whether the infant was sitting or lying down) and how their posture was achieved (either by themselves, or with assistance from their guardian or PT). The importance of this study is to produce preliminary findings evaluating the efficacy of Start-Play, which seems to be an instrument to maximize early intervention outcomes regarding cognitive and motor development.

CUNY SCHOOL OF LABOR AND URBAN STUDIES

In What Way Does Racialized Policing Impact the Mental Health of Black Men?

Tonia Hucey

Mentor(s): Professor Elizabeth Sergile
CUNY School of Labor and Urban Studies

Research on racialized policing include studies and questions regarding the mental health effects that are caused by or exist because of racial profiling, and frequent improper and aggressive techniques used by police against Black men. Black people, victimized at the cost of their mental health, remains a topic that some say has no relevance or does not exist (Williams,2018). Surveys and research have resulted in finding that black men and their mental health, in the actuality of racialized policing, exposes a link with psychological findings in anxiety type issues, post-traumatic stress, and racialized policing in stop, question, and frisk and tactics that violate and subjugate black people and their civil rights based on bias and race. The victimization of Black men's civil rights and mental health extends beyond racialized policing. It is suggested that it is a source of emotional trauma for Black men, and the "sanctioning of proactive policing constitutionally" (Geller, Fagan, Tyler, Link, 2014). Psychologists hypothesize the treatment may "trigger stigma and stress responses" and contribute to adverse mental health effects and "depressive symptoms" (Geller, Fagan, Tyler, and Link 2014). Racial profiling and stopping Black men, helps define the mental health effects that exist with racialized policing called Torture Lite (Butler, 2014). Torture Lite has been explored to aid in reducing racial health inequities. Suggestions have been made to implement surveillance of police brutality, racial profiling, researching, teaching, and the understanding of the experience faced by Black men with profiling and their mental health. Evidence has shown Black men are profiled for their race first, not the reasonable suspicion doctrine believed to apply to everyone. Quantified evidence from Black men, unveils racial and negative attitudes and images, affecting mental health from the angle of institutionalized discrimination, restricting economic mobility, & producing poor living conditions and stress.

Poverty Alleviation Programs in New York City

Okon Mbaba

Mentor(s): Professor Elizabeth Sergile
CUNY School of Labor and Urban Studies

This research project identifies various poverty alleviation programs in New York city communities. The research evaluates the impact that poverty alleviation programs have made in reducing poverty. The implementation strategies used with poverty alleviation programs create barriers to the full success of the programs in the New York City communities. Some of the observed diminishment of the efficacy of poverty alleviation programs in New York City areas are traced to funds meant for poverty alleviation being diverted to finance other programs outside the core mandated poverty reduction programs. Funds being diverted to paying private investigators to monitor child abuse incidences instead of using those funds for childcare that can assist a parent in poverty to obtain gainful employment. This research project recommends policy makers provide more funds for macroeconomic strategic programs such as jobs training programs for youth in poor communities.

Local Government Call Center Provision of Customer Service Satisfaction

Caressa Ogletree

Mentor(s): Professor Elizabeth Sergile
CUNY School of Labor and Urban Studies

There has been little to no research conducted on factors that ensure customer satisfaction in the NYC Department of Finance Collection call center. Effective and efficient communications with the public can often become a challenge for the Department. The NYC Department of Finance Collection call center's goal is to service the public and produce a satisfactory outcome. The study is to determine whether such service is being provided to the public. This study will produce data that will

identify the satisfactory or non-satisfactory service provided by the customer service representatives. In addition, to satisfactory of service, it will also decipher whether the needs of the customer service representative are being fulfilled to ensure that they execute effective and efficient service to the public through the Automatic Call Distributer. A survey of questions will be administered to all call center representatives. The customer service representatives' feedback will create statistics on whether the Collections call center has the necessary tools to service the needs of the citizenry.

Peer Leadership and State Management: Neoliberal Design in Consumerist Community Mental Health

Emily Warshauer

Mentor(s): Professor Elizabeth Sergile
CUNY School of Labor and Urban Studies

The adoption of the recovery model and the inclusion of peer providers in mental healthcare are widely understood as radical reforms achieved by the ex-patient movement. At the same time, deinstitutionalization and the corresponding creation of community mental health programs associated with these reforms also mark a major shift in how mental healthcare has been regulated and funded. Since the start of deinstitutionalization, and federal funding strategies have given rise to a broad market for mental healthcare services, creating profit opportunities for private industries, incentivizing neoliberal public/private partnership strategies, and rationalizing service provision. This funding paradigm upholds the value of peers as a way that services can be responsive to the demands of consumers. Considering how mental health services have been funded and implemented since the 1960s, this paper challenges the assumption that consumerism and the inclusion of peers in mental health systems is indicative of meaningful power sharing in mental healthcare.

GUTTMAN COMMUNITY COLLEGE

The Neurological Effect of Per and Polyfluoroalkyl Substances

Eden Bishop & Ayotunde Anidugbe

Mentor(s): Professor Jihyun Kim & Professor Shiryn Sukhram (CSI)
Guttman Community College

Per- and polyfluoroalkyl substances (PFAS) exposure is a global public health concern that affects millions of people every year. PFAS are potentially neurotoxic and human exposure could affect neurological structures that may have harmful effects on the central nervous system (CNS). Experimental studies in rodents suggest that PFAS contribute to depressive symptoms. However, few studies have examined the impact of these chemicals on mental health effects in humans. PFAS are unique synthetic chemicals known for their use in products universally utilized by consumers and industries. They are toxic pollutants that are long lasting in the environment due to their carbon-fluorine backbone, which accounts for their chemical stability, makes them impervious to degradation, and strengthens their persistence in the environment. The extensive use of PFAS in industrial processing over many decades has worsened the contamination levels in terrestrial and aquatic habitats, which consequently affects humans. Research indicates high levels of PFAS in benthic macroinvertebrates from the Hudson River stream pathway, resulting in bioaccumulation in the tissues of fish and wildlife. Long chain compounds like perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) are the most abundant PFAS and significantly associated with adverse health effects. The blood brain barrier and dopaminergic areas embedded within the CNS are highly susceptible to infiltration by PFAS, such as the brain stem, hypothalamus, cerebellum, and cortex. To address this global concern, this study aims to identify associations between PFAS exposure and psychosocial risk factors on neurological outcomes or effects in humans. Also, public health awareness of the adverse effects of PFAS should be promoted among high-risk populations.

Water-Soluble Polyphenols in Food and Food Waste

Aaliyah Harris

Mentor(s): Professor Chulsung Kim
Guttman Community College

Coffee has been a primary resource for antioxidants in the USA. Many studies have shown that polyphenols are common antioxidants in many foods helping diseases like cancers, heart, and other inflammatory conditions. This research aims to determine the amount of water-soluble polyphenols in commercial coffee. The Folin-Ciocalteu assay was used, and the results were expressed as Epicatechin equivalent total phenolic amount in µmole of epicatechin per ml of coffee sample. Total water-soluble polyphenol amounts were determined as a function of different water temperatures. The coffee particles were sieved and collected particles between 0.50 - 0.71 mm for consistent particle size. The epicatechin standard curve (absorbance vs. concentration) was prepared using ACS-grade chemicals. The dilution processes were replicated at least ten times, and the Grubbs test was adopted to identify any outliers which were removed from the regression calculation. The created reference curve was used to determine the epicatechin equivalent polyphenol amount from the commercial coffee. According to the preliminary experimental results, commercial coffee showed a significant amount of polyphenols available in water, which could benefit coffee drinkers.

The Unequal Field of Play: How Race, Class, Gender and Immigration Impact Access to Sports, Entertainment and Other Amusements

Holliday Senquiz, Chunyin Chu, Michael Sanchez, Bella Degracia, and Daina Best

Mentor(s): Professor Samuel Finesurrey & Professor Diana Zechowski
Guttman Community College

This project interrogates the intersectionality of race, gender, and immigration status, with a focus on how these factors can impact access to sports and play opportunities in youth. It explores how socio-economic barriers, familial responsibilities, and cultural representations of play can limit opportunities for marginalized youth to engage in sports and other forms of play. We argue that a lack of access to play in youth is a substantial obstacle among several marginalized groups. By studying how people play as children, and their respective backgrounds that inform those manifestations of play, we can illuminate deep wells of inequity contaminating a fundamental element of childhood. We place this work in conversation with scholarship on both the landscape of play and play as "self-care" (Nijorf et. al 2018, Spors & Kaufman 2021). Playing and engaging in acts of leisure is necessary for the purposes of self-preservation and emotional wellbeing. An absence of play in our society informs America's staggering mental health crisis.

Direct Detection of Cr(VI)

Ellis Spica

Mentor(s): Professor Chulsung Kim
Guttman Community College

Hexavalent chromium is a highly soluble carcinogen. The fast and reliable determination of [Cr(VI)] in water is critical to promoting safe drinking water. Various methods of determining the aqueous phase [Cr(VI)] are available; however, they are pricey and time-consuming assays. Recently, direct determination of [Cr(VI)] in water was proposed. The current study

examined the hexavalent chromium determination in the presence of potassium chloride using a 325nm wavelength. Various concentrations [KCl] were applied to the constant hexavalent chromium concentration of 10 mg/L. Each experiment was replicated at least ten times, and the Grubbs test was used to find any outliers in the data sets which were removed from the statistical evaluation. Mean comparisons using student's t-tests were used to validate the effect of KCl on the direct detection of aqueous phase hexavalent chromium. The experimental observation showed no statistical importance on the [Cr(VI)] determination was observed up to 0.1 M KCl.

Generating Loss-of-Function Mutations in the MEN1 Gene

Georgia Uwechue

Mentor(s): Professor Karla Fuller
Guttman Community College

Multiple Endocrine Neoplasia Type 1, or MEN1 Syndrome, is a hereditary dominant genetic disorder caused by mutations in the protein menin encoded in the MEN1 gene. Studies have shown that menin is a scaffolding protein for the genes CDKN2C, CDKN1B, and JUND (Matkar, 2013). Using zebrafish, scientists discovered that deleting sections of menin's amino acid sequence causes these genes to cease function and MEN1 Syndrome to develop (Khodaei, 1999). This study aims to discover which amino acids, in particular, are responsible for JUND's function. We identified overlapping sections in each deletion that affected JUND, and with CRISPR-Cas9 technology, we will create random silent and missense mutations in these chosen sections to try to resolve precisely which parts of the menin gene are responsible for JUND interaction and functionality.

HOSTOS COMMUNITY COLLEGE

Phytoremediation of Water Pollution by Heavy Metals

Altagracia De La Rosa

Mentor(s): Professor Anna Ivanova
Hostos Community College

Water pollution is an important environmental problem. This research project focuses on studying water pollution by heavy metals using Phytoremediation method, a low-cost and eco-friendly way to clean water of impurities, such as heavy metals. The scientific goal of this project is to study the ability of herbaceous aromatic plants (*Thai Basil, Genovese Basil, Purple Basil, Mint, Lemon Balm, Sage, Cilantro, Dill and Parsley*) to purify water contaminated by heavy metals. We hypothesize that herbaceous aromatic plants have the ability to reduce and/or remove heavy metals from the contaminated by heavy metals water samples. The project implements hydroponic gardening system - a soil-free approach to grow the experimental plants. The selected plants are grown in hydroponic towers and then used to treat water samples contaminated by heavy metals (*zinc, copper, lead*). Solutions of heavy metals such as lead, zinc and copper serve as contaminated water samples. The effectiveness of the experimental plants in reducing the levels of heavy metals in water samples are assessed by means of Complete Water Testing Kit. This project will help us better understand contaminated water purification mechanisms using aromatic herbs and has a potential to be applied in geographical areas with poor water quality.

“C’s Will Get Degrees” The Forgetting Curve and the Benefits of Consistent Study Habits

Kevin Dillon, Aaron Arjunelall, & Fatima Bah

Mentor(s): Professor Lauren Wolf
Hostos Community College

Many students have issues with developing effective and consistent study habits and therefore have difficulty retaining information. These issues have worsened since the Covid-19 pandemic. Our research presentation is focused on memory and retention of learned material. Our title “C’s Will Get Degrees” stems from our hypothesis that if the degree of difficulty of the material studied is not high, more of that information can be retained over time without frequent study. The student researchers (who have also been tutors) along with their research mentor hypothesize that a student could easily learn and retain a linear inequality over time. When encountering a quadratic or higher degree inequality that involves additional steps, concepts, and increased study time to achieve success, a student’s retention would be diminished. This led us to 19th-century Psychologist Herman Ebbinghaus’s forgetting curve as our initial model. Ebbinghaus was the first to quantify memory experimentally and showed it as a mathematical function. We use this logarithmic function to show a correlation between the difficulty of the material studied and the ability to retain that information over different periods. Throughout our research, we also examine techniques that can counteract the forgetting curve such as “over-studying” and regular reinforcement. Our data will come from an experiment involving the memorization of numbers/formulas and will be conducted after the spring 2023 semester.

In Silico Discovery of Small-Molecule Modulators of BACE1 as Alzheimer’s Therapeutics Agents

Yassine Gaye & Michael Soadwa

Mentor(s): Professor Yoel Rodríguez
Hostos Community College

Alzheimer's disease (AD) is a lingering progressive neurodegenerative disorder that causes patients to lose cognitive function[1]. The inhibition of transmembrane enzyme β-site APP cleaving enzyme I (BACE1), an aspartic protease essential for the generation of β-amyloid, shows promising therapeutic results[2]. Due to its open active site, BACE1 cannot be effectively inhibited by small molecules capable of penetrating the blood brain barrier[3]. However, it has been shown the possibility of inhibiting the enzymatic activity of BACE1 by also targeting its exosites[4-6]. Our hypothesis centers on small molecules that could inhibit BACE1 enzymatic activity through its catalytic site and exosites. Thus, we aim to discover small-molecule modulators of BACE1 enzyme by using computer-aided drug design. Towards this, firstly, we conducted a literature review on reported small-molecule BACE1 inhibitors to guide our search. Secondly, we performed structure-based molecular docking virtual screening of commercially available small molecules database (eMolecules[7] ~4.3M) against BACE1 available structure (4DJW) to identify high-affinity-selective inhibitors using OEDocking 4.1.1.0 and FRED 4.1.1.0 programs[8]. The FRED-4.1.1.0 Chemguass4 scoring function[8] is being used to rank the screened molecules based on their affinities toward BACE1. The best candidate compounds (~50) will be tested experimentally. These study’s insights could eventually help better understand and treat AD.

Discovery of Entry Blockers for SARS-CoV-2 Spike Glycoprotein Using In-Silico Drug Design

Jose Armando Keppis & Marian Albornoz

Mentor(s): Dr. Yoel Rodríguez
Hostos Community College

The global pandemic of Coronavirus Disease 2019 (COVID-19) has been caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Viral infection occurs when the SARS-CoV-2 Spike Glycoprotein Receptor Binding Domain (RBD) attaches and fuses to the human Angiotensin-Converting Enzyme 2 (hACE2). Therapeutic drug research for SARS-CoV-2 inhibitors aims to neutralize the Spike Glycoprotein to prevent infection. We hypothesize that small molecules could block the binding of SARS-CoV-2 Spike Glycoprotein RBD and hACE2. Three small-molecule inhibitors (hits) against SARS-CoV-2 Spike Glycoprotein have been identified through our group's previous research. Here, we aim to further identify analogs of these three hits with higher affinity, selectivity, and lower cytotoxicity towards SARS-CoV-2 Spike Glycoprotein RBD. Thus, we conducted a ligand-guided search using vROCS 3.4.3.0 to rank around 4.3 million small molecules (eMolecules database) using the Tanimoto shape and color scoring function against hit pharmacophores. An analog database of 10,000 top-ranked small molecules from each hit was processed through structure-based molecular docking against the SARS-CoV-2 South Africa variant (Beta: K417N, E484K, N501Y | B.1.351) and Omicron variant (XBB.1.5) using OEDocking 4.1.1.0 and FRED 4.1.1.0 programs. The Chemgauss4 scoring function, FastROCS Toolkit, and visual inspection on VIDA 5.0.1 have been used to determine the high-ranking molecules (~50) which are the candidates for experimentation using the SARS-CoV-2 cell-based pseudotype assay. Sifting through small-molecule candidates may identify a therapeutic treatment for COVID-19. The post-processed small molecules could become probes to enhance the discovery of antivirals against SARS-CoV-2 as well as study the biology and interactions of SARS-CoV-2.

Efficacy of Pyrimethamine, a Novel STAT3 inhibitor, for Treatment of MDS and AML

Reinaldo Lopez

Mentor(s): Professor Bianca Rivera-Peña
Hostos Community College

Myelodysplastic syndrome (MDS) and Acute Myeloid Leukemia (AML) occur after accumulation of genetic and epigenetic alterations in hematopoietic stem cells (HSCs). Alterations in HSCs promote malignant transformation, giving rise to leukemic stem cells (LSCs). Existing therapies for MDS and AML have been unsuccessful in eliminating LSCs. Hence, molecular targeting of LSCs can be a strategy for developing targeted therapies capable of eliminating LSCs. Aberrant HSCs have altered cellular pathways, including overexpression of signal transducer and activator of transcription 3 (STAT3). Our lab has shown that MDS and AML patients have elevated levels of STAT3, and STAT3 overexpression is associated with an adverse prognosis. An initial drug screening identified Pyrimethamine (PYR), FDA approved anti-malaria drug, as a potential STAT3 inhibitor. Therefore, we are evaluating the efficacy of PYR for treatment of MDS and AML, including its efficacy in a hypomethylating agent (HMA) and Venetoclax (Ven) resistant model. Our in vitro studies show that PYR can inhibit cell proliferation by inducing apoptosis in multiple leukemic cells. Western blot analysis reveals that STAT3 protein is overexpressed in Ven resistant, and in HMA resistant cell lines. Furthermore, PYR can significantly decrease cell proliferation when combined with azacytidine or venetoclax treatments. Remarkably, PYR and Ven drug combination show a strong synergistic interaction in HMA resistant and Ven resistant cell lines. Our results demonstrate that MDS/AML cell lines, including HMA and Ven resistant leukemia cell lines, are sensitive to PYR treatment, in a dose dependent manner. Interestingly, PYR with Ven drug combination shows significant reduction in cell proliferation and likely synergy. Our current findings support PYR synergy with Ven and the combination as a possible therapeutic option for patients with MDS/AML after prior treatment with hypomethylating agents for MDS and AML.

