
Key Note: Marlisa Santos, Division of Humanities – “The ‘Flicker’ of Inspiration: The Art and Craft of Scholarship”

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A Cardiac Arrhythmogenesis Model: Spiraling Out of Control

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Faculty Advisor: **Dr. Evan Haskell**

Abstract

Arrhythmic Sudden Cardiac death accounts for up to 5 million cases per year across the world. Cardiac arrhythmia is an abnormal activity in the heart that can lead to sudden cardiac death resulting from ventricular fibrillation. The electrocardiogram (ECG) reading during an arrhythmia indicates rapid contractions of the heart. This phenomenon is due to the development of a re-entrant circuit of electrical activity that repetitively stimulates the heart. The heart presents a spatio-temporal complex system, where the tissue biophysics and structure leads to reaction diffusion type models. These models portray the re-entrant wave patterns observed during arrhythmia. Fibrillation is characterized by the break up of a single spiral wave formed during tachycardia into multiple waves of electrical activity. We will use our model to better understand the mechanisms that lead to fibrillation and can halt fibrillation. Moreover, various factors such as sexual hormones may facilitate arrhythmogenesis. Female sex hormones may lead to a prolonged Action Potential Duration (APD). This prolongation of APD allows for L-Type calcium channels to recover their excitability while the membrane remains in the depolarized state. The resulting current may lead to an extrasystole, which yields a re-entrant pattern that triggers the arrhythmogenesis. Thus, we will also consider the role of female sex hormones in the model.

A Final Truth: Based on the True Story of a College Student Diagnosed with HIV/AIDS

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Abstract

“A Final Truth: Based on the True Story of a College Student Diagnosed with HIV/AIDS” is a short film about a student living with HIV/AIDS. It is a dramatic retelling of a true story. The film touches on the social stigma of a person living with the disease, and the implications that the disease can have on friendship, sexual health, and college life. This story is told through the perspectives of a close group of college friends. One of the friends is living with HIV/AIDS and is unable to tell her friends in fear of rejection and judgment by her closest peers. The film focuses on the daily interactions of this circle of friends, with interview-style cuts in between each scene to develop the characters’ awareness and feelings towards sexual health. The purpose of the film is to inform and entertain, while raising awareness about the importance of sexual health in the college lifestyle -- and how, ultimately, the truth can set you free. The film is directed by Uyen-Linh Jackie Dao.

A Look Into Abstinence Only Sex Education vs. Comprehensive Sex Education

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Abstract

For almost two decades between the years of 1990 and 2010, many schools in the US were educating their young people on sex via abstinence only programs. Abstinence only sex education means that when students are taught in school about sex that they are taught abstinence is the only way (Barnett & Hurst, 2003). In comprehensive sex education the students would be taught more information about different contraceptives, sexual health and sexual decision making (Barnett & Hurst, 2003). In February, 2010, after years of federal funding for abstinence only sex education, President Obama cut this budget by \$170 million. The Obama administrations' reasoning on this was because many studies have said that abstinence only sex education does not work. After many states studied these programs, conclusions have been made that abstinence only sex education may work temporarily. However, it does not teach our young people everything they may need to know in order to adequately protect themselves.

A Perfect Day

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Abstract

“The Perfect Day” is a short film about a normal day in an average American office. Will hates his job and goes through the motions painstakingly. However, a comical incident that seems to threaten the office gives him the chance to break out of the norm and find his individuality. The film is directed by Juan S. Gallo. Other crew members and actors include Lyle Howe, Kevin L. Alvarez, and Marc Pulido.

A Regression Study of the Relation between Rocks and Fish Assemblages

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Faculty Advisor: **Dr. Bashar Zogheib**

Abstract

The objective of this study is to see if the amount of rock in a given transect is related to the fish that inhabited the area. A regression analysis is conducted to find the relation between the two variables, rocks and fish. Besides finding the model, the analysis includes the confidence interval for the coefficient s , residual plots, predicted intervals of the number of fish for selected values of the amount of the rock, and identifying outliers and influential points by looking at various statistics, such as RESIDUAL, STUDENTIZED RESIDUALS, COVRATIO, and DFFITS.

A Tale of African Dust: Cross-Oceanic Transport and Climatic Impact

Calista Ming

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Faculty Advisor: **Dr. Song Gao**

Abstract

Aerosols are believed to partially counteract greenhouse warming effects and can also cause harm to human health, although the detailed mechanisms are not fully understood. A major reason for this is the lack of knowledge of the composition, origin and evolution of these aerosols. In order to better understand these issues, field research was carried out at Ragged Point, Barbados, during the summer of 2010. The sampling site is the eastern most point in the Caribbean region and the first land contact for dust aerosols that originate in Africa and travel transatlantic to the Caribbean and Floridian regions. Aerosol samples were collected using two types of samplers over the period of eighteen days in July and August of 2010. They were transported to and stored in the laboratory at NSU under freezing conditions for analysis. Multiple analytical instruments are used to characterize the inorganic and organic species present in these aerosols. This study also investigates the meteorological trajectories of the aerosols over the sampling period with regards to their origins and evolution pathways. Some preliminary results, along with the field sampling processes, are presented.

Adhesion of Transferrin to Tisifilcon A Contact Lenses

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Abstract

Tear proteins are known to deposit differently on contact lenses of different materials, causing lens wearer comfort to be compromised. We examined the adhesion of transferrin to contact lenses made of tisifilcon A, a rigid gas-permeable silicone hydrogel (FDA Group III). Lenses were incubated 2.0 mg/ml solutions of human *holo*-transferrin for 1, 2, 3, and 4 days, and protein adhesion was determined by bicinchoninic acid assay. Transferrin adhesion increased from day 0 to day 3 and then dropped after days 4 and 5. This pattern resembled transferrin adhesion to lenses made of polymacon (FDA Group I), alphafilcon (FDA Group II), omafilcon (FDA Group II) and balafilcon (FDA Group III) materials, but differed from the pattern of transferrin adhesion to etafilcon (FDA Group IV) material. Transferrin adhesion to tisifilcon A was greater than transferrin adhesion to all other materials except balafilcon, which had equivalent transferrin adhesion. These differences may be related to the positive charges on transferrin originating from arginine residues and the N-terminus. These cause transferrin to adhere better to the low water ionic Group III materials than to the non-ionic materials (FDA Groups I and II) and the high water ionic material (FDA Group IV).

An Effective Pedagogical Approach To Understanding Qualitative and Quantitative Organic Chemistry by Using a Gas Chromatograph Mass Spectrometer

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Faculty Advisors: **Dr. Dimitri Giarikos and Dr. Reza Razeghifard**

Abstract

One main objective of organic chemistry courses is to show students how much of a desired organic product is synthesized in the reaction mixture. Here, we report how a Gas Chromatography-Mass Spectrometry (GC-MS) instrument can be applied to a set of common organic chemistry experiments for identifying the main product, any minor product(s) and quantifying the product yield. GC-MS is a powerful analytical instrumentation tool capable of detecting, identifying and quantifying many volatile organic compounds. The GC-MS technique is routinely used in chemistry research and manufacturing laboratories. Despite its wide application in organic chemistry and ease of use, many colleges and universities have not incorporated this technique into their organic chemistry courses.

Analysis of D1S80 Locus, an introductory Bioinformatics analysis study in Human Genotype

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Faculty Advisor: **Dr. Venkatesh Shanbhag**

Abstract

DNA profile analysis focuses on hyper variable regions of DNA. This project seeks to study a specific variability called VNTR (variable number of tandem repeats). DNA sequencing data of D1S80 locus was obtained from individuals from African American, Caucasian, and Hispanic databases was analyzed. The data collected had been previously processed by PCR and DNA cloning using *E. Coli*. This data was provided by Dr. Duncan from the Broward's Sheriff Lab. The study demonstrated that variation of D1S80 alleles are predominantly due to the number of repeat units contained within the amplicons obtained from PCR. Also, it was demonstrated that this type of micro variation can be the result of mutations such as insertion and deletions.

Analyzing Hotel Room Cleanliness on a Microscopic Level

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Faculty Advisor: **Dr. Julie Torruellas Garcia**

Abstract

The cost of a hotel room is usually correlated to the quality of the hotel room and the quality of services provided during one's stay; e.g. the cleanliness of the room and the thoroughness of the cleaning staff. The cleaner a hotel is the more desirable it is. The goal of this experiment was to analyze hotel cleanliness at the microscopic level to determine if pathogenic micro-organisms were present. Samples were taken from telephones, toilet seats, remotes, toilet flushers, bath tubs and doorknobs from five different hotels and grown at room temperature on nutrient agar plates, counted and then isolated. Each individual colony was then gram stained to differentiate between gram-negative and gram-positive bacterial species. A battery of biochemical tests were done including growth on mannitol salt and eosin-methylene blue agar plates, as well as using the API® Identification System (BioMerieux, Inc.) to identify the bacterial species. Several bacterial species were identified, most of which were gram-positive commensals, bacteria normally found on the body. The majority of those identified were nonpathogenic, though few had pathogenic potential such as *Staphylococcus aureus*. Surprisingly, no *Escherichia coli* was found. This experiment showed that most bacterial species found in hotel rooms of any rating are not harmful though the occasional pathogenic species may still be present. Patrons of hotels should not be overly concerned with the possibility of infection through contact with items in hotel rooms. This project was funded by *Univision* and the results were presented on "Aqui y Ahora."

Artscience: A Study of the Human Arterial and Venous Systems

Nergess Taheri

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Deanne Roopnarine**

Abstract

Artscience is a blending of both aesthetic and scientific methods. This project combines both in a way that neither can be distinguished from the other. This is a study of the human arterial and venous systems. These systems were artistically represented as linoleum block prints. Two models were produced, one for the arterial system and the other for the venous system. The process used to make the models is called printmaking. Printmaking was one of the first forms of mass illustration with each print being considered an original. In this study two linoleum blocks were carved into the desired anatomical structures. Ink was placed on each of the blocks which were then pressed into twelve by eighteen sheets of printmaking paper for the print to register. Before the printing press was invented each print was hand pressed. In this project each print is hand pressed with a bamboo baren. Once the blocks are completed, multiple prints can be made from them. The prints for this project were labeled and laminated for use in future anatomy and physiology labs.

Budding Brain

Kurshaad Cheenibas, Smit Patel, Adam Abdulhafid and Patrick Cao

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Faculty Advisor: **Dr. Evan Haskell**

Abstract

Mathematics is used to illuminate the world around us by describing what we see through various models. Models can range from simple linear models of gravity and line weaver Burk to complex models such as models of storms. Simple models are easy to use but lack the accuracy in prediction that more complex model provide. The difference between this dynamic model and statistical model are descriptive while dynamic model are predictive. Descriptive model make sense of data and predictive model use the data you have to make prediction. This research seeks to uncover cross disciplinary nature of dynamic model and modeling. One of the models describes transcriptional regulatory network of yeast cells while the other models chaos and possible applications to artificial neural networks such as super computers and natural neural network such as brain mapping. In order to create simplified state some assumption are made for this data of these models. The model for the transcriptional yeast regulatory network is simplified stochastic differential equation model. The model for chaos is uses the three dimensional ordinary differential equation. The stochastic model is used to extract useful information from microarrays. The three dimensional ordinary differential equation models use the data from simple neural network to predict the behavior of more complex neural network.

**Bystanders to Evil:
The Failure of the United States' Foreign Policy towards Genocide**

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Faculty Advisor: **Dr. Gary Gershman**

Abstract

Since the Armenian Genocide in the early twentieth century, the United States' policy towards genocide has been, at best, delayed and, at worst, intentionally indifferent. This study will examine America's historic reaction to genocide, as well as the radically different results that might have been achieved with even minimal efforts. To understand American action, research will focus on four examples of mass killing: the extermination of Jews and other undesirables by Nazi Germany, the widespread ethnic cleansing of Bosnian Muslims by Serbian nationalists, the conflict between rivaling Hutus and Tutsis in Rwanda, and the ongoing war plaguing Southern Sudan. The analysis will reveal that though asserting its role as a symbol of universal equality and guarantor of liberties, in the face of genocide, the United States has knowingly and willingly maintained a policy of nonintervention with catastrophic results. Furthermore, when the United States has taken positive steps to prevent genocide, the results affirm the country's ability to cause positive change.

Can Ya Hear Me Now?

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Faculty Advisors: **Dr. Chetachi Egwu and Dr. Weylin Stern glanz**

Abstract

“Can Ya Hear Me Now?” is a short film about a married young couple who are madly in love with each other. Michael wants nothing more than to serve God and to love his wife, Daysha. Michael works hard, and when he comes home he gives Daysha his undivided attention. And Daysha wants to please her husband and to stand by him. But Daysha has a dark secret; she is sometimes drawn to her not-so-distant past lifestyle, which involved parties, drugs, sex and clubs. Clear communication is a challenge for Daysha. Can Michael’s relationship with Daysha survive? Can Daysha’s love conquer all her imperfections? Those with ears, let them hear; “Can Ya Hear Me Now?” The film is directed by Aishah Thompkins. Other crew members and actors include: Denise Thompkins, William Aish, Iris Saunders, Damion Johnson, Gema Calera, Nalini Singh, and Mimi Muinat.

Carpentier's Version of Time: Back to the Ending

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Faculty Advisor: **Dr. Suzanne Ferriss**

Abstract

In Alejo Carpentier's short story "Journey Back to the Source," he used a nonlinear narrative and manipulated temporal elements to challenge the traditional view of the passage of time. Through his experimentation, he developed a new form of the narrative timeline. Carpentier's work demonstrates that time can move in reverse, from the end to the beginning, while still moving forward. The theories of Sergei Eisenstein and Henri Bergson influenced Carpentier's experiment and reveal the magnitude of his pushing of the boundaries. For instance, Carpentier employs a narrative strategy like Eisenstein's cinematic montage to stitch together a timeline. Bergson's theories of memory, duration, and personality further explain how Carpentier's experiment challenged reality. In examining Carpentier's construction of time, we can better understand that literature's limits are not bound by reality and that fictional narratives can challenge the status quo.

Change and Stop-signal paradigms with hands and feet

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Faculty Advisors: **Dr. Leanne Boucher and Dr. W. Matthew Collins**

Abstract

Hands and feet are useful in most sports but they are even more important when driving. The present study aims to find the time it takes to stop or switch a hand or foot movement. Researchers have noted that it takes longer to stop a hand than it does an eye, but little if any research has been done on foot movement. We are currently collecting data in the stop-signal paradigm in which subjects are to strike one of two keys when they see the corresponding visual stimulus unless an auditory signal is presented. Data are also being collected on the change task for hands where instead of stopping at an auditory signal, subjects are to switch their response. Future studies will repeat those paradigms using foot movements. We expect to find that switching takes longer since the participant is faced with not only inhibiting a response but making a different one as well. It is expected that reaction times are quicker for hand movements than feet for two reasons. First, the distance from the brain to the hand is shorter than from the brain to the foot. Second, subjects are likely to have more experience doing similar tasks with their hands. Results have implications for driving behavior especially when fast reaction time is crucial.

Chemical interactions between *Staphylococcus aureus* and *Candida albicans* within mixed species biofilms

Rachel Comito, Fiorella Diaz, Martin Herrera and Ariel Jordan

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Faculty Advisor: **Dr. Joshua Loomis**

Abstract

Biofilms are communities of microbes that grow and function together in order to gain protection from environmental stressors. *Staphylococcus aureus* and *Candida albicans* are two of the most common microbes found to grow as biofilms within medical facilities and are among the leading causes of infectious disease. Previous studies found that *S. aureus* and *C. albicans* grow together synergistically within biofilms and that *S. aureus* actually secretes some chemical that drastically improves candidal biofilm growth. The current project is focused on better characterizing the mechanism of this chemical interaction. One aspect of the project examines when *S. aureus* secretes this stimulatory chemical during its growth cycle and whether release is restricted only to *S. aureus* growing as a biofilm. Future experiments will try to isolate and characterize the exact chemical that is responsible for this growth. As of now, the chemical is believed to be related in function to quorum sensing molecules (e.g. tyrosol, farnesol) normally made by *C. albicans* during the control its own growth.

Cognitive Inhibition in Bilinguals vs. Monolinguals

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Faculty Advisor: **Dr. Mercedes Fernandez**

Abstract

Bilingualism has been linked to enhanced cognitive abilities and these enhanced abilities are believed to be mediated by the same frontal lobe system that controls language output in bilinguals. Moreover, recent research suggests that this bilingual advantage may be moderated by degree of balance between the two languages such that those who are equally proficient in their two languages show the best performance on cognitive tasks compared to unbalanced bilinguals and monolinguals. For instance, results from one study revealed that balanced bilinguals showed significantly fewer errors on the Wisconsin Card Sorting Test (WCST) than unbalanced bilinguals. Thus, the purpose of the present study is to compare performance of bilinguals and monolinguals on the Go-NoGo task, a task associated with frontal lobe function, and to assess how degree of balance affects bilinguals' performance. Bilingual (English-Spanish) with differing degrees of balance between their two languages and monolingual (English) participants will be required to discriminate tone pairs and to only press a button to target pairs while reaction times and errors are measured. We predict that bilinguals will make fewer errors and have faster reaction times compared to monolinguals and that balanced bilinguals will exhibit the best performance.

Complete Protection and Glycosylation of Hydroxylysine

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Faculty Advisor: **Dr. Beatrix Aukszi**

Abstract

One of the most common types of cardiovascular disease is the coronary heart disease, atherosclerosis. Adiponectin, a protein hormone, has been shown to play a role in preventing the development of atherosclerosis. Modification of this compound could help to produce more beneficial effects. One of the amino acids in adiponectin, Hydroxylysine (HYL), can often undergo posttranslational modifications, such as glycosylation.

The aim of the intended research is to protect specific functional groups of the amino acid to make it suitable for peptide synthesis. Total synthetic route will entail a differential protection of the amino acid, and addition of specific sugar molecules to the hydroxyl group. Galactose and glucose are the sugars that will be used for attachment, by processes galactosylation and glycosylation respectively. First, galactose will each be attached to hydroxylysine alone, and later it will be attempted to attach both galactose and glucose, as a dimer to the same molecule of hydroxylysine. Infrared spectroscopy (IR), gas chromatography-mass spectrometry (GC-MS), and thin layer chromatography (TLC) will be used for characterization.

The organic molecules synthesized in the laboratory will be sent to a collaborator, Dr. Mare Cudic, at Torrey Pines Institute for Molecular Studies, in Port St. Lucie, FL, for incorporation into the larger peptide, adiponectin. The peptides will be used to investigate the effects of tobacco use in the cardiovascular disease, atherosclerosis.

Construction of a Polyphosphate Kinase Gene Deletion in *Yersinia spp.*

Shan Desai

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Faculty Advisor: **Dr. Julie Toruellas Garcia**

Abstract

The goal of this experiment is to study the bacteria, *Yersinia pestis*, *Yersinia enterocolitica*, and *Yersinia pseudotuberculosis*, and the possible role of the enzyme polyphosphate kinase (PPK) in pathogenicity, motility, and gene expression. PPK is an enzyme that produces inorganic polyphosphate, which is universal and found in all forms of life from prokaryotic bacteria to eukaryotic mammals. The PPK enzyme has been shown to be required for motility and virulence of several pathogenic bacteria. *Yersinia spp.* are diverse bacteria that cause diseases ranging from gastrointestinal diseases to bubonic plague; however, the role of PPK is unknown. The focus will be on constructing the *Y. pseudotuberculosis* and *Y. enterocolitica* *ppk* deletion strains using λ Red-mediated gene replacement in order to understand the effects of deleting the *ppk* gene and determine if removal of the PPK enzyme affected motility and virulence. Determining a role for PPK in *Yersinia* pathogenicity could make it a prospective target for new antimicrobial drugs, innovative vaccines, and may have a great impact on the future.

Dipole Moment of Ni(II), Cu(II), AND Zn(II) Porphyrins and Out of Plane Distortions Quantified by Semiempirical Methods and Compared to Thin Layer Chromatography

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Faculty Advisor: **Dr. Maria Ballester**

Abstract

The objective of this experiment was to calculate the dipole moment of Ni(II), Cu(II), and Zn(II) porphyrins and relate the measurements to the Thin Layer Chromatography (TLC) experimental results. Tetraphenylporphyrin (TPP) and Octaethylporphyrin (OEP) were metallated with these transition metals (Ni(II) d^8 , Cu(II) d^9 , and Zn(II) d^{10}). The results of the TLC were then further compared to the dipole moment from calculations obtained using semi-empirical methods. It is known that different transition metals can expand or contract the core of these porphyrins due to electronic effects as well as size. The TPP series follows the trend of the dipole moment, correlating to the semi-empirical calculations. The Cu(II) OEP and Ni(II) OEP did not follow the experimental trend of the dipole moment calculations, however the Zn(II) OEP did follow the trend. The reasons for the inconsistency of the Cu(II) OEP and Ni(II) OEP may be the result of different conformations of the porphyrin skeleton, inductive effects of the peripheral substituents or unique splitting of the d orbital electrons of the metals.

Effects of DAXX and IL-8 gene expression on Tumor growth

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Faculty Advisors: **Dr. Joshua Loomis and Dr. Appu Rathinavelu**

Abstract

Vascular Endothelial Growth Factor (VEGF) is an important factor that regulates tumor cell growth and angiogenesis. Tumor angiogenesis results in the supply of oxygen and nutrients to the tumor cells, enabling further growth. Various genes in the genetic sequence contribute differently, and affect this process by either promoting or inhibiting further angiogenesis. Among these genes are DAXX and IL-8. DAXX gene, which encodes Death Domain Associated protein, can enhance FAS mediated apoptosis, by activating the Jun N-Terminal Kinase (JNK). MDM2 is an oncogenic protein, that is believed to ubiquinate DAXX and reduce its level when it is overly expressed; HAUSP is a ubiquitin specific protease that regulates p53 tumor suppressor, and controls cellular levels of DAXX by inducing deubiquination. On the other hand, IL-8 signaling is known to promote angiogenic responses while increasing proliferation and survival of endothelial and cancer cells. IL-8 also potentiates the migration of cancer cells, endothelial cells, and infiltrating neutrophils at the tumor site in order to promote angiogenesis within the tumor. In this project the expression levels of DAXX and IL-8 were studied in Prostate cancer cells (LNCAP), and MST cells (MDM2 gene).

This project was supported by the Royal Dames of Cancer Research, Ft. Lauderdale, FL.

Electrophysiological and Neuropsychological Correlates of Emotion Regulation

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Faculty Advisor: **Dr. Jaime Tartar**

Abstract

Avoidance or escape from emotionally negative events is associated with poor psychological health outcomes. Importantly, humans can influence how emotions are experienced or expressed through emotion regulation (ER) strategies. ER strategies have been shown to alter the expression of emotions in individual with differing levels of experiential avoidance (as indexed by the Acceptance and Action Questionnaire, or AAQ). Here, we are comparing a control group of participants who do not show emotional avoidance with a group of participants who score high on emotional avoidance. To that end, we are assessing neurophysiological and behavioral responses to emotional vs. non emotional pictures across three separate emotion regulation strategies (no-regulation, suppress emotion & up-regulate emotion). We are employing electroencephalographic (EEG) event related brain potentials (ERPs) and self-report measure of emotional intensity. We hypothesize that compared to the control group, the emotional avoidance group will show a greater ability to suppress and a decreased ability to up-regulate emotional response to negative stimuli. These predictions would be reflected in a blunted ERP measure of attention to emotional stimuli in the emotional avoidance group compared to the control group. We further predict that the behavioral measure will show blunted emotional response in the emotional avoidance group. Findings from this study will show that avoidance emotion regulation strategies not only blunt behavioral responses, but also result in neurophysiological indices of decreased emotional responding. Results will also show whether adults with a high escape avoidance trait are able to regulate their emotional reactivity in an adaptive manner.

Event Related Potentials as a Measure of Neural Inhibition Resulting from Bilingualism

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Faculty Advisor: **Dr. Mercedes Fernandez**

Abstract

Research suggests that there is a link between bilingualism and neural inhibition. Findings reveal that bilinguals more efficiently and effectively switch between cognitive tasks and ignore irrelevant aspects of a stimulus than monolinguals. According to the Inhibitory Control model of bilingualism, a mechanism is in place which allows bilinguals to suppress one language while using the other. This mechanism also mediates non-linguistic inhibition, which allows bilinguals to outperform monolinguals on these tasks. Functional Magnetic Resonance Imaging studies comparing monolinguals and bilinguals on non-language tasks suggest that these two groups utilize different frontal lobe areas when performing non-language cognitive tasks. The frontal lobe is a mediator of working memory, cognitive flexibility, selective attention, and reasoning. Event-related potentials (ERP), are electrical potentials generated by a population of neurons in response to a stimulus that can be measured through an electroencephalogram. The N2 component of the ERP, a negative wave that begins ~200ms after the stimulus onset, has been linked to neural inhibition and the frontal lobes. Importantly, there has been no research investigating the correlation of the N2 component of the ERP to enhanced cognitive capabilities of bilinguals. We propose to measure the N2 component of the ERP while monolinguals and bilinguals perform non-linguistic cognitive tasks to directly correlate neural inhibition with bilingualism. We hypothesize that compared to monolinguals bilinguals will exhibit enhanced neural inhibition on non-linguistic tasks mediated by the frontal lobe.

Experimental and numerical determination of phase synchronization between a Chua system and an external periodic signal

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Faculty Advisor: **Dr. Victor Castro**

Abstract

We present our first experimental results in relation to the phase synchronization of a single sinusoidal function to a Chua oscillator. We approached the synchronization process with real time observation. We were able to observe that a Chua oscillator will stay phase synchronized if the periodic signal has the appropriate amplitude and frequency, *i.e.*, falls inside a synchronization tongue (Arnold Tongue). These early results will be compared in the future with numerical simulations.

Exploring the Formation of Novel Organic Compounds in Urban Atmosphere

Melanie Campbell

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Faculty Advisors: **Dr. Dimitri Giarikos and Dr. Song Gao**

Abstract

It has been reported that the atmosphere surrounding Shanghai and other eastern Asian cities contain a surprisingly large amount of formaldehyde and other carbonyl compounds as well as amines, which are the byproducts of industrial sources. In theory, formaldehyde can react with primary or secondary amines and these additional carbonyl compounds containing acidic protons to form novel organic compounds, such as organic salts, through a process known as a Mannich reaction. In this research project, different types of Mannich reactions were performed in the lab by using several organic precursor compounds, some readily found in the atmosphere in Shanghai, to determine if the anticipated Mannich-type products will form. These reactions were performed under various conditions and the products were analyzed by a Gas Chromatography Mass Spectrometer. Preliminary results are reported in this presentation.

Exploring the Phylogeny of *Helicosporidium* using the *cysT* gene

Vanessa Anaya

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Faculty Advisor: **Dr. Aurelien Tartar**

Abstract

Helicosporidium is a unique pathogen that can infect the larvae of mosquitoes. Phylogenetic analyses show promise of establishing a relationship between *Helicosporidium* and other species. Observation of species from the *Aunexochlorella* and *Prototheca* genera will provide an exact taxonomic classification and assist with identifying the closest relative to the genus *Helicosporidium*. Since it has been shown that the *Helicosporidium* shows effects on the larvae of mosquitos, this can be a potential organism of interest in the use as an alternative to common chemical insecticides. The confirmation of the relationship was found by performing sequencing of the ribosomal DNA of the *Helicosporidium* and corresponding organisms which were collected from different host samples. The techniques employed in this research ranged from Polymerase Chain Reaction (PCR), Gel Electrophoresis and DNA purification. The purified DNA sample of the “*cysT*” gene of a corresponding organism to the *Helicosporidium* was sequenced and analyzed. This DNA sequence for the *cysT* gene was able to be identified.

Expression of AT1, AT2 receptors and a non-AT1, non-AT2 angiotensin II binding site in rat brain after endothelin-1 induced ischemic stroke

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Faculty Advisor: **Dr. Robert Speth**

Abstract

New findings suggest that the activation AT1 receptor decreases cerebral perfusion after an ischemic stroke in the brain while the activation of AT2 receptor opposes those actions providing neuroprotective effects. Recent discoveries reveal the existence of a novel non-AT1, non-AT2 binding site for angiotensin II (Ang II) in the brain which may indicate additional effects of the brain angiotensin system after ischemic damage. To assess this, 5 rats were microinjected with 3 μ l of 80 μ M endothelin-1 (ET-1) to stimulate middle cerebral artery occlusion in the right hemisphere of the forebrain. 24 hours later, the rats were sacrificed and the brains were removed and frozen. The brains were analyzed by observing the binding of ^{125}I -Sar¹ Ile⁸ Ang II to the tissue by receptor autoradiography. Using quantitative densitometric analysis of the ^{125}I -Sar¹ Ile⁸ Ang II binding (MCID) to the forebrain caudal to the ischemic region of the brain, no differences in AT₁, AT₂ or non-AT₁, non-AT₂ binding was observed between the hemispheres in either the density of the receptor binding or the area encompassed by each hemisphere. The results suggest that the ischemia does not alter the expression of angiotensin binding proteins in the region posterior to the stroke zone at 24 hours post-ischemia.

Externship in Graz, Austria: Research Opportunities

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Faculty Advisors: **Dr. Robin Sherman, Dr. Deanne Roopnarine and Dr. Mark Jaffe**

Abstract

Nova Southeastern University (NSU) and the Medical University of Graz, Austria (MUG) formed a unique externship opportunity. The opportunity is only awarded to two undergraduate students at NSU annually. The six week externship in 2010 consisted of two research opportunities. The first experiment consists of studying the effects of different preservation methods on pig liver explantations and the second studies the impact of Sanopal on Cyclosporin-A induced nephropathy in rats. Prior to beginning the research we underwent training in the different techniques involved in each experiment as well as the ethical situations faced when conducting the experiments. The techniques we trained to utilize included injection, phlebotomies, anesthetizing, suturing, and cauterizing blood vessels. After training in the basics we assisted in several pig liver explantations which are very similar to a human liver transplant. With the guidance and preparation given to us through training and practice we were allowed to continue the experiments on our own with some supervision by our mentors. In addition, we led a pig liver explantation with our mentor as our assistant. Altogether, the countless experiences in these research opportunities were enlightening.

Implicit Bias and Public Policy Recommendations

Alyssa Mineo

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Faculty Advisor: **Dr. Glenn Scheyd**

Abstract

We intend to measure implicit (as opposed to self-reported) attitudes towards gay people, specifically in the context of adoption rights. Opponents of gay adoption rights persist in arguing that having gay parents is harmful to the children and for this reason should be opposed. However, if the position is based exclusively on concern for the welfare of the children rather than (entirely or partially) on the parents' sexual orientation *per se*, it should follow that any individual who acts out of this concern would be equally concerned with the welfare of the children adopted by heterosexual parents. Whatever restrictions the individual would support imposing upon adoptive parents should then be determined only by what he or she believes is in the children's interest. We suspect that, even among those who publicly espouse tolerance of and support for equal rights for gay parents, there is substantial "modern prejudice" (Dovidio and Gaertner, 1996), such that if placed in a situation that removes the concern of being judged and bigoted, the bias can be revealed. It may indeed be the case that such individuals do not perceive themselves as prejudiced but that their implicit attitudes (Greenwald & Banaji, 1995; Fazio & Olson, 2003) are such that they are more prepared to discriminate against homosexuals than against heterosexuals. If, as we hypothesize, such implicit bias is widespread, drawing attention to it may be one of the most important steps in reducing it.

Improvement of Trauma Symptoms in a Male Dual-Diagnosis Outpatient Treatment

Brittney Tamayo

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Faculty Advisor: **Dr. Andrew Bunce**

Abstract

Traditionally, treatment aimed at helping those with both trauma related symptoms and substance abuse issues has first addressed the substance-related issues and then, after the client obtains abstinence, provided treatment to address the trauma-related issues. A more recent trend, the 'traumaddiction' model, suggests that psychological trauma and substance abuse can and should be treated concurrently. Support for this simultaneous treatment model has largely been limited to research in residential treatment settings. The current study set out to determine whether the integration of therapy for both trauma and substance abuse can be effective in an outpatient treatment setting as well. Specifically, parallel with past research, exposure therapy and psycho-education using the traumaddiction model was administered in an outpatient dual-diagnosis treatment setting with adult males. The participants (mean age = 47.5, SD = 6.29.) completed the Trauma Symptom Inventory-Adult Form at pretreatment and again after a course of therapy (60-90 days). Significant improvement was noted in three of 11 scales (Atypical Response, Anger Irritability, and Tension Reduction Behavior) suggesting that clinically significant trauma symptom improvement can result from simultaneous treatment of substance abuse and trauma disorders.

Independence From The Operating System

Thomas Sylvester

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Faculty Advisors: **Dr. Saeed Rajput and Dr. Josue Cuevas**

Abstract

Virtualization is almost as old as mainframe computers, when a large computer was shared by several different users. Computer engineers have also struggled with many different Operating Systems (OS) that traditionally worked on specialized hardware. Usually only one OS could be loaded on one physical machine at one time. This posed a significant barrier to experimentation and testing of multi-OS environments.

These VMs can relieve instructors and students of the configuration issues across different physical machines; every class's VM can be loaded the same way. These VMs have additional benefits. Dedicated VMs can be created to address OS, software and configuration needs of a specific course or research topic. For instance, students in security classes can initiate viruses on the VM without damaging their machines to see how the viruses attack. Students in networking class can simulate an entire network with router and multiple hosts on a single machine. Students and instructors who simply wish to run another OS for better software compatibility can make great use of VMs. It is the point of this presentation to illustrate the steps we have made toward finding direct uses for VMs and how we are planning to distribute them effectively.

Influence of Hardbottom Availability on a Nearshore Fish Community

Jesse Secord, Angelica Garcia, Rocio Masgoret and Kaitlyn Brucker

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Paul Arena**

Abstract

The purpose of this project is to determine if hard bottom availability affects the fish abundance and species richness of a nearshore community. The research was conducted on the northeast side of Hillsboro Inlet in Broward County, Florida. The Rover Diving Technique was used to conduct visual fish counts while snorkeling within four 30 m^2 areas. Quantification of hard bottom and sand substrates were also performed within these areas using transect lines. The majority of data collection occurred on a weekly basis from February 21, 2010 to October 10, 2010. We hypothesized there would be a direct correlation between fish abundance and species richness and the amount of hard bottom available. The linear regression method was used to calculate whether the results were statistically significant. Species richness was shown not to be correlated to hard bottom availability.

Investigation of a Crime Scene: Applying Biological and Chemical Forensic Techniques

Jennifer Marcelin, Jorge Leal, Sagir Patel and Lindsey Nowland

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Faculty Advisors: **Dr. Maria Ballester and Dr. Deanne Roopnarine**

Abstract

The purpose of this experiment was to explore the principles of investigating a crime scene; utilizing both biological and chemical laboratory techniques. Collecting proper evidence is crucial to crime scene investigation. The insight that an investigator may gain about a perpetrator can be determined by analyzing the physical evidence obtained at the scene, and therefore an investigator must carefully examine numerous pieces of evidence found at a crime scene. However, the knowledge and education of the investigator are able to elucidate both the obvious and the obscure. Each piece of evidence may provide a clue to who committed the crime that is under investigation. Techniques such as hair, gunshot, fingerprint, footprint and blood spatter analyses were learnt and then used in the investigation process. This research project involved the investigation of a hypothetical crime scene, which was analyzed by using the aforementioned forensic techniques.

Isolating and Characterizing Natural Products from Fruits and Vegetables by Using Gas Chromatography Mass Spectroscopy

Andrew Lister

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Faculty Advisors: **Dr. Dimitrios Giarikos and Dr. Reza Razeghifard**

Abstract

Natural products of fruits and vegetables play important roles in human health. Due to their benefits, researchers have tried to identify specific natural compounds within a single fruit or vegetable. These are technically demanding experiments because of the complex sample matrix and the need for a sensitive chemical analysis technique. This research project presents optimized protocols for the organic extraction and separation of multiple natural products of fruits and vegetables. The compounds were analyzed, and characterized by using Gas Chromatography-Mass Spectrometry and cross referenced with journal articles that have previously reported these products.

Kazal Serine Protease Inhibitors and their Role in *Prototheca wickerhamii* Pathogenicity

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Faculty Advisor: **Dr. Aurélien Tartar**

Abstract

Several genes are known to be involved in pathogenic processes. Among these, Kazal serine protease inhibitors (InterPro IPR002350) have been shown to be recurrently used by pathogenic eukaryotes. Kazal serine protease inhibitors are involved in the pathogenicity of *Plasmodium falciparum* by providing protection to parasitic proteins from the host's defenses. Although Kazal protease inhibitors have been associated with the pathogenicity of several eukaryotic microbes, it is unclear if they are involved in *Prototheca wickerhamii* infection. *Prototheca wickerhamii* is an achlorophylllic green alga known to cause infections in humans. Olecranon bursitis, cutaneous, and bilateral choroiditis are three types of clinical infections resulting from this facultative pathogen in immunosuppressed hosts. Over one-third of the reported cases advanced to systemic dissemination, some eventually led to death. The main objective of this study was to sequence Kazal-like protease inhibitor genes from *Prototheca wickerhamii* and estimate the role of these proteins in the pathogenic process. *Prototheca wickerhamii* has been successfully cultured and cells collected were used for DNA extraction. Although Kazal-like protease inhibitor genes have yet to be sequenced, preliminary sequence analyses performed on 18S rDNA and β -tubulin genes revealed that two strains classified as *Prototheca wickerhamii* might have been erroneously identified and may be better represented by establishing a new genus (*Pseudoprototheca* gen. nov.). These findings are crucial to establish a clear taxonomic framework for the identification of emerging pathogens. Additional studies will be directed towards the expression of Kazal and its involvement in pathogenicity.

Mobile Operating Systems

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Raisa Szabo**

Abstract

Over the last decade, there has been a proliferation on mobile computers. Last year, more than 67 million smart phones were sold in the United States. Not all mobile computers are the same; these devices, have different hardware and operating systems. Each different mobile device and operating system has unique features and is targeted to a distinct demographic. For example, Blackberry devices are marketed as the business smartphone, on the other hand, the numerous amount of applications available for the iPhone make this device a favorite among the average youth.

Mobile operating systems are often compared by its features and applications, Blackberry OS is known by its email application, and the iPhone OS is known by its outstanding MP3 player. But it is rare to see mobile operating systems compared by its internal architecture and organization. Our presentation will focus on the most used mobile operating systems; iPhone's iOS, Nokia's Symbian, RIM's Blackberry OS, Palm's WebOS, and Microsoft's Windows Mobile OS. We will analyze the programming language used to build these operating systems, the kernel, frameworks, libraries, and features such as multithreading. We will also demonstrate step-by-step how to build a small application for the Android OS.

More Than Just a Memory

Sebastian Acosta-Nijamkin

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Faculty Advisors: **Dr. Chetachi Egwu and Dr. Weylin Stern glanz**

Abstract

“More than just a memory” is a film about love and friendship. Ethan is confronted with a tough decision: whether to tell the girl he loves how he really feels, or whether to accept the fact that she loves someone else and that Ethan will only be a friend in her eyes. Throughout the film, Ethan is driving in a car, and flashbacks of the night where he chose to be just a friend keep entering his mind. That night he made a choice -- a choice that would change his life forever. The film is directed by Sebastian Acosta-Nijamkin.

Music Production: Behind the Scenes

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Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Chetachi Egwu and Dr. Weylin Stern glanz**

Abstract

“Music Production: Behind the Scenes” is a short documentary film about the different steps needed to create a salsa song production, culminating in a demonstration of the finished salsa song production. The film is directed and narrated by Michael Navarrete.

MYH16 Masticatory Gene Mutation Correlates with the Evolution of Human Morphological Cranial Capacity

Renee Michelle Potens

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Jose Lopez**

Abstract

In the late Miocene, *Homo sapiens* encephalization accelerated simultaneously with an anatomic craniofacial transformation, associated with a shift towards a gracilization pattern of diet. Hansell H. Stedman has discovered a deleterious masticatory gene mutation responsible for jaw muscle development that is found in all modern human populations. This gene is functionally conserved in all non-human primates such as chimpanzees and extinct Hominidae species such as *Australopithecus* and *Paranthropus*, and is only found in its mutated, non-functional state in humans. The myosin heavy chain (*MYH16*) inactivation occurred after the divergence of the phylogenetic lineages leading to humans and chimpanzees, predating the appearance of the *Homo* species. The frameshift mutation is a functional defect, causing hypotrophy of the type II fibres of the masticatory apparatus, yet through natural selection evolution has 'fixed' this deficiency in the lineage leading directly to *Homo sapiens*. Stedman, working with Nancy Minugh-Purvis, proposes an evolutionary theory that the dramatic eightfold decrease of the masticatory muscles had a pleiotropic effect on *Homo sapiens* cranial morphology. Stedman and Minugh-Purvis propose this first identifiable molecular distinction between humans and apes removed an evolutionary constraint on encephalization of the *Homo* species, correlated with traceable morphogenesis in the fossil record, thus providing a mechanistic genetic basis for human evolution.

Nonlinear Analysis of Phosphorus Levels in Lake Okeechobee and Proposals of Solutions

Lacrima Nemulescu

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Victor Castro**

Abstract

The research was designed to analyze the phosphorus levels in Lake Okeechobee and the consequences related to the introduction of supplemental nutrients in an oligotrophic ecosystem. The eutrophication of a fresh water habitat has the potential of negatively impacting the underwater species, as well as the predators that depend on these organisms to obtain their nutrition. An increase in the amount of phosphorus has portrayed a positive correlation with the stimulation of plant growth. The most detrimental consequences are associated to algal overgrowth, which causes the oxygen levels inside the water to decrease and therefore deplete the sub aquatic environment of this substantial resource. This domino effect leads to the reduction of nourishment for birds, fish, and other species, which can result in their extinction or departure from the Lake Okeechobee habitat. Solutions were designed to restore the oligotrophic characteristics of the lake using genetically engineered bacteria, which incorporates the genetic sequence for phosphorus consumption within the plasmid. Additionally, the introduction of noncompetitive species that have phytoplankton as a primary food source were examined to combat the expansion of algal blooms. Nonlinear representations of the predator-prey model were derived to illustrate the original condition of eutrophication, as well as the outcomes of the proposed solutions.

On Parmenides' Reality

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Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Vicki Toscano and Dr. Darren Hibbs**

Abstract

The treatment being submitted here for the Farquhar College of Arts and Sciences Undergraduate Student Symposium began quite simply in the form of a journal entry submitted as one of the required elements of Dr. Toscano's Introduction to Philosophy (PHIL 1010) in the 2010 fall term. The professor's review and critique of that original work (which was comparably brief compared to this final edition) produced remarks from Dr. Toscano that motivated me to reevaluate my own interpretations of the proposition on Reality put forth by Parmenides of Elea in the fifth century BCE. Having studied philosophy as a personal interest for many years prior to selecting the discipline as my life's pursuit, I had, of course, encountered Parmenides and his heirs along the path and already held an initial perspective on his particular proposition on Reality. That perspective was firmly opposed to his exceptional point of view. However, upon closer examination of Parmenides' work, behind the professor's evaluation of my own, I found a bit of a role reversal underway as I became more intimately acquainted with the finer points of Parmenides' distinct works entitled "The Way of Truth" and "The Way of Opinion" and instead of conflict with his work on the matter, I discovered concurrence. This treatment is the consequence of that closer examination.

Peace through Hostility: The Beats' Call for Equality through Aggressive Poetic Imagery

Dan Abella
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Faculty Advisor: **Dr. Lynn Wolf**

Abstract

This paper focuses on the poetic techniques of two Beat poets, Lenore Kandel and Allen Ginsberg, whose impressionistic, caustic poetry is in some ways representative of the entire Beat movement. Kandel's poems ring with overt sexual overtones, seemingly unconcerned with respect to morality or grace, invoking instead shocking and disturbing images. In her poetry is an intrepid protest of violence and conformity through the paradoxical use of violent description. Like the other Beat poets, she often refused to compromise in either structure or content, adopting a flowing, free-verse form. Allen Ginsberg's poetry employs the same modes: free verse, shocking context, and explicit social critique. While his poetry is not nearly as volatile as Kandel's, his poem *Howl* arguably speaks for a generation of disenchanted and disillusioned youths, surveying the problems of society the Beats identified. Ginsberg similarly attacks the wrongs of the world around him without caution. Both poets believed the cure, or at least part of the cure, for the ills of society could be achieved with an embrace of freedom and individualism, exemplified by their sprawling, and often hostile, poetry.

Crystalline Metal-Organic Frameworks Drug Transfer

James M. Brandes

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Donald Baird**

Abstract

A relatively new type of chemical compound is finding application in such areas as gas storage, and drug delivery. Metal-organic frameworks, or MOF's, are rigid structures with large cavities which other molecules can occupy for later release and use. We are studying the properties of new MOF's based on copper and organic molecules known as BAII's. In at least one case it has been demonstrated that these frameworks are capable of adsorbing, and later desorbing, host molecules. This makes them candidates for drug delivery and gas storage. The synthesis, characterization and adsorption properties of one framework will be discussed. A detailed discussion of the synthesis and structural characterization of NBAIIICuOAc **1** will be presented. NBAII is an organic molecule whose structure resembles a lobster. It will be shown how copper containing NBAII molecules arrange themselves in the solid crystalline state in such a way that a framework results which contains channels in which guest molecules may reside. A study of the repeated adsorption and desorption of carbon tetrachloride from the crystals of NBAIIICuOAc will also be presented.

Project Braille: The Implementation of the Seeing-Eye Computer

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Faculty Advisor: **Dr. Saeed Rajput**

Abstract

The goal of this project is to provide convenient access to all of the printed materials to the visually impaired by utilizing functional senses other than sight. The proposed solution involves the use of modern technology to convert printed text into computer readable text through optical character recognition and later narrating the text using modern text-to-speech conversion (TTS). The process of converting books into an audio version via computer is currently in its infancy stage of development. There are several major issues that must be addressed in this conversion process. Today's systems that are devoted to the TTS conversion process are expensive and are not widely accessible. The objective of this project is to create a conversion system at a minimal expense to those in need. The other issues that will certainly be addressed are the efficiency and accuracy of this conversion process. The project goals are to eventually provide affordable systems for institutions that educate and serve the visually impaired and to continuously improve upon the TTS conversion process.

Renovatio

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Faculty Advisors: **Dr. Chetachi Egwu and Dr. Weylin Stern glanz**

Abstract

“Renovatio” is a short film about a couple of individuals who engage one another due to eerie occurrences in their vicinity. As each character bonds with the other, they begin to share emotions and choose sides. In this web of deception, secrets are revealed that confound even the most rational characters, ultimately concluding with their “rebirth.” The film is directed by Amrish Ramnarine. Other crew members and actors include Ximena Raquel Alvarez, Monica Lynne Herrera, Calista Siobhan Ming.

Singles View Other Singles as Sexy: The Influence of Relationship Status on Judgments of Attractiveness

Jenna Wells

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Faculty Advisor: **Dr. R. Weylin Sternglanz**

Abstract

Previous studies on whether people find single or non-single opposite-sex targets more attractive are inconsistent (e.g., O'Hagen et al., 2003; Bressan & Stranieri, 2008; Uller & Johansson, 2003); these effects may vary according to social and hormonal factors (e.g., Gangestad et al., 2004). We propose that participants' own relationship status may influence their judgments of the attractiveness of single and non-single people. In the present study, 43 participants each rated the attractiveness of ten "profiles," using a between-participants design. Each profile consisted of a photograph and short personal description of a young opposite-sex adult. Half the profiles were depicted as being single, and half the profiles were depicted as being romantically involved (counterbalanced). Both male and female single participants found single opposite-sex profiles more attractive, sexy, and dateable than romantically involved profiles; participants who were themselves romantically involved showed the opposite pattern, finding the romantically involved profiles more attractive, sexy, and dateable than single profiles. These findings cannot be explained as a mere halo effect of perceived similarity (i.e., people thinking more positively across the board of people they perceive as similar to themselves), because single and romantically involved participants did not differ in the degree to which they rated the confidence, honesty, comfort, and likeability of single versus romantically involved profiles. In other words, single people may be prejudiced to view other singles as attractive and sexy, but this process does not take place by affecting single people's global impressions of singles.

Standardization of a Technique for Quantification of Glutathione Concentration in Human White Blood Cells: a Biomarker for Autism?

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Faculty Advisors: **Dr. Mark Jaffe and Dr. Ana Maria Castejon**

Abstract

Glutathione is an unusual tripeptide ubiquitous in scientific literature for its antioxidant capacity and its relevance as an indicator of oxidative stress. Glutathione's role within cellular homeostasis is well documented, but the entirety of glutathione's biochemical role within the human body remains fervently researched. Deficiencies in glutathione have been linked to patients suffering from a wide spectrum of disorders including, cancer, cardiovascular diseases, and autism (Pastore, Federici, Bertini, & Piemonte, 2003). Much of the research on glutathione centers on the relationship between the reduced (GSH) and oxidized (GSSG) versions of the tripeptide. Fluctuations which lower the ratio of GSH to GSSG are indicative of oxidative damage (Monostori, Wittmann, Karg, & Turi, 2009). It has been noted that a significant percentage of children with autism exhibit reduced levels of intracellular glutathione and correspondent increased levels of oxidative stress (Grannemann, Kern, Gutman, & Trivedi, 2008). The purpose of this study was to standardize a technique to measure intracellular levels of Glutathione in both reduced and oxidized forms within human white blood cells. White blood cells were isolated from whole blood samples and GSH and GSSG were quantified using a photometric method. Intra-assay ($\pm 9.0\%$) and inter-assay ($\pm 5.0\%$) variability of tGSH levels in the white blood cells as well as inter-assay variability of the standard curve concentrations of GSH ($\pm 13.2\%$) were assessed to establish reproducibility of the technique. The correlation coefficients of the standard curve concentrations of GSH from different assays were compared to establish linearity of the measurements (.990, $\pm .003$). The technique will be used to research the possible correlation between GSH/GSSG ratio and behavioral aspects of Autism Spectrum Disorders.

Survey of Fish Landings in Broward County: Preliminary Results

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Paul Arena**

Abstract

Each year thousands of recreational saltwater fishers are drawn to South Florida. Statewide regulations exist to monitor the sport and its associated landings. However, these laws may not be enough to protect local populations. Many of the commonly overfished species in Florida, specifically the snapper and grouper species, are targeted and caught by recreational fishers. To examine the current state of fishing activities in Broward County a questionnaire was created and recreational fishers were asked to participate anonymously. The purpose of the questionnaire is to provide baseline information on targeted species and landings off the coast of Broward County, as well as determine habitat and site preferences of fishers. There are two parts to the questionnaire; the first discusses demographical information of the angler, including what type of fishing license they possess. The second part asks details on the individual's fishing methods, as well as specific data on the types of fishes caught. The participants are also asked to discuss their views and concerns on local fisheries and whether they support efforts to help preserve certain areas. The results of this study will provide us with a better understanding of the opinions and activities of local fishers. The data can also be used by local natural resource managers to evaluate the effectiveness of current regulations and determine the potential support for a local marine protected area within Broward County.

Synthesis of Porous Organic Materials for Gas Storage Media

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Faculty Advisor: **Dr. Donald Baird**

Abstract

The purpose of this research is to help synthesize porous organic materials as possible gas storage media. Moreover, experimentation and chemical reactions will assist in finding and producing products that will be porous. Their porous nature will enable them to hold a certain volume of gas or act as agents for drug delivery. Earlier research involved a reaction to place an extra ring on the compound NBAIICuOAc. This molecule has two benzene rings, of which have shown to hold a trace amount of methane gas after DMF and H₂O have been removed from it. It has been hypothesized that the porous molecule is unable to hold large amounts of gaseous substances because the removal of DMF and H₂O cause the holes of this structure to collapse. Therefore, further study of this molecule is required to perfect it. Synthesizing this molecule with an extra benzene ring, for a total of three rings, may enable it to hold a greater volume of gas. Placing an extra ring on the molecule requires the use of 2, 3 napthalene dicarboxylic aldehyde, fumonitrile, and triethylphosphine. The final product is a Wittig reagent. In creation of this final product, advancements will be made towards the completion of synthesizing a molecule for drug delivery.

The distribution of two sea pens (Pennatulidae) in the SW Gulf of California, Mexico with reference to predation

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Faculty Advisor: **Dr. Joshua Feingold**

Abstract

Sea pens (Pennatulidae) are sessile, benthic cnidarians that inhabit soft sediment, and rely on filter feeding to obtain energy. They have a central stalk (rachis) which contains secondary polyps for feeding. Since no previous data has been collected on their distribution, abundance or size in the SW Gulf of California, Mexico, benthic surveys were conducted at depths of 11.0 – 32.6 m near Isla San Fransiscito and El Pardito. Two species (*Stylatula elongata* and *Ptilosarcus undulatus*) were observed. The average height \pm s.d. (tip to sediment surface) of *S. elongata* was 9.5 ± 3.8 cm (n=37) and was 3.5 ± 1.6 cm (n=54) for *P. undulatus*. Twenty-four *S. elongata* individuals and five *P. undulatus* individuals were observed for horizontal movement over a 24 hour period. Three of the *S. elongata* individuals moved 0.4-1.4cm and 24 others showed no movement. Also, 2 sea pens could not be located (possible retraction into sediment or predation). Four of 37 *S. elongata* surveyed had predation damage on their tips indicated by a bare rachis. Two octocorallivorous mollusks were collected from these damaged tips and were identified as *Neosimnia avena*. Sea pens are part of the diet of *Chelonia mydas*, the endangered Green Sea Turtle, as well as many sea stars and nudibranchs, suggesting they are an important part of the marine food web. A return trip is planned for July 2011 to augment existing distributional and size data and supplement our knowledge of sea pens with observations on predation as well as bioluminescence.

The effect of thimerosal-containing and thimerosal-free pediatric flu vaccine on gene expression in *Saccharomyces cerevisiae*

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Faculty Advisor: **Dr. Emily Schmitt**

Abstract

Mercury-based preservatives including thimerosal, typically added to some vaccines, may pose health concerns as mercury toxicity has been implicated in many human diseases. In this study, microarray technology and reverse transcriptase-polymerase chain reaction (RT-PCR) were used to examine the potential effects of a typical dose of thimerosal-containing vaccine (TCV) or thimerosal-free (TFV) pediatric flu vaccine on gene expression in *Saccharomyces cerevisiae*, a model organism that shares roughly 30% of its genome with humans. Yeast were grown in three treatments: standard media (YEPD), YEPD plus TCV, and YEPD plus TFV. Microarray gene expression data were examined for variability both within and among microarrays and only the genes which gave results with consistently very low variability were included for further analysis. Four gene expression patterns were examined with the remaining data: 1) genes strongly induced in the TCV only, 2) genes strongly repressed in the TCV only, 3) genes strongly induced in the TFV only, and 4) genes strongly repressed in the TFV only. The greatest number of genes was found to be strongly induced in the TFV (221), while 13 genes were strongly repressed in the TCV, only one gene was strongly induced in the TCV, and no genes were found to be strongly repressed in the TFV. Of the genes strongly repressed in the TCV, two of them (THI7, involved in thiamin transport and IDP2, involved in glutamate biosynthesis) are especially interesting due to both of these processes being potentially linked to autism.

**The Effect of Water Temperature on Florida Manatee (*Trichechus manatus latirostris*) Abundance
in Port Everglades**

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Faculty Advisor: **Dr. Edward O. Keith**

Abstract

Port Everglades, located near Nova Southeastern University's Oceanographic Center, is a wintering area for the Florida manatee (*Trichechus manatus latirostris*), because it is a warm-water habitat. This study used data that were collected on trips through the Port, which was then examined with the following criteria for comparison: past water temperature versus current water temperature, past surveyed manatee numbers versus current manatees surveyed, and water temperature versus manatees surveyed. These comparisons were examined to illustrate any climate change trends that have occurred, as well as how those have affected the manatees in Port Everglades. These data were then compared with the numbers found by the Florida Fish and Wildlife Commission synoptic surveys that are conducted annually throughout the state of Florida. The first null hypothesis for this study was that there has been no change in the water temperature in Port Everglades, and the second null hypothesis was that there has been no change in the number of manatees present. However, the data demonstrate a trend of rising manatee population in Port Everglades between the years of 2008 – 2010, allowing us to reject the second null hypothesis.

The Effectiveness of Various Pesticides on Aphid Infestations

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Faculty Advisor: **Dr. Paul Arena**

Abstract

The main goal of this research was to examine the effectiveness of various pesticides on aphid infestations found on landscape and garden plants. Aphids, also known as plant lice, are small (~5 mm) sap-sucking insects in family Aphidoidea commonly observed in home landscapes and gardens, as well as in many agricultural areas. They are some of the most destructive insects on cultivated plants and control of these pests usually requires pesticide treatments. The three most common types are organic, synthetic, and soap pesticides. We chose three commonly sold varieties at a local home improvement warehouse to use for during this study. These pesticides were: *Ortho Max Lawn and Garden Insect Killer* (synthetic; active ingredient - bifenthrin), *Ecosmart Organic Insecticide* (active ingredient – plant oils), and *Ortho Ecosense Insecticidal Soap* (active ingredient – potassium salts of fatty acids). Their effectiveness was determined by studying the change in aphid abundance found *Ixora* shrubs and scarlet milkweed (*Asclepias curassavica*). The synthetic pesticide killed all aphids the quickest. The organic pesticide and insecticidal soap also killed all aphids, however it took longer to do so. The negative health effects of synthetic pesticides on humans and the environment are well documented and consumers should consider this and the severity of aphid infestation when selecting a pesticide treatment. Based upon our results, we would suggest the environmentally safe insecticidal soap as an initial pesticide treatment.

The Effects of an Ad Libitum High Protein-High Fat Diet on Body Composition and Health

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Faculty Advisor: **Dr. Jose Antonio**

Abstract

The purpose of this study was to demonstrate the effects of a high-protein high-fat diet on an inactive 21-year-old female student during two 30-day experimental periods; there was no exercise intervention.. For the first 30 days of the study, a 47% carbohydrate, 23% protein, and 29% fat diet was followed and approximately 1573 calories were consumed. During the second experimental period of 30 days, the subject consumed a higher-protein/higher-fat diet that consisted of 24% carbohydrate, 29% protein, and 48% fat diet. Approximately 1719 calories were consumed daily. A Comprehensive Metabolic Panel and Lipid Panel blood test was obtained at the end of each diet and there was a significant decrease in total cholesterol, triglycerides, and glucose after the high protein-high fat diet. A positive effect on blood lipid levels was noticed which indicated that a high protein-high fat diet improved cardiovascular health. Total percent body fat showed 11% decline and subcutaneous adipose tissue also declined significantly in the triceps, suprailliac, and thigh regions. Thus, the consumption of a diet higher in protein and fat resulted in a decrease in body fat as well as an improvement in various health indices in spite of the fact that more calories were consumed

The Effects of an Unrestricted High-protein/High-fat Diet plus Exercise on Body Composition: A Case Report

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Abstract

The purpose of this independent study is to demonstrate the effects of exercise, diet and dietary supplementation on body composition and various indices of performance and health using a case study model. The exercise regimen consisted of heavy resistance training in combination with various aerobic exercises. The training program will follow a periodized scheme such that the volume and intensity of the exercise will be altered throughout the 8-week intervention period. Furthermore, the alterations in diet will involve an isocaloric replacement of carbohydrate with protein and fat. No change in caloric intake will occur. Various dietary supplements such as whey protein will be added as well. Blood samples will be drawn before and after the treatment period to determine the effects of blood lipids, liver enzymes and other clinical measures. The hypothesis is that the student will lose body fat and increase lean body mass while improving her cardiovascular disease risk profile as a result of the unique diet, exercise, and supplement treatment.

The Effects of Categorization on Memory

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Faculty Advisors: **Dr. W. Matthew Collins and Dr. Leanne Boucher**

Abstract

The purpose of this study was to explore the effects of categorization on our ability to remember events and objects. This is an important question because little research has tested the notion that the ability to categorize helps produce better memory. Morris & Baker-Ward (2007) studied a similar question when they examined whether having the vocabulary to describe an experience affected the ability to remember that experience. Specifically, they tested whether infants who had learned their colors prior to participating in an experiment involving different colored bubbles would recall the experiment better than those who learned the colors after the experiment. Results showed that infants who learned the color labels after the experiment could apply those labels to the memory of the experiment as well as those who had prior knowledge. We directly tested questions of categorization and memory by examining participants' memory for a number of symbols they were asked to draw in a drawing task. Some of the symbols had been learned before the drawing task and some were learned after the drawing task. If memory for the symbols is better when they were learned before the drawing task, this suggests the ability to name and categorize the symbols improves memory for the symbols.

The Effects of Sugar Substitutes on Gene Expression in *Saccharomyces cerevisiae*

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Faculty Sponsor: **Dr. Emily Schmitt**

Abstract

Sugar substitutes are marketed as being healthier than sucrose (table sugar). Within this experiment, information about how table sugar and three different sugar substitutes, Splenda (sucralose-based), Truvia (stevia-based), and Equal (aspartame-based), affect gene expression in yeast was examined. Since the genomes of yeast and humans are approximately 30% similar, the specific genes selected for analysis in yeast overlapped with genes that are expressed in humans. Thus, *Saccharomyces cerevisiae* (Baker's yeast) was used as a model eukaryotic organism in order to examine the effects of sugar substitute exposure on gene expression. The yeast was grown under four different conditions: 1) A control environment with yeast grown in regular growth media (YEPD) + sucrose, 2) An experimental environment with yeast grown in YEPD + sucralose, 3) An experimental environment with yeast grown in YEPD + aspartame and 4) An experimental environment with yeast grown in YEPD + stevia. Total RNA was then extracted and evaluated using gel electrophoresis allowing visualization of the ribosomal RNA subunits. Subsequently, cDNA was made from the extracted total RNA specifically targeting the mRNA within the sample. PCR was then performed to examine particular genes of interest in the cDNA and their relative degree of expression was compared via gel electrophoresis.

The effects of traditional Weight Training versus Crossfit on various measures of physical performance: a case report in a 25 year old healthy and fit female

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Abstract

The purpose of this case study was to determine the effects of the CrossFit Workout versus Traditional Weight Training on various performance indices. During the 4-week experimental periods for each of the workouts, the subject consumed a standard Mediterranean diet. Each workout was conducted 3 times per week during those 4 weeks. No pre-workout stimulants were used in either of the workout regimens. Tests were done at the end of the experimental periods to determine the effects each workout had on strength and performance, which were compared to the pre-workout “control” data. Significant changes were found in the vertical jump test after both workouts when compared to the control data. The vertical jump after Weight Training regimen was at 46.5cm high and after Crossfit was 51.7cm high, while the control pre-workout jump reached 42.5cm high. Both exercise regimens showed an increase in fitness and performance when the post-exercise tests were compared to pre-exercise control fitness tests. No changes were found in body composition, body mass index (BMI) or waist and hip circumferences. Being that the subject was already in athletic shape, to achieve a distinct change in the body composition, shape and BMI would require a more extensive training. In conclusion, both a traditional Weight Training program as well as the CrossFit Workout can produce gains in physical fitness.

The Impact of Psychological Stress on an Acute Stress Challenge: An Investigation into Biochemical, Social and Personality Correlates

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Faculty Advisors: **Dr. Jaime Tartar and Dr. Allan Schulman**

Abstract

Stress exposure activates a variety of physiological coping systems. While acute stress responses are considered important for healthy coping, overexposure to stress results in an alteration of the functioning of the stress (HPA) axis, leading to a variety of deleterious psychological and physiological effects. For that reason, understanding and explaining these mechanisms is essential. Here, we sought to determine whether chronic psychological (examination) stress would result in a decreased ability to mount an acute stress and immune response. We also assessed locus of control and social support measures. Thirty subjects participated in 2 sessions (baseline and examination week) in which they underwent an acute stressor- the Cold Pressor Test (CPT). Salivary samples of cortisol and S-IgA were obtained before and after the CPT during both sessions. The results demonstrated that, as predicted and consistent with previous findings, both S-IgA and cortisol increased after exposure to the acute stress during both sessions. We further found that compared to the baseline week, the examination (chronic stress) week resulted in a blunted cortisol response to the acute stressor (CPT). There was no apparent effect of the examination stress on the immune response to the CPT. Neither social support nor locus of control measures were related to individual differences in stress responses during baseline or examination week. Combined, findings from this study show that chronic psychological stress has divergent effects on adaptive acute stress responses- a blunting of the body's ability to mount an acute cortisol response and preservation of an acute immune response.

The Impact of Speed Reading on the Generation of Inferences

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Abstract

This experiment explores the effect that speed-reading has on the inferences made while reading texts. More specifically it will compare comprehension and inferences made between participants that read at a normal rate and participants that have been trained to read at a faster rate than normal. Speed-reading courses promise the ability to learn how to take in larger amounts of text and information than normal reading. However, most research has shown that while these courses increase reading speed, comprehension and retention of the material suffers a significant drop (Just, Carpenter, & Masson, 1986). Very little research has examined the effects speed-reading has on inference generation. As people read they naturally make inferences about the material they are reading. This natural tendency allows readers to connect ideas and events in a passage and fill in any missing information. In general, inferences are important for readers to understand passages and for long-term memory storage. The purpose of this experiment is to explore how speed-reading influences the generation of inferences during reading. In the experiment, subjects will read text passages which require inference generation for deep comprehension. After reading each passage, subjects will perform a lexical decision task to determine whether the inference has been generated or not. Given that speed-reading has been found to hurt comprehension, it is expected that speed-reading should also disrupt the necessary mental processes for inference generation, as measured by accuracy and reaction time on the lexical decision task.

The Influence of Emotional Regulation on Response Inhibition

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Faculty Advisors: **Dr. Leanne Boucher and Dr. Jaime Tartar**

Abstract

The relationship between emotional regulation and response inhibition is examined. The presentation of highly arousing emotional pictures interferes with ongoing cognitive processes such as one's ability to inhibit an unwanted response. In study 1, we measured emotional regulation and response inhibition independently. Results indicated that low emotional regulators exhibited faster reaction times. However, we did not find a correlation between emotional regulation and response inhibition. In study 2, we will examine the collective influences of emotional regulation and response inhibition. Participants will be trained to either up-regulate or down-regulate their emotional reactivity to highly-arousing negative stimuli. We predict that participants exposed to negative images will reveal slower response inhibition times; we further hypothesize that trained participants will demonstrate improved inhibitory control.

**The Influence of Emotional Stimuli on Attention Sharing in a Dual Modality ERP Paradigm:
Effects of Varying Interstimulus Intervals**

Amanda Lynch

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Faculty Advisor: **Dr. Jaime Tartar**

Abstract

A large and growing body of evidence demonstrates that attention is preferentially allocated to stimuli with emotional content. Emotionally negative stimuli serve as a mechanism of biological preparedness to enhance attention. In agreement with this idea, previous studies looking at the influence of emotional pictures on tone processing showed that the ERP measures of cognition was reduced when participants were exposed to an emotional picture with intermittent auditory startle probes. We hypothesized that if an auditory oddball (attention capturing) stimulus was placed in the same perceptual time frame as a preceding emotional picture, the auditory stimulus would then share attention resources with the visual stimulus. To this end, we employed a dual sensory modality task, wherein emotionally negative pictures were contrasted with emotionally neutral pictures and each picture was immediately followed by a tone in an auditory oddball paradigm. We have observed the influence of the emotional pictures at a short (600 ms) and long (2000 ms) interstimulus (picture-tone) interval. We find that only the short (600 ms) interstimulus interval alters attention resources to the subsequent tone. Combined, these results suggest that shared attention resources only occur at the short interstimulus interval. Here, the visual LPP to negative pictures likely serves as an ERP counterpart of the early stages of selective attention (if this longer interval will alter the attention), implying that an emotionally arousing or emotionally negative stimulus results in further automatic stimulus evaluation.

The Language of Mathematics: Proof without Words

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Faculty Advisors: **Dr. Frank Zhang and Dr. Abdelkrim Bourouihiya**

Abstract

Mathematics is the language of the sciences. Unlike most other scientific laws, mathematical laws are by nature unbiased and irrefutable, and as such, tend to be accepted as truth in a way that other scientific laws cannot. While understanding the proofs of many well-known mathematical facts requires a high level of mathematical maturity, there are also many (perhaps not so intuitive) facts whose proof can be easily understood by anyone. The goal of this project is to show the use of mathematics as a language in the hope of providing insight into the beauty of mathematics.

The Occurrence of *Helicosporidium* in Freshwater Bodies in South Florida

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Faculty Advisor: **Dr. Aurelien Tartar**

Abstract

Helicosporidium is a mosquito pathogen found in most South Florida water ecosystems. It is composed of four cells and related to green algae but is non- photosynthetic. It has been proven to be a vector control agent and has therefore shown the potential to eradicate mosquito-borne diseases. However, barely any biogeographical and ecological data regarding *Helicosporidium* exists. In order to determine the occurrence of *Helicosporidium* in environmental freshwater samples, water samples were collected from a local south Florida natural freshwater body. The metagenomic DNA extraction and specific amplification of *Helicosporidium* 18S rDNA genes using Polymerase Chain Reaction were then performed using the Qiagen PCR purification Kit. The result was viewed using gel electrophoresis in 1% agarose gel. These techniques produced visible bands suggesting the presence of the *Helicosporidium* gene. The extracted DNA was then amplified using using MGR and MGF primers, which also produced bands, confirming the presence of *Helicosporidium* in the everglades as well as natural lakes.

The Real Within the Dream

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Faculty Advisor: **Dr. Suzanne Ferriss**

Abstract

Latin American modernist authors were inspired by European surrealists to craft their own experimental style, magical realism. In his short story, "The Night Face Up" ("La Noche Boca Arriba"), Argentine author Julio Cortázar employs magical realism to alter the reader's perception of the "real" and the "dream" world. The story opens with an unnamed protagonist who gets into a motorcycle accident. The remainder of the story alternates between scenes from his hospital bed and scenes from a presumed dream, where he is a Motecan warrior running from the Aztecs. The reader is expected to believe that the hospital scene constitutes reality when, in fact (or fiction), it is the dream. Our presentation will discuss several indicators that prove the presumed dream to be "real," such as uses of smell, voids in time, references to a trail and the absence of common names of objects. We will argue that Cortázar provides in his short story not just entertainment but a lesson in perception: we should refrain from allowing our own perceptions of reality interfere with the perceptions revealed in the story, because if we do, we will be taken quite literally on a ride.

The Relationship Between Number of Facebook Friends and Self-Esteem

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Faculty Advisor: **Dr. Megan Fitzgerald**

Abstract

Previous studies have identified relationships between social networking sites (SNSs) and the variables of its users such as age, gender and personality type. The growing popularity of SNSs has prompted the initiation of the current study which seeks to identify if a relationship exists between a Facebook user's number of online friends and his/her level of self-esteem. A Facebook Questionnaire, the Rosenberg Self-Esteem Scale, and the Eysenck Personality Questionnaire-Revised (EPQ-R) will be administered to a sample of students and adults ages 13 to 55.

The Study of *Lagenidium Giganteum* *crinkler* genes

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Aurelien Tartar**

Abstract

Lagenidium giganteum is an entomopathogenic oomycete that is known to infect and kill the larvae of mosquitoes. Due to this characteristic, the organism has been deemed a potential alternative to chemical insecticides. This information is significant when the world issue of mosquito control is considered. The human death toll now reaches one million per year by mosquito-borne diseases, and the research on potential alternatives to chemical insecticides is quite minimal. Only seven *L. giganteum* protein-coding gene sequences have been reported to date, and the objective of this project is to accelerate the gene research of *L. giganteum* and identify the genes that are part of the pathogenicity process. In this way, the discovery of a bioinsecticide against mosquitoes could potentially be developed. The study would increase the understanding of the molecular basis interactions of the host and pathogens. The experiment will consist of utilizing the complete genome sequences of currently known six oomycete genomes in order to analyze the complete genome sequence of *Lagenidium giganteum*. These genes will then be screened for genes that are involved in any pathogenicity process. In this research, polymerase chain reaction and gel electrophoresis techniques will be used for the analysis and screening of the transcriptome for this pathogenic *Lagenidium giganteum*, and the sequencing of selected full-length transcripts. More specifically, *crinkler* genes were targeted, as they have been associated with host cell toxicity in plant pathogens. The results of this research will illustrate the progress made in identifying parts of this unique pathogenicity process.

The Universe Divine

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Faculty Advisors: **Dr. Chetachi Egwu and Dr. Weylin Stern glanz**

Abstract

“The Universe Divine” is a short film that follows Sam, a passionate young man at an important crossroads in his life. After an unsettling dream, we see that the Universe may have different plans for Sam than those he envisioned for himself. The film is directed by Alyiece Moretto. Other crew members and actors include Patrick Watkins, Cohen Robinson, Kathleen Bushong, and Jamie Mattocks.

The Widening Spectrum of Celiac Disease

Mary-Catherine Fleck

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Robin Sherman**

Abstract

Celiac Disease or *Celiac Sprue* is a chronic autoimmune disorder with a genetic component. Gluten or *gliadin* is a protein found in wheat, rye and barley. Ingestion by genetically susceptible individuals, under certain conditions such as surgery, infection, or severe emotional stress can trigger the onset of Celiac Disease, the production of *anti-gliadin* antibodies, which destroy the villi lining the lower intestines. This is where most of the nutrients for sustenance are absorbed and hence can lead to malnutrition, diarrhea, anemia and fatigue; the villi gradually get restored, only upon exclusion of gluten from the diet. What was once only thought to be a childhood gastrointestinal affliction is now known to be multi-systematic in nature, the exact physiologic mechanism is yet to be identified though anti-body production, chronic inflammation and cytokine cascades are acknowledged. This reaction can perpetuate a myriad of symptoms, regardless of age from *Dermatitis Herpetiformis* to migraines. Since the advent of endoscopy, serologic and genetic testing Celiac Disease is readily diagnosable, yet it remains underdiagnosed despite affecting one percent of today's 'healthy' population. Due to this immune-mediated pathology, seemingly unrelated symptoms go unnoticed leading to a misdiagnosis or diagnosis of the symptom, especially when one presents without gastrointestinal symptomatology. Despite a recognized immune mediated pathology Celiac Disease is often overlooked and notoriously thought of as merely a disease of the gut. Exploring the research on the extra intestinal manifestations widens the spectrum of Celiac disease, and proves quite clinically significant as Celiac Disease is on the rise.

TMNT: Dynamic Models of Cancer and HIV

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Faculty Advisor: **Dr. Evan Haskell**

Abstract

Differential equations are used to build dynamic mathematical models for systems and nonlinear phenomena, which dynamically change with time. Ordinary differential equations describe a relation that contains functions of only one independent variable, and one or more of their derivatives with respect to that variable. Applications of those models are found in biological systems. In one study, homogeneous mathematical models are used to describe the interactions between cancerous cells and the immune system. Modeling using differential equations will allow better understanding of the behavior and spreading of those malignant cells. The models will investigate the dynamics of populations of cancer cells, the mechanism of immune surveillance, whereby the immune system identifies and kills foreign cells, the interactions between cancer cells, immune cells, and other type of cells or signaling proteins and the interacting components of the tumor microenvironment. These mathematical models of differential equations will provide a simpler framework within which to explore the interactions among tumor cells and the different types of immune and healthy tissue cells. Another application of models is in HIV dynamics, which have aided significantly in AIDS research. Deterministic dynamic models are used to study the viral dynamic process for understanding the pathogenesis of HIV Type 1 infections as well as antiviral treatment strategies. This study estimates the parameters of a long-term HIV dynamic model containing constant and time varying parameters by using HIV viral load and CD4 + T cell counts.

Total Synthesis of Functionalized Acenes

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Faculty Advisor: **Dr. Beatrix Aukszi**

Abstract

This research project is focused on the total synthesis of three different acene dinitriles. With the understanding that syntheses of such acenes are affected by chemoselectivity, it is imperative that proper protocol be followed in order to produce the desired acenes in a favorable and useful yield. By means of Wittig reactions, condensation and reduction reactions the final product will be formed. Acene-2,3-dicarbaldehyde is utilized as a starting compound undergoing a Wittig reaction and a consecutive Aldol reaction to produce a second ring with diester functionalities. Following reduction to a dialdehyde a modified Wittig reaction and consecutive Aldol reaction will ensure formation of the third fused ring with dinitrile functionalities. Formation of proper intermediates and final product will be confirmed via Infrared Spectroscopy (IR), Gas Chromatography-Mass Spectrometry (GC-MS), and Thin Layer Chromatography (TLC). Obtained products will be utilized for further research by collaborator, Dr. Donald Baird.

Transcriptome analysis of *Lagenidium giganteum*

Jennifer L. Grant

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Faculty Advisor: **Dr. Aurelien Tartar**

Abstract

Mosquitoes are carriers of numerous diseases for instance, malaria and west-Nile virus. *Lagenidium giganteum* is a parasitic organism during larval stage that infects and kills mosquitoes. In time, this could be proven to be useful in bioengineering to create an environmentally safe insecticide. Molecular research was performed in order to determine the imperative genes in *Lagenidium giganteum* that hinder the development in mosquito larvae. A culture of *Lagenidium giganteum* was used to extract RNA and initiate a transcriptome analysis. Large scale sequencing led to the annotation of 20,000 transcripts. PCR amplification was performed using a Qiagen PCR kit in order to sequence full-length transcripts. Numerous sequences were determined allowing for further analysis of the *Lagenidium giganteum* genes that are associated with pathogenicity.

Validation of an alternative microbiological method for nutritional supplements and over-the-counter drugs

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Faculty Advisor: **Dr. Joshua Loomis**

Abstract

This project is focused on determining the efficacy of the alternative microbiological plate counting method, the 3M Petri-Film plate reading device. The 3M plate reader device is used for high volume microbial enumeration of food products in large food manufacturing facilities. This device claims to increase operator speed by 3 times providing considerable cost savings to companies performing 100+ microbiological tests daily. This study was conducted to validate this device for use in tablet, capsule, liquid, semi-solid dosage forms, cleaning validations, and water sample testing. With this project we were compared plate counts on the Petri film device to plate counts on standard media. We performed testing on USP listed microbes for testing of aerobic plate counts, total yeast and mold counts, and identification & enumeration of *S. aureus*, *Salmonella*, *E Coli*, and *P. Aeruginosa*, *C. Albicans*. We are also tested for total coliforms. This report shows equivalent counts when comparing known quantities of microbes in a range of dilutions on standard plate to dilutions on Petri-film plates. With this study we determined that the 3M Petri film device is capable of providing faster & equivalently accurate microbial growth results to standard plating methods.