



Graduate Student Research Day 2011

PROGRAM BOOK

Friday, April 8, 2011

**Live Oak Pavilion and
Grand Palm Room**

Boca Raton Campus



GRADUATE STUDENT ASSOCIATION
Florida Atlantic University



**Research Day
Friday, April 8, 2011
Presenter Abstracts**

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DOROTHY F. SCHMIDT COLLEGE OF ARTS & LETTERS

Mathilde Marchesi: A study of her life and work in vocal pedagogy, including historical and modern implications

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Mathilde Marchesi played a significant role in vocal education during the nineteenth and early twentieth centuries. Ms. Marchesi taught many of the prominent female vocalists of her time and published a wealth of material based on the *bel canto* style and her own personal vocal techniques and methods. The research presented includes an examination of Mathilde Marchesi's life dating back to musical influences in early years, and provides extensive information related to her studies with Manuel Garcia II, who played an important role in Marchesi's training and her future devotion to the *bel canto* style of singing. Section II defines the Marchesi method, with in-depth analysis of her instruction books and vocalises. Background information on three of her most well-known students – Nellie Melba, Emma Eames, and her own daughter, Blanche Marchesi, is presented in Section III, along with autobiographical narrative which reveals the relationship between teacher and student and offers insight into Mathilde Marchesi's personality and character. The thesis concludes with discussion of the viability of Marchesi's vocal pedagogy one hundred years after her death, and its applicability in modern voice studios.

Re-Constructing the Past: Women, Time, and Inanimate Objects in Virginia Woolf's *The Years* and Daphne du Maurier's *Rebecca*

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My research focuses on two important woman authors of the twentieth century: Virginia Woolf and Daphne du Maurier. Both authors attempt to redefine the role of women in patriarchal society during the 1930's. The domestic role women had to fill within a masculine household constrained their ability to form an independent "self," apart from fathers/husbands. This thesis explores the possibility of gaining freedom from patriarchal inscription by focusing on the domestic objects in/of the house. Throughout history, women were, and still are, associated with being valued as a desirable "commodity." According to Luce Irigaray, "the passage into the social order, into the symbolic order, into order as such, is assured by the fact that men, or groups of men, circulate women among themselves" (174). In order for women to find their place in the symbolic, they must adhere to the demands of patriarchal society. Moreover, "socially, they are 'objects' for and among men and furthermore they cannot do anything but mimic a 'language' that they have not produced" (Irigaray 187). Since women have no choice but to work within the symbolic order and are already labeled as "object," women writers have manipulated the system by exploring the relationship women have with inanimate, and particularly domestic, objects. In the literary texts of Woolf and du Maurier, women have a unique relationship with material objects in relationship to subjectivity. By examining "objects," women are able to construct themselves as free "subjects" in a male dominated world.

“Between my life that is over and my life to come”: Embodying Authorial Ambivalence in Fred D’Aguiar’s *Feeding the Ghosts* (1997)

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Anglophone Caribbean literary criticism has extensively addressed regional women writers’ responses to their male counterparts’ literary authority. However, it has not attended to contemporary male writers’ responses to women writers’ evolving literary authority and swift ascendance in the international literary market. Consequently, it appears to counteract what it also celebrates: women writers’ active role in the discursive formation of the Caribbean nation. This paper is part of a larger project asserting that women writers’ entrance into the Anglophone Caribbean canon has necessitated contemporary male writers’ renegotiation of a formerly exclusive literary authority and attendant responsibility to write the nation. I argue that contemporary male authors’ negotiation of what David Scott calls the “problem space” borne of shared literary authority within the Anglophone Caribbean has resulted in a persistent ambivalence that pervades their works. This ambivalence is most clearly evidenced in these authors’ construction of female protagonists, namely their corporeality, agency and capacity for verbal expression. Fred D’Aguiar’s *Feeding the Ghosts* features the slave Mintah as a female protagonist who offers a firsthand account of colonial subjection; here, I demonstrate how Mintah also serves as an embodiment of the ambivalence produced through male writers’ renegotiation of literary authority. My reading of D’Aguiar’s text challenges a critical paradigm and counters the formation of another problem space by activating women writers’ work in the formerly male-dominated Caribbean canon rather than fixing their place within it.

Mining in Ecuador: Alternative Development Perspectives and Environmental Decision-Making

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The new mining law in Ecuador sparked reactions from indigenous populations in Ecuador. Despite concerted efforts made by the new Ecuadorian government to include environment health in the constitution, indigenous groups argue that the new mining law remains unconstitutional and needs to be repealed. However, Canadian Mining Company IAMGOLD was allowed to continue mining exploration and development in the Southwestern areas of the country. In this paper, I will use political economy, political ecology and environmental justice theories in order to understand the power struggles and environmental discourses between the Ecuadorian state and indigenous groups in the Southwestern town of Victoria del Portete. Furthermore, I will expand on the dynamics between groups and how their views on development differ - on one side the government and transnational companies and on the other the indigenous populations and non-governmental organizations. In addition, I will analyze the history of dependency from the neoliberal policies coming from Northern institutions and their development models.

Documentary Theatre: Pedagogue and Healer *Health Stories of Hiroshima and Pearl Harbor Survivors*

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In my dissertation research project, I suggest that documentary theatre is a vehicle used to educate the audience and promote cross-cultural awareness. Documentary theatre has long been considered a vehicle for learning. Stories and experiences told from different perspectives within the diegesis of the verbatim script aim in underscoring events as they were witnessed, often calling upon memories and emotions as though they were recently experienced. Through the telling and re-telling of personal historical account, the documentary format serves to provoke, inspire, and ultimately aid the healing process.

Even though the catastrophic events of Pearl Harbor and Hiroshima occurred during World War II over half a century ago, survivors, such as those of the Holocaust, remember the events as if they were witnessed yesterday. In the spring of 2010, Dr. Patricia Liehr (professor) and Lisa Marie Wands (doctoral student), from the Lynn School of Nursing at Florida Atlantic University, approached me to write a documentary play script based on health records and interviews gathered from American and Japanese survivors of Pearl Harbor and Hiroshima. In addition to using conventional methods of research, they were interested in reaching a broader audience through documentary theatre. I was eager to comply. Their voices, stories, and histories needed to be heard, not as culturally segregated entities, but as one. While the play itself still a “work-in-progress,” a tentative date has been set for a public presentation at the Morikami Museum and Japanese Gardens on December 7th, 2013.

Industry and Inlets of Florida's Indian River Lagoon, 1842-1900

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Mid to late nineteenth century settlers in Florida's Indian River Lagoon region adapted to life in a simultaneously fertile and hostile environment. Facing heat, mosquitoes, malaria, interaction with Native Americans, and most importantly, near-total isolation from the rest of the world, the Lagoon's nineteenth century settlers adapted by agricultural experimentation, altering the ecology of their environment, hunting non-traditional food sources and modifying traditional boats to meet their needs in this watery environment. The last decade of the nineteenth century saw the coming of Henry Flagler's railroad and with it the outside world, ending the isolation, which forced the lagoon's settlers to be largely self-reliant. The sweeping changes ushered in with the railroad dramatically altered the industry and culture of the lagoon. These early settlers opened two inlets connecting the mostly fresh water body with the Atlantic Ocean, forever changing the composition and face of the lagoon. I intend to research both how the settlers were changed by the Indian River (it saw the adaptation of cotton farmers into fishermen, boat builders, traders, wreckers, and citrus and pineapple growers), and how the settlers changed the lagoon by focusing on the opening of the inlets.

An Examination of Post-Vatican II Music for the Catholic Liturgy: Ethnic Diversity as a Vehicle of Unity

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The Second Vatican Ecumenical Council of 1962-1965 initiated the translation of the Roman Catholic liturgy into languages other than Latin, spurring numerous ethnic liturgical settings, which have in turn transformed the liturgy. Following an examination of the musical history of the Catholic Latin liturgy, this document considers the position of those who oppose the cultural progress of post-Vatican II liturgical musical settings and who view these settings as less unified in Christian scripture and prayer than pre-Vatican II settings. The study then contributes to research in support of post-Vatican II settings through an analysis of examples of liturgical settings from different cultural backgrounds (Vietnamese, Hispanic, and Filipino) and a discussion of their positive usage and unifying effects within Catholic communities. Musical approaches which these cultures have taken to the liturgy are demonstrated, including: the translation and musical interpretation of the same text in each culture's own tongue, the incorporation of ethnic musical qualities such as rhythm, melody, and vocal styles, and the embracing of traditional ethnic instruments and styles of worship. Demonstrating musically the way in which culture-specific settings of the liturgy have impacted the Church community clarifies the benefits of many modern developments, helping the reader to understand how ethnic diversity in the Catholic liturgy is not a means of dissention; rather, it can serve as a vehicle of unity. Through their inclusion of diverse musical and cultural styles, post-Vatican II settings do not constitute a break with the past but rather continue the Church's catholic (universal) mission.

Women at the Heart of Change in Early Modern Spanish Theater

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At the heart of the Early Modern Spanish theatre community, female actors influenced the direction of plays and its response to the external forces that worked to control them. Motivated by a need to move freely from 'object' to 'subject' to establish their subjectivity, they interpreted their role in society according to their own experience. Many playwrights challenged the notion of inherent right to love and honor in their plays, presenting them as viable ideas to those outside the higher stratum, and making it possible for other classes to experience high art by imagining themselves in the process of change. At the heart of this change was the woman of the stage. In my dissertation, I apply the notion of somaesthetics, which examines the interaction of art, interpretation, and experience, to prove how the new theatrical art provided a way of dealing with everyday experience as well as how the seventeenth-century female Spanish actor embodied her role—erasing the line that separated her onstage character from her offstage persona—and how her embodied experience influenced the playwright and the success of the plays. I illustrate how women of the stage used the theatre to expand their roles on society, not by *mirroring* it but instead by *experiencing* it.

Utopias Imagined and Real: The Communities of George Rapp and Robert Owen in Relation to the Utopias Conceived by Plato and Sir Thomas More

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Plato and Sir Thomas More wrote about ideal societies. Much of their writing dealt with the qualities of the ideal leader of Utopian Societies. In this paper, the intentional communities of George Rapp and Robert Owen are compared to the literary utopias of Plato and More, with particular emphasis on the nature of the leaders. This comparison is illuminated by academic dialogue on the nature of leadership. Models of leadership which state that leaders must be virtuous, are contrasted with those that argue that leaders must be effective, which requires the type of compromise and calculation that arises from a darker nature. Both Plato and More described virtuous, well-educated leaders in their respective utopian visions. Neither Owen nor Rapp received an exemplary education, and both of these men exhibited a mixture of positive and negative character traits. I conclude that although neither Rapp nor Owen measured up to the ideal leaders of established societies envisioned by Plato and More, they did possess the skills necessary to found real communities, which may be a different set of skills than is required to rule an established society.

COLLEGE OF BUSINESS

Business: Ratio metrics

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Ratio metrics are commonly used to analyze corporate financial statements to compare companies according to common metrics regardless of size. Typically small sets of corporations are submitted at one time to this type of analysis. According to these methods however, the comparison of ratios could theoretically be used to rank every corporation listed on the NYSE. This type of ranking could uncover details such as relative profitability, benchmark values, and fluctuations due to market psychology. The ratios of each corporation are supplied by an automated data-extraction mechanism from xignite.com in XML format. The results available online display each corporation by major exchange dynamically according to ratio.

COLLEGE FOR DESIGN AND SOCIAL INQUIRY

Does the Presence of Nonprofits Carbon Offset Groups Enhance Public Stakeholder and Private Shareholder Values in Public-Private Partnerships?

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With the advent of a carbon cap and trade program commencing in 2012 in the State of California, a revisit of the presence of non-profit carbon offsets groups upon the legitimacy and credibility of climate change focused public-private partnerships is both timely and relevant. Burgeoning global green public-private partnerships are providing pragmatic mechanisms for the delivery of sustainable solutions. Increasingly, the presence of third-party carbon offset groups is appearing at the forefront. Recent events have called into question the validity of carbon offsets as an instrumental means with which to combat climate change. Set against a backdrop earmarked by fiscal constraints, revenues resulting from such projects are already being diverted to general funds, thereby losing their perceived impact. This experience highlights a major challenge among state and local governments - how do we link environmentalism with financial stewardship? Amidst the challenges, local governments are teaming up with private sector participants. Carbon offset groups are perceived to lend value to such undertakings. The purpose of this study begins to address the issue as to whether carbon offset groups, in the role of a third party nonprofit organization, enhance stakeholder value for the public sector while maximizing shareholder value or profit for the private sector. Several case studies involving carbon offset groups, local governmental organizations, and commercial businesses will be examined. Quantitative and qualitative approaches to the study will be conducted with the intended results potentially serving as a recommendation for utilization of carbon-offset groups by public-private partnerships.

The Planning Living-Lab Network™

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The Planning Living-Lab™ Network is an interdisciplinary project between the School of Public Administration and the School of Urban Planning. It is a platform of collaboration that brings together and involves all stakeholders, such as end-users, researchers, industrialists, policy makers, etc., at the earlier stage of the innovation process. Living labs move research out of laboratories into real-life contexts to stimulate innovation. This allows citizens to influence research, design and product development. Users are encouraged to co-operate closely with researchers, developers and designers to test ideas and prototypes. Functioning as Public-Private Partnerships, especially at regional and local level, living labs provide some advantages over "closed labs": they stimulate new ideas, provide concrete research challenges and allow for continuous validation of research results.

Understanding the ‘good’ in ‘good public procurement’: A survey of the perspectives of public procurement specialists

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Public procurement is an area that until recently has received relatively little theoretical attention. While things have improved within the last decade, there are still considerable gaps in the literature. In this paper the researchers deconstruct the existing body of literature on the economic, political and social impacts of public procurement and public procurement reforms, domestically and internationally. Based on survey data the paper identifies what public procurement specialist believe ‘good’ procurement should attain. The study delineates several perspective dimensions and culturally sensitive attitude patterns that are useful in depicting the expectations of a ‘good’ public procurement process. The researchers argue that the visibility and significance of public procurement process is only expected to grow and appropriate procurement reforms can lead to significant economic, political and social benefits. The financial dimension of public procurement within a country’s economic activity makes responsible and effective public procurement practices and processes an essential aspect of economic growth and of good governance.

COLLEGE OF EDUCATION

Identifying Barriers to Accessibility for Individuals with Visual Impairments in Transition and Employment

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With the advent of online education and proliferation of the web-based education, barriers to access have been created for the transition and employment of children and adults with visual impairments and blindness. This may account for the lower yields of educational attainments and employment in all age ranges. In the year 2008, an estimated 34.0 percent ($\pm 0.27\%$) of non-institutionalized persons aged 21 to 64 years with a disability in the United States have an educational attainment of a high school diploma or equivalent. 29.7 percent ($\pm 0.27\%$) of non-institutionalized persons aged 21 to 64 years with a disability in the United States have an educational attainment of some college or an Associate degree. Only an estimated 12.3 percent ($\pm 0.19\%$) of non-institutionalized persons aged 21 to 64 years with a disability in the United States have an educational attainment of a BA degree or higher. Employment statistics reflect similar trends, as only 26.4 percent ($\pm 1.10\%$) of non-institutionalized persons with a disability, ages 16-20 at all education levels in the United States were employed, and 38.7 percent of non-institutionalized persons with a disability, ages 16-64, were employed. These numbers may reflect barriers to education and subsequent employment. People with visual impairments often do not drive, therefore removal of barriers may allow more people to get degrees and obtain employment because online education lessens transportation issues. Through analysis and sampling of multiple programs this study will examine the technical aspects of barriers and their effect on success rates for visually impaired individuals through college.

A Comparative Analysis of Environmental History Programs

Lindsay Feinberg and Ernest Brewer

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Environmental history is the study of human's interaction with the natural environment in the past. The ultimate goal is to deepen our understanding of how the environment in the past has affected humans and how they have affected the environment and with what results. Many history museums now include environmental history programs and/or exhibits showcasing their local environmental history. These programs may become more important in the field of environmental education in the future and compliment the idea of place-based education. To date, little research has been done studying the outcomes of such programs. Do they increase environmental awareness or responsibility in participants as a result? The Historical Society of Palm Beach County currently runs an environmental history program. However, it is only a small part of a larger program. Using the participants of this program as a sample, through unobtrusive observation analysis, the present study attempts to gather data on how participants' environmental awareness and attitudes are affected as a result of the program. The author hypothesizes that a longer, more inclusive program will have greater affects on participants.

Effects of seventh grade hands on science field trip performed at Gumbo Limbo compared to same lesson in classroom setting on student performance

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Using pre and post-test student data, this study will examine the effects of an environmental science seventh grade field trip program conducted at Gumbo Limbo compared to the same lesson in a regular classroom setting by using quantitative & qualitative data. Pre and post tested will be created in order to examine student content knowledge, higher order thinking, perceptions and enjoyment. Teachers will also be surveyed in the study. Quantitative and qualitative data will be gathered and collected from pre and post-test, student surveys, and teacher surveys. By participating in field trips students and teachers can be positively affected. Students can also be motivated in the study of science after these hands on field trip experiences. This research expands the research done on Gumbo Limbo Nature Center, environmental education and field trips.

A formative evaluation of the Grassy Waters Preserve Aquatic Connections and Watershed Awareness (ACWA) environmental education Program

Sarah Hopler^{1,2} and Carol Meltzer^{1,2}

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This ongoing formative evaluation seeks to determine if participation in an Aquatic Connections, Watershed Awareness (ACWA) Environmental Education program at Grassy Waters Preserve lead to improvements in students' knowledge of wetlands ecosystems and attitudes towards the natural environment and conservation. Both cognitive and affective growths are desired outcomes of a successful environmental education program. Knowledge of ecosystem processes and environmental issues leads to environmental literacy, however there is not a direct relationship between knowledge and pro-environmental action. An emotional connection to the environment is also a key component. Successfully developing both environmental literacy and a sense of environmental stewardship in students is crucial to Florida's future. Florida's next generation is sure to face serious threats of environmental degradation and inadequate supply of fresh water. Environmental education programmers, funding sources, and other stakeholders must strive to ensure that programs like ACWA successfully provide students with the emotional and cognitive abilities to make informed decisions and take appropriate action regarding water and wetland conservation. This evaluation employs a pre-test/post-test quasi-experimental design to collect quantitative and qualitative data on students' environmental knowledge and attitudes in order to determine the cognitive and affective outcomes of the ACWA program. These findings will be used to validate the importance of this field-based environmental education program and to make recommendations to improve the ACWA program in the future.

In-Field Practical Application Experiences

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The following research proposal seeks to identify a solution to the following problem: how do we prepare students, upon graduation, to enter the workforce in a competitive manner? This proposal identifies experiential learning experiences, or those learning experiences, which provide students with hands on, practical, and meaningful experiences, as one method for preparing students to enter the workforce. Armed with meaningful, practical experience students may be more marketable and competitive when entering the workforce. One method for experiential learning at the higher education level is providing students the opportunity to participate in a thesis/internship course within the program curriculum. The purpose of this research proposal is to identify whether or not the addition of a thesis/internship component would enhance student learning and workforce preparedness for students within the master's degree of environmental education program at FAU. The methodology used in this study begins with a comparative analysis considering other degree programs within the university, which may or may not contain a thesis/internship component. This analysis hopes to identify trends and some of the best techniques for adding an internship/thesis component into a curriculum. Contributions from this proposal will ensure that the master's degree in environmental education satisfies the goals set forth in the 2006-2013 University Strategic Plan.

The Adaptability of Academic Advising Teams in Higher Education

Leigh McFarland and Patricia Maslin-Ostrowski

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Academic advising teams interact directly with students, parents, faculty, the registrar, and admissions; yet, they are rarely consulted about changes to policy and procedures in the university. Being in this position, advising teams tend to be the most knowledgeable about what the consequences will be to the students and the university systems. Often, communication does not happen and advisors are left uninformed. The purpose of this single site case study is to identify how four advising teams in a medium-sized public university adapt to the changes presented to them and what role leadership and culture play in that adaption. This is accomplished through analysis of advisor and administrative interviews, office and meeting observations, and reviews of documents relating to advising. Changes are defined as changes in academic policies and procedures, specifically, curriculum changes and the addition of forms and systems. Culture is defined as the shared norms and beliefs among a group, in this case the academic advising team. The key themes emerging from this dissertation are the dynamic among the group, the positive and negative influences of external people or units, and the role of leadership in and outside of the group. Preliminary findings show that self perceptions, external perceptions, and group and organizational culture have an influence on how advising teams adapt to changes.

The Junior Naturalist Program

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The Junior Naturalist Program as offered by the Busch Wildlife Sanctuary in Jupiter, FL was examined. The Junior Naturalist Program, an environmental education program designed for children ages 9-14, consisted of six 3-hour sessions. The stated objectives of the program were to foster appreciation for nature and wildlife and to learn their importance. A formative program evaluation to gauge how successfully the program was meeting its objectives was conducted through the use of educator and student interviews and observations, as well as alternative assessment tools. Observation forms and score codes were used in staff and program observations. Student observations were conducted through noting occurrences of specified conservational and destructive behaviors, in addition to anecdotal observations of student engagement. Learning outcomes were assessed through an oral discourse alternative assessment after the students performed an issue investigation exercise. This program evaluation was then used to design a restructured Junior Naturalist Program to better meet the program objectives and learning outcomes of environmental education.

Does Participation in the It's Not Easy Being Green Camp Program at the Miami Seaquarium lead to improvement in student's knowledge of endangered animals and marine habitats as well as their attitudes towards conservation and preservation?

Summer Scarlatelli and Dr. Carol Meltzer

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This capstone study discusses the current state of environmental education, how important it is that children partake in educational activities outside of the classroom, and how zoos and aquariums give children a stronger connection to nature. With the population of the world expanding, children need to understand how human interactions affect animals and their ecosystems and they need to be given the opportunity to be shown how they can help and protect our biosphere. The question to be answered through this capstone study is “does participation in the It's Not Easy Being Green Camp Program at the Miami Seaquarium lead to improvement in students' knowledge of endangered animals and marine habitats as well as their attitudes towards conservation and preservation”? The target research group was all 6th -12th grade campers who participated in Miami Seaquariums Spring 2011 camp and the instrument used to collect camper information was two-part questionnaire. The first section was a set of ten objective questions to assess camper's ecological knowledge about animals and ecosystems present at the Miami Seaquarium. The second section of the questionnaire consisted of 10 statements taken from populationconnection.com and related to campers attitudes and apathy towards the environment.

Everglades Education: Analysis of the 'Everglades on You Program'

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The following research seeks to identify the strengths and weaknesses of the 'Everglades to You program', and develop educational material to be used for this program in the future. The 'Everglades to You' program is delivered by the non-profit Arthur R. Marshall Foundation as an outreach program to classes who cannot afford a field experience. The methodology in this research began with an internal, formative, participant oriented evaluation. Quantitative evaluation data was collected in the form of teacher surveys for programs delivered from 2007 to 2010. Qualitative data was collected in the form of a personal interview with Marshall Foundation Education Manager Eric Gehring. Analysis of the data showed that 87% of teachers whose classes participated in the program rated the program content as excellent, and 98% of teachers surveyed would like to repeat the program in the future. Analysis of the data also showed that the program is in need of pre and post visit material, which closely aligns with Next Generation Sunshine State Standards and can function as a supplemental FCAT exercise. The additional material for the Everglades to You program is currently being created and will consist of grade level appropriate pre and post visit lessons. These lessons will also feature an interdisciplinary component, allowing instructors to teach across multiple subjects at once.

Critical Pedagogy: An Approach to Professional Development for Holocaust Education

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In an educational context dominated by standardization, the preparation of teachers for active and critical engagement of their students is crucial. This study focuses on a Professional Development program offered to prepare teachers for Holocaust education in Florida. Observation and document analysis reveal how elements of critical pedagogy were evident in the goals, the content, and the implementation of the program and the manner in which the program facilitated knowledge construction among teachers with respect to Holocaust education. The findings of the study indicate the value of using critical pedagogy as an approach to maximize learning and to encourage social action.

Fostering Self-Directed Learning in Adolescents Through E-Learning

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Despite the large body of literature on self-directed learning and readiness for this type of learning in adulthood, little research exists on its effects on adolescents. It has been stated that an individual needs a high level of readiness for self-directed learning in order to be successful in e-learning environments. The overall consensus is that in order to take classes in a virtual setting, as opposed to the traditional face-to-face model, one must have some self-directed learning readiness, which according to literature, is something acquired in adulthood. This study proposes that self-directed learning may be fostered at an earlier age if blended learning models are implemented at the elementary school levels and continued through the middle and high school grades. Qualitative observational data; interviews with students; and quantitative survey data is being designed to study the relationship between readiness for self-directed learning in students who take virtual classes at the high school level. While data is still being collected over a period of time to study whether self-directed readiness increases with access to more virtual learning, preliminary findings suggest that when students are exposed to taking classes online they develop an increased readiness for self-directed learning at an earlier age that may possibly effect their learning in adulthood.

COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

Maximum Power Point Tracking of Photovoltaic Systems

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The need for alternative energy sources has increased dramatically over the past 10 years. The demand for oil is higher than ever with emerging economies such as China and India. In addition, there is great concern about the emission of carbon dioxide. It is of utmost importance to create and develop renewable energy sources. Solar energy has been in the forefront of such a demand. However, there is much more research to be conducted from both theoretical and practical viewpoints to make alternative energy sources cost-effective and efficient. In this presentation, the power optimization of solar panels is investigated. Power optimization is extremely important in trying to receive the most energy from any renewable energy source. Photovoltaic cells (solar panels) in particular offer an interesting challenge due to how the weather conditions (irradiation/temperature/shading) constantly change the operating power for a fixed electrical load. Also, different electrical loads will result in different current/voltage outputs for the same weather conditions. In order to optimize the output, DC-DC converters using Maximum Power Point Tracking (MPPT) algorithms are placed between the photovoltaic array and the electrical load. The author has been working on the integration of a complete solar system that optimizes the output power for close to a year. In particular, the author is looking at the reliability of the current proposed MPPT algorithms, and also investigating both transient behavior and the effect of different sampling procedures for these MPPT algorithms.

Low Velocity Impact and Compression After Impact Characterization of Woven Carbon/Vinylester at Dry and Water Saturated Conditions

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The low velocity impact and compression after impact performance at dry and water saturated conditions of plain weave carbon/vinylester composites are examined herein. The composite employed T700 carbon fibers and vinylester 510A and 8084. Quasi-static impact tests were conducted on dry C/VE510A and C/VE8084 so as to estimate the threshold impact force required to cause damage in the composite. Impact tests were conducted on dry specimens and moisture saturated specimens conditioned in seawater at room temperature (RT) and 40°C and humid air at 85% RH and 50 °C using a falling weight impact tester. The impact force response was measured using an accelerometer mounted on the falling weight. After impact loading, selected panels were sectioned for inspection of damage while others were tested in compression (CAI) to examine the severity of the impact event. Upon inspection it was found that the damage caused by the drop weight impact was located near the surface of the top and/or bottom plies and took the form of matrix cracks as well as delamination between fiber bundles. The extent of the damage was found to be confined to an elliptical centered at the impact site of maximum approximate dimensions of 5 x 2.5 (cm) along the long and short side of the panel respectively. The reduction of compression after impact (CAI) ranged from 50 to 60% at an impact with an energy of 47 J. Absorbed moisture reduced the compression strength of the composite materials, but did not cause any further reduction of the CAI strength.

Assessment of Extreme Precipitation Events in Florida during AMO (Atlantic Multi-Decadal Oscillation) Phases

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AMO stands for Atlantic Multi-Decadal Oscillation. The study evaluates the extreme precipitation events for depth and intensity of different temporal durations in different phases of AMO within Florida. A total of 87 rain gages within Florida are selected for the evaluation of these events with long monitoring historical data. The study involves probability distributions to data in different temporal windows that coincide with the AMO cool and warm cycles and assess the variability in different regions of Florida. Also, trends in meteorologically homogeneous rain areas are assessed.

Numerical Simulation of Composite Ship under Hydrodynamic load using Fluid Structure Interactions

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Composite sandwich material is playing an important role in ship structure construction. Structural analysis of a composite multi-hull structure has been performed using finite element analysis (FEA). Two-way fluid structure interaction (FSI) is implemented by coupling FEA with computational fluid dynamics (CFD). Hull structure is made of sandwich construction having composite face sheets and PVC foam core. The finite element catamaran model was built in ANSYS workbench. In CFD code CFX, fluid domain was created and wave motion was simulated based on Sea State 5. Hydrodynamic load was therefore generated in the CFD code. FSI module was then used to connect FEA with CFD module by transferring load and displacement back and forth. Dynamic response of the hull in time domain was generated. A critical area with high stress gradient was chosen and a sub model with refined mesh and layered composite configuration was developed. Force and displacement boundary conditions were transported to the sub model from the global model. Interlaminar stresses and shear stress distribution at the core and girder were then determined. Materials failure criteria for composites and foam were applied on the sub model and structural integrity of each component was checked.

Web-based Wireless Sensor Network Monitoring Using an Android Smartphone

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In this research we studied and implemented a prototype of a web-based wireless sensor network monitoring system. Sensor nodes are used to measure characteristics of the physical environment and measurements are stored on Internet servers using web-based technologies. Smartphones with fast 3/4G cellular data connections have become ubiquitous and provide an ideal platform for developing a gateway for a wireless sensor network. This allows the sensor network itself and the web client users to be mobile, as cellular connectivity is available in most locations. We have developed a prototype for a web-based sensor network data management system that uses Crossbow Mica sensors and Android smartphones for bridging the wireless sensor network with the web services for data storage and retrieval. Our application has the ability to retrieve sensed data directly from a wireless sensor network composed of Mica sensors and from a smartphone's onboard sensors. The data is displayed on the phone's screen, and then, via Internet connection, it is forwarded to a remote database for manipulation and storage. The attributes currently sensed and stored by our application are temperature, light, accelerometer, and compass. Authorized personnel are able to retrieve and observe this data both textually and graphically from any browser with Internet connectivity or through a native Android application. Web-based wireless sensor network architectures using smartphones provide a scalable and expandable solution with applicability in many areas, such as healthcare, environmental monitoring, infrastructure health monitoring, border security, and others.

Systems Identification and Control of an Autonomous Amphibious Vehicle: Experimental Testing & Control Model Validation for an Autonomous Cargo Transport Navy Vehicle

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The DUKW is a Navy concept for an autonomous, amphibious cargo delivery vehicle. A 1/7th scale model was given to FAU for testing and development (DUKW-ling). The vehicle's amphibious capabilities allow it to drive ashore in locations where a port may not be available. This new concept brings design challenges since the surf zone is a new operating environment for autonomous vehicles.

The model will be used to explore the feasibility and performance capabilities of a full-scale version. The DUKW must operate well on land, at sea and the dynamic and energetic surf zone transition region. Path planning and control strategies for autonomously traversing the surf zone are relatively unexplored and require substantial study before implementation. Since autonomous vehicles have historically been designed to perform either on land or in water means little experimental data or control algorithms are available for a vehicle that performs in both.

The focus of this project is to explore this new operating environment and determine the feasibility of amphibious missions. Experimental testing will be performed in the surf zone, for development and experimental validation of adequate models for control, and for better characterization of the vehicle's dynamic behavior in breaking waves. The electronic system will be upgraded, and a vision based obstacle avoidance system will be implemented and developed. This project is part of the Navy's sea-basing concept, which eliminates the need for elaborate ports and reduces logistics on land. The DUKW will provide reliable, autonomous cargo transfer to and from the sea-base.

Evaluating the Impact of Increased Frequency on Light Rail Operations on Private Traffic

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The project addresses impact of the Light Rail Transit (LRT) lines on vehicular traffic on corridors, which intersect with LRT tracks in Salt Lake City (UT). With an increase in spatial coverage and frequency, it is likely that the LRT services will affect vehicular traffic. The goal of this research is to find a solution that will provide smooth operations for both traffic and public transit. This paper investigates such an issue by looking at various operational strategies to develop LRT schedules at a couple of crossings with major arterials. In this study the LRT frequency is increased from 12 trains per hour to 26 trains per hour, which is an increase that may cause problems with increased traffic flows in the future. Five distinctive scenarios were evaluated in a properly calibrated and validated micro simulation model. To further resemble field operations we introduced randomness, like ones observed in the field, for the train arrivals. A scenario, which minimizes red time for vehicular traffic with introducing a small amount of delay to LRT passengers, generated the best results. The findings showed that there were no significant differences between arrivals, which adhered to the schedule and randomized arrivals. Future research should investigate more strategies and potentially introduce an optimization-based search for the best strategy.

A Biologically Inspired Myelinated Neuron Axon Model Using a System Identification Approach

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A method to modeling and simulating neural action potential (AP) propagation along the length of an axon containing a number of Ranvier nodes is proposed in this paper. A system identification approach is employed to determine a transfer function representative of the input-output relationships attributed to the use of the classical Hodgkin-Huxley equations for membrane voltage potential (1952). The identified transfer function model is applied to a site-of –stimulus introduction, of which cascading segments of internodal regions and nodal regions represent the remaining downstream axon. This cascading network is used to simulate “cable” properties and signal propagation along the length of the axon. This work proposes possible solutions to attenuation losses inherited in the classical myelinated cable models and accounts for neuronal AP velocity of propagation as well as introducing signal attenuation and transient delays associated with internodal demyelination.

Operational, Environmental, and Safety Comparisons between Three Innovative Types of Intersection Designs: Displaced Left Turn, Diverging Flow, and Left-turn Bypass

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Traffic congestion is an ongoing issue among the transportation industry. The intense exponential growth of the population in the United States has caused expansion of the urban regions so people have to travel longer distances and spend more time on the roads. These factors cause congestion of the current networks and the demand for new roadway and intersection design is a high priority, as wasted fuel and travel time increases each year. Conventional intersection design has been in use for many years and transportation engineers know that in order to improve the current design of the intersections there are limited options. Some alternatives include building more lanes, overpasses and optimizing signal plans. Thus, engineers have proposed a new method to solve the traffic congestion issue which is the creation of unconventional arterial intersection designs (UAID). The objective of this study is to compare the operational, safety, and environmental performance of three UAID such as the Left-turn Bypass, the Diverging Flow intersection, and the Displaced Left-turn intersection. This study will first evaluate the isolated unconventional intersection designs and then compare the intersections in a network using an existing corridor in the state of Florida. The operational performance will be evaluated based on the different results for average delay time, total number of stops, and queue time while the environmental analysis will include results for pollution levels. While conducting this study the microscopic simulation platform VISSIM v. 5.10 will be used to test different scenarios. In the conclusion we will provide recommendations based on the operational performance of the unconventional intersection designs.

Florida Atlantic University Bus Shuttle Efficiency Study: “Owl Express Shuttle”

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Florida Atlantic University first began classes conducting classes in 1964 in Boca Raton Florida as an upper-level and graduate school only. Over the years Florida Atlantic University has grown and opened its enrollment to full undergraduate and graduate programs housing 10 colleges and 170 degree programs. With the growth and scope of the university programs increasing over the years, student enrollment has exponentially increased since the school's inception. As congestion has increased on campus different traffic and parking initiatives have been enacted on. The parking issue came to the forefront of university issues at the beginning of the fall semester in 2009. The university has implemented a shuttle system to encourage the use of remote access parking, and to reduce congestion on the campus. The intent of this project is to evaluate and make recommendations for the Florida Atlantic University shuttle system. The scope of this study is to review the current shuttle system, and make recommendations on optimizing the shuttle network for the Florida Atlantic University Boca Raton campus for travel time, efficiency, and safety. With the increasing growth of the campus and student body, increasing strain to the traffic and parking conditions have occurred. While approximately net increase of 600 parking spaces were added on the campus from 2006 - 2010, the student enrolled for the same period of time had an increase of 1,364 students. The current ratio of number of students/parking spaces on campus is approximately 2/1 and does not include faculty, staff, and visitors.

The Effects of POSS Surface Treatment on the Interlaminar Property of Marine Composites

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The fiber/matrix (F/M) interface of carbon/vinyl ester composites has been modified by treating the carbon fiber with polyhedral oligomeric silsesquioxane (POSS). The objective was to improve the durability of the F/M interface in various environments. POSS has hydrophobicity characteristics that decrease the water uptake, swelling and corrosion degradation of composites, which is ideal for marine applications. Two POSS systems with different functionalities, namely octaisobutyl and trisilanophenyl, have been investigated. Surface treatment involved de-agglomerating the POSS into a solvent by sonication, soaking the fibers for three hours, and then removing the solvent in an oven. Treated and untreated carbon fibers were then used to make composites using Derakane 8084 vinyl ester resin. Composites samples were immersed in three different environments: seawater at room temperature (SWRT), seawater at 40°C (SW40), and in 85% relative humidity at 50°C (HM50). Over a period of six weeks, POSS modified samples absorbed less water reducing absorption by 20-32% compared to control specimens. Short beam shear tests of samples after exposure to environmental conditions have shown that there is no degradation in interlaminar shear strength. Instead there was improvement of about 7-32%. This observation suggests that while under environmental exposure the resin was still curing, especially at elevated temperature.

Model-based global assessment of ocean thermal energy conversion (OTEC) power potential

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Ocean thermal energy conversion (OTEC) is a method of collecting solar energy stored as sensible heat in the upper mixed layer of tropical and subtropical oceans. Deep, cold water originally formed at the polar margins provides the low temperature needed for a working fluid (e.g. ammonia) to recondense in a closed Rankine power cycle. Though the thermal efficiency is relatively low, OTEC is capable of providing clean, renewable base-load power without being subject to output fluctuations caused by environmental variability. Conservative estimates put the global OTEC energy potential at a few TW, comparable to all of today's installed generating capacity. Useful power generation with OTEC begins around $\Delta T = 20^{\circ}\text{C}$, where $\Delta T = T_{\text{warm water}} - T_{\text{cold water}}$. Marginal gains of 10-15% gross power are estimated with every 1°C increase in ΔT (Nihous, 2005, 2010), making slight variations in water temperature with depth and location worth pursuing.

In order to conduct a global-scale estimate of OTEC potential power generation, temperature and deep-water velocity data were acquired from the data-assimilative Hybrid Coordinate Ocean Model (HYCOM) using simulations conducted by the United States' Naval Research Laboratory. HYCOM global temperature and current velocity data were averaged on monthly and seasonal time scales beginning September 2008. Mapped estimates of ΔT , depth and velocity were used to identify sites of interest for concentrated direct OTEC resource assessment. Model predictions were verified against *in situ* temperature profiles monitored along the southeastern coast of Florida.

Prognosis and Health Management Communications Quality of Service

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Nowadays we can witness ever-growing need of research and development to harness renewable energy sources. One of the most promising directions is ocean energy. This project is funded by the Southeast National Marine Renewable Energy Center (SNMREC) at FAU and its objective is to develop Quality of Service (QoS) mechanisms for the wireless communications architecture of the Prognosis and Health Management (PHM) Communications Subsystem. There are numerous technical challenges that the PHM Communication Subsystem tries to solve. Due to ocean platform mobility from waves, currents, and other environmental factors, signal quality can vary significantly. As a result, the wireless link between the electric generator platform and shore systems at Seatech will have variable quality in terms of data rate, delay, and availability. In addition, the data traffic that flows from generator sensors and from PHM applications to the shore consists of numerous types of messages that have different QoS demands (e.g. delay) and priority that depends on the message type, user ID, sensor location, and application-dependent parameters. The PHM communications subsystem must handle effectively high priority messages, such as alarms, alerts, and remote control commands from shore systems. The PHM Communication Subsystem consists of three components: the wireless link, the Link Manager, and Web Services Network Proxy. We present experimental results for the Web Services Network Proxy and demonstrate the effectiveness of XML data compression and semantic-based message scheduling over a link with variable capacity.

Experimental Hydrodynamic Performance Assessment Of the SNMREC's 20 kW Ocean Current Turbine

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Designers of open-ocean, marine hydrokinetic (MHK) systems currently rely on aerodynamic performance estimating algorithms to predict the hydrodynamic performance of future systems. They must use these aerodynamic models due to a lack of field-collected experimental data, proven deployment and testing procedures, and established certification criteria. It is imperative to understand how ocean current turbines and other deep water renewable energy systems will perform in the harsh and unpredictable open-ocean operating environment. For that reason, a self-contained instrumentation package is being developed to measure and correlate free-stream ocean current velocity with the hydrodynamic attitude and motion response of a deployed system in real-time. This instrumentation package will record motion-compensated vertical and horizontal current velocity profiles and the six degree-of-freedom motion response of the system. The prototype instrumentation package will be tested using Florida Atlantic University's Southeast National Marine Renewable Energy Center's (SNMREC) experimental scaled ocean current turbine. During these tests, the free-stream current velocity profile and motion response data will be analyzed with the addition of rotor RPM and energy conversion data from onboard monitoring capabilities to develop a set of measured performance metrics to validate the numerical performance estimating algorithms that were used for its design. The ultimate goal of the project is to develop a small, yet rugged and modular, instrumentation package that can be used to log experimental data, develop safe deployment and testing techniques, and establish certification criteria to be used in evaluating the technology readiness level of new systems as they approach full-scale grid integration.

An Algorithm for the Integrated Scheduling Problem of a Container Handling System Within a Container Terminal

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Currently, there has been an exponential increase in container volume shipment within intermodal transportation systems. Container terminals as part of the global ports represent important hubs within the systems. Thus, the need to improve the operational efficiency is the most important issue for container terminals from an economic standpoint. In order to increase the efficiency of operations, the development of optimization models and mathematic algorithms is critical in finding an optimal solution. The objective of this study is to evaluate the optimum solution to find the proper number of Yard Trailers (YTs) with the minimal cost for the container terminals. This study uses the Dynamic YTs operation's method as a background for modeling. A mathematical model with various constraints related to the integrated operations among the different types of handling equipment is formulated. This model takes into consideration both serving time of different types of cranes, and cost reduction strategies by decreasing use of YTs with the specific objective of minimum total cost including utilization of YTs and vessel berthing time. A heuristic algorithm combined with Monte Carlo method and Brute-force search are employed. The Monte Carlo method is proposed to generate vast random numbers to replicate simulation. The Brute-force search is used for identifying all potential cases specific to the conditions of this study. Some preliminary numerical test results suggest that this method is good for use in conjunction with simulation of container terminal operations.

CHARLES E. SCHMIDT COLLEGE OF MEDICINE

Calpain Cleavage of GAD65 is Pathological and Impairs GABA Neurotransmission

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Low GABA is associated with a plethora of neurodegenerative diseases, a few of which are epilepsy, Parkinson's disease, Huntington's chorea etc. The GABA synthesizing enzyme, L-glutamic acid decarboxylase 65 (GAD65), is cleaved to form its truncated form (Δ GAD65). Previously, we showed by in vitro biochemical characterization that Δ GAD65 was 2-3 times more stable and stronger than the full length form (FLGAD65). The enzyme that caused cleavage was later identified as calpain. Calpain is known to cleave its substrates either under a physiological stimulus or upon a sustained pathological insult. However, the precise role of calpain cleavage of GAD65 is poorly understood. In this communication, we aimed to investigate the significance of GAD65 cleavage and understand its implications on GABA neurotransmission. Specifically, we addressed under what circumstances - physiological or pathological, is the formation of Δ GAD65 favored. We used diverse in vitro and in vivo methods employing techniques such as western blotting, immuno-precipitation, radioactive GAD activity assay, along with a rat model of epilepsy to study the implications of GAD65 cleavage. Our data indicate that Δ GAD65 progressively accumulates with increasing excitotoxic stimulus. After cleavage, the more active Δ GAD65 detaches from the synaptic vesicles, thereby resulting in reduced GABA synthesis. Efforts are underway for optimizing conditions to study calpain cleavage of GAD65 in a rat model of epilepsy. So far, our data suggest that calpain mediated cleavage of GAD65 is pathological and that it leads to decreased GABA synthesis at the synaptic vesicles that result in poor uptake causing local inhibitory circuit dysfunction.

N-terminal truncated cardiac TnI improves cardiac function in vivo and rescues restrictive cardiomyopathy

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Our previous studies have demonstrated that transgenic mouse hearts expressing a restrictive cardiomyopathy (RCM) causing cardiac troponin I (cTnI) C-terminal mutation (R193H) are characterized by diastolic dysfunction and sudden cardiac death (SCD) (Du et al, 2006, 2008). In addition, it is known that restrictive cleavage of the N-terminal extension of cTnI (cTnI-ND) that occurs in physiological and pathological adaptations (Yu et al., 2001; Feng et al., 2008; McConnell et al., 2009) desensitizes myofibril to Ca²⁺ and enhances diastolic function in transgenic mice expressing solely cTnI-ND. We have previously produced double transgenic mice (Double-TG) expressing the same amount of RCM causing mutant protein, cTnI193His, as the diseased RCM transgenic mice, but also characterized by the complete replacement of the wild type cTnI protein by cTnI-ND. Our analyses of these animals revealed that cTnI-ND is able to correct the diastolic dysfunction encountered in RCM mice (Li et al, 2010). In the present study, we have generated new double transgenic animals expressing different levels of mutant cTnI193His and cTnI-ND to investigate the dose-dependent rescue effect of cTnI-ND and the mechanisms underlying its protective role. Double-TG animals presenting over 45% of cTnI193His in their cardiac myofilaments showed a short lifespan and Doppler-echocardiography measurements of their cardiac function indicated diastolic dysfunction. Cell-based assays measuring cardiomyocyte contractility and calcium dynamics further confirmed relaxation impairment. Therefore, increased expression of RCM causing protein cTnI193His worsens the cardiac performance of RCM mice and impedes the rescue effect of cTnI-ND which presents dose-dependent characteristics.

Dose-dependent arrhythmia and cardiac dysfunction in restrictive cardiomyopathy mice due to troponin mutations

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Restrictive cardiomyopathy (RCM), associated with cardiac troponin I (cTnI) mutations, is a heart muscle disease, characterized by impaired diastolic function. We have generated transgenic (TG) mice expressing a human RCM mutation R192H (R193H in mouse sequence). The TG mice show a phenotype similar to that observed in RCM patients, exhibiting biatrial enlargement, restricted ventricles and diastolic dysfunction. In the present study, we used 3 TG mouse lines to investigate the dose-dependent effects of the cTnI mutation on cardiac function and to reveal the cause of death in RCM. The data indicated that impaired relaxation was a significant feature in TG mice and the severity of diastolic dysfunction was dependent on the amount of the mutant cTnI in cardiac myofilaments. TG mice with about 80% mutant cTnI in the heart, all died by day 30. Telemetric ECG recording from these mice showed significant ischemia, bradycardia and arrhythmia. Histological examinations confirmed substantial ischemia and signs of congestive heart failure. Consistently, echocardiography showed a significantly reduced coronary blood flow in these mice before the presence of the overt heart failure signs. The results of this study demonstrated that cTnI R193H mutation-caused cardiac dysfunction is dose-dependent, which results in reduced coronary blood supply leading to myocardial cell death, systolic dysfunction and heart failure. Myocardial ischemia plays an important role during the disease's progression, in correlating the early diastolic dysfunction with systolic dysfunction at the later stage of the disease. Heart failure is a major cause of early death in RCM cTnI TG mice.

A novel immunosuppressive pathway mediated by chitinase-3-like-1 protein in a model of breast cancer

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Elevated serum levels of chitinase-3 like-protein-1 (CHI3L1) are associated with poor prognosis and shorter survival in patients with primary or metastatic solid tumors compared to patients with normal serum CHI3L1. However, the biological and physiological functions of CHI3L1 are still unclear. Secreted by tumor cells and macrophages alike, expression of CHI3L1 in macrophages has been linked with upregulation of proinflammatory chemokine, C-chemokine ligand 2 (CCL2) and matrix metalloproteinase-9 (MMP-9) both of which contribute towards tumor metastasis. In this study, we describe a novel immunosuppressive pathway by which CHI3L1 in tumor-bearing hosts leads to the production of CCL2 that has suppressive effect on IFN- γ production by T and NK cells. We found that inhibition of CHI3L1 by siRNA suppressed the production of CCL2 and MMP-9. Importantly, treatment with chitin (β -(1-4)-poly-N-acetyl D-glucosamine), a substrate for CHI3L1 promoted immune effector functions with increased production of IFN- γ and decreased CCL2 and MMP-9 expression. These studies suggest that CHI3L1 plays a role in tumor progression and that chitin can inhibit the pleiotropic effects of CHI3L1. Significantly, in vivo administration of chitin to mammary tumor-bearing mice decreases lung metastasis giving support to the idea that CHI3L1 is a useful target for treatment of breast cancer.

Replacement of sex steroids prevent lymphocytic infiltration of the lacrimal glands in Sjögren's Syndrome (SS)

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Purpose: SS is a chronic autoimmune disease characterized by lymphocytic infiltration of the lacrimal glands, consisting mainly of CD4+, CD8+ T cells and B220+ B cells. We have been studying disease progression using ovariectomized (OVX) NOD.B10.H2b mice, which provides a model of menopause combined with a predisposed genetic background to SS. Recently, we have shown that ovariectomy significantly increases lymphocytic infiltration in the lacrimal glands of NOD.B10.H2b mice compared to control (C57BL/10) mice. In this study we investigated whether replacement of the sex hormones, dihydrotestosterone (DHT) or 17 β estradiol (E2) can prevent lymphocytic infiltration in these mice.

Methods: Six week old C57BL/10SnJ and NOD.B10-H2b were subjected to 4 treatments: Sham, OVX, OVX+DHT or OVX+E2 for 3, 7, 21 or 30 days. Subcutaneous pellets providing physiological doses of DHT or E2 were administered to DHT or E2 treatment groups respectively. At the end of each experimental period, lacrimal glands were removed and processed for immunocytochemistry. Quantification of the stained positive cells was done using an Image Pro Plus analysis system.

Results: Treatment with DHT or E2 prevented the increase in the numbers of CD4+, CD8+ T cells and B220+ B cells observed at 3, 7, 21 and 30 days in the post-OVX NOD.B10-H2b mice.

Conclusions: Our results suggest that sex hormones play a major role in the pathogenesis and prevention of dry eye in SS. The mechanism by which decreased levels of sex hormones causes lymphocytic infiltration and the interaction with the genetics elements remains to be elucidated.

CHRISTINE E. LYNN COLLEGE OF NURSING

Reconceptualizing Normal After Traumatic Brain Injury

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The purpose of this presentation is to describe the phenomenon of reconceptualizing normal after traumatic brain injury, to serve as a foundation for practice and research. A ten-step process was used, beginning with a practice story describing a nursing situation and culminating with a mini-synthesis that merged the theoretical perspective, the literature and a story from a person who had lived “reconceptualizing normal”. A definition of reconceptualizing normal, a model linking its core qualities and a mini-saga that distills the story collected from a person living the phenomenon will be presented. When a child survives a traumatic injury, there is a period of rehabilitation followed by a longer period of community reintegration. Families demonstrate resilience and determination to get to know their child all over again and reconceptualize what is normal. Understanding what families experience helps guide the nurse’s supportive interventions. Studies of children’s cognitive and functional recovery after brain injury identify a number of factors that influence outcomes, including pre-trauma profile, family characteristics and severity of injury. There is tremendous uncertainty associated with how a child will recover from brain injury. Families develop basic competencies and patterns that foster growth, protect children and enable recovery. In coping with uncertainty, they demonstrate flexibility and draw on their unconditional love for their child to get to know them all over again and develop new patterns. The support of client and family to re-envision their present and future, to reconceptualize normal, is a continuous process of coordination and communication, focusing on short term goals and long term needs. Understanding this phenomenon guides the nurse and offers opportunities for further research in helping families cope with trauma.

CHARLES E. SCHMIDT COLLEGE OF SCIENCE

Generation of a Dichaete Gal4 strain in *Drosophila Melanogaster*

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Following the discovery of mammalian testis determining factor, SRY (sex determining region on the Y chromosome), approximately twenty proteins that share an evolutionarily conserved high mobility group (HMG) domain have subsequently been detected. SRY and these related SOX proteins, define a family of transcription factors that bind to DNA and regulate various aspects of development. In *D.melanogaster* there exist eight Sox proteins, including Dichaete (D). The HMG domain of D is 88% identical and 94% similar to mammalian Sox2, an important regulator of stem cell formation. D has critical roles in embryonic neurogenesis and CNS organization, segmentation, and hindgut development, organization of the CNS, imaginal discs. Further evidence of D's essential functions is that knockout mutations of D lead to an embryonic lethal phenotype. In order to better characterize the post-embryonic functions of D, we are utilizing a P element enhancer trap strain rJ375, which contains a P[lacZ] insertion in the D gene. rJ375 drives expression of a lacZ reporter gene in a pattern that mimics endogenous D during embryogenesis and larval stages, but not in adults. We are attempting to exchange the rJ375-lacZ P element with a P[GawB] P element that drives expression of the yeast Gal4 transcription factor rather than lacZ. We have thus far obtained several fly lines where the original P[lacZ] element appears to have been replaced by the P[GawB] element. We are currently working to confirm this possibility and determine if any appropriately inserted P[GawB] element drives transgene expression in a D-related pattern. If so, The P [D-Gal4] strain will be used to better characterize the D-expressing cells in embryos and larvae, and analyze adult-specific functions of D via generation/analysis of adult-specific D mutants.

Mathematical Modeling of Plankton Patchiness

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In natural systems, it has been observed that plankton exist in patches rather than in an even distribution across a body of water, in spite of similar abiotic conditions. However, the mechanisms behind this patchiness are not fully understood. The purpose of this study is to answer (at least in part) the question: "Why does plankton exist in patches?" Several previous modeling studies have examined the effects of abiotic and biotic factors on patch structure. Still, there has not yet been a definitive explanation for the patchiness. The previous models ignore a key point: zooplankton often undergo diel vertical migration. It is possible that vertical migration plays a role in establishing the patchy structure of plankton and this possibility is explored in this study. I formulated a series of differential equations to mathematically represent the movement, biological processes, and predator-prey interactions of the plankton. I used stability analysis and spectral analysis to analyze the model output. I found that adding vertical movement tends to stabilize the predator-prey dynamics. By analyzing temporal stability and spatial structure, my results show that vertical movement interacts with productivity to determine patch structure. My results suggest that the combination of vertical movement and temporal instability can drive spatial heterogeneity, i.e., patchiness. I found conditions under which the qualitative spatial pattern is consistent with published empirical data. Adding my findings to previous studies brings us one step closer in determining why plankton exists in patches.

Habitat selection among fishes and shrimp in the pelagic *Sargassum* Community: The role of habitat architecture

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The importance of habitat architecture is often overlooked when determining what influences habitat selection by animals. Support for the significance of habitat architecture has been shown in systems such as mangroves, coral reefs, rocky intertidal, and benthic seagrass and algae communities. This growing support for the significance of complex habitat architecture should encourage further investigation in a habitat that has received little research attention - the pelagic *Sargassum* community. This study will look at the habitat architecture of pelagic *Sargassum fluitans* and determine if it influences habitat selection for two species of *Sargassum* fishes (*Histrio histrio* and *Stephanolepis hispidus*) and one species of shrimp (*Leander tenuicornis*). Specifically, I will be manipulating interstitial spaces between stipes of *Sargassum* and depth independently (in separate experimental trials to test whether spatial components of habitat architecture are important for habitat selection). Additionally, I will compare two habitats of differing structural complexity and species composition (*Sargassum* sp. versus *Sargassum* sp. intermingled with *Thalassia testudinum* and *Syringodium filiforme* and *Sargassum* sp. versus *Thalassia testudinum* and *Syringodium filiforme*) to test whether the habitat architecture is important for habitat selection. These experiments will add additional evidence towards the importance of habitat architecture of a pelagic macroalga that supports an entire food web of organisms by confirming an increase in interstitial spaces and structural complexity does influence habitat selection of fishes and shrimp.

When a “Useful” Tool is Not Enough: Preschoolers Prioritize Preference over Utility while Problem Solving

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While some have argued that adults' positive emotion towards objects influence children's object-interactions (Mumme & Fernald, 2003), others suggest that children are most attuned to how useful a tool is (Csibra & Gergely, 2009). Given these differing suggestions, what communicative content is most influential for children's tool use? Two studies examined performance in a tool-selection task following a model's emphasis of either positive emotion toward a tool or the utility of a tool.

Forty-five preschool children and 52 adults participated. Half watched a video where a model grasped a tool and said “*I really like this!*” The other half watched the model use the tool for an unrelated task and say, “*I can use this.*” Then, participants chose from five tools to attain an out-of-reach toy. Results revealed that children chose the modeled tool more when 'liking' was expressed (modeled tool chosen on 67% of "like" trials) than utility (modeled tool chosen on 25% of "use" trials). In contrast, adults chose the modeled tool equally often regardless of expression.

In study 2, 56 preschoolers and 49 adults watched a model (a) fail or (b) succeed at the lure-retrieval task. Additionally, half of the videos emphasized liking and half emphasized using. Participants then chose between two tools (one novel, one from the video) to retrieve a toy. Results showed that (especially younger) preschoolers relied on preference information (and ignored utility information), even when the model was shown failing at the same task they would attempt. Discussion focuses children's learning from media.

The use of surrogate technologies to estimate suspended sediment concentrations in Cape Sable, Everglades National Park, FL

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In 2009 Everglades National Park received funding through the American Reinvestment and Recovery Act to restore two failed dams in the Cape Sable region. The Sediment Transport and Saline Intrusion on Cape Sable Project was initiated in 2008 by the U.S. Geological Survey – National Park Service Water Quality Partnership Program. One objective of the project was to investigate reliable surrogate relations between suspended sediment concentrations (SSC) and acoustic signal strength and water quality data sampled before the restoration project started in October 2010. Synoptic sampling events were conducted to collect continuous discharge using acoustics, water quality, and suspended sediment data over various tidal cycles. Data presented are from a synoptic event performed on September 7-10, 2010 at USGS station 250802081035500 (East Side Creek). During the synoptic, a LISST 25X laser diffraction sediment sampler and an optical turbidity probe were deployed to collect 5 minute data. A 1.5 kHz acoustic Doppler velocity meter was deployed to collect 1 minute signal strength data. Hourly suspended sediment samples were collected using an automatic sampler. Correlation analysis will be performed using the measured surrogate variables and sediment concentration data from the LISST as well as the SSC collected from the automatic sampler. The correlations determined from the September 2010 synoptic event will be compared to surrogate relations developed from previous synoptic events. If the LISST and SSC data are highly correlated, the LISST may be a useful tool for developing sediment surrogate relations and compliment traditional sediment sampling methods.

Rapid neuroprotection from acute oxidative stress

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Most organisms require oxygen to survive and anoxia tolerance is limited to a few species. The fruit fly, *Drosophila melanogaster*, can withstand anoxia for up to several hours. The cGMP-dependent protein kinase G (PKG) cascade is a critical biochemical pathway that controls low oxygen tolerance in the fruit fly. This signaling pathway has been directly linked with K⁺ channels and higher K⁺ channel conductances have been observed in flies with greater PKG activity. Previous behavioral assays have shown that the onset time of the anoxic fly coma can be adjusted through pharmacological manipulation of the PKG pathway. The hypothesis behind these experiments is that synaptic transmission during chemical anoxia (acute oxidative stress) can be modulated via inhibition or activation of the PKG pathway. Our results demonstrate that PKG pathway manipulation during acute oxidative stress alters the time until synaptic loss of function. PKG inhibition increases synaptic tolerance to acute oxidative stress while activation rapidly increases the rate of neuronal failure. These findings suggest a potential role for PKG activity to regulate the tolerance of synaptic transmission during acute oxidative stress, where inhibition promotes functional protection and activation fosters susceptibility to the breakdown of neurotransmission.

Foraminifera *Archaias angulatus* and *Amphistegina* spp. as possible indicator species of ocean acidification and temperature increase

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Currently, there is little understanding of the potential impact of global climate change on the world's oceans. The Intergovernmental Panel on Climate Change (IPCC) predicts elevated atmospheric CO₂ concentrations, which will translate to a 0.3-0.4 unit drop in oceanic pH by the year 2100. This has led to concerns of decreased calcification in marine fauna, which alone has the potential to greatly influence DIC transport and sequestration within the world oceans. Within the carbonate flux, foraminifera account for 1.3–3.2 Gt yr⁻¹ calcite production and represent 25-50% of the total carbonate flux. Using the Intergovernmental Panel on Climate Change business-as-usual scenario for the year 2100 (IS92a) as a template for future ocean conditions, this study will investigate bleaching in *Archaias angulatus* and *Amphistegina* spp. under elevated water temperatures and decreased pH. Specifically, this study will investigate the impact of pH and temperature on test diameter, weight, test damage, and symbiont damage of foraminifera from three distinct habitats of the Florida Keys. This study will help to further the understanding of climate change's role on calcifying primary producers, the foundation of the oceanic food chain.

Adolescent Alcohol Consumption: Level of Consumption in the Friendship Group Impacts Friendship Choice and Friend Influence

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Friend selection and influence effects contribute to friend similarity in alcohol consumption during adolescence. Less is known about how an adolescent's close friendship group affects these processes. This study examines the influence of an adolescent's close friendship group on alcohol consumption during adolescence. Specifically, we anticipate that friendship choice and friend influence will be impacted by the level of alcohol consumption in an adolescent's closest friendship group. Participants included 1419 Finnish students (729 females, 690 males) from 9 upper secondary schools. Two waves of data were collected, starting when participants were between 15 and 17 years of age ($M = 16.36$, $SD = 1.49$) and in the 10th grade.

Adolescents choose friends similar to themselves in levels of alcohol consumption. The level of alcohol consumption in the friendship group does not interact with friendship choice. Adolescents are influenced by their friends to engage in levels of alcohol consumption similar to their friends. The level of alcohol consumption in the friendship group interacts with this process so that adolescents in high drinking friendship groups experience increased levels of influence pressure. Alcohol consumption in an adolescent's close friendship group affects the degree of initial similarity in the friendship group and how influence pressure is experienced in the group. Influence pressure is strongest among high drinking friendship groups. This suggests that adolescents engaging in elevated levels of alcohol consumption may experience greater pressure to consume alcohol at increased rates, similar to their close friends.

Power dependent van der Waals interaction and cold atom reflection

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Atomic reflection by evanescent waves mirrors (EWM) was used more than a decade ago [1] as a means of measuring atom-wall interactions, and in particular the C6 coefficient of the van der Waals interaction. Recent measurements of cold atom reflection by EWM at intermediate intensities of the evanescent wave [2] have shown an increasing discrepancy between the measured dependence of the barrier height on the laser power, and the theoretical expectations for the barrier height as obtained from a nonretarded van der Waals-like potential, a retarded potential and the full QED potential. The deviations from the predictions of all of these theoretical models are particularly large for high laser powers. In both experiments the reflection potential was described as the sum of the optical potential and the (power independent) van der Waals interaction. We introduce an intensity dependent van der Waals potential resulting from the interaction between the induced dipole and its image in the dielectric EW mirror. Our theory predicts the linear behavior observed experimentally for the barrier height as a function of the EW power.

[1] “Measurement of the van der Waals Force in an Atomic Mirror”, A. Landragin, J.-Y. Courtois, G. Labeyrie, N. Vansteenkiste, C. I. Westbrook, and A. Aspect, PRL 77, 1464-1467 (1996).

[2] “Direct Measurement of Intermediate-Range Casimir-Polder Potentials”, H. Bender, Ph.W. Courteille, C. Marzok, C. Zimmermann, and S. Slama, PRL 104, 083201 (2010).

Statistical Correlation between DMSP-OLS Night Light Images and Economic Activity at the MSA Level in Florida

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The Defense Meteorological Satellite Program (DMSP) Optical Line Scan (OLS) instruments collect data from an altitude of approximately 830km above the surface of the Earth. The OLS sensor is typically operated at a high gain setting for the detection of clouds at night. During 2006, the National Geophysical Data Center (NGDC) requested data collected at various gain settings to limit saturation in the brightest areas while still detecting dimmer lights. The resulting composite image is a radiance calibrated (RC) image of lights at night. The night light data from these instruments have been shown to correlate by lit area with national level Gross Domestic Product (GDP), and to correlate with GDP at the State level by total radiance value. In this study, the 2006 RC image is examined at a new, larger scale, the Metropolitan Statistical Area (MSA), within the state of Florida. The RC night-lights image is subset to the MSA level and checked for correlation to 2006 MSA-level GDP figures from the United States Bureau of Economic Analysis (BEA). Preliminary results show that three different calculated correlation coefficients are significant at the 0.01 level (2-tailed). The results therefore suggest that correlation between radiance values and GDP at the MSA level is very strong. Based on these preliminary results, principal components analysis (PCA) using subdivisions of GDP by industry will be performed. Those results may then indicate which industries within each MSA explain the greatest amount of variance within the data.

Helicobacter cetorum in and its role in development of gastric ulcer disease in Atlantic bottlenose dolphins

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Helicobacter cetorum is a gram-negative bacterium that infects the pyloric stomach of dolphins and whales. It is in the same family as *Helicobacter pylori*, a pathogenic bacterium that causes inflammation of the mucus lining in the pylorus and duodenum in humans, which has been strongly linked to gastritis, peptic ulcers, and stomach cancers. Wide reports of gastric ulcers in both captive and wild dolphin populations appear to parallel lesions found in *H. pylori*-infected humans. *H. cetorum* has high homology to *H. pylori*, however, no clearly defined etiology has been identified for ulceration of the stomach mucosa. Many scientists believe this wide-spread ulceration may be associated with *H. cetorum* infection. Further research is needed in order to investigate disease dynamics. In this supportive study, cultures of gastric biopsies from stranded dolphins will be used to ascertain the relationship between *H. cetorum* and ulceration of the stomach mucosa. In addition, minimally invasive techniques will be used to collect gastric fluid from wild dolphins in an ongoing health study in Florida's Indian River Lagoon to confirm prevalence of gastric ulcer disease within representative subpopulations using PCR techniques. A comparison of samples will then be utilized to investigate the role *H. cetorum* plays in inflammatory response of the stomach mucosa. Results from this study will help to establish prevalence of gastric ulcer disease in wild dolphin populations; will assist in early detection and treatment in managed dolphin populations; and will support further research in etiology of *Helicobacter* infections in marine mammals and humans.

Look at My Mouth When I'm Talking: Developmental Shift in Infant Attention Away from the Eyes to the Mouth of a Talking Face

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Talking faces are ubiquitous and a critical source of communicative information for developing infants. Previous studies have found that infants look at the eyes but all of these studies only investigated looking at silently talking faces. It is possible, however, that when infants view and hear a talking face their pattern of visual attention may change with development, especially when the speech is highly prosodic. Here, we presented movies of talking faces to groups of 4-, 6-, 8-, 10-, and 12-month-old infants (N=220) and recorded visual fixations. We presented four 50 sec movies of talking female actors, speaking either in English or Spanish in an infant-directed or adult-directed manner. To determine what part of the talking face infants were fixating, we used an ASL Eye-Trac 6000 eye-tracker to record pupil movements. A repeated measures ANOVA, with Region as the within-subjects factor and Age, Manner-of-Speech, and Language as between-subjects factors, yielded two significant findings: a significant Age x Region interaction and a Region x Manner-of-Speech interaction. Our results indicate that when infants look and listen to a talking face, their pattern of selective attention undergoes a dramatic shift. At 4 months, infants focus primarily on the eyes but by six months of age they begin to shift their attention to the mouth. This shift corresponds to the rapid emergence and improvement in speech perception abilities, suggesting that infants focus on the region of the face that contains the most information about the speech signal.

Anticancer activities of genistein-topotecan combination in LNCaP prostate cancer cells

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Prostate cancer is one of the leading causes of death in men aged 40 to 55. Topotecan Hydrochloride (Hycamtin) is an FDA-approved chemotherapy, primarily for secondary treatment of ovarian, cervical and small cell lung cancers. Genistein isoflavone (4', 5', 7-trihydroxyisoflavone) is a dietary phytochemical with demonstrated anti-tumor activities in a variety of cancers. This study was to demonstrate the potential anticancer activities and synergy of genistein-topotecan combination in LNCaP prostate cancer cells. The potential efficacy and mechanism of genistein/topotecan-induced cell death was investigated. Study design: LNCaP cells were grown in a complete RPMI medium, seeded in 48-well MTP and cultured at 37°C, 5% CO₂ for 24-48 hr to achieve 80-90% confluency. The cells were then treated with varying concentrations of genistein, topotecan and genistein-topotecan combination and cultured for 24 hours. The treated cells were assayed for i) post-treatment sensitivity using MTT and Trypan Blue exclusion assay, ii) treatment-induced apoptosis using nuclear stains, caspase binding assay, cytochrome c release, and iii) VEGF expression. Results: The overall data indicated that i) both genistein and topotecan kill LNCaP cells, ii) genistein-topotecan combination was significantly more efficacious in killing LNCaP than either genistein or topotecan alone, iii) in all cases, cell death was primarily through apoptosis, via the activation of caspases involved in the intrinsic pathway, iv) VEGF expression diminished significantly with the genistein- topotecan combination treatment. Conclusion: Treatments involving genistein- topotecan combination may prove to be an attractive alternative phytotherapy or adjuvant therapy for prostate cancer.

Crayfish (*Procambarus spp.*) sorting and density effects across a predator gradient

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Species sorting along a habitat-predation gradient in freshwater systems is well documented for many aquatic organisms. We are examining crayfish species (*Procambarus alleni* & *P. fallax*) sorting across a predation gradient in a simulated long-hydroperiod subtropical wetland. Mesocosms simulating Everglades slough habitat were established with typical vegetation and community members to test if sunfish predation would affect total crayfish biomass and cause the crayfish community to shift from *P. alleni* dominance to *P. fallax* dominance with increasing sunfish densities. Dollar sunfish (*Lepomis marginatus*) and warmouth sunfish (*Lepomis gulosus*) were used as predators and both species are common in Everglades slough habitat. Small juvenile crayfish (~3mm carapace length) of both species were stocked in equal numbers across all tanks and fish stocking densities. A MANOVA looking at the response of mosquitofish, shrimp, and crayfish total catch to sunfish stocking density was significant (Wilks' Lambda $P=0.002$). Individually each parameter was significant: mosquitofish ($P < 0.0001$, $R^2=0.87$), shrimp ($P=0.008$, $R^2=0.52$), and crayfish ($P=0.0036$, $R^2=0.59$). There was also a significant shift in proportion *P. alleni* with increasing sunfish density using a weighted linear regression, weighted by total crayfish catch ($P=0.007$, $R^2=0.53$). There also appears to be a larger effect of proportional growth reduction among *P. alleni* than *P. fallax* with increasing sunfish densities.

Crystal Structure Studies of Cone Snail Shells by Powder X-Ray Diffraction

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Purpose: To study the crystal structure properties of the shells in different species of venomous marine cone snail.

Background: The samples in our study are marine venomous cone snails native in the South Florida oceanic waters. Their venoms promise great medicinal applications such as treatment of postsurgical and neuropathic pain or accelerating recovery from nerve injury. These venoms are a mixture of peptides of different compositions. Our study is focused on potential differences in the shell's crystal structure properties.

Methods: Six samples from different species were measured by using powder x-ray diffraction (XRD). The XRD data were collected using a Siemens D5000 x-ray diffractometer with monochromatic $\text{CuK}\alpha 1$ radiation. The JCPDS databank was used for phase identification. The Scherrer equation was used to calculate the average crystallite size.

Findings: The main phase (~90 wt %) in all the samples is aragonite (CaCO_3), Space Group Pmcn (PDF2 # 41-1475). Quicklime (CaO), Space Group Fm-3m (PDF2 # 37-1497) was also identified in all the samples as a secondary phase (~10 wt %). The average crystallite size in the samples was found between 34 nm and 38 nm.

Discussion: To our knowledge, this is the first report on the bulk crystal structure properties of the shells of the venomous marine cone snails. Although aragonite is known as the main component of shells, quicklime seems to appear in this type of marine cone snails as a secondary phase. Further analysis of the diffraction patterns is in progress.

Sulindac enhances the killing of cancer cells exposed to oxidative stress

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Sulindac is an NSAID that has been shown to have anti-cancer activity not related to its ability to inhibit COX 1 and 2. Recently, there have been a large number of studies attempting to elucidate its mechanism of action. Our laboratory has shown that sulindac protects normal cells against oxidative stress. Furthermore, it was found that under similar conditions in which normal cells were protected against oxidative damage, several different cancer cell lines showed enhanced killing when treated with sulindac and an oxidizing agent. It was apparent that there was a basic difference in how normal and cancer cells reacted to oxidative stress after exposure to sulindac. Subsequent studies have shown that sulindac protects normal cardiac cells against oxidative damage resulting from ischemia/reperfusion by a preconditioning mechanism. Since cancer cells, because of a defect in their respiratory chain, obtain less energy from mitochondrial respiration than normal cells, it seemed reasonable that mitochondrial dysfunction might play a major role in the enhanced killing of cancer cells by sulindac and oxidative stress. A recent report studying the effect of sildenafil (viagra), a known preconditioning agent on normal and cancer cells has provided insight into sulindac's mechanism of action. Our results suggest that the enhanced killing of cancer cells by sulindac and oxidative stress also involves early steps in a preconditioning response resulting in ROS formation. In normal cells this leads to survival by a preconditioning pathway, but cancer cells react by initiating a pathway leading to apoptosis.

Accurate Verification of Balloon Rotation Correction for the Contura® Multi-Lumen Device for Accelerated Partial Breast Irradiation

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Purpose: To validate a method of accurately confirming the orientation of the Contura multilumen balloon (MLB) catheter prior to each fraction and to determine if any residual device rotation remains after adjustment.

Background: Accelerated Partial Breast Irradiation (APBI) is a method for direct radiation delivery to the tissue surrounding the original tumor bed after lumpectomy. Balloon based Brachytherapy is one of the commonly techniques to deliver APBI. The Contura MLB is used for APBI but the possibility of balloon rotation before each fraction has not been investigated yet.

Methods: Statistical analysis was performed on data from sixteen patients. They had undergone CT scans prior to each treatment with APBI. A CT spot marker was used as a reference point on the patient's skin while a skin mark was aligned with lumen #1. The distances measured from the CT spot marker to the three reproducible points on the CT markers were used for balloon rotation verification.

Findings: 318 measurements were obtained. The median residual rotation for all cases corresponds to a displacement of 0.2 mm. Later fractions and skin spacing changes over time were associated with slightly greater residual rotation and skin spacing change.

Discussion: Our statistical analysis confirms that the external alignment of a skin mark with lumen #1 provides an accurate and reliable method to align the balloon prior to treatment and that no significant internal device rotation is likely to occur.

Magnetic Alignment of SWCNT(COOH)s Coated by Fe₃O₄ in SC-15 Epoxy and Anisotropy of Physical Properties

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The alignment of carbon nanotubes dispersed in an epoxy matrix and oriented in a particular direction is important for many engineering applications. We present the alignment of single wall carbon nanotubes (SWCNT(COOH)s) in SC-15 epoxy by coating them with Fe₃O₄ nanoparticles and curing them under a modest magnetic field. SWCNT(COOH)s have extremely low magnetic susceptibility and cannot be aligned in a magnetic field by themselves. The Fe₃O₄ particles are strong ferromagnets which respond well in the polymer matrix to the modest field. A sonochemical technique is used to coat SWCNT(COOH)s with the magnetically active elements. High-resolution transmission electron microscope (HRTEM) and X-ray diffraction (XRD) are used to characterize system. Magnetic measurements show the alignment of the SWCNT(COOH)/ Fe₃O₄ epoxy-based nanocomposite. Mechanical and thermal tests are prepared to observe the enhancement in mechanical properties of the aligned system.

Beyond the Attractor Metaphor: New Quantitative and Qualitative Methods to Analyze Interpersonal Psychology Dynamics

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An attractor is a point to which different trajectories converge over time. Dynamical psychology theories use attractors as metaphors for human thought and behavior, including judgments, self-concept, and habits (Nowak & Vallacher, 1998). While methods to examine the interpersonal dynamics have been proposed, there are few techniques for identifying attractors in psychology data. This poster presents new methods to examine attractor phenomena found in self-report time-series data.

Vallacher et al. (1994) proposed a method for generating time-series data representing judgment or valence. The data is from recordings of participants' movements of a computer cursor to rate judgment or valence. Participants are instructed to move a computer cursor to indicate judgment or valence. They are told that the left side of the monitor represents positive or pleasant judgment/valence, while the right side represents negative or unpleasant judgment/valence.

We developed new methods to analyze data from this method, including:

- 1) Computation of a participant's tendency to move the cursor towards either the positive or negative rating domain.
- 2) Quantification of the expansion or retraction of the data set over time using the data's convex hull area, which reveals an attractor if the area decreases over time.
- 3) Generation of three-dimensional "attractor landscapes" that graphically reveal attractor patterns of judgment or valence.

The new methods described in this poster bridge the gap between dynamical systems metaphors and experimental data. The dynamical measures help retain the richness of each individual's unique patterns of thought and behavior while allowing rigorous analysis of those patterns.

The Effect of Face-Voice Synchrony on Infant Allocation of Visual Attention

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Talking faces are a rich source of synchronous and, thus, redundant auditory and visual cues. Although it is known that infants can perceive audiovisual synchrony, it is not known whether infants' differential allocation of visual attention to the eyes and the mouth of a talking face depends on face-voice synchrony. This question is important because infancy is when language acquisition begins. Previously, we have found that differential allocation of infant visual attention to the eyes and mouth of a synchronized talker changes. Infants younger than 6 months look more at the eyes whereas older infants look more at the mouth. Here, we used an eye tracker to investigate whether asynchrony of the face and voice has an effect on infant allocation of visual attention by examining the distribution of visual attention to an asynchronous talking face in 4-, 6-, 8-, 10-, 12-, and 18-month-old infants (N=203). In addition, we investigated whether the prosody of audiovisual speech affects attention by presenting either desynchronized infant-directed speech (high prosody) or desynchronized adult-directed (low prosody) speech to different groups of infants. Results indicated that the developmental shift in allocation of attention in response to asynchronous audiovisual speech is similar to the shift found previously in response to synchronous speech and that the shift is more pronounced to infant-directed speech. Our findings suggest that the mouth is the most salient aspect of a talking face for older infants than is the synchrony between the audible and visible attributes of the talking face.

Replacing An Event-Driven Framework with a Process-Driven Framework for Disaster Displacement Recovery: Learning from Hurricanes Andrew, Katrina and Ike

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Displacement has traditionally been conceptualized as a phenomenon that results from conflict or other disruptions in developing or unstable countries. Hurricane Katrina shattered this notion and highlighted various dilemmas of population displacement in the United States. This poster focuses on post-disaster sheltering and housing timelines as experienced after Hurricanes Andrew, Katrina, and Ike. Methodology and data sources include a review of scholarly research, a Lexis-Nexis search of major laws and regulations, congressional reports, and newspaper articles. There is evidence of flexible but ad-hoc policy and program response during the disaster housing recovery process. The livelihoods approach is drawn on for understanding household assets and how stresses and shocks contribute to a cumulative vulnerability or resilience within the household asset structures. This poster presents the utility of this approach using only a few indicators for illustrative purposes: income; rental expenditure; and food expenditure per household within Census Block Groups in Galveston County, Texas. Analysis indicates that up to forty percent of households live in relative poverty yet earn over the federal poverty line. These households are excluded in common vulnerability models, yet are as vulnerable to the cumulative impacts of natural hazards as those living below the poverty line. This poster seeks to illustrate the importance of both the inclusion of relative poverty measures within vulnerability research and the utility of scaling indicators of poverty such as income and basic needs expenditures toward improved programming, and advocates a process-driven framework over the current event-driven framework that drives disaster recovery.

Frazzled and Netrin: a story of neuronal confusion and competition in the Drosophila Giant Fiber System

Brian Orr and Rod Murphey

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Huble and Weisel's Nobel Prize winning cross-eyed cat experiments showed that mammalian systems rely on competitive neuronal interactions to build some circuits. Competition occurs when multiple genetically identical neurons fight for a limited resource provided by the post-synaptic cell. The molecular mechanisms responsible for this behavior are unknown. We show similar competitive behaviors exist in the CNS of invertebrates. In order to search for the molecular machinery for competition we first demonstrate that competitive interactions exist in the fruit fly giant fiber system and then use genetic tools to search for the molecular machinery underlying synaptic competition. This giant fiber system is the perfect model because we are able to determine the strength and anatomy of a single synapse. We are able to see classical competitive neuronal behaviors anatomically because the two genetically identical pre-synaptic cells, the giant fibers, compete for space on the postsynaptic jump motor neurons. First we show that the classic guidance molecule Netrin dictates the static neuronal connections. Physiological recordings and dye injection of GFs in Netrin loss and gain of function mutants show that Netrin directly affects the synaptogenic fidelity between the GF and their targets. Then we show that Netrin is the limited resource during competitive interactions between giant fibers. When Netrin is over-expressed GFs no longer compete for post-synaptic cells and both GFs innervate both motor neurons. In summary, we have identified Netrin-Frazzled interactions as the molecular mechanism underlying competition and its role in synaptogenesis in the Giant Fiber System of Drosophila.

Mechanism of taurine protection against endoplasmic reticulum stress induced by glutamate in primary cortical neurons

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Our recent studies showed that taurine, a free amino acid present in high concentrations in a variety of organs of mammals, can provide protection against oxidative stress-induced cell injury in PC-12 cells through preserving the integrity of ER^[1] and taurine in neuronal systems can exert a protective function against toxicity induced by glutamate^[2]. Here we present a study to investigate the potential protective benefits of taurine against endoplasmic reticulum stress induced by glutamate in primary cortical neuronal cultures. We found that taurine suppresses the up-regulation of GRP78, caspase12, GADD153/CHOP and Bim induced by glutamate, suggesting that taurine may exert a protective function against glutamate by reducing the ER stress and taurine can down-regulate the ratio of cleaved ATF6 and full long ATF6, and p-IRE1 expression, manifesting that taurine inhibits the ER stress induced by glutamate through suppressing ATF6 and IRE1 pathway.

[1]. Wu JY, Wu H, Jin Y, Wei J, Sha D, Prentice H, Lee HH, Lin CH, Lee YH, Yang LL: Mechanism of Neuroprotective Function of Taurine, *Adv. Exp. Med.*, 2009, 643:, 169; [2]. Pan C, Prentice H, Wu JY: Taurine Protection against Endoplasmic reticulum stress induced by oxidative stress, *J. Biomed. Sci.*, 2010, 17

From salps to sea turtles: mercury and selenium in leatherback sea turtles (*Dermochelys coriacea*).

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Leatherback turtles are pelagic migrants that specialize on gelatinous prey. They experience higher reproductive failure than other sea turtle species. From eggs that hatched, we documented muscular anomalies in hatchling turtles that were similar to those found in selenium deficient bovine calves. Selenium acts in the liver to detoxify mercury, a common toxicant. As mercury levels rise, bodily selenium may become depleted, resulting in selenium deficiency. Mercury and selenium accumulate through food and water intake. The hatchling muscle anomalies led us to explore mercury and selenium relationships with leatherback nest success. We measured mercury and selenium concentrations in (i) nesting female leatherbacks and their hatchlings from two populations, (ii) common prey items of adult turtles, and (iii) we quantified nest success.

We found that maternal mercury tended to decrease as the season progressed in nesting females sampled multiple times throughout the season, suggesting females dump mercury into eggs. Nesting female blood selenium correlated with blood selenium concentrations of their hatchlings, suggesting some individuals provide protection for their offspring.

Prey species consume zooplankton that likely sequester mercury and selenium from microbial and planktonic sources. The mercury and selenium levels in leatherback prey species oftentimes were higher than those found nesting females' blood. Thus they likely serve as sources of mercury and selenium.

Our study is the first to (i) measure mercury or selenium in leatherback prey species, (ii) document mercury and selenium concentrations in hatchling sea turtles, and (iii) show that contaminants play a role in reproductive success in leatherbacks.

Using Clusters of Population Vulnerability to Determine Hurricane Shelter Locations A GIS Based Investigation of Broward County Florida

Shivangi Prasad and Ann Margaret Esnard

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Socially and economically disadvantaged populations are especially vulnerable in the event of natural hazards like hurricanes. They are very likely to report to shelters during hurricanes. Hence shelters must be located in close proximity to where vulnerable population groups reside.

Using spatial statistics tools in GIS, major clusters of socioeconomically vulnerable population groups in Broward County are identified. 6 factors of vulnerability are analyzed at the census tract level. These are race, age, poverty, disability, education and immigration. A composite index of vulnerability is derived from these 6 factors. Moran's I, which is a Local Indicator of Spatial Autocorrelation (LISA) technique, is calculated to identify highly vulnerable clusters of census tracts. Housing vulnerability is incorporated in the analysis by analyzing the distribution of mobile homes and recreational vehicle parks. Results of the analyses indicate that there are 3 high vulnerability clusters in Broward County. Furthermore, housing vulnerability exhibits a distinct north-south orientation in the county. A suitable location for a shelter is one that is easily accessible to the most vulnerable populations. Current shelters in Broward County are identified and new locations recommended. Recommended shelter locations are public schools that lie within the clusters of vulnerability and that are easily accessible from major arterial networks that run north to south.

Who influences whom in adolescent romantic relationship?

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Who influences whom in adolescent romantic relationships? This is an important question not only because of the abundance of influence in adolescence in general, but also because of the possible detrimental effects that can arise. Knowledge of the workings of influence between adolescent romantic partners can lead to better ways to handle the influential nature of these relationships, especially when it comes to harmful effects, as they can possibly be avoided. The current study addresses this problem using data from a longitudinal study in Denver Colorado. Our analyses are composed of a sample of 87 stable adolescent couples who were in this relationship for two consecutive time points. Each member of the romantic couple filled out several questionnaires, including those that asked about jealousy and support-seeking in the relationship. Using an actor-partner interdependence model, which is a statistical technique that takes into account the interdependence of the data, we found that males influence their girlfriends on jealousy, and females influence their boyfriends on support-seeking. This study extends prior research by using an APIM to show partner effects and gender differences regarding influence in romantic partner dyads. It also illustrates the finding that the dyad member with higher levels of a particular relationship attribute, for instance jealousy, does not necessarily predict influence in the relationship.

Effects of Hippocampal Impairment on Rodent Spatial and Non-Spatial Memory

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The human hippocampus is a critical brain region for the encoding and retrieval of both episodic and spatial memory. Although it has been established that the rodent hippocampus is involved in spatial memory, its role in non-spatial memory has been largely debated. The purpose of the current study is to establish the role of the rodent hippocampus in non-spatial memory.

To determine the necessity of the hippocampus during memory retrieval, muscimol is infused through previously surgically implanted bilateral dorsal CA1 cannulae, thereby temporarily deactivating the hippocampus. The Morris Water Maze, a well established hippocampal-dependent spatial navigation task, was initially utilized in order to confirm that the experimental procedures effectively impair proper hippocampal function. Next, Novel Object Recognition (NOR) experiments began. In the NOR experiments, mice are given three arena habituation/sample sessions to become familiar with the arena and with two identical objects. During a test session 24 h after the last habituation session, the mice are presented with one of the familiar objects one novel object. Successful retention of object memory is inferred if the mice exhibit a preference for exploring the novel object over the familiar one during the test session.

The current study is still in progress, but the findings are sure to address the long-standing debate regarding the function of the rodent hippocampus in non-spatial memory. Understanding the similarities between rodent and human hippocampal function could enable future animal studies to effectively answer questions about diseases and disorders affecting human learning and memory.

Novel compounds isolated from the marine sponge *Clathria* sp.

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A number of compounds including alkaloids, peptides and steroids have been found to have interesting biological activities such as anti-cancer, antimicrobial and anti-inflammatory from the marine sponge of genus *Clathria*. In the course of screening pre-fractionated and semi-purified extracts of marine invertebrates in an effort to discover compounds that impact hESCs growth, we have isolated three new compounds clathric acid, clathrimide A and B from the sponge *Clathria* sp. In this the poster the isolation, structural elucidation and determination of the absolute stereochemistry will be discussed.

Comparative functional morphology of hooked setae versus pappose setae on the exoskeleton of the Florida Speck Claw Decorator Crab *Microphrys bicornutus*

Monique Alexandra Salazar and W. Randy Brooks

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Crabs are typically inconspicuous in the marine environment. Masking or decorator crabs achieve this subtle presence by attaching materials from their environment to their exoskeleton, and are morphologically well adept for decorating behavior. Little is known about the functional morphology that facilitates such activities. In this study, ultrastructural and internal morphology of hooked setae and pappose setae on the carapace of the Florida Speck Claw Decorator Crab, *Microphrys bicornutus*, were examined using scanning electron microscopy (SEM)/transmission electron microscopy (TEM) and related to decorating activity. TEM revealed that hooked setae are filled with what appears to be collagen, which provides structural support in many animals. Pappose setae are innervated by a myelinated nerve that provides sensory input. Hooked setae ablation experiments confirmed attachment function, as crabs without hooked setae were unable to decorate. Thus, hooked setae are integral in decoration, while pappose setae may also play an auxiliary role in decoration, by likely providing sensory information as indicated by the presence of a nerve in the setal shaft.

How Do Different Types of Toys Influence the Complexity of Children's Play?

Patricia Schultz and Marissa Greif

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Play serves many important functions for human development including the promotion of a variety of cognitive and social skills (Dansky, 1999; Singer & Singer, 1990). The levels of toy realism may steer the direction of the child's play behavior. For instance, while some studies find that high-realism toys such as Barbie-dolls, and firetrucks elicit more elaborate pretend play than low-realism toys such as blocks, and playdough (Trawick-Smith, 1990); others have found that low-realism toys encourage more complex play behavior (McLloyd, 1983). Here we address this discussion with an experiment in which we manipulated children's access to high and low-realism toys and assessed their performance on several dimensions of pretend play.

Fifty-four 3, 4 and 5 year old children (27 boys) participated in a play session. Half of the participants played with high-realism toys and half played with low-realism toys. Analyses were performed on children's object-oriented play, and the richness of their storytelling. Results revealed that play with low-realism toys produced more complex symbolic substitutions (i.e., using objects for functions other than their original purpose) than play with high-realism toys [$p < .01$]. Interestingly, in terms of storytelling during play, high-realism toys produced stories with richer fantasy and plot development than play with low-realism toys [$p < .05$].

Results suggest that toys that vary in realism promote different types of play. Low-realism toys encourage more complex symbolic object transformations. However, high-realism toys support the development of children's play narratives. Mechanisms by which toy structures independently and interactively scaffold various dimensions of play will be discussed.

The Attentional Basis of Deontic and Moral Reasoning in Social Situations

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Social contract theory suggests that children and adults use deontic reasoning more efficiently in the context of social contracts relative to other contexts (Cosmides & Tooby, 1992; Harris & Nunez, 1996). Cummins (e.g., 1996, 1998) has proposed that this is an innate representation. We argue that this reasoning is more likely the product of an extended juvenile period in which children's attention is sensitive to information relevant to social contracts (Bjorklund & Pellegrini, 2001).

Participants ages 3, 4, and 