HUNTER COLLEGE

[44Sc]Sc-HOPO-octreotate for PET Imaging of Somatostatin Receptors

Diyorbek Bahromov

Mentor(s): Professor Lynn Francesconi
Hunter College

Effective cancer imaging and treatment is a worldwide challenge. Neuroendocrine tumors (NETs), a hormone-producing cancer subtype, affect various organs, including the gastrointestinal tract and lungs. Positron emission tomography (PET) imaging has emerged as an essential tool for the diagnosis of NETs. This study aims to develop a novel radiopharmaceutical, 3,4,3-(LI-1,2-HOPO) (or HOPO), for PET imaging of NETs that express somatostatin receptors (SSTRs). Scandium-44 is a radioactive isotope of scandium, a positron emitter with a half-life and energy that is suitable for PET imaging. The project involves synthesizing a bifunctional HOPO ligand and conjugating it with octreotate peptide to form HOPO-octreotate. Octreotate is a synthetic analogue of somatostatin, a hormone that regulates the endocrine system. Octreotate has a high affinity for somatostatin receptors (SSTRs) which allows it to be used for SSTR targeting. The compound is then radiolabeled with scandium-44 (^{44}Sc), a radioisotope that has shown potential in radio-medicine due to its decay properties. Preparative high-performance liquid chromatography (HPLC) is employed to purify both the bifunctional ligand and the HOPO-octreotate product, ensuring high purity and homogeneity. Analytical HPLC and NMR spectroscopy are used for compound characterization. The successful development of [^{44}Sc]Sc-HOPO-octreotate will advance the number of options for SSTR PET imaging. Additionally, this study will contribute to the effectiveness of radio-scandium in nuclear medicine. The outcome of this study is expected to provide a reliable and efficient method for producing [^{44}Sc]Sc-HOPO-octreotate, which can enhance PET imaging capabilities for SSTR-positive NETs and improve patient outcomes.

Baseline Anxiety and Metabolism are Associated with Vulnerability to Activity-Based Anorexia in Mice

Nancy Collie-Beard

Mentor(s): Professor Nesha S. Burghardt
Hunter College

Up to 65% of patients with anorexia nervosa are also diagnosed with an anxiety disorder, but it is unclear if anxiety is a risk factor for anorexia or a consequence of malnutrition. Using the activity-based anorexia (ABA) rodent model, we tested the relationship between pre-existing levels of anxiety and ABA vulnerability in adult C57BL/6 female mice. Anxiety was evaluated in the open field test one day before mice were individually housed with running wheels. Baseline bodyweight, food intake, and wheel running were recorded for 7 days before food was removed. During the following 10 days of food restriction, food access was limited to the first 2 hours of the dark cycle, during which time mice could consume as much as they wanted. Vulnerable mice were removed from the experiment when they lost at least 25% of their baseline weight. We found a positive correlation between the number of entrances into the center of the open field and day of ABA removal ($r = 0.75$, $p<0.001$), indicating that more anxious mice are more vulnerable to ABA. We also found a positive correlation between baseline food intake and ABA removal ($r = 0.48$, $p<0.01$). Similarly, baseline food intake divided by bodyweight correlated positively with ABA removal ($r = 0.45$, $p<0.01$), suggesting that a lower baseline metabolism may also increase ABA risk. Our preliminary results indicate that anxious individuals with a lower baseline metabolism who diet and exercise may be at higher risk of developing anorexia nervosa. Understanding these relationships further may provide much needed insight into the biological substrates of this poorly understood eating disorder.

The Expression of the Short Isoform of armitage Leads to Abnormal Maternal mRNA Regulation During D. Melanogaster Oogenesis

Imad Khalil & Caroline Casella

Mentor(s): Professor Diana P. Bratu & Professor Livia V. Bayer
Hunter College

Transposable elements called transposons are DNA sequences that jump within a genome and insert themselves into functional gene loci resulting in deleterious mutations. To safeguard the genome, transposons are degraded via the PIWI-interacting RNA (piRNA) pathway. The RNA helicase Armi (*armitage*) is a crucial player in the piRNA pathway, as well as being involved in the regulation of maternal mRNAs during *Drosophila melanogaster* oogenesis. The *armi* gene encodes for two mRNA isoforms (short and long), which are differentially expressed within the egg chamber. The long isoform is expressed in the 16 germline cells (an oocyte and 15 supporting nurse cells) and in the monolayer of somatic follicle cells, surrounding the germline. The short isoform is only expressed in the follicle cells. We are interested in deciphering the regulation of these isoforms based on previous studies of *armi* mutants which only affected the long isoform. Using the Gal4-UAS system to induce the knock down in expression of the long or both isoforms in either germ or somatic cells, has enabled us to characterize the roles of each gene product. We hypothesize that in the absence of the long transcript, the short isoform is upregulated causing major defects in the regulation of the maternal mRNA, *oskar*. Using distinct sets of single molecule FISH probes which we generated, we visualized the presence of each isoform in wildtype egg chambers. We used these probes in combination with systematic knockdowns of these isoforms in the germline and/or soma to determine the expression and localization of each *armi* mRNA isoform in the absence of the other. The insight gained is important not only for *Drosophila* egg development, but also for the implications *armi*'s human ortholog MOV10 might have due to its involvement in cancerous tissue and antiviral activity with Coronaviruses.

The Impact of Approach and Avoidance Coping Strategies on Anxiety and Depressive Symptoms in Emerging Adults with Adverse Childhood Experiences

Jonathan J. Kogan & Melanie Abbondola

Mentor(s): Tracey A. Revenson
Hunter College

Adverse Childhood Experiences (ACEs) have a strong negative impact on mental health; studies have shown that ACEs are linked to higher rates of anxiety and depressive disorders years later. Emerging adults (18-29 years old) are highly susceptible to depression and anxiety symptoms. Two modes of coping, approach and avoidance coping, have been shown to be effective strategies for coping with stress, and might buffer the effect of ACES. This study examines the relation of ACES to depressive symptoms and anxiety among emerging adults, and the ability of approach and avoidance coping to buffer these effects. Participants were recruited through *ResearchMatch* (an NIH platform), the undergraduate subject pool at Hunter College, and flyers posted at Hunter. Inclusion criteria were: being ages 18-29; having experienced at least one ACE between the ages of 0-18, and being fluent in English. Participants (n = 241) completed a Qualtrics survey containing a 15-item ACE questionnaire, self-report scales to measure approach and avoidance coping at the time of the ACEs (Brief COPE), and validated self-report measures of depressive symptoms (PHQ9) and anxiety (GAD7). ACEs had a significant main effect on anxiety ($R^2 = 0.10$, $p < 0.001$) and depressive symptoms ($R^2 = 0.11$, $p < 0.001$). Approach coping was unrelated to anxiety or depressive symptoms, while avoidance coping had a significant main effect on anxiety ($R^2 = 0.15$, $p < 0.001$) and depressive symptoms ($R^2 = 0.17$, $p < 0.001$). Consistent with previous research, ACEs showed a significant negative effect on anxiety and neither type of coping buffered the effects of ACES. Shockingly, 69% of participants reported 4 or more ACEs, much higher than in previous studies. Limitations for this study included the use of participant retrospection for data collection, which can be unreliable.

Comparative therapeutic inhibition of KRAS in Cancer

Shlomo S. Pallas

Mentor(s): Professor Leonard J. Ash, Professor Dennis Lam, & Professor Andrew L. Wolfe
Hunter College

KRAS is a small GTPase mutated in 15-30% of all cancers, making it one of the most commonly altered oncogenes. Development of targeted KRAS inhibitors has been a major objective in cancer pharmacology. In 2013, the first direct inhibitor of the KRAS G12C mutant was developed, leading to the development of the first clinically approved drug for direct KRAS inhibition, Sotorasib. However, patients treated with Sotorasib develop resistance to KRAS inhibition after a median of 6 months, indicating a need to understand relevant mechanisms of resistance and study new ways to inhibit KRAS. This project has focused on characterizing resistance mechanisms to six structurally and mechanistically distinct KRAS G12C and G12D inhibitors. We have conducted time and dose course experiments on ASPC1 (G12D) and H358 (G12C) lines and characterized cell viability and downstream cellular signaling. We found that all tested inhibitors significantly reduced cell viability in both a dose and time dependent manner, and that inhibition was specific to the targeted KRAS mutant allele. Our results indicate that the structurally distinct KRAS G12C inhibitor, Garsorasib, is more effective than currently approved KRAS G12C inhibitors against sensitive H358 cells. Future directions will be to conduct a drug anchored synergy screen on our six direct KRAS inhibitors using a cancer drug library of FDA approved antineoplastic agents.

Reduced Acute Stress Susceptibility and Depression in Post-Menopausal Female Mice C57bl6: The Role of Dopamine Neuron Sensitivity and Plasticity

Lauren Renzoni

Mentor(s): Professor Allyson K. Friedman & Professor Yuka Miura
Hunter College

Aging is a multifaceted process that affects the physiological, psychological, and cognitive aspects of an individual's life. Our study investigates the role of aging in reducing acute stress susceptibility and depression in post-menopausal C57bl6 female mice. The focus is on understanding the underlying mechanisms that involve reduced dopamine neuron sensitivity and plasticity. Previous research has shown that women tend to exhibit a decline in depression rates late in life, particularly after menopause. Here, we aimed to elucidate the biological basis for this phenomenon. We hypothesized that the reduction in acute stress susceptibility and depression observed in post-menopausal female mice is due to decreased dopamine neuron sensitivity and plasticity.

To test our hypothesis, we subjected young and aged post-menopausal female C57bl6 mice to acute stress tests and evaluated their behavioral responses and dopamine neuron plasticity. Our results revealed that aged female mice demonstrated reduced susceptibility to acute stress compared to their younger counterparts. Additionally, we observed a significant decline in depression-like symptoms in aged female mice, which correlated with the reduced sensitivity of dopamine neurons. Our findings support the idea that reduced dopamine neuron sensitivity and plasticity may be key factors contributing to the decline in depression rates observed in post-menopausal women. In conclusion, our study provides valuable insights into the role of aging, dopamine neuron sensitivity and plasticity in reducing acute stress susceptibility. These findings may have significant implications for understanding the neurobiological basis of late-life depression and developing targeted interventions for mental health in aging populations.

Pointing Out Differences? Comparing Human-Given Pointing Cue Following in Pet and Guide Dogs

Angelica Vega, Angie Lee, Madison Murray, Liza Rothkoff, & Gillian Schmitt

Mentor(s): Professor Sarah-Elizabeth Byosiere
Hunter College

Dogs have been found to attune to human-given ostensive cues, communication motivated by an informative intention, and ignore similar, but non-ostensive cues. However, little is known about whether prior training experience influences the ability to follow these cues. Using a two-way object choice task, we assessed the ability of 22 pet dogs at the Thinking Dog Center and 16 guide dogs in training at Leader Dog For the Blind, to follow ostensive and non-ostensive contralateral momentary proximal pointing cues to find hidden food rewards. No significant differences between the ostensive and non-ostensive conditions were observed within pet dogs (N=22, p= 0.657) or guide dogs (N=16, p= 0.251), and pet dog and guide dog performance was at chance (50%) across both conditions. These results emphasize that pointing cue following, regardless of ostension, may not be influenced by training experience.

Thermal and Concentration Effects on 1H NMR Relaxation of Gd3+ -aqua using MD Simulations and Measurements

Casey Walsh

Mentor(s): Professor Steve Greenbaum & Professor Carla Franeza
Hunter College

MRI is a method of medical imaging that employs the use of a large, constant magnetic field. MRI contrast agents are used to create sharper images, by shortening T_1 and T_2 relaxation times of protons, thus creating better contrast in these images. Gadolinium is one of the more popular elements used in contrast agents, because of the highly paramagnetic nature of the Gd(3+) ion. However it is toxic and must be chelated in order to make it safe to inject into patients. Unfortunately, not much is understood about how these molecules behave once inside the body, and the quest for new and safer contrast agents requires a firmer understanding of NMR relaxation dynamics of Gd(3+) in water and various “bio-solvents”. We studied the molecular dynamics of GdCl3 in water in varying temperatures and concentrations, by means of molecular dynamics simulation as well as experimental measurements using NMR techniques, including fast field-cycling NMR relaxometry.

It was found that the dynamics of the water closely surrounding gadolinium ions are highly sensitive to temperature changes, the experimental relaxivity results have validated the molecular dynamics simulations at human body temperature and concentrations used in clinical MRI. From our results, we can better understand the mechanisms behind contrast agents. Further research is needed to simulate conditions more similar to the human body to improve our model. This can lead to the design of less-toxic contrast agents.

JOHN JAY COLLEGE OF CRIMINAL JUSTICE

Domestic Violence Rates in NYC Before and During COVID-19 Pandemic

Gabrielle Andrade

Mentor(s): Professor Jayne Mooney
John Jay College of Criminal Justice

This study seeks to better understand changes in reported domestic violence during the COVID-19 pandemic. Previous literature has indicated a drastic limit in resources during the pandemic due to shutdown, vaccine mandates, and employment shortages (Schosser, 2022). We are interested in looking at fluctuations in domestic violence rates pre-pandemic compared to the city lockdown era. Annual reports provided by the New York Police Department (NYPD) will be used to extract reported domestic violence rates from 2020 and 2021. We hypothesize lower domestic violence rates in 2020 compared to 2021, due to the drastic changes in resource availability. COVID-19 has directly impacted DV survivors and the assistance received from the city and

from the NYPD. This continues to be a crucial legal and public health topic and can shed light on a situation in need.

The Design of Anticancer Drugs with Earth Abundant Metals

Selin Ates, Camila Marino, Quan Tang, & Nora Zadori

Mentor(s): Professor Guoqi Zhang & Professor Shu-Yuan Cheng
John Jay College of Criminal Justice

Metal-ligand interactions are the backbone of understanding coordination complexes that display interesting molecular structures, physical/chemical behaviors, and biological properties such as cytotoxicity. These compounds can produce reactive oxygen species within the endoplasmic reticulum, inducing immunogenic apoptosis in cancerous cells. The product formed between an organic ligand and a base metal through coordination bonds, also known as the Lewis acid-base reaction, is called a metal-organic complex. The ability to examine and reveal the structure of these complexes through single-crystal X-ray crystallography requires crystallization of the products as uniformed single crystals. In our work, crystals of metal-organic complexes are prepared using either a layering technique or a solution evaporation method that are commonly used for crystal growth. Our project focuses on the synthesis and characterization of two classes of metal-organic complexes from earth-abundant transition metals in Dr. Zhang's lab at John Jay College. We propose to use earth-abundant base metals such as Mn^{2+}, Co^{2+}, and Cu^{2+} combined with terpyridine- and Salen-containing chelating ligands to make new coordination complexes. The structures of organic ligands can be readily modified by varying the substituents on the backbones. With the collaboration of Dr. Cheng's lab specialized in toxicology studies, our metal complexes are tested with cytotoxicity with breast cancer cells and healthy epithelial mammary gland cells in vitro using CCK-8 assay for 24 and 72 hours, respectively. We hypothesize that altering the substituents with functional groups on the ligand backbone or the combination of different metal centers may significantly affect the cytotoxic activity of the resulting complexes, offering opportunities for observation of optimized structures with improved anticancer abilities. We observed that cobalt complexes of Salen ligand are potential candidates for cancer treatment due to their ability of disrupting the composition of breast cancer cells but not the mammary gland cells.

The Dissonance of Success: Divergent Experiences at a NYC Charter School

Whanda Collado

Mentor(s): Professor Edward Snajdr
John Jay College of Criminal Justice

This research investigates patterns of bias and inequity in the policies and practices of a New York City charter school. The project was developed as a semester-long qualitative research effort for the capstone in Deviance, Crime and Culture at John Jay College. The primary source of the research came from social media platforms, news articles and blogs. One site, in particular, included anonymous posts by staff, parents and students giving unfiltered and informal feedback. It also included a review of the archival material of this social media account and other sources on charter school research. Findings for this project include patterns of racial implicit bias, and disparities in the way discipline is enforced across the network with direct ties to social-economic status. Some of the most striking findings included administrative initiatives targeting certain students as under-performers, incidents of teacher abuse, and restriction of resources such as school breakfasts and bathroom breaks as disciplinary practices. The dissonance between explicit mission statements, New York City Department of Education mandates and actual practices are highlighted as conclusions, followed by suggested best practices for changing charter schools.

The Impact of Comfort Animals on Mental Health During Times of Personal or Global Crisis

Julia Grossman

Mentor(s): Professor Kathleen Collins
John Jay College of Criminal Justice

This research study focuses on comfort animals and their impact on those struggling with mental health issues. Because some common therapeutic practices can be off-putting, intimidating, too costly, or have mixed benefits, the goal of this study is to provide awareness of alternatives to the traditional client-therapist model. Comfort animals, or domestic pets, are one possible alternative "treatment" for a variety of mental health issues. The recent Covid-19 pandemic is one example where research has shown that comfort animals played a role in helping people struggling with depression and anxiety.

Análisis de la Crisis Carcelaria en el Ecuador, 2013-2023

Esmeralda Guiracocha

Mentor(s): Professor Rosemary Barberet
John Jay College of Criminal Justice

Investigaciones previas realizadas sobre el sistema de justicia ecuatoriano predijeron que su sistema penitenciario eventualmente sufriría como resultado del hacinamiento en sus prisiones; sin embargo, los detalles de cómo sufriría aún no se habían visto en ese momento. Desde febrero del 2021, el Ecuador ha visto varios incidentes de masacres carcelarias por todo el país resultando en varios encarcelados muertos o heridos, el propósito de esta investigación es analizar los principales contribuyentes para esta crisis carcelaria y descubrir sus implicaciones en el futuro. La investigación consta de datos cualitativos recopilados de varios artículos durante la última década sobre la historia del sistema penitenciario ecuatoriano, sus insuficiencias, los derechos de los encarcelados y sus perspectivas sobre las instituciones que los albergan. Según mis hallazgos de cuestionarios y entrevistas autoadministrados, los encarcelados sufren de salud mental no tratada y, en algunos casos, no diagnosticada como resultado de que las prisiones no tienen los recursos necesarios para cuidar a sus detenidos. Adicionalmente, la tasa de reincidencia que alimenta el hacinamiento carcelario se debe a que el Ecuador se enfoca en una medida de justicia más punitiva que rehabilitadora. Los datos recopilados complementan investigaciones anteriores al mostrar que la crisis penitenciaria del Ecuador si se deriva de su problema del hacinamiento, al igual de un sistema de justicia subdesarrollado. Sin resolución, estos factores continuarán creando un ambiente aún más violento dentro de las penitenciarías, lo cual también pueda resultar en que las masacres carcelarias se conviertan en un evento más regular en el futuro. Investigaciones futuras harán bien en tener grupos de muestra más representativos, al analizar grupos más grandes y diversos de varias prisiones a nivel nacional, futuros investigadores podrán generar resultados más generalizables.

(Abstract translation in English for above project):

Previous research done on the Ecuadorian justice system predicted that its prison system would eventually suffer as a result of overpopulation in its prisons; however, the specifics of how it would suffer were yet to be seen at the time. As of February 2021, Ecuador has seen various incidents of prison massacres spread over the nation resulting in various dead or injured inmates, the purpose of this research is to analyze the main contributing factors for the prison crisis and to discover its implications for the near future. The research consists of qualitative data collected from various articles over the past decade regarding the history of the Ecuadorian prison system, its inadequacies, prisoners' rights, and their perspective on the institutions that hold them. Based on my findings from self-administered questionnaires and interviews, prisoners suffer from deteriorating untreated and in some cases undiagnosed mental health issues as a result of prisons not having the resources to care for their incarcerated. In addition, the recidivism rate fueling prison overpopulation seemingly stems from Ecuador focusing on a more punitive measure of justice rather than a rehabilitative one. The data collected complements previous research by showing that Ecuador's current prison crisis indeed stems from its neglected overpopulation issues as well as its underdeveloped justice system. If left unresolved, these factors will continue to create an

even more violent environment within penitentiaries, perhaps resulting in prison massacres becoming a more regular event in the near future. Following research will do well to have more representative sample groups, by analyzing bigger more diverse groups from several prisons nationwide, future researchers will be able generate more generalizable results.

A Department Requirement for Evidence-based Suspicion Increased Juror Sensitivity to the Base-Rate of Guilty Suspects in ID Procedures

Jaleel King

Mentor(s): Professor Margaret Kovera
John Jay College of Criminal Justice

With eyewitness testimony being the leading cause of wrongful convictions, we examined jurors' sensitivity to situations in which police officers have insufficient evidence to place a suspect in a lineup depending on the department's requirement for evidence-based suspicion. Participants watched a recorded mock trial and the scenarios varied in the presence of evidentiary connection (weak vs. strong), and the department's requirement for evidence-based suspicion. We expect results to show a main effect of evidence connection and an interaction between evidence connection and the department's requirement. These findings would suggest that guidelines would potentially lower the rate at which innocent suspects are placed in identification procedures.

Multi-Party Computation for Post-Quantum Cryptography

Dilan Morales Caro

Mentor(s): Professor Matluba Khodjaeva
John Jay College of Criminal Justice

In this research project, I will cover the many ways in which post-quantum cryptosystems are built and their delegation so that online communications can be secure and private. Specifically, I will cover Lattice-based cryptosystems, which happen to be post-quantum secure. Lattices are a mathematical structure studied in order theory and abstract algebra, consisting of partially order sets, in which each element has a supremum and infimum. Lattices can be expressed in matrix form and, thus, operations can be performed on them with linear algebra while making sure that their properties are met. Delegation means to be able to divide a computation into different parties, usually the client and the server, without compromising security. For example, a cryptographic system will require the client to evaluate a function, however, this function is usually computationally intensive, which makes it difficult for low power computational devices to be cryptographically secure. The idea is to outsource the computation without compromising any of the private information. In order to outsource the computation of the lattice-based crypto system I will use the delegation of matrix operations. This way, I can reduce the computation overhead on the client and allow the server to encrypt using the lattice-based crypto system in a way that is secure and private.

Fetal Programming and the 2D:4D Biomarker: Associations with Romantic Dominance

Eliza Popa

Mentor(s): Professor Elizabeth L. Jeglic
John Jay College of Criminal Justice

Dominance in a romantic relationship context is an interesting field of study, in that there are supposed sex differences. The expression of dominance has been researched in the context of biopsychology, mainly through the lens of psychoendocrinology and sexual dimorphism, but findings have been limited. Womb development is a moderately researched biological factor for human behavior. Biomarkers of a "stressful" womb development have been used, like 2D:4D, which has associations with dominant behaviors. 2D:4D has been loosely applied to romantic relationship research, but there have been no current studies that clarify sex differences in dominant behavior within an intimate relationship setting, while also investigating associations with low and high 2D:4D. The aim of the current study is to refine sex differences found in 2D:4D by analyzing if low or high digit ratio in men or women correspond with specific dominance styles based on Hamby's Dominance Scale in an intimate relationship setting.

Adult men and women who are currently in a monogamous relationship (n = 78) were recruited. Participants provided 2D:4D values and completed a 40-item online questionnaire. To determine relationships between 2D:4D and dominant romantic styles, investigators applied *The Dominance Scale* (Hamby, 1996), which highlights three subtypes of dominant behavior: Authoritativeness, Disparagement, and Restrictiveness. Results showed small-scale associations between 2D:4D and Hamby's subscales, but no significant overall relationships. Interestingly, we did find that authority and restrictiveness were positively associated in men ($r = 0.600$, $p < 0.001$) and women ($r = 0.461$, $p < 0.001$). We also found that in women, prenatal stress was significantly related to disparagement ($r = 0.248$, $p < 0.05$) and restrictiveness ($r = 0.307$, $p< 0.02$). Despite our small sample, these findings can be used for future research of the relevance of biomarkers in dominant behaviors.

The Washing of(f) Cocaine to Prevent False Positives

Patricia St. Fleur, Alexandra Drombroski, Marialejandra Faure Betancourt, & Alexis Alvarado

Mentor(s): Professor Ana Miguel Fonseca Pego
John Jay College of Criminal Justice

A fast-growing tool within the field of forensic toxicology is hair analysis. Despite its impending rise and its numerous advantages, there are still some issues with this matrix's utilization that are concerning, such as external contamination. Drugs which can be snorted or smoked (such as cocaine and cannabis) are especially worrying as they can be deposited on the exterior of the hair shaft, hence its detection resulting in what is known by a false-positive result. To avoid such a risky outcome, hair must first be decontaminated prior to analysis. Additionally, another factor which plays a role in hair analysis is cosmetic treatments. Therefore, the aim of this work was to evaluate two distinct washing (A – water, methanol, dichloromethane and B – water, acetone and hexane) procedures on hairs which have been both contaminated in-vitro with cocaine and treated cosmetically with henna or bleach. For that, a total of 13 real hair samples have been acquired from volunteers with distinct hair colors and shapes. Contamination was then performed by submerging the hairs in a 1ug/mL cocaine (COC) and benzoylecgonine (BE) solution in water for 24h, followed by overnight drying. Hair samples were washed, extracted, filtered, and analyzed via reversed-phase LC-MS/MS. Results have shown that, overall, for the bleach treatment the most effective wash is A as it is statistically more effective at removing external COC contamination (280% difference, p-value 0.0002). As for henna, there seems to be no difference between wash A and B (-1.10% difference, p-value 0.6221).

Feminicidio en México

Sara Tlacomulco

Mentor(s): Professor Barberet Rosemary
John Jay College of Criminal Justice

El proyecto "Feminicidio en México" tiene como objetivo el poder demostrar la gran problemática sociocultural que tiene México, ya que anualmente se puede notar un incremento y de esa manera poder concientizar a la sociedad para que encuentren la empatía y respeto hacia las mujeres y niñas y que se den cuenta de que todas las vidas velen. Este estudio se realizó analizando diez artículos sobre feminicidio en México de los últimos diez años, la mayoría de los artículos tenían un propósito y métodos diferentes con la finalidad de abarcar más territorio conforme a como los feminicidios son un problema y como crea una inseguridad muy grande para toda la sociedad, pude hacer relaciones entre los artículos de como la sociedad tiene una mentalidad chapada a la antigua y como piensa la sociedad sobre las mujeres que fueron asesinadas. Los resultados que obtuve al analizar los artículos fue comprobar que, si hay un incremento y saber que estados sufren más este problema, también los artículos me comprueban que la sociedad sigue teniendo la mentalidad de que si hay un feminicidio es por culpa de la mujer ya sea por la hora en la que transitaba, por ir sola, por usar ropa provocativa, etc. Y lamentablemente muchos de los feminicidios no son solamente por extraños, sino que también se da entre familiares y amigos y el mayor resultado que pude encontrar fue comprobar que el gobierno no toma medidas para poder solucionar un problema tan grave como este.

KINGSBOROUGH COMMUNITY COLLEGE

Exploring Bilingual Effects on Cognitive Functions: Iconic Memory Using 2D and 3D Visuospatial Recognition Tasks

Cinty Chang Wu

Mentor(s): Professor Laura Spinu
Kingsborough Community College

Numerous studies indicate positive effects of bilingualism on cognition, mostly found in domains such as working memory, attention, and inhibitory control. In contrast, Iconic memory (IM), is a sensory memory produced as ongoing post-retinal neural processes, lasting for a fraction of a second. Moreover, the visual stimuli are uncoded, thus, no neural pathways are created in the brain. While many studies have explored the correlation of bilingualism on distinct types of memory involving encoding, its effects on IM remain understudied. In this study, we explore whether bilingual experience results in enhanced IM in the form of visuospatial, and gestural recognition using three remote experimental tasks following Chang (2023):

Foreign Characters Recognition: Participants see a Chinese character on the screen for 1.00s, followed by a highly similar character next to it, and asked to identify it using the Left or Right command. This completes one trial, and there are thirty trials.
2D American Sign Language (ASL) Recognition: participants see a set of five ASL images following Costello & Lenderman (1994), lasting 1.00s each. The participants then identify the original stimuli when presented with other similar ASL signs as the completion of one trial and repeat two more trials.
3D ASL Recognition: same procedure as the 2D ASL Recognition Task, using 3D ASL short videos, lasting less than 2.00s, as stimuli.

To date, we analyzed the outcomes of 16 participants, 10 bilinguals and 6 monolinguals. A tendency of bilinguals exhibiting slower response time and higher accuracy than monolinguals is observed. However, the discrepancies in outcomes are negligible. The limited data from small sample size (aim for n=40) is also insufficient to form generalizations. While the experiment is currently underway, the findings are expected to expand on current work investigating bilingual effects on cognition, especially its understudied interrelation with IM.

New Tools forActivism: The Impact of Political Social Media Engagement on user's Emotions and Activist Intentions

Giovanna Jara Cervigon

Mentor(s): Professor Jeremy Sawyer
Kingsborough Community College

Social media use has been linked with changing inter-group attitudes and some studies have found a correlation between online activism and in-person activism (Wang et al., 2021; Noland, 2017). However, evidence is mixed on the relation between online and in-person activism, particularly on the causal directions between the two (Greijdanus et al., 2020). In an effort to better understand the potential of social media for creating political change, the present study will look at political social media engagement and activist intentions. Given the volatile nature of political social media experiences, Ecological Momentary Assessment is used to measure political social media engagement, emotions, and activist intentions, via 14 daily surveys. A repeated measures multi-level model will be used to look at changing relations between these variables over time. The study is ongoing, but preliminary results show both the social media platforms used and how people engage with them predict future activist intentions. Participants had higher activist intentions on days they used Instagram, Twitter, or TikTok; used more than one platform; created original posts, shared other's posts, and/or tagged mutuals on political posts. Conversely, they had lower activist intentions on days they used Facebook. Preliminary correlational analysis found that negative intentions were negatively associated by happiness and positively associated by feeling worn out. Data collection and analysis is ongoing. We will analyze a final survey that asks participants to reflect on the political content they engaged with and changes in their attitudes toward activism over the past two weeks of the study.

Evaluating Into to American Government: A Student Research Lab

Ana Jourdain

Mentor(s): Professor Shawna Brandle
Kingsborough Community College

Our project focuses on the representation of historically marginalized and oppressed groups such as African Americans, Latinx, Asian, Indigenous, LGBTQIA+, Women and other oppressed identities within published textbooks used in introductory American Government courses across City University of New York two-year and four-year colleges. Our goal is to determine how the scale of representation affects the learning outcome of students as well as the implications on those underrepresented marginalized groups. The results will be determined through a precise data collection method, co-investigators reached out to professors willing to share their previous Introductory American Government courses syllabi. The syllabi are then blinded for anonymity and reviewed for specific information that would identify the quantity and quality of representation of historically marginalized and oppressed groups. This data collection is paired with individual interviews of students that were enrolled in Introductory American Government courses, where a determination is made about their overall understanding of the material, as well as the material itself. The goal is to use these results to help better the representation of historically marginalized and oppressed groups throughout Introductory American Government courses to provide insight for publishers and academic institutions to ensure representation and adequate learning of these groups to better their outcomes and statistics, as well as better preparing students for higher education.

The Role of the Gut Microbiota in SARS-CoV2 Infection

Nawel Messaoudi

Mentor(s): Professor Roberto Mariani
College: Kingsborough Community College

In 2019, the World Health Organization declared a Public Health Emergency due to a severe and potentially fatal infectious disease, the COVID-19 pandemic. COVID-19 infectious agent is the Coronavirus, SARS-CoV2. SARS-CoV2 can cause a strong inflammatory response in a subset of individuals, which can lead to death. Many strongly affected COVID-19 patients were immune-compromised or had co-morbidities such as obesity, heart disease, or type-2 diabetes. Moreover, hospitalization rates are more than four times higher in socioeconomically challenged ethnic groups in the U.S. One common potential denominator for both groups is nutrition quality, suggesting potential links between Covid-19 severity and nutrition-based changes in immune health.

One potent modulator of nutrition-related immune health is the gut microbiota, which contains a multitude of different bacteria that promote immune versus inflammatory responses in a balanced manner. Poor diet and health can lead to microbiota imbalances (dysbiosis), which could directly affect SARS-CoV2 pathogenicity via hyperinflammatory signals. For example, SARS-CoV2 infects and destroys cells of the gut, and pathogenic gut bacteria were found in the body of 8.6% of hospitalized Covid-19 patients with secondary bacterial coinfections.

The goal of this study is to identify microbiota with established roles in inflammatory versus immune responses that are dysregulated in patients with severe COVID-19 symptoms. The results will be combined with comparative analyses utilizing data from populations with nutrition- or co-morbidity-based gut dysbiosis. The data will be used to establish mutually not exclusive models by which the gut microbiota could influence the severity of Covid19 infections. The result of these studies will shed light on how diet, overall health, and gut microbiota adjustment and restoration might play a new therapeutic role in

managing SARS-Cov2 infection and subsequent Covid-19 disease severity.

The Search for Coesite

Matthew Solorzano

Mentor(s): Professor Steven Jaret
Kingsborough Community College

The objective of this research is to investigate and identify the presence of coesite (a form of SiO2) in the impactites produced by the hypervelocity impact creating Tenourmer Crater, Mauritania. Hypervelocity impacts are extremely energetic events that can transform the target rocks and minerals struck. The crater was previously thought to be igneous in origin, but the identification of shock metamorphic features in Quartz and Feldspar (French et al., August 10, 1970; Jaret et al. April 16, 2014) indicate it is the result of a meteorite impact. The most notable form of shock deformation observed are planar deformation features (PDFs), microscopic planes of glass that form inside the crystal when the crystal lattice is broken. Of the many transformations Quartz has been observed to transform into coesite, an ultra-high pressure metamorphic mineral not usually found on the Earth's surface. Coesite forms under extreme conditions: temperatures exceeding 1,300°F and pressures between 2-3 gigapascals. A pascal is a unit of pressure measurement, its formula being one Newton(N) of force over an area of one meter squared(m^2), with a singular gigapascal being equivalent to 10^9 pascals. Temperatures and pressures of that magnitude can only be produced at approximately 30-40 km below Earth's surface, or through extremely energetic events such as an impact event. The samples used for this experiment were collected by Dr. Bevan French and Dr. Bob Fudali in the 1970s and have been archived in the Smithsonian National Rock and Ore collection. Although coesite has never been identified at this location earlier unpublished work done by my mentor, Dr. Steven Jaret suggests it might be there. Should it be there, then we will be able to narrow down the estimated pressure and temperature these rocks form under.

DNA Metabarcoding as a Tool to Identify and Classify Microbial Diversity

Stefan Valdez and Ani Iremashvili

Mentor(s): Professor Dmitry Brogun
Kingsborough Community College

Microorganisms, like bacteria, are responsible for fundamental ecosystem processes like nutrient cycling, organic matter decomposition, and stimulating plant growth. For these reasons, it is important to study and understand the microbiomes present in soil. Composting is the aerobic process of breaking down organic matter, often by bacteria and earthworms, into natural fertilizer used to enrich soil and plants providing urban farmers with an alternative to harmful chemical fertilizers. Bacteria are one of the main drivers of nitrogen conversion in compost; this process is vital for plants and animals to obtain Nitrogen as it is a major element of life used to build amino acids as well as chlorophyll in plants. This study aims to use DNA Metabarcoding to identify bacterial life within composted and non-composted soil samples from Kingsborough Community College Urban farm using 16s rRNA primers with a focus on the V4 hypervariable region. Then use QIIME 2, an interactive bioinformatics tool, to analyze and classify sequencing results. This classification will provide a greater understanding of the bacterial life present in the composting process and determine the difference in microbial variation among composted and non-composted soil to help develop better practices for soil enrichment. We hypothesized that composted soil samples will contain greater bacterial diversity than non-composted soil samples because compost provides a nitrogen-rich environment for more bacteria to thrive in. The results indicate that the following phyla were the most abundant: Acidobacteria, Actinobacteria, Proteobacteria, Firmicutes, and Verrucomicrobia. These taxonomic classifications were present in both compost and non-compost samples with variations in concentration.

AFTERNOON SESSION: POSTER SESSION B

LAGUARDIA COMMUNITY COLLEGE

Fault Detection in Wireless Sensor Networks through Machine Learning Techniques

Christin Bertin

Mentor(s): Dr. Alaa Darabseh
LaGuardia Community College

Wireless sensor networks (WSNs) are vulnerable to various types of faults, including software, hardware, and communication-related failures. These faults can significantly affect the WSN's performance and reliability. To prevent false alarms and minimize the loss of data or network functionality, fault detection techniques in WSNs must be both accurate and rapid. In this study, five machine learning techniques are evaluated in terms of their ability to detect faults in WSNs. The algorithms are compared on various criteria including accuracy, processing time, and memory usage. A real-world dataset was used to evaluate the results of our study. Our experimental results show that despite maintaining high detection accuracy, some approaches perform better than others in terms of processing time and memory utilization. This is highly helpful since selecting the correct detection algorithms will help the fault detection system function better. Moreover, by comparing algorithms using various criteria, we were able to discover the strengths and limitations of each algorithm. As a result, it will be easier to select the algorithm that is best suited for a certain application or deployment scenario.

PAAI: Password Authentication Using Artificial Intelligence

David Huang

Mentor(s): Professor Doyel Pal
LaGuardia Community College

Online services have become an integral part of our daily life. With the increasing reliance on online services, the significance of securing the authentication of such services is growing. Most of the authentication nowadays typically uses the traditional textual passwords and provides a second layer of authentication such as SMS-based or app-based. However, it usually suffers from several limitations such as low memorability, susceptibility to brute-force attacks, dictionary attacks, and password reuse. In contrast, graphical passwords offer an alternative form of authentication that is both intuitive and easy to remember. Instead of relying on characters, graphical passwords use images or symbols to authenticate users. In this project, we propose a novel graphical password authentication mechanism using text-to-image and artificial intelligence (AI). Our proposed technique, PAAI, generates images from textual passwords, which makes them more memorable and unique while retaining the basis of graphical password authentication. The graphical password mechanism using AI has great potential to revolutionize graphical password authentication, while offering a novel way to improve security and usability in a single system.

Feature Selection for Enhancing Accuracy in Human Activity Recognition Systems

Min Young Kim

Mentor(s): Professor Alaa Darabseh
LaGuardia Community College

Human activity recognition (HAR) has become increasingly important in various fields such as healthcare, security, and entertainment. To improve the accuracy of HAR systems, this study focuses on evaluating the performance and impact of various features. The main objective is to identify which features contribute most to the accuracy of the system. The performance of each feature is measured individually, as well as in different subsets. The study uses six features, which are the averages and variances of six beacon packets' received signal strength data (RSS) measured by three Iris nodes placed on the chest and ankles. The k-nearest neighbor classifier (KNN) machine learning classification technique is employed to analyze the data. The study uses a real-world dataset to evaluate the results. The experimental findings demonstrate that some features outperform others, highlighting the importance of proper feature

selection in enhancing the accuracy of human activity recognition systems.

Representational Equity for Women in STEM at LaGuardia Community College

Suhana Lama

Mentor(s): Professor Milena Cuellar & Professor Reem Jafar
LaGuardia Community College

LaGuardia Community College is ranked third among all CUNY colleges for graduating a significant number of students in science, technology, engineering, and mathematics (STEM) fields. Despite this progress, there are still significant disparities in STEM attainment based on race, ethnicity, and gender not only at LaGuardia but across CUNY. Female students at LaGuardia lag behind male students in STEM majors when it comes to graduation rates, even though the female population has remained steady at around 58% since 2012. The underrepresentation of women in STEM fields is a major concern, despite efforts to increase female participation. As a STEM student, I have personally experienced the lack of female representation in my major classes, where the number of female students is typically less than 20% in a class size of 20 students. In some cases, I have been the only female student, and even my professors expressed surprise at my presence in their classes. To better understand the reasons behind this trend and quantify equity gaps at the institutional level, we utilized equity indexes to compare male and female students' performance in mathematics classes at LaGuardia. We calculate equity indexes for several metrics and desegregations for College Algebra and Pre-Calculus, key course in the STEM sequence. These are gateway courses in mathematics, which are also seen as gatekeepers. A gatekeeper mathematics course is defined as a course where success outcomes are not equitable across data disaggregation. Our analysis revealed that female students are underrepresented in STEM majors, yet they are overrepresented in their success outcomes compared to male students. In this work, I realize the importance of educating all students about the value of gender diversity in STEM to create an inclusive and welcoming environment for all students.

Underwater Acoustic Communication and Hardware Implementation

Seungyeon Lee

Mentor(s): Professor Yun Ye
LaGuardia Community College

In this project we will work on building an embedded hardware platform for underwater acoustic communications and study the performance of signal frequency modulation in the communication system. Applications of such a system include SCUBA diver tracking, aquaculture, ocean seismic detection, maritime shipping, etc.

We will implement basic wireless communication system design in MathWorks Simulink, microcomputer architecture, VHDL FPGA (Field Programmable Gate Array) programming, and hardware interfacing. We will test both transmitter and receiver in the hardware platform, collect experimental data, and perform data analysis to quantify the performance of the studied OFDM (Orthogonal Frequency Division Multiplexing) modulation scheme.

We Choose Freedom: An exploration of Samana Americans' existence in the Dominican Republic

Laredo Regular

Menor(s): Professor Ryan Mann-Hamilton
LaGuardia Community College

Samaná is a region of the Dominican Republic with a long history of interaction between different ethnic and racial groupings. Emigration from various regions of the Atlantic world have touched its shores and over time became a site of resistance for Indigenous and African peoples. This research project focuses on a particular emigrant African American ethnic group known as Samana Americans or "Americanos de Samana". The project explores their history, trajectory and contributions to the Dominican Republic and Caribbean history by examining historical records from two community churches, St. Peter's Evangelical Church and Mother Bethel AME

church. These religious institutions housed many documents pertaining to birth, baptism and marriage of the members of the community and provide many details to larger processes of immigration, labor, and relationships in this multicultural region of Hispaniola.

Investigating Chemoimmunotherapy Efficacy with Angiogenesis Facilitated 3D Human Esophageal Adenocarcinoma Organoid Culture System

Malcom Reid & Iñigo Caballero Quiroga

Mentor(s): Professor Na Xu with Ying Liu[1] & Shahin Rafii[1]

[1] Ansary Stem Cell Center for Regenerative Medicine, Weill Cornell Medical College, 1300 York Ave, New York, NY, 10021

Chemotherapy drugs are selected mainly based on the location of cancer. However, patients with the same type of cancer may develop dramatically different responses to the same drug. Among the factors that affect therapeutic efficacy, blood vessels directly connecting with the cancer tissues have been reported to be essential to cancer cell growth and metastasis from a primary site to other organs. Dr. Rafii's group has developed a novel method to recreate the interaction between tumor cells and endothelial cells (ECs), the major component of blood vessels. By transiently overexpressing the ETS variant 2-transcription factor (ETV2) in adult human vascular endothelial cells (HUVECs), the "Reset" Vascular Endothelial Cells (R-VECs) can self-assemble into interconnected vasculature networks with tumoroid in a 3D matrix, enabling stable transportation of human blood, immune cells, tumor cells, or tumor exosomes within a microfluidic device (Palikuqi et al., 2020). This technique mimics the tumor growth with blood vessels in patients and provides a close-to-physiological platform to rapidly select chemotherapy drugs for a specific cancer patient.

In this study, we investigated the efficacy of several chemotherapy drugs on tumoroids derived from esophageal adenocarcinoma (EAC) patients. We analyzed the total area, count, and average size of tumoroids cultured alone or with R-VECs in both 2D culture and 3D matrix and identified remarkable chemoresistance provided by ECs. Our method not only allows us to evaluate the therapeutic efficacy of anti-blood vessel drugs but also helps to assess the side effects on blood vessels for anti-tumor drugs. Our findings help to select treatments that are more likely to be effective and have fewer side effects. This tumor-blood vessel cell co-culture system also provides a platform to study the crosstalk between cancer tissues and blood vessels in patients.

LEHMAN COLLEGE

Early Music Education and the Activity of the Parasympathetic Nervous System

Noah Al-dabishi

Mentor(s): Professor Steven Holochwost
Lehman College

The parasympathetic nervous system (PNS) modulates metabolic activity in situations of modest-to-moderate challenge, and therefore PNS activity may be particularly relevant to children's functioning in the early education classroom (Holochwost et al., 2019). However, a systemic literature review conducted in late 2022 indicated that no study has examined the link between participation in musical activities and PNS activity in the classroom. However, small literature has reported associations between music listening or making and PNS activity in the laboratory. Based on these results, we developed an observation measure of musical activities in the early education classroom. Our hypotheses are that: 1) early educators will present opportunities for children to engage in music listening, music and movement, and music-making activities, but 2) these activities will occur with decreasing relative frequency following the order in which they are listed. If these hypotheses are supported (analyses are in progress), it would suggest that children are being provided with the opportunity to engage in musical activities that should reliably prompt changes in PNS activity, although they are not being presented with an equal opportunity to engage in each type of activity. In our next study, we would use our observational measure to code musical activities during classroom sessions for which data are currently being collected, and in which young children's PNS activity is being continuously

monitored, to examine within- and between-person differences in PNS activity as a function of children's engagement in these musical activities.

African Women's Leadership: How its History Shaped the Covid-19 Response

Aminata Gueye

Mentor(s): Professor Bertrade Ngo-Ngijol Banoum
Lehman College

Despite Senegal faring relatively better than wealthier, "developed" countries throughout the COVID-19 pandemic, pre-existing gender discrimination issues and disparities were still exacerbated greatly. From gender-based violence to male preference in land distribution, statistics regarding the rights of Senegalese women have only worsened. This research uncovers how women's rights advocates and organizations have exemplified African women's leadership models to recuperate from the pandemic's consequences. The approach taken for this research consisted of traveling to Senegal, West Africa to conduct interviews with experts on gender discrimination, domestic violence, and women's leadership. The presentation will include interviews conducted with the "Association des Juristes Sénégalaises", an organization of women lawyers and legal advocates who dedicate their work to women's legal rights and empowerment. The presentation will analyze the trends in gender discrimination based on AJS's reported statistics, corroborated with international organizations' reported statistics. Interviews with HLM, a collective of women in the village of Kebemer, will be included to share how they utilize a communal financial system called "Tontine" to become financially independent, address the village's pertinent issues, and support the vulnerable in the community. The findings of this research on the significant progress African women leaders have conclusively shown that they come from a rich, vibrant tradition of gender-equality advocacy, which remains the undercurrent for their proactiveness in the Covid-19 response. The presence of women's leadership throughout the African continent in history has laid the foundation for the models of leadership utilized by these women to overcome the pandemic.

Cutting (h)Edge News! Shrub Biodiversity Grows on Lehman College Campus!

Trinity Montana

Mentor(s): Professor Jack Henning
Lehman College

Biodiversity is the variety of life on Earth from the nucleotide level to ecosystems. Plants are important for overall biodiversity of an environment as they provide structure, shelter, food, oxygen, and sequester carbon. Understanding the diversity of an area is a good indicator of its ability to perform ecosystem functions, especially in artificially contrived man-made environments that have not assembled on their own. Shrubs are small woody plants with several stems at or near ground level. Like trees, they capture rain, filter dust and air pollutants, act as carbon storehouses, and provide food and shelter for birds and insects, as well as seasonal beauty. Lehman College is noted for its green campus, which stands out in a neighborhood with few parks. As part of a continuing assessment of plant diversity on campus, we conducted a survey of the shrub layer, which is sometimes overlooked in floristic surveys. Shrubs were identified during winter dormancy in 2023 using iNaturalist and on-line keys. The compiled data set was entered into a spread sheet and analyzed using PAST software to generate diversity indices and explanatory graphics. Shrub data was then combined with a previous tree analysis to calculate overall woody diversity. Simpson's Index Diversity (SID) for trees was 0.9783; shrub SID was 0.8863. Pooled woody diversity was 0.9324 which shows that the lower diversity of shrubs impacts total woody diversity.

Star Galaxies as Probe of Physics Beyond the Standard Model

Neena Noble

Mentor(s): Luis Anchordoqui
Lehman College

The Cosmic Microwave Background makes the universe opaque with the propagation of ultra-high energy cosmic rays. The energy degradation originates

in the so called GZK interactions. This interaction has a characteristic length scale 10-20 mpc. The Pierre Auger collaboration and Telescope Array Collaboration reported an isotropy of the highest energy cosmic rays pointing to the direction of nearby starburst galaxies(3mpc). We analyze the spectrum of these sources. We would expect the spectrum of these sources to have a large variance because of the difference in power among these galaxies. We search for the cosmic ray spectrum of galaxies and show that there is an interval for which it is universal, implying new physics beyond the gzk effect.

Estimating the Cost of a College Degree: Graduates Losing Medicaid, SNAP, and Section 8

Emily Oliveira

Mentor(s): Professor Amy White
Lehman College

This research study estimates the total cost of obtaining a college degree for students who, upon graduation, lose their eligibility for public assistance such as Medicaid, SNAP, and Section 8 housing vouchers. Other published studies estimate the cost of obtaining a college degree for different populations: public vs. private college students, STEM majors vs. majors with lower earning potential, and students who graduate in four years vs. those who graduate in more than eight semesters. These estimates demonstrate the cost and value of a college degree to different populations. Still, the research ignores individuals who receive public assistance while a student and out-earn the eligibility requirements upon graduation when they get a job that pays a Bachelor's-level salary. The lost in-kind benefits or value of government assistance programs need to be incorporated into the cost of earning a college degree to be a true estimate of the cost. Local public colleges justifiably pride themselves on lifting low-income students out of poverty and into the middle class; however, the calculation needs to reflect the costs borne by students who receive public assistance. To calculate the true cost of a college degree for individuals out-earning their government assistance, lost in-kind benefits are incorporated into the previously-published calculus of determining the cost of a college degree. This research project is based on a detailed literature review of published peer-reviewed content and forms the foundation for future research studies on the economic value of a college degree to all students, including those who receive public benefits.

Are Exaptations Exceptional? Exploring The Origins Of SPO11

Dawn Roy & Karla Hernandez

Mentor(s): Professor Jack Henning
Lehman College

Haploid gametes are produced during the process of Meiosis in eukaryotes where crossing over between homologous chromosomes generates allelic variation. SPO11, a protein dimer, is responsible for cleaving the DNA molecule that allows crossing over to occur. SPO11 is found in a class of enzymes called toposiosmerases (TOPO). TOPO alleviate tension in replicated DNA prior to attachment of helicase to prevent supercoiling during DNA replication. SPO11 is a modified form of topoisomerase VI (TOPO VI) that can be found in prokaryotes as well as eukaryotes, thus predating the emergence of sexual reproduction. The occurrence of TOPO VI in asexual prokaryotes suggests that its original function of stabilizing DNA was preadapted for use by eukaryotes, where it gave rise to one of the major endonucleases of Meiosis I, Prophase I. We decided to investigate the relationships of SPO11 TOPO VI with other topoisomerases in a representation of all living organisms. Our results indicate unusual relationships between topoisomerases throughout the three Domains of life. Given its ubiquity, knock-down techniques could help elucidate the role of SPO11 and other TOPO VI variations in non-sexually reproducing model organisms. This can be achieved using knocking techniques to knock down SPO11 in simple research models such as yeast and amoebae to see how it affects subsequent phenotypes.

Can Trauma be Passed Down to the Next Generation?

Michaela Sakellaki

Mentor(s): Professor Victoria Sanford
Lehman College

It's important to know the ways in which trauma affects survivors of traumatic events and how their lived trauma affects their own children. The purpose of this project is to explore the impact that trauma has on mothers during and prior to their pregnancy. Studies have shown that trauma can leave a mark on a person's genes which can then be passed down to future generations. I am collecting information from recent research in scholarly articles and books. Based on the information, there is evidence to suggest that extreme trauma changes the DNA of the victim and is passed on to their children. This trauma is called intergenerational because trauma experienced by one person in a family can be passed down to future generations because of the way that trauma epigenetically alters genes. This research is important because trauma can be passed down. I present research that demonstrates the impact on the offspring as well as the effect during pregnancy and after the pregnancy of traumatized women. Studies show how the hormones of children later in their life can be affected based on their mother's trauma. Children whose mothers have been exposed to childhood trauma show increased risk of behavioral problems. There are a lot of effects that raises the possibility that maternal experiences influence the developing brain even prior to the conception. There is an association between maternal childhood trauma and the frontal alpha symmetry which is associated with stressful environments. The results, show that FAA has a strong connection to child behavioral problems when exposed to maternal childhood trauma.

Can Clinical Trial data Inform our Understanding of the role of Depressive Symptoms in Alzheimer's Disease?

Munira Z. Urmi

Mentr(s): Professor David Manier & Professor Adam Brickman
Lehman College

This Honors Research presentation in Psychology primarily focuses on the correlation between depressive symptoms, Alzheimer's, and Cerebrovascular Disease (CVD). It is a scholarly oral presentation of original ongoing research at Columbia University. There is research that suggests that depressive symptoms are a risk factor for Alzheimer's Disease (AD); however, we were not sure whether depression is part of AD, related to some other condition that often goes along with AD (such as CVD), or a cognitive symptom that might be misinterpreted. We addressed this question in the Anti-Amyloid Treatment in Asymptomatic Alzheimer's Study (A4) trial. We used baseline data to examine depressive symptoms' correlation with AD pathophysiology, which is amyloid and white matter hyperintensities (WMH), a marker of CVD. The result shows a statistically significant correlation between amyloid and depressive symptoms. Also, a more significant proportion of people classified as depressed are in the amyloid-negative group than the amyloid-positive group. Furthermore, regardless of amyloid status, depressive symptoms were associated with WMH volume. Our study is critical because we believe that if there is a correlation found between depressive symptoms, AD, and CVD, individuals with evidence of depressive symptoms can take action to improve their conditions and can avoid being a victim of AD and CVD.

MACAULAY HONORS COLLEGE

Lessons from The Vault: What Children Have Learned from the Past Century of Disney Animation

Alanna Kroening

Mentor(s): Professor Lisa Brundage & Professor Logan McBride
Macaulay Honors College

Children's media has a way of transmitting life lessons to kids in a form they can understand. By feeding kids information in a fun, slightly abstract manner, it's as though they're experiencing it through their own imagination. I decided to delve into the topic of children's animation, via a close reading of five Disney animated films, to decipher and analyze some of the themes being presented to kids in mainstream media. I first situated each film in its historical context, with a consideration to the impact current events have on both the making of a film and its audience reception. The five films I chose span the last century, and I believe bridge together major checkpoints in both American history and the history of Disney Animation: *Steamboat Willie* was the first cartoon with fully synchronized sound and launched Mickey Mouse into the limelight as a pioneer through the Great Depression; *Dumbo* teaches that your disability is your superpower, and we should learn from our past mistakes; *Toy Story* brought the film industry into the computer age as the first fully computer-animated film, as well as being the first feature film of the Disney/Pixar partnership; *Wall-E* teaches the dangers of not taking care of our planet, especially during its timely release alongside the 2008 Recession; and *Encanto,* Disney's most diverse film to date, teaches about familial and societal pressures, as well as tying into refugee issues in America and COVID-19. My hope in teaching more about these films is to continue to inspire future generations of children, of all looks and backgrounds, to see even life's biggest lessons through the scope of imagination.

Acute vs Chronic Cuprizone-Induced Demyelination Differentially Affects Behavior

Nawshin Maleeha

Mentor(s): Professor Ekaterina Likhtik & Professor Carmen Melendez-Vasquez
Macaulay Honors College – Hunter College

Cuprizone is a copper-chelator that induces oligodendrocyte apoptosis and drives demyelination. Although this model has been widely used to study the pathophysiology of multiple sclerosis, its effects on behavior at acute and chronic stages of demyelination are unknown. In the present study, we tested male C57BL/6J mice exposed to the cuprizone diet for 6 weeks (acute demyelination), and 12 weeks (chronic demyelination) to age-matched controls on three types of memory: object recognition memory, using the Novel Object Recognition (NOR) task, spatial working, and reference memory, using the Y-Maze task. The NOR task revealed that animals developed significant memory impairments only after chronic demyelination. In contrast, the Y-Maze revealed that spatial working memory was already impaired after acute demyelination, when mice showed significantly less spatial alternation than controls. Acutely demyelinated mice also showed significantly less rearing in the novel arm than controls without differences in overall rearing, suggesting a specific impairment in exploratory behavior in a novel context and increased anxiety. Notably, spatial reference memory was not impaired at any stage of demyelination, as mice visited the novel arm equally above chance regardless of demyelination status. A preliminary analysis of myelin basic protein (MBP) density after chronic demyelination revealed two trends: 1) MBP density increased in the entorhinal cortex, a region implicated in object recognition memory, with NOR performance, and 2) MBP density increased in the dorsal hippocampus, which supports spatial working memory, with Y-Maze spatial alternation. This work is foundational for developing effective physiology and behavioral treatments for multiple sclerosis.

From Information to Action: The Role of Data Communication in Flood Risk Management in New York City

Syeda Tabassum

Mentor(s): Professor Daniel Shtob
Macaulay Honors College- Brooklyn College

Floods affect more people globally than any other natural disaster. Urbanization and climate change are expected to heighten the frequency and severity of flood risk. In cities and urban areas, there exists an issue of inadequate drainage systems and infrastructure that cannot handle heavy rainfall. The impacts are detrimental, with significant economic and social disruption, damaging infrastructure, homes, and businesses, and causing displacement of people. Additionally, its impact on communities and the livelihoods of individuals, particularly those who are marginalized and have low-income status, is noteworthy. The need for effective flood monitoring, management, and communication is clear now more than ever. FloodNet is a low-cost sensor wireless sensor that collects data on water levels, rainfall, and other environmental conditions connected to a central data management system allowing real-time data collection and transmission. This research paper will examine the key challenges and opportunities for effective data communication and visualization with the FloodNet data dashboard, and how this impact the project's ability to inform decision-making and community action.

MEDGAR EVERS COLLEGE

Recommender Systems and Subgrouping

Sharielle Millington-Mclean

Mentor(s): Professor Rosa Zavala-Gutierrez
Medgar Evers College

A Recommender System makes product recommendations to users. Some of the recommender technologies that are used today include Netflix, Amazon, and Reddit. In this project, I have used collaborative filtering as a technique to build a recommender system for food. It uses likes and dislikes (ratings) for a user based on their past data and others' data. Based on the ratings, it groups users with similar tastes over all the items and makes recommendations to a user based on those items enjoyed by others in the group. More specifically, it finds what a user is most similar to and follows that pattern. I have tested the recommender system on a small made-up dataset of users and their snack preferences (a ranking from 1 to 10) and I am working on testing it on a larger, real dataset. Finally, I am exploring solutions to the fact that two users with similar tastes in one item subset may have very different tastes in another subset. Therefore, there might exist many groups of like-minded users with similar tastes in subgroups of items, and by grouping them by their preferences over all items we might be missing those nuances.

African American and Latino Low Income Families Dietary Patterns: Unhealthy Eating Habits in Communities of Color and How to Promote Change

Patrice Sackor

Mentor(s): Professor Zulema Blair
Medgar Evers College

In the United States, 48% of African Americans suffer from heart disease and 63%of men and 77%of women are overweight or obese. To effectively promote and support healthy eating among African American and Latino families in New York City, there needs to be insight into the factors that developed unhealthy behaviors. This overview provides a background for the studies and programs in NYC pertaining to the food crisis in communities of color. For generations, black and brown communities have followed their traditional recipes without accounting for the level of nutrition in each dish, which formulated a twisted perception of nutritional food in their cultures. Alongside the cultural aspect, minority communities often reside in neighborhoods lacking in nutritional food options such as full service supermarkets and farmers markets; and are abundant in fast food and bodegas which makes obtaining whole foods more difficult. This research seeks to address how to qualify healthy eating, specifically for the colored communities, according to their culture and traditions

so that a model of preventive care and a better quality of life can also be achieved in their communities. Research has shown that lack of nutrition can lead to chronic illnesses like diabetes and obesity, with increased chances of liver and kidney diseases which is prominent in black and brown communities. Future research may build on the suggestions of advancements in the current and future community plans and food assistance programs in NYC.

An Alternate Synthetic Route to Diacylglycerol (DAG)-lactone Derivatives: Towards More Potent and Specific Protein Kinase C Agonist

Shekiel V. Sydney

Mentor(s): Professor Richard W. Denton
Medgar Evers College

Diacylglycerol (DAG) is a prolific second messenger that activates proteins involved in various signaling cascades. They target a family of protein kinase C (PK-C) isoenzymes. The isoenzymes can catalyze the O-phosphorylation of serine/threonine of proteins that are involved in the signaling pathways that regulate cell growth, differentiation, apoptosis, and the promotion of tumors. A more potent kinase C agonists are the DAG-lactones. The syntheses of these compounds are widely reported in the literature, and they promise therapeutic targets for cancer, dementia, HIV, AIDS, and multiple other disorders.

In this project, an alternative synthesis of the DAG-lactone (2-(hydroxymethyl)-5-oxotetrahydrofuran-2-yl)methyl palmitate (**IV**) was attempted. Initially, the synthesis begins with the monosilylation of the 2-methylene propane-1,3-diol (**I**) with *tert*-butyldimethylsilyl chloride. The resulting product undergoes a Johnson−Claisen rearrangement with triethyl orthoacetate and acetic acid under microwave conditions to give methylene ethyl ester. Base hydrolysis followed by acidification yielded methylene carboxylic acid (**II**). The latter was oxidized to give the epoxide with *m*-chloroperbenzoic acid. This epoxide opened via an intramolecular lactonization under acidic conditions to give the desired five-membered ring DAG-lactone (**III**). Esterification with palmitoyl chloride followed by deprotection of the silyl group will provide the desired product (**V**). This alternate synthesis will allow our group to prepare more potent DAG-lactone frameworks (**VI**) from **III**.

NEW YORK CITY COLLEGE OF TECHNOLOGY

Discrimination in New York City's Housing Voucher Program

Tashana Brooks

Mentor(s): Professor Jeannette Espinoza
New York City College of Technology

The Fair Housing Act (FHA), enacted as Title VIII of the Civil Rights Act of 1968, prohibits discrimination from selling or renting a dwelling to any person because of race, color, disability, religion, sex, family status, and national origin. The federal government provides rental subsidies for many low-income renters through government programs. Rental assistance such as Section 8 vouchers administered by Housing and Urban Development is considered a lawful source of income for paying rent; however, many landlords or realtors discriminate against individuals utilizing Section 8 vouchers. According to the New York City Human Rights Law, this is illegal. The Legal Aid Society filed a federal lawsuit against 88 New York City real estate firms and landlords alleging rampant housing discrimination towards prospective tenants attempting to use Section 8 housing vouchers. The lawsuit claims that nearly half of all cases recorded under the investigation were denied housing. It is against the law in New York State for landlords or brokers to deny an applicant who uses housing vouchers, which is considered a violation of the FHA.

Studying Factors of Environmental Injustice and ways to Achieve Equity

Arham Hussain & Reginald Metellus

Mentor(s): Professor Marzieh Azarderakhsh
New York City College of Technology

In this day and age, the biggest concern for current and future generations: is the environment. The urban

heat island (UHI) with its significant energy, health, and societal impacts is among the major environmental issues in urban regions, especially in historically underserved and socially vulnerable communities (HUSVCs). In the 1930s, the former federal agency, Homeowners' Loan Corporation (HOLC), created "Residential Security" maps of major cities known today as "redlined" areas. These neighborhoods were often designated as "hazardous" due to the high percentages of people of color living there. Consequently, this leads to systematic disinvestment based on race. While the program ended in 1968, the impacts of discriminatory lending are still experienced in redlined areas in the form of urban hotspots. Fortunately, the advent of new technologies and the availability of environmental data from satellites alongside ground observations such as ArcGIS and QGIS could improve our understanding of these heat impacts as well as be used to develop, assess mitigation, and resiliency strategies.

Designing of X-ray Beams to Assess Mineral Loss in Dehydrated Fruits – Radiology Readiness During Climate Change

Angela Moore & Katie Tam

Mentor(s): Professor Subhendra Sarkar & Professor Evans Lespinasse

Key minerals such as iron, manganese and copper are necessary for optimal health and vitality of human beings. These minerals are within the biomolecules of food, particularly in fruits and are not detectable without destroying their natural biochemical roles. A compilation was done on average mineral compositions for multiple apple varieties from USDA and academic horticulture research labs to design the x-ray beams in the low energy ranges in our mammography system that provide "soft" x-rays for imaging light-weight atoms. In this project homemade external filters like Aluminum sheets, Iodine and Gadolinium contrast media were developed to modify low energy X-rays for more dedicated detection of each of these minerals. The absorption patterns and utility of such modified x-ray beams were analyzed. Differentiation between the imaging of iron and other minerals was challenging but a common distribution pattern from the core to the cortex of the apples was observed for all varieties of apples tested.

Analysis of Imaging Database and Identifying Novel MRI Diffusion Abnormalities in Alzheimer's Disease

Authors: Jennifer Padilla, Analia Basilicata, Anjalee Rabbani, & Anam Ruiz

Mentor(s): Professor Subhendra Sarkar
New York City College of Technology

Alzheimer's disease (AD) is presumably caused by two neuropathological protein markers: amyloid beta (Aβ) and neurofibrillary tangles. Alzheimer's Disease Neuroimaging Initiative (ADNI) collects high quality patient data from standardized clinical trials using Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET), and Cerebral Spinal Fluid (CSF) biomarkers to diagnose and evaluate the effectiveness of treatment for AD. MRI and PET screening for Alzheimer's Disease aim to find structural, functional, and neurochemical abnormalities causing or caused by AD brain diffusion tensor imaging (DTI) and Resting State functional MRI (RSfMRI) are emerging AD MRI tools. Tau PET is a promising method for predicting cognitive abnormalities, more accurate than amyloid PET and MRI.

To our knowledge, metal exchange among key bio metals like Fe, Cu, Mn, and Ca (transmetallation) has not yet been explored in neurobiology of AD. However, our research in carbohydrate and animal protein matrix (fruits and chicken eggs) has demonstrated transmetallation and chelation in such biological media. Exogenous chemical stress from radiology contrast agents or environmental metallo-toxins could also alter homeostasis of brain bio metals. Iron transporter proteins in deep brain areas have been researched with little success in Alzheimer's and Parkinson's and their role in protein aggregation and oxidative stress, leading to neuronal loss is not clear. We note that when iron is shielded from bioreactions it is non-magnetic while if it takes part in metal exchange it could be in charged states that are paramagnetic. We hypothesize that changes in brain iron levels or brain iron electron charge states are

reflected in magnetic susceptibility changes in white and gray matter leading to diffusion tract abnormalities in MRI of the AD brain.

It is not possible to perform invasive biopsy and thus pathologically correlate iron or any other metal in AD brain with cognitive dysfunction in AD patients during their lifetime or even post-mortem since the disease is not in the presence or absence of the metals but presumably in the functional form of the proposed bio metals (Fe, Cu) in the neuro-biochemical pathway. Both diffusion MRI and magnetic susceptibility measurements to localize abnormal iron provide complementary information and are affected in AD. We have analyzed ADNI database for DTI abnormalities and have identified two parameters (Fractional Anisotropy and Mean Diffusivity) that show significant fluctuations only in the Fornix region with AD progression that we are modeling as presumably due to abnormal CSF dynamics.

Exploring Methods for Recycling Filament Waste in 3D Printing

Max Rios Carballo

Mentor(s): Professor Angran Xiao
New York City College of Technology

The goal of the current study is to investigate cutting-edge techniques for recycling filament waste from 3D printing procedures. Appropriate waste management techniques are required to reduce this trash's harmful environmental consequences. The goal of the project is to look at new methods for recycling filament waste in order to minimize disposal and encourage reuse. To acquire data from pertinent papers and research, a thorough literature review methodology was used. The findings show that this issue may be resolved utilizing a variety of recycling techniques, including shredding, melting, and re-extrusion. The type of filament waste and the intended goal will determine which approach is best to use. Overall, the study promotes sustainable behaviors, reduces the environmental impact of filament waste, and helps create appropriate waste management solutions for 3D printing.

Characterizing a Calpain gene, TTHERM_01108610, Belonging to Tetrahymena Thermophila

Eva Tse

Mentor(s): Professor Ralph Alcendor
New York City College of Technology

Tetrahymena Thermophila is a unicellular ciliated Protozoan. It is commonly found in many freshwater habitats globally. *T. thermophila* has two nuclei, a macronucleus and a micronucleus. The macronucleus is the vegetative nucleus involved in gene expression during vegetative growth, while the micronucleus is the germline nucleus involved in sexual reproduction. These cells serve as model organisms for the discoveries and the broadening of information on many biological processes such as cell division, evolution, histone acetylation and DNA elimination. Calpains are calcium-dependent, non-lysosomal cysteine proteases that are prevalent among eukaryotes and bacteria. In the human genome, there are 15 calpain genes that convert into a calpain-like proteases. Of the 15 calpain genes, there are nine that are classical calpains and there are six that are nonclassical calpain. Classical calpains have a PEF domain, while non-classical calpains do not have this domain. Studies have shown that calpains are involved with programmed cell death, cell motility, and cell proliferation. Other studies suggest that uncontrolled regulation of calpains may be linked to various diseases such as, Alzheimer’s disease, retinal cellular dysfunction, and many others. *T. thermophila* has about 27 calpains; however, very little is known about these calpains in *T. thermophila*. Therefore, the goal of this research project was to begin examining the effects of oxidative stress on TTHERM_01108610, one of *T. thermophila* calpain family members, gene expression. Cells were exposed to different concentrations of cadmium, an oxidative stress inducer, and TTHERM_01108610 gene expression was examined. Total RNA was extracted and mRNAs were converted to cDNA. Preliminary PCR results suggest the expression of TTHERM_01108610 decreases after two hours of 10 – 100 μM of cadmium but increased after 24 hours. These results suggest TTHERM_01108610 may be involved in cadmium toxicity.

Importance of Incorporating Computer Ethics in Computer Curriculum

Tiya Williams

Mentor(s): Professor Elizabeth Milonas
New York University of Technology

Ethics specifically in Computer Curriculum is a growing problem that has yet to be widely addressed. Although, start of computer ethics being taught has been traced back to the early 1940's it has not been standardized or implemented in all computer curriculum. The objective of this research is to diagnose the reasons why ethics is so crucial in computer curriculum at all levels. I used surveys to investigate whether students were taught ethics in their computer curriculum. I also conducted surveys for professors at universities and colleges if they were taught ethics while obtaining their degree, as well as if they teach ethics in computer curriculum. I also completed thorough research through CUNY colleges to find which colleges teach ethics in computer curriculum as well as the levels in which it is taught. The data suggests that while not all students have been taught ethics in computer curriculum, they are aware of the value. The results of my research indicate most CUNY colleges do in fact teach ethics in computer curriculum. This project will also provide insight into why it is so pertinent to have ethics in computer curriculum at all levels. These findings are different than those in the past because ethics in computer curriculum has changed, it has gotten more relevant and important in the day-to-day decisions of people creating computer systems, artificial intelligence and more.

QUEENS COLLEGE

Facing Death: Photoceramic Gravestone Portraits in the United States

Wilhelmine Coste

Mentor(s): Professor Evan Daniel
Queens College

This project explores the use of photoceramic gravestone portraits by Jewish and Italian Catholic immigrants in the United States. These portraits, allowing strangers to come face-to-face with the deceased, were a direct challenge to the mainstream American attitudes towards death, which sought to distance the living from the dead. The central objectives of this research are to estimate the potential remaining numbers of photoceramic gravestone portraits and assess their connections with Italian Catholic and Jewish immigrant communities. I conducted surveys to map the photoceramic gravestone portraits in two cemeteries, one with a predominantly Italian Catholic population in Chicago and a Jewish cemetery in Queens. Contacts were made with several cemeteries and historical organizations in order to determine viability for potential candidates, including visiting the Oak Park River Forest Museum to evaluate their collection of materials related to the J.A. Dedouch company, the largest American producer of photoceramics. Previous research suggests there are only a relatively small number of photoceramic gravestone portraits remaining in cemeteries across the United States. However, this project reveals these estimates were remarkably conservative and perhaps inaccurate by over a hundred thousand. These findings have significant implications for the study of memorial art and reach into such varied disciplines as immigrant history, photography, material culture, urban studies, and thanatology.

Electrophysiological Characterization of Neurons in the Trigeminal Principal Sensory Nucleus in Prrxl1 Knockout Mice

Daniel Fedida

Mentor(s): Professor Joshua C. Brumberg & Professor Giuseppe Cataldo
Queens College

Trigeminal neuropathic pain, a frequently debilitating orofacial pain, is difficult to manage, resistant to conventional treatment and contributes significantly to a poor quality of life. Prrxl1, a paired homeodomain transcription factor, is indispensable for the development of patterning in the trigeminal lemniscal pathway. Its deletion disrupts patterning in primary sensory afferent fibers into the spinal dorsal horn and in the lemniscal whisker-to-barrel cortex pathway. It is well established that Prrxl1 deletion is associated with hypoalgesia to body stimulation. We recently reported

that Prrxl1 deletion is also concomitant with hyperalgesia to stimulation of the facial region, suggesting a hitherto unreported contribution of Prrxl1 to the organization of orofacial nociception. The rodent trigeminal system is comprised of parallel pathways originating in the principal sensory nucleus (PrV) and in the spinal nucleus (SpV). The PrV is implicated in a variety of active sensing behaviors, including object recognition and texture discrimination, while the SpV is associated with transmission of noxious input. Although absence of patterning is accompanied by disruption of sensory behaviors, its involvement in nociception has not been previously reported and is poorly understood. Electrophysiological recordings in the low-threshold, touch-encoding PrV revealed nociceptive wide dynamic range neurons where none were previously reported. This raises the possibility of hypersensitive wide dynamic range neurons in the PrV of Prrxl1 knockout mice contributing to their facial hyperalgesia.

QUERENCIA: An Immersive Dance Study on Intrusive Thoughts

Daniella Hernandez

Mentor(s): Professor Edisa Weeks
Queens College

Negative Intrusive thoughts can be a challenging experience as they are triggered by stimuli, distressing and interfering with daily life's thoughts. It can become so overwhelming that they interfere with daily life. Many people have turned to dance to cope with difficult emotions and mental health issues; as dancing releases serotonin, which is a natural chemical in the body that makes people feel good.

The choreographic work *QUERENCIA,* by Daniella Alexis Hernandez, Integrates elements of Hip-Hop and Contemporary Dance to embody the human mind's reaction stimuli that trigger intrusive thoughts. From early February to May, 2023 Daniella auditioned and cast six dancers in the work, and began rehearsing twice a week. To investigate movement that communicates a sense of struggle and how to manifest anxiety. Hernandez collaborated with many individuals to evolve the nature of the piece, such as Courtney Johnson to generate costumes for the dancers and with Arcinello Jocson and Leah McKeehan to create an original music score, "bluing". The concept for the music and costumes came from conversations connecting how we protect ourselves from anxiety and in order to begin the healing process we must acknowledge what is proving to be triggering and the cause of our anxieties. They were also inspired by the bluing process of steel, which is steel becoming "passive" or less prone to rusting and resistant to being corroded by the environment around them. *QUERENCIA* aims to explore the struggles and triumphs of the human body and mind in response to intrusive thoughts, as well as its capacity to work through the resulting anxiety, depression and negativity that comes along with it, providing a safe, inclusive space to connect. The finished work premiered on May 11-14, 2023, as a part of *Aphelion: the Student Choreography Showcase at Queens*

Neurological Underpinnings of Psychological Factors Distinguishing OCD and Misophonia

Simona Iskander, Ravinder Kaur, Monica Soni, Dylan Arnero, Naila Shamsina, & Kerry Aguero

Mentor(s): Professor Usha Barahmand
Queens College

Several studies have suggested that misophonia should be categorized as an obsessive-compulsive disorder due to similar neural manifestations, such as impairments in limbic structures as well as hyperactive insula, and psychological features, such as perfectionism, anxiety sensitivity, and disgust sensitivity. However, the two disorders may differ in the specific domains of disgust sensitivity. In OCD, the domain of pathogen disgust has been studied extensively, with dysfunctions in the insular region and CTSC circuit implicated as central to OCD pathophysiology**.** Misophonia has not been reported to be associated with pathogen-based disgust. We hypothesized that moral disgust may better characterize the disgust experienced by individuals with misophonia, as studies indicate that misophonics view their triggers as morally unacceptable. Furthermore, neuroimaging has shown anterior cingulate cortex (ACC) activation during exposure to

misophonic triggers, which is an area associated with moral assessment of stimuli. Another psychological factor that we anticipated would point to the two disorders being discrete is intolerance of uncertainty (IU), an aversion to undetermined events. IU has been well documented in OCD and considered a predictor of OCD symptoms. IU has been found to be positively associated with striatal volume as well as dysfunction in the ACC, both common findings in individuals with OCD. Though IU has yet to be explored in misophonia, we expected misophonics not to exhibit IU since they experience distress in response to specific triggers and unlike individuals with OCD, they do not experience preemptive anxiety. Multivariate logistic regression analysis run on survey-gathered data revealed IU as a significant risk factor for the development of OCD and moral disgust as a significant predictor of misophonia. Consistent with our hypotheses, our findings suggest that IU and moral disgust and the associated neural underpinnings differentiate misophonia from OCD.

Attention Deficits in People with Aphasia: Determining the Best Treatments

Sarah Marmol

Mentor(s): Professor Yael Neumann
Queens College

Aphasia is a language disorder often caused by a stroke in the left hemisphere of the brain. In addition to a plethora of language issues, attention deficits may also be present in people with aphasia (PWA). Since attention deficits are linked to the language deficits found in PWA, it is imperative that clinicians work towards finding the best treatment methods. The objective of this research project is to investigate two different attention training programs in PWA, namely, domain-general vs. domain-specific treatments, in a randomized controlled cross-over single-subject design study (aka alternating treatment design). More specifically, we aim to compare the outcomes of *Play Attention,* a neurofeedback attention program that has been successfully used in children with attention deficits (domain-general), to that of a Language-Specific Attention Treatment (L-SAT) program (domain-specific). Over a period of 25 weeks, participants will undergo two five-week treatment phases (fifteen one-hour sessions/per treatment) and language and attention assessments at baseline, after each phase of treatment, and at a 1-month follow-up. Language and attention tests include: the Western Aphasia Battery-Revised, Boston, Discourse Comprehension Test, Communication Activities of Daily Living–Second Edition, Assessment of Living with Aphasia, Test of Everyday Attention, Stroop test, The Paced Auditory Serial Addition Test–3-Second Version, and Rating Scale of Attentional Behavior. The study has been granted IRB approval and testing is currently underway. Although we are awaiting results, we believe this research will help us understand the extent to which a more language-specific vs. general attention treatment program helps PWA. In addition, this study will be unique in that it is the first to scientifically investigate the effectiveness of the *Play Attention* neurofeedback program in PWA.

Preference for Masculinity: The Effects of COVID-19 on Attraction

Justin T. Moyer

Mentor(s): Professor Claudia C. Brumbaugh
Queens College

An amalgam of literature finds that communal health and pathogen prevalence affects mate preferences (DeBruine et al., 2010; Beall, 2021). Our goal is to examine how a major recent real-world health event (the COVID-19 pandemic) affected romantic preferences. Mainstream evolutionary psychology theories maintain that women generally prefer more masculine men, because masculine features indicate higher testosterone, and thus greater genetic fitness (Trivers, 1972). In times of low public health, such as during the pandemic when multitudes were ill and dying, it is adaptive to mate and reproduce with men who are more genetically fit (DeBruine et al., 2010; Beall, 2021). In the current study, participants will be primed for COVID-19 and asked to rate attraction to male faces that vary on masculinity. We predict women's attraction to masculine faces will be greater in the Covid prime condition compared to the control condition. Research also finds that anxiously attached individuals (i.e., people who have concerns about rejection) are more likely to adopt pandemic-related safety precautions and less likely to compromise genetic fitness traits in a partner, such as masculinity (Alexopoulos et al., 2021). Thus, we predict that

anxiously attached women will be even more likely to prefer masculine faces when primed with Covid. As the first study to analyze the effects of pandemic concerns on attraction in gay men, we additionally take an exploratory approach to assess the effects of COVID-19 priming in a gay male subsample. Finally, we explore moderating effects of pandemic proximity, personal loss, and fear of contamination on preferences. Upon preliminary analyses (n = 60), we found moderating effects of attachment anxiety; anxious females tended to prefer feminine faces when primed for COVID-19 and more masculine faces in the control condition. Data collection and analyses are ongoing.

Employees Burnout and Food Safety Behaviors in the Restaurant Industry

Kalynn Ng

Mentor(s): Professor Jihee Choi
Queens College

Employee burnout is known as mental and physical exhaustion prompted by ongoing stress that can lead to a lack of motivation to work. While employee burnout can lead to job dissatisfaction and demotivation in general, the question whether burnout amongst restaurant employees is associated with food safety behaviors in the context of restaurant remains unanswered.The objective of this study is to measure the level of burnout of restaurant employees and affective job commitment and determine the relationship between these factors and employees' food safety behaviors.

A total of 143 respondents who are currently working in the restaurants in the U.S as non-managerial employees participated in the survey through M-Turk (58% male and 42% female). Descriptive statistics and multiple linear regression were used for data analysis to test the relationships between employees' burnout, affective job commitment as independent variables and food safety behavioral intention (dependent variable). The assumptions for the regression analysis were tested including normality, constant variance, linearity, and outliers and the results met the requirements, and no assumptions were violated. The resulting model was statistically significant (F=55.302, p<.001), with adjusted explanatory power of r^2 = 0.538. The variables related to employee's food safety behaviors were employee's burnout (β=-.420 for personal burnout, β= -.315 for work related burnout, p<.001) and affective job commitment (β = 0.584, p<.001). The results will be valuable to develop strategies to mitigate employees' burnout and increase effective job commitments to improve food safety behaviors in the restaurant industry.

The Pedunculoponto-nigral Pathway is Involved in Acquisition of Food-based Conditioned Approach Learning in Rats

Kirk Persaud & Nima Patel

Mentor(s): Professor Robert Ranaldi
Queens College

The current experiment investigated the functional role of the pedunculopontine-nigral (PPT-SNr) pathway in the acquisition of food-based conditioned approach learning in rats. Utilizing a double viral vector chemogenetic technology, designer receptors exclusively activated by designer drugs (DREADDS) were specifically expressed on neuronal projections from the pedunculopontine tegmentum (PPT) to the Substantia Nigra reticulata (SNr). Two groups of 8 rats were surgically injected with a Cre-dependent adeno-associated virus in the PPT, the experimental group was given the functionally active virus, and the control group was given the inactive virus. The Cre-virus was injected into the SNr for both groups. After recovery, rats underwent conditioned approach learning, in which both groups received a systemic injection of 3mg/kg CNO prior to each conditioning session, to inhibit the PPT-SNr pathway. During conditioning, rats were exposed to 30 light stimulus (conditioned stimulus, CS) presentations each followed immediately afterward by a food (unconditioned stimulus, US) pellet delivery into a food trough; rats would naturally approach the food trough for food. On test day, the rats were only presented with the CS, and nose-pokes (approach) was measured in response specifically to the CS. The results show that on test day, the experimental group expressed significantly stronger conditioned approach than the control group. The findings suggest that the inhibition PPT-SNr pathway facilitated conditioned approach learning. Ensuing studies will target interactions between the PPT-SNr pathway and local

SNr elements to further elucidate the role of the PPT-SNr pathway in reward-related learning.

Survivors' Perceptions of the #MeToo Movement

Rokeya Sultana

Mentor(s): Professor Valentina Nikulina
Queens College

The #MeToo movement has been a force in empowering survivors of sexual assault and harassment to share their stories. It has emphasized the importance of safe spaces, education, and awareness, and survivors' perceptions. The movement has challenged traditional narratives of assault by highlighting the complex power dynamics and the importance of consent and has increased awareness of responses to disclosure and their impact on survivors. It has also brought to light the backlash sometimes experienced by those sharing their victimization experiences. From a research perspective, there is a need to better understand the relationship of the survivor's perceptions of #metoo and their willingness to disclose sexual assault. This study aimed to explore the perceptions of emerging adult survivors of sexual assault regarding the #metoo movement and their disclosure status. A total of 340 female survivors of sexual assault from an urban university in the Northeast completed an online study. Qualitative data were thematically coded, and fourteen themes of survivors' perceptions of the #metoo movement were identified, as across-positive, neutral, and negative perceptions. Chi-square analyses identified differences in themes between disclosers and non-disclosers of sexual assault. The findings provide valuable insights into survivors' perceptions of the #metoo movement and associations with disclosure decisions. The findings may inform interventions and support services for survivors of sexual assault. Overall, this study highlights the importance of survivor-centered approaches to addressing sexual assault, including the need for awareness of survivors' perceptions.

Reconstructing Laurentide Ice Sheet Retreat in the Hudson Valley, NY with Modeling and Cosmogenic ^{10}Be Dating

Rania Taib & Devina D. Kalika

Mentor(s): Professor Alia J. Lesnek
Queens College

Ice sheet retreat due to climate change is an important issue that poses risks to society through rising sea levels. We can learn more about how modern ice sheets may react to climate change by studying the processes and timing of past ice sheet retreat. Here, we are using modeling and geologic dating techniques to reconstruct the retreat and thinning of the Laurentide Ice Sheet in New York's Hudson Valley and resolve conflicts between existing chronologies. For our research, we used digital elevation datasets from the Hudson Valley to extract multiple topographic profiles that follow the direction that the Laurentide Ice Sheet flowed. We then modeled the Laurentide Ice Sheet's surface elevation and thickness during different deglaciation stages using an Excel spreadsheet from Benn and Hulton (2010). Our models suggest that the retreat of the Laurentide Ice Sheet exposed upland and lowland areas simultaneously, going against our expectations of higher elevations being exposed first. To test and refine our model's simulated timing of exposure for different land elevations, we will collect rock samples for cosmogenic ^{10}Be surface exposure dating from the lower Hudson Valley in summer 2023. Our findings will provide a new timeline of ice margin retreat in an important, but understudied drainage of the Laurentide Ice Sheet, allow us to learn more about the processes of ice sheet collapse, and increase our understanding of how modern ice sheets will react to future climate change.

QUEENSBOROUGH COMMUNITY COLLEGE

Development of Ionic Liquid & Solvate Ionic Liquid Electrolytes for Low Temperature Li-Metal Batteries

Elijah Bernard

Mentor(s): Professor Sharon Lall-Ramnarine, Professor Michael J. Keating, & Professor Elizabeth Biddinger
Queensborough Community College

Lithium-Ion batteries are used for energy storage in everyday electronics such as cellphones, and computers. However, the limited energy density capacity cannot keep up with advancing demands and there are safety concerns of the organic electrolytes within the batteries owing to their high flammability. We attempt to solve this issue by developing new electrolytes, containing a mixture of ionic liquids and lithium-based solvate ionic liquid complexes (SILs). Ionic liquids are molten salts below 100°C, which exhibit properties such as non-flammability, high conductivity and a wide electrochemical window. SILs are formed via mixing equimolar amounts of glymes with Li-salts, such as lithium bis(trifluoromethylsulfonyl)imide (LiTFSI). Further, ILs with ether side chains are expected to modify and interact with the SIL structure, leading to an improvement in the electrolyte's low temperature and electrochemical properties such as: remaining a liquid through a wider temperature range, maintaining a large electrochemical window (>5V) and higher conductivity. They demonstrate similar properties as ILs but offer higher Li+ concentration and better Li+ transport. In this work, SILs were mixed with pyrrolidinium based ILs containing various ether functionalized side chains. They were characterized for physical and electrochemical properties. Conductivity measurements were done via electrochemical impedance spectroscopy. The phase transitions were measured from –85 °C to 120 °C using Differential Scanning Calorimetry. Lithium transport properties were determined by measuring the lithium transference number.

Integer Values of Generating Functions for Fibonacci-Like Sequences

Fariya Chowdhury

Mentor(s): Professor Andrew Bulawa
Queensborough Community College

Associated with any infinite sequence of numbers is an infinite polynomial whose coefficients are the terms of the sequence. This polynomial is called the generating function for the sequence. In this project we study the generating function f(x) corresponding to the well-known Fibonacci sequence: 0,1,1,2,3,5,.... It can be shown that f(n) is an integer whenever n is a ratio of subsequent terms of the Fibonacci sequence. Recent research has shown the more surprising result that such ratios are the only rational numbers n for which f(n) is an integer. The goal of this project is to extend this result to sequences more general than the Fibonacci sequence.

Monitoring Influenza A and SARS-CoV2 in NYC Public Hospitals Wastewater

Anna Liu

Mentor(s): Professor Monica Trujillo
Queensborough Community College

Wastewater-Based Epidemiology (WBE) is a new tool that monitors pathogen levels in collected sewage water. Infected individuals, regardless of being symptomatic or asymptomatic, shed pathogens in their stools. This data therefore is more inclusive than clinical data that is mostly collected from symptomatic individuals. WBE is an emerging technology and it is starting to be used to make public health decisions. Our group has developed and filed a patent for a passive *in situ* concentration device which can be easily deployed at any water source. Using a chemically inert compound, cells are easily absorbed by the material. The device is deployed in either manholes or sewer pipes from NYC Health and Hospitals (NYC H+H) across the Bronx and Queens and removed after 24 hours. It is then brought to the laboratory where, using proprietary buffers and a commercial kit, total nucleic acids are extracted.

Following the CDC RT-qPCR protocols and commercially available standards the concentration of Influenza-A and SARS-CoV2 in each sample is determined. The purpose of this study is to conduct wastewater surveillance for Influenza-A and SARS-CoV2 and compare wastewater data with clinical data provided by NYSDOH, NYC DOHMH and NYC H+H to understand the correlation between wastewater data and clinical cases. Here we present the timeline of both virus concentrations from November 2022 to March 2023 and compare it with clinical data.

Mass Growth of Supermassive Black Holes

Yuantong Luo

Mentor(s): Jillian Bellovary
Queensborough Community College

The goal of this research is to find how supermassive black holes grow, and if growth is dominated by black hole mergers or accretion of gas and dust. We study the mass growth of black holes using a smooth particle hydrodynamics (SPH) cosmological simulation. Specifically, we examine the DC Justice League simulation suite, which consists of four SPH simulations of milky way type galaxies with surrounding dwarf satellites. The simulation starts at the start of the universe until current time, so we can study how a black hole grows over time. Deep analysis of one of the four simulations shows several black hole mergers occurring in the early universe, and thus mergers appear to be the dominant growth mechanism for black holes in low-mass galaxies. Through our analysis, we found evidence for an inverse correlation between black hole mass and the percentage of mass gained by accretion; generally black holes gain 1-10% of their mass through accretion. Also, we see that merger events last between 0.5 and 3 gigayears. We also investigate how different intrinsic properties such as the inclination angle and the eccentricity of the merging black hole's orbit affect the duration of the merger. Our goal is to use these mergers to predict gravitational waves that will be observed by the upcoming LISA mission.

Synthesis and Anticancer Properties of Polyrhodanine Copper Nanocomposites

Hafiz Tariq & Rose Felix

Mentor(s): Professor Moni Chauhan & Professor Sarbani Ghoshal
Queensborough Community College

Rhodanine (derived from thiazolidine), a heterocyclic compound, plays an essential role in the biological system of humans. Its derivatives are present in drugs and used as antibiotics, antiviruses, antidiabetics, and antifungals. Rhodanine and its derivatives can prevent HIV-1 integrase, JSP-1 Phosphates, RNA polymerase, hepatitis C virus NS5B polymerase, and PMT1 mannosyl transferase. We hypothesize that the shape-controlled synthesis of PolyRhodanine will provide an exciting perspective for diagnosing and treating diseases, including cancer. In our research, we investigated the synthesis of PolyRhodanine in a single-step oxidation-reduction reaction in the presence of transition metals in the microwave. Two morphologies for PolyRhodanine have been identified depending on the metal: core-shell and nanotubular. Subsequently, we tested our compound in a human lung cancer cell line, namely A549, to measure cell viability by the colorimetric MTT (3- [4,5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide) assay. Our data shows the viability of A549 cells decreases in a dose-dependent manner with treatment concentrations from 0.01µM to 1µM in comparison to cells in the control DMSO-treated group. Future studies will focus on investigating the effect of the compound in other cancer cell lines, including triple-negative breast cancer cells.

Antimicrobial Resistance in Environmental Microbes

Shaniakay Williams

Mentor(s): Professor Mangala Tawde
Queensborough Community College

Antibiotic resistance is a grave concern in clinical practice since more and more pathogens are becoming resistant to commonly used antibiotics. Environmental microbes, including the species producing

antimicrobial agents are important sources of resistance transfer amongst species. Antibiotic producing bacteria harbor resistance genes for self-protection that are often clustered with genes coding for antibiotics. The overuse of antibiotics has resulted in exposure of environmental bacteria to many more antibiotics. Soil and water could thus serve as under recognized reservoirs for antimicrobial resistance in clinically important bacterial pathogens. We have sampled various environmental bacteria from areas such as doorknobs at popular food places, the park, and gas station and in the clinical settings and isolated bacteria such as *E. coli, Serratia marcescens, Pseudomonas aruginosa etc*. We have also isolated and cultured new strains of Streptomyces from different soil samples in the country and overseas. Some of these samples were taken from Jamaica W.I, other samples were obtained from New York City region. We co-cultured Streptomyces with other environmental bacteria to examine interspecies interactions and their ability to produce antimicrobial substances. While these bacteria can be modified or killed by most commonly used antibiotics, we observed that both common environmental bacteria as well as Streptomyces species impact each other in both positive and negative interactions. Streptomyces inhibited growth of environmental bacteria whereas later augmented growth of Streptomyces. We have identified our isolates by Biochemical, molecular methods and using Biolog assay.

Exploring the Properties of Ether- and Thioether-Functionalized Imidazolium Ionic Liquids

Ho Martin Yuen, Mehreen Mughal, Nicole Zmich, & Furong Wang

Mentor(s): Professor Sharon Lall-Ramnarine & Professor James F. Wishart
Queensborough Community College

The growing global demand for energy gives rise to the need for safer, more efficient energy storage and process devices. Ionic liquids (ILs) hold the potential to enable superior alternative technological solutions for efficient energy systems. ILs are liquid salts at room temperature and their nanostructure can be tailored to optimize physical properties needed for different applications. However, their relatively high viscosity is a major obstacle to the use of ILs for certain applications. It contributes to slower charge transport and reduces the effectiveness of ILs as electrolytes. Previous research work from our group and collaborators has shown that the inter- and intramolecular interactions between ions and side chains with different lengths and functionalization influence the viscosities of imidazolium ILs. We report here on the synthesis and characterization of a series of alkyl-, ether-, and thioether-functionalized methyl and dimethyl imidazolium ILs with various anions. Target ILs were synthesized by reacting 1-methylimidazole or 1,2-dimethylimidazole with selected halogenated substituents followed by the metathesis with different fluorinated sulfonamide metal salts. The structures of the ILs were confirmed by ^{1}H, ^{19}F, and ^{13}C Nuclear Magnetic Resonance (NMR) spectroscopy. Physical properties including conductivity, viscosity, and thermal profile will be discussed and compared. Preliminary results reveal that ether-functionalization leads to ILs with the lowest viscosity (EOEmim NTf_2: 46 cP @25 °C) compared to analogous thioether- (ESEmim NTf_2: 82 cP @25 °C) and alkyl-substituted (C_5mim NTf_2: 58 cP @25 °C) imidazolium bis(trifluoromethylsulfonyl)amide ILs.

THE CITY COLLEGE OF NEW YORK

In Vitro Studies of Kinase-Regulator Interactions in Stress-Responsive Two Component Signaling Systems

Ramisha Aymon

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City College of New York

Bacteria commonly use two-component systems (TCSs) to detect and respond to diverse physical and chemical stimuli from their environment. TCSs minimally consist of a membrane-bound sensor histidine kinase (SHK) that transmits a phosphorylation signal to a cognate response regulator (RR); changes in specific stimuli trigger changes in SHK activity to alter this signaling. To explore the mechanisms of such regulation, we studied SHKs with

two types of sensor domains: Light-Oxygen-Activated (LOV)-HKs, which respond to blue light, and Per-ARNT-Sim (PAS)-HKs, which are often controlled by levels of specific metabolites. As noted above, SHK signaling involves the transfer of a phosphoryl group from a conserved SHK histidine residue onto a specific aspartate residue on the downstream RR. In canonical systems, such phosphorylation leads to a range of changes in the RR, such as dimerization or high affinity DNA binding. We studied three novel SHKs from the understudied HWE/HisKA2 family of sensors involved in the general stress response: the PAS-HK MS367 from *M. silvestris* BL2, the PAS-HK RE356 from *R. etli CFN 42*, and the LOV-HK RT349 from *R. thermophilum DSM 16684*. We investigated their biological functions by identifying potential PhyR-type RRs for each SHK. Initial identification of PhyR homologues was done using bioinformatics, which yielded four potential candidates among the three SHKs. All of these have been successfully cloned out of their host genomes and into expression vectors, and three have been expressed and purified thus far. To confirm the suspected pairing of each HK and its PhyR, we will conduct *in vitro* phototransfer assays to measure the phosphoryl transfer activity. These data will spur subsequent structural and functional studies of this family of SHKs to expand our knowledge surrounding canonical signal transduction pathways of TCSs.

The Role of Attachment Styles in the Associations Between History of Childhood Sexual Abuse, Depression, Anxiety, and PTSD Symptoms: A Literature Review

Alivya M. Barry, Noga Davidson, & Mengjia Ji

Mentor(s): Professor Lesia M. Ruglass
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Child sexual abuse (CSA) is highly prevalent and is often associated with PTSD, anxiety, and depression (Adams et al., 2018; Jardin et al., 2017; Schoedl et al., 2010); however, not all who experience CSA will go on to develop psychological disorders (Gilbert et al. 2009). Research has begun to explore the role of attachment style as a protective factor in reducing risk for psychological symptomatology after exposure to childhood trauma, yet few studies have examined the associations among these variables simultaneously. Thus, the aim of this literature review was to provide a review of the research conducted to date on the relationship between attachment style and PTSD, depression, and anxiety symptoms among CSA victims. A comprehensive search of the empirical literature was conducted with the following search terms: (Secure attachment OR Insecure attachment OR Attachment Theory OR Attachment Style OR Attachment) AND (Sexual Child Abuse OR Child Sexual Abuse OR CSA OR Sexual Abuse) AND ((Anxiety OR Anxiety Disorder) AND/OR (Depression OR Depressive Symptoms OR Major Depression Disorder) AND/OR (PTSD or Posttraumatic Stress Disorder)). The following databases were included in the search: PubMed, Medline, CINAHL Complete, APA Psych Info and APA Psych Articles. Of the 152 articles retrieved, six studies met the inclusion criteria. The studies reviewed suggest that those with a history of CSA and an insecure attachment are more likely to develop symptoms of PTSD, depression, and/or anxiety. The limited amount of research highlights a gap in current research regarding attachment, CSA, and PTSD, depression, and anxiety; furthermore, in this review only two studies examined all variables simultaneously, and only one (Ensink et al., 2021) used a moderation analysis. Additionally, none of the studies examined college-aged students. More research is needed to address the relationship between CSA, attachment styles, and the development of psychological symptoms to inform prevention and intervention efforts.

Paying the Price: The Plight of Sex Workers in New York City

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Sex work (also commonly referred to as “prostitution”) is viewed and categorized as a criminal act throughout most of the United States- New York is not an exception. Currently in 2023, the debate about legalizing sex work in New York City has become a topic of importance as the question of whether prosecuting sex workers decreases the rate of sex

work being offered. In addition, there is the matter of who can be harmed and how in arresting and prosecuting of those involved in the act of sex work. This paper examines how women in leadership in New York City, namely the New York City Council, have shifted the conversation surrounding the policies that govern sex work as well as how they recognize that it is the immigrant (often undocumented) women of color who are being penalized and harmed while male patrons suffer none of the consequences. I anticipate finding patterns as well based on analyzing relevant political discourse that indicates that the preference is to penalize marginalized women instead of men who are guarded by the privilege of their gender. Another matter to examine is what message is sent when women are continuously targeted by the law for an act that is perpetuated by men and the implications of this for the realm of human rights.

Trends of Student Grades on RateMyProfessor

Wen Jie Long

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RateMyProfessor.com is a popular site that allows students to write public reviews on professors using metrics such as quality or difficulty. Students utilize the site to gain insight into course difficulty, read comments left by other students and to seek recommendations on taking a specific course. An attempt was made using ML to determine what is being measured and to predict grade distributions using these reviews and how students can utilize the site more effectively. Preliminary work will focus on the datasets from New York City College of Technology and Brooklyn College that were utilized to explore trends in grade distribution related to Adjunct/Full time status, Pre and Post Covid-19, Transfer Courses, Gatekeeper Courses/General Education, Course Difficulty/Passing Rates, and the Disciplines. In addition, there is also comparison of trends in grade distributions within the two CUNY schools within equivalent courses to see if they hold, as students request ePermits learn at other colleges.

Effects of Hydrogenation on Sb_2Te_3 and $(Sb_2Te_3)_{1-x}$ $(MnSb_2Te_4)_x$ Thin Films

Amy Lopez Navarro

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The City College of New York

Topological Insulators (TI), such as Sb_2Te_3, are a class of materials with unique, highly conducting metallic surface states and insulating bulk regions [1], of interest for quantum computing and thermoelectric devices. They also provide test beds to explore novel physics like Majorana fermions [1,2]. The surface states have locked spin and momentum and are protected by time reversal symmetry leading to their exotic metallic nature. When magnetic impurities are added, the symmetry breaks, a gap appears in the surface states and the system becomes a magnetic topological insulator (MTI). Previously, it was shown that the electronic and magnetic properties of bulk grown 3D topological insulators could be changed by a process known as hydrogenation. Molecular beam epitaxy (MBE), a high vacuum deposition technique, was used to grow the TI materials $(Sb_2Te_3)_{1-x}$ $(MnSb_2Te_4)_x$ with different compositions. X-ray Diffractometry (XRD) and atomic force microscopy (AFM) are used to measure compositions and surface quality, respectively. Hall Effect focuses on the electrical and magnetic properties of the material before and after hydrogenation. For hydrogenation, the samples are dipped in 0.5 M solution of hydrochloric acid for different amounts of time and their properties are measured.

First, we studied the bulk carrier density of MBE grown Sb_2Te_3 using hydrogenation. It reflects a small but reproducible reduction of carrier density. The results showed that thinner layers have a higher percentage reduction of doping. The magnetic properties of bulk grown $(Sb_2Te_3)_{1-x}$ $(MnSb_2Te_4)_x$ were previously predicted to change from ferromagnetic to antiferromagnetic along with a reduction of ~40% in carrier density; following similar effect with sample thickness [4].Our measurement revealed changes in the field dependent Hall resistance that are consistent with the coexistence of ferromagnetic and antiferromagnetic domains after hydrogenation. We conclude that hydrogenation on

the MBE grown thin films has comparable effect to the bulk samples.

Community-centric Distributed Energy Resources Scheme for Energy Justice and Decarbonization in Dense Urban Regions

Lea Manglicmot

Mentor(s): Professor Ahmed Mohamed
The City College of New York

Low-to-moderate income (LMI) households suffer from higher energy cost burden as they spend a larger portion of their income on electricity bills than higher-income households due to factors including limited access to renewable energy. Although distributed energy resources (DERs) can be owned by individuals, supposedly enabling energy justice, reality shows otherwise since it requires capital investment and property ownership. This is particularly evident in dense urban regions where rental units are prevalent. To mitigate these barriers, this project proposes the "Community Energy Cells" (CECs) structure, defined as a group of DERs and controllable loads in proximity, represented by a "Cell Aggregator" (CA) as a single controllable entity. CECs deploy renewable energy to LMI households, provide multiple value streams for their DERs, including the option to sell their aggregate generation in the wholesale energy market, and can operate independently during main grid disruptions. To assess its financial feasibility, a case study was conducted for Community Board 9 (CB9) in New York City using National Renewable Energy Laboratory's System Advisory Model (SAM). The study uses select buildings to approximate CB9's solar (2.468 MW) and storage (15 MW) potentials, to input in SAM. Assuming their CA benefits from investment tax credits, and accounting for costs including installation and electricity purchase, CB9's CEC has a net present value of over $19M, an internal rate of return of 38% after 25 years, and sufficient cash flow to cover debt service. These positive returns are sensitive to three key values: utility rate, battery price, and incentive programs for DERs. CEC's realization has technical, financial, and regulatory challenges which the project elaborates on. Nevertheless, a successful demonstration of CEC in CB9 will serve as a blueprint for dense urban regions in effectively utilizing DERs to facilitate energy justice among LMI communities, while addressing climate change and resiliency.

Developing Understanding of Zinc Plating vs Zinc-ion Intercalation in the Chevrel-phase Mo_6Se_8 through Variable-Temperature Galvanostatic Discharge

Tricia M. Marchese

Mentor(s): Professor Brian Chen & Professor Robert J. Messinger
The City College of New York

Electrochemical ion intercalation is one charge-storage mechanism responsible for the operation of several battery chemistries such as rechargeable lithium (Li)-ion and zinc (Zn)-ion batteries (ZiBs). One possible failure mechanism for intercalation-based energy storage systems is uncontrolled metal electrodeposition (i.e., plating), where metal ions reduce on the electrode surface instead of intercalating. Metal plating is harmful to the functionality of the battery as the process consumes active material and can accelerate side reactions that decrease the available capacity of the battery. In certain battery chemistries, metal plating can be dangerous. Lithium metal is highly reactive and can form dendrites that can trigger thermal runaway in Li-ion batteries and result in battery fires. The mechanistic interplay between electrochemical ion intercalation and metal plating is not yet well-understood. Elucidating a mechanism that describes the conditions necessary for metal to plate on ion-intercalation electrodes could facilitate development of supression strategies. In this research, Zn plating was verified to occur on the surface of the chevrel-phase Mo_6Se_8 cathodes, an electrode material capable of electrochemically intercalating Zn^{2+} ions. Variable-temperature (+10 to +60 °C) and variable discharging current (0.1 mA/cm^2 to 1 mA/cm^2) measurements were conducted on two-electrode cells composed of Zn metal anodes and Mo_6Se_8 cathodes to force Zn to plate on Mo_6Se_8. Zn plating was determined to have occurred on the surface of Mo_6Se_8 through measurement of the nucleation overpotential, which appears as a minimum in the two-electrode cell potential during galvanostatic discharging below 0 V.

Decreasing the discharge current from 1 mA/cm^2 to 0.1 mA/cm^2 resulted in the observation of three distinct electrochemical reactions: Zn^{2+} intercalation, hydrogen evolution, and Zn nucleation/growth. The presence of metallic deposits were confirmed using an optical microscope by harvesting Mo_6Se_8 electrodes after Zn nucleation. With this knowledge, it is verified that Zn can indeed plate on Mo_6Se_8 similarly to how Li plating on graphite electrodes can occur in Li-ion batteries.

Exploring the Materiality of Walker's Estate: Human Presence in the Plantation Economy

Susannah Pittman

Mentor(s): Professor Matthew Reilly
The City College of New York

Traditional scholarship on plantation life during institutionalized slavery often focuses on excavating at Antebellum and manor homes of traffickers, which centers enslavers in conversations of lifeways during institutionalized slavery. However, since the 1960's, researchers have begun shifting their academic focus to the lived experiences of those left out of the archival and archaeological record: enslaved laborers.

A team of CUNY City College students, led by Dr. Matthew Reilly, excavated at Walker's Estate in St. James, Barbados during the Summer of 2022. The team intended on locating the village in which enslaved laborers lived during the colonial period in order to understand their domestic lives through earthenware and static feature analysis. However, the site yielded ceramics related to industrialized sugar production, leading us to believe this site was not a village, but likely a midden within a larger workspace. Sugar production in the British West Indies is linked to the origins of industrialized production in the age of capitalism; thus the artifacts recovered from this site are residues of this economic system designed to divide communities and dehumanize labor for the sake of profit. My presentation will discuss how the artifacts recovered from Walker's estate demonstrate how human presence endures in the material despite this history. This site reveals the human dimension of a system created to decimate it.

This ongoing research project builds upon the scholarship of anthropologists studying the Caribbean by combining archaeological, geoscientific, and artistic methodologies. This work seeks to center the ingenuity, resistance, and everyday lives of captive groups operating within the confines of the imperial white supremacist heteropatriarchy.

Sectors of Conformationally Coupled Residues Reveal Potential Allosteric Pathways in Protein Tyrosine Phosphatases

Akshay Raju

Mentor(s): Professor Daniel Keedy
The City College of New York

The protein tyrosine phosphatase (PTP) family is a diverse set of enzymes that play key roles in signaling pathways. The PTP family has a highly conserved catalytic domain structure, suggesting that its diversity in function stems from small-scale conformational changes within sectors of residues that allosterically connect regulatory domains to the active site. Studying conformationally linked alternate conformations within protein structures has been shown to identify internal dynamics within the protein, making it an ideal tool to study these sectors. Therefore, an approach was developed to group alternate conformations of residues across a large, curated set of suitably high-resolution PTP X-ray crystal structures. In our preliminary work, the algorithms qFit and CONTACT were used to model and then group alternate conformations into networks of coupled residues. These networks were aligned at analogous residues and then concatenated into a PTP-wide graph to demonstrate where these networks are conserved. Clustering can then be done across the different PTP structures, revealing how internal dynamics are related across PTPs. Clustering within the PTP-wide graph can also computationally identify distinct sectors of connected residues shared within the PTP family. Overall, this computational pipeline sets the stage to reveal potential conserved and unique pathways of allostery within members of the PTP family that could be used for allosteric drug discovery.

Climate Information-Based Seasonal Forecasts of Crop Water Deficits

Caroline Schwab

Mentor(s): Professor Naresh Devineni
The City College of New York

As the global population rises and climate change persists, food and water security are increasingly being threatened. American agriculture is likely to see an impact from the increase in frequency and severity of droughts. Drought is commonly viewed as a climatic phenomenon, and irrigation is considered to be a means to mitigate climatic extremes. There is limited research on the impacts that anthropogenic decisions made on farms have on water deficits and crop yields. This research examines agricultural yield under the perspective that water-use and crop type decisions have the potential to worsen the impacts of drought over time. This project uses a regression framework and conditional probability analysis of 50 years of historical data of corn, wheat, and barley to understand the changes to yield with shifts in spatial drought. The yield data were detrended from time to understand the changes without the impacts of improved technology. These results are summarized using a series of impact maps that visualize the most at-risk areas and crops, looking solely at irrigation and crop type. Seventeen states, including Texas, Missouri, Kentucky, and Kansas, experienced large negative impacts in yield that were statistically significant beyond the impacts of climate and improvements to crops over time. These statistical relationships were then applied to investigate a regression forecast localized to specific counties. A regret score was developed to assess the overall benefit of applying a regression-based forecast to predict instances of agricultural drought. The implications of how these counties could mitigate the effects of spatial drought by altering the extent of water use and crop type grown there are discussed.

Temporal Clustering of East Coast Cyclones

Max Sehaumpai

Mentor(s): Professor James F. Booth
City College of New York

Temporal Clustering of extratropical and/or tropical cyclones (hereafter clustering) occurs when multiple cyclones pass through a region in quick succession. Clustering has been shown to generate dangerous hazards in Europe, but less is known about clustering in the Northeast US. As such, this analysis characterizes Northeast US clustering and its role in precipitation events. The work uses atmospheric reanalysis and an automated tracking algorithm to identify extratropical cyclone tracks. HURDAT2 is used for tropical cyclones. For precipitation, a gridded dataset derived from observations combined with a hydrologic model is used. The data analyzed runs from 1959 – 2018. First, an examination of the thresholds used in defining the clustering events is performed. This led to the definition of “high-density clusters”, which are clusters in which 6 or more cyclones pass through the region. High-density clusters occur more frequently in winter and spring than in the other seasons. These events involve cyclones that travel slightly slower than average, however, their track durations do not differ from non-clustered cyclones. There is no long-term trend in the frequency of high-density clusters, but their interannual variability is large. These events generate more precipitation than non-cyclone events, but not enough to distinguish the difference as statistically significant when considering the variance in both types of events. These results demonstrate that clustering events for the Northeast US are not as anomalous as those reported for Europe, however, some of the cases did lead to extreme precipitation hazards.

Strain Engineering Effects on the Optical Properties of Bilayer MoS_2

Charanjot Singh

Mentor(s): Professor Vinod Menon
The City College of New York

Two-dimensional (2D) materials like transitional metal dichalcogenides (TMDs) exhibit interesting optical, mechanical, and electronic properties. These properties can be manipulated in several ways, one of them being strain engineering. By applying strain to very thin layers of TMDs, we can change properties like photoluminescence and absorption for these materials by causing their bandgap to change under strain. In our experiment, we prepared SiO_2 pillars on a distributed Bragg reflector substrate. A MoS_2 bilayer, encapsulated in hBN, was transferred on the pillars via dry transfer technique. Photoluminescence and white light absorption measurements were carried out at low temperature (5K) to understand the effect of strain on the excitonic properties.

Development of R744 Heat Pump for Northeastern Winter Markets

Geoffrey Turbeville

Mentor(s): Dr. Ramamurthy
The City College of New York

Fossil fuels used in both space heating and cooling account for 60% of GHG emissions from buildings and 30% of citywide GHG emissions. For NYC approximately 6,000 buildings have adopted cleaner forms of energy, as of 2017. It is further expected that the population of New York City will expand by 100,000 buildings with over 9 million occupants by 2050. One common alternative to gas furnace heating is the heat pump (HP). HP's commonly use a variant of hydrofluorocarbons (HFC) such as R410A or R134 which have high global warming potentials. The EPA has introduced numerous regulations aimed at mitigating the dispersion of HFC's into the atmosphere. Even so, it is estimated that HPs lose on average, 12 pounds of refrigerant over a typical life cycle. Our proposal is to use a natural refrigerant such as carbon dioxide (R744), which has 1,860 times less global warming potential than HFC's.

Our main objective is to develop a commercially feasible R744 HP system for primarily multi-family buildings in cold climates. During the development of our HP, we plan to address space heating efficiency while keeping our unit competitively priced to traditional gas and oil fueled furnaces. Typical HP's currently in the market have been optimized for mild climates where cooling is the priority. In order to obtain competitive results with R744 we will need to design an innovative gas cooler that will be able to deliver a COP comparable to that of traditional refrigerants. We have designed and implemented a laboratory environment with which to benchmark our experimental system and tested it on an existing R410a HP. We have also implemented a method of simulating outdoor weather conditions inside our lab as well as comprehensive sensing equipment to fully understand what is going on at the component level.

Adapting an Evidence-Based Nutrition Workshop to the Nigerian Community

Udeme Udom

Mentor(s): Professor Lubetkin Erica, Professor Gany Francesca, & Professor Leng Jennifer
The City College of New York

Many studies have highlighted that a diet is associated with chronic diseases. The Centers for Disease Control states Black immigrants have a higher prevalence of chronic diseases. The American Community Survey states nearly 500,000 Nigerians live in the U.S, with the largest population in NYC. Aikins et al.'s (2010) study in Global Health revealed that Nigerians in the U.S have a higher prevalence of chronic illnesses than the general population. Nutrition educational workshops are available, but they're untailored for Nigerians. This study aims to adapt an evidence-based (USDA MyPlate) diet, nutrition educational workshop for the Nigerian community, to assess changes in nutrition knowledge, attitudes, and beliefs (KAB) pre-post participation. An existing nutrition workshop (from Immigrant Health & Cancer Disparities Center at MSK), based on USDA MyPlate was adapted in collaboration with a NYC-based, Nigerian community-based organization (CBO).

Adaptations of culturally relevant dietary substitutions; high carbohydrate swallows (tuber flour), garri (cassava flour) with lower carbohydrate, higher fiber swallows; wheat. The workshop & pre-post-nutrition KAB surveys will be given to a convenience sample of adult participants recruited by the collaborating CBO. The pre-survey contains questions on sociodemographic, nutrition habits, perceived barriers to healthy eating, and nutrition KAB. Participants will complete a post-workshop survey assessing the same KAB questions after the workshop. Workshops were conducted in September and October 2022. Result of the study reveals that culturally relevant Nigerian workshop using USDA MyPlate adaptations has increased nutrition knowledge of Nigerians. The workshop & surveys will be available to collaborating CBO and disseminated to other Nigerian CBOs to improve dietary habits and reduce the prevalence of chronic diseases.

YORK COLLEGE

FASENRA: Monoclonal Antibody for Treatment of Eosinophilic Asthma

Angelica Arjune

Mentor(s): Professor Deb N. Chakravarti
York College

Asthma is a chronic long-term condition that affects the airways in the lungs. The airways are tubes that carry air in and out of the lungs. In people with asthma, these airways can become inflamed and narrowed. This makes it harder for air to flow out of the airways when breathing out. As a result, breathing can become difficult and trigger coughing and wheezing leading to shortness of breath. Severe asthma is a debilitating, and potentially fatal condition affecting millions of people worldwide. Patients may have uncontrolled symptoms despite treatment with high doses of standard asthma control medicines and experience frequent exacerbations and significant limitations of lung function and health-related quality of life. Asthma cannot be cured, but its symptoms can be controlled. Fasenra is a prescription biologic drug used with other asthma medicines for the maintenance treatment of asthma in people 12-years and older whose asthma is not controlled with their current asthma medicines. Fasenra is a monoclonal antibody used to treat eosinophilic asthma. Fasenra was developed by AstraZeneca. Fasenra binds directly to IL-5 receptor alpha on eosinophils and attracts natural killer cells to induce rapid and near-complete depletion of eosinophils via apoptosis, programmed cell death. Fasenra is currently approved as an add-on maintenance treatment for severe eosinophilic asthma and is possibly the only available biologic drug that specifically binds to the IL-5 receptor, thus inhibiting the interaction. This poster reviews the pharmacodynamics, pharmacokinetics, mechanism of action along with information on clinical studies, dosage forms and administration of Fasnera.

Fast Food Consumption and Health Disparities among African Americans

Sigazie Brown

Mentor(s): Professor Debra Weiss
York College

Poor dietary practices prevail among most Americans. Yet adverse impacts are produced more on the African American population of America. Poor dietary practices are directly associated with fast food consumption and its increase over the years. The research has been conducted based on secondary data collection methods through a review of the literature. About 10 articles have been selected initially through search engines like Google Scholar, Cite This for Me, etc. Only peer-reviewed literature has been considered for the data collection. Inclusion criteria are as follows: availability of full article, English language, and publication within last five years. Five recent articles have been chosen from the initial 10 collected that are very relevant to the topic and contribute to the report's findings.

The research in the report found that similar impacts are produced by fast food intake among black and white Americans. However, the lower scope of exposure of African Americans to the equipped treatment system, poor lifestyle and dietary habits, and poor treatment accessibility has contributed to reporting health impacts at a higher rate. Non-Hispanic Black Adults (49.9%) had the highest age-adjusted prevalence of obesity, which is a risk factor

for heart disease, stroke, type 2 diabetes and certain types of cancer. These are among the leading causes of preventable, premature death. Consumption of “fast food” has been found to be negatively impacting the health of Americans, creating an epidemic of obesity and diabetes 2, especially among African Americans. African Americans eat more fast food due to living in the neighborhoods that lack healthy food choices also known as ‘food desert’ and are also affected by lack of transportation and food budget.

A Phylogenetic and Biochemical Analysis of Beta-Carotene Ketolase Homologs

Huangshen Chen, Kahtan Alsaedi, & Monisha Sherpa

Mentor(s): Professor Louis Bradbury-Boyd
York college

Keto-carotenoids are a class of carotenoid pigments that contain a ketone functional group in their structure. They are produced by microorganisms and some algae, but but are also found in animals (e.g. krill and salmon) that feed on keto-carotenoid \accumulating species. In cyanobacteria, keto-carotenoids play important roles in photoprotection and as antioxidants. In humans, they have been shown to have potential health benefits, such as anti-inflammatory, anti-cancer, and anti-diabetic properties. As a result, there is significant interest in the production of keto-carotenoids from cyanobacteria for various applications in the food, cosmetic, and pharmaceutical industries. The biosynthesis of keto-carotenoids involves several enzymes that catalyze different reactions, including the conversion of phytoene to lycopene, followed by the subsequent cyclization and oxidation of the substrate, and finally ketolation by the enzyme ß-carotene ketolase to produce either canthaxanthin or astaxanthin. Structurally similar ß-carotene ketolase enzymes from different cyanobacteria have been shown to have varying degrees of activity, some add ketone groups to both ends of their substrate, others add ketone groups to only one end, while others appear to be inactive as carotene ketolases. This project uses surrogate-biochemistry to survey the enzymatic activities of multiple closely-related cyanobacterial carotene ketolases in an attempt to identify sequences that might impact enzyme activity.

Chronic Obstructive Pulmonary Disorder (COPD) + COVID-19

Shadia Mazahar, Ashley Dass, Harpreet Bali, Jennifer Cabrera, Ariana Singh, & Alyssa Khan

Mentor(s): Professor Magalie Alcindor & Professor Margaret Hickey
York College

Chronic Obstructive Pulmonary Disorder (COPD) is a chronic progressive disease of the lung that gets worse over time, impacting millions of individuals and a major cause of disability. Collaboration of Covid-19 infection and COPD creates major complications. The damage caused, although is irreversible, can be manipulated to slow it`s progression and even prevent further damage.The purpose of this study was to gain knowledge of the disease process of COPD and the impact of Covid-19, as well as explore interventions to prevent risk factors and further complications and damage to the lungs. The inclusion of elderly people, adults and individuals with preexisting respiratory issues is imperative for overall management of COPD and create better outcomes.

In conducting our research, we used abstracts and articles on case reviews, systematic reviews, and meta-analysis studies within the past 5 years. We examined over 20 scholarly articles to gain a better understanding of the interaction between COPD and COVID-19. This study highlights the fact that Covid-19 infection has detrimental effects on COPD patients, which leads to increased hospitalization and mortality rate. Affected individuals can suffer from severe pulmonary and circulatory complications, ultimately resulting in death. Early diagnosis can prevent progression, symptomatic management can reduce suffering, and lifestyle modification can prevent the exacerbation of this disease. COPD alone is exhausting, and with Covid, it becomes severely life-altering for patients. Therefore, It is imperative to educate about ways to prevent further advancement. Management includes implementing hygiene measures, medication regimes, energy-conserving

techniques, and developing personalized plans based on the patient's severity. Additionally, there are various strategies offered by the government to prevent and control COPD and for Covid-19. However, in future research, studies should be conducted on the success of adopting combination measures to prevent the complication of these diseases.

Artificial Intelligence and its Role in the Pharmaceutical Industry

Asif Miah

Mentor(s): Professor Deb N. Chakravarti
York College

The term "artificial intelligence" (AI) refers to the process of recreating human intellect in computers to give such machines the ability to think and behave the same way humans do. AI is a subfield of computer science that focuses on developing computer programs that can mimic human cognitive abilities, such as, logic, reasoning, planning, learning, and perception. AI has the potential to be a useful tool for a variety of tasks, including the identification of optimum solutions to problems, the identification of patterns, and even classification of data. The process through which AI may assist in understanding circumstances by emulating the human brain in terms of knowledge and evaluation and, as a result, can assist in problem-solving is referred to as "machine learning". The acronym "artificial neural network" refers to a conceptual framework that was developed specifically to perform AI algorithms. They are considered to be a replica of the human brain, which consists of a network of neurons linked and constructed by channels of communication that are weighted between neurons. These are created by a collection of nodes linked together and sharing information to conduct the required function in the most effective manner.

Artificial intelligence applications may currently be found in every industry around the globe. Some of the applications of AI in pharmaceutical industry include drug development and design, improved performance of the production processes, drug compliance and dosing frequency, therapeutic targets, predictive pharmacogenomics, predicting therapeutic outcomes, recognizing clinical trial applicants, rare diseases, and targeted therapies, managing medical and biological data, diagnostic imaging, analysis of gene expression sequence, recognition of rare conditions, targeted therapies, as well as detecting medical conditions, etc. This poster will describe how AI is benefiting drug discovery, drug manufacturing, and medical diagnostics.

STEM-Care Winter Workshop 2023. Small World Initiative

Micaela V. Reyes

Mentor(s): Professor Derrick Brazill
York College

Antibiotics are chemicals made from bacteria. A series of steps are followed in this research study to identify the bacteria that produced a desired chemical. First, soil is collected from near environment of York College in Jamaica, Queens, NY. The soil is then diluted and distributed in Agar plates to allow bacterial growth. After some hours the bacteria are isolated and relocated in Master Plates containing different types of bacteria that are known to trans mutate into the MERSA (multi-resistant) bacteria. Later, the isolated colonies that inhibit the growth of other bacteria are relocated in the ESKAPE plate to dilute and further observation under the microscopy.

This winter workshop is constituted in three weeks . The purpose of this work is to collect, isolate, identify and store pure bacteria colonies that could possibly lead the development of a new antibiotic. New antibiotics are needed to fight AMR (antimicrobial resistance) that are increasingly becoming more life-threatening and untreatable. Soil collected from different locations around the USA is studied to help new antibiotics discoveries. Because the time required to make new findings implies a large amount of dedication and many times are not rewarded, the pharmaceutical companies do not pursue nor invest in this purpose. Students from different universities pursuing a STEM career are encouraged to participate in this initiative and submit the data to the website where all information is stored for further studies. Small World Initiative is the program responsible for instructing the student and collecting all data.

Quantification of the neuronal density across cortical depth of macaque primary auditory cortex (A1)

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Quantitative studies of brain anatomy at different scale levels are necessary to comprehend the relationship between the brain function and its structure. Due to the size and scale of the data sets required to investigate the neuronal brain density in different areas, large scale confocal and automatic segmentation methods have demonstrated to be a powerful technique for accurately neuronal quantification of large amount of data in a relatively short period of time. We have used this approach to assess the neuronal density in the macaque V1, V2, and MT. Here, we use the same methodology to estimate the neuronal density across cortical depth of macaque primary auditory cortex, region A1. The auditory cortex of macaque monkeys can be divided into a core of primary or primary-like areas, surrounded by a narrow belt of associated fields, and a para belt region. The primary core region is further subdivided into A1, R, and RT regions, with A1 receiving a point-to-point input from the thalamus, in a similar way to the other primary sensory areas S1 and V1. Although these three primary sensory regions exhibit an almost identical six-layered structure, variations in the total neuronal density and across each layer could explain differences across sensory modalities. The aim of the current study was to determine the neural density in macaque A1 using large-scale confocal imaging combined with automated image analysis of neurons. The neurons were labeled with pan-neuronal marker NeuN and the sections were counterstained with DAPI. In our preliminary data from 2 macaques, we have found an average total neuronal density of 75,000 neurons/mm3 in macaque A1. This neuronal density in A1 is ~3 times smaller than the neuronal density found in macaque V1, which could explain some of the differences in information processing capacities of these two areas.

Investigating the Effect of a Peptides Derived from Sars-COV-2 on the Aggregation of Serum Amyloid A

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The aggregation of serum amyloid A (SAA) leads to a long-term complication of inflammatory disorders such as rheumatoid arthritis, Crohn's disease, etc. The misfolding or aggregation of SAA is a hallmark of systemic AA amyloidosis. Preventing the aggregation of SAA should help prevent the health problems associated with amyloidosis. Recently, the overexpression of SAA has been found to be a marker for COVID-19 severity. A computational study found that a nine-residue segment in SARS-CoV-2 envelope protein (SK9) promotes the aggregation of SAA. Introducing species that can hijack the interaction could potentially suppress SAA aggregation aggravated by SARS-CoV-2. Interestingly, according to another computational work, human islet amyloid polypeptide (hIAPP) binds SK9 with no increase in amyloidogenicity. SK9 in fact stabilizes the helicity around residues 20-29, the aggregation prone region of hIAPP. Besides SK9, it was also reported that a ten-residue segment of SARS-CoV-2 spike protein (FI10) also stabilizes the helicity of the same hIAPP region.

We hypothesize that the SARS-CoV-2 derived peptides could potentially promote the amyloidogenic propensities of SAA and that the presence of hIAPP suppresses these effects. To test our hypotheses, we synthesized using solid-state techniques and characterized spectroscopically the peptides SK9, FI10, and the amyloidogenic fragments of both SAA and hIAPP. We probed the interaction formed between the different peptides by measuring changes in the amyloidogenic propensities and analyzed the results in terms of the influence in the misfolding mechanism of SAA. We used molecular modeling techniques to correlate spectroscopic data to changes in the conformation of the peptides studied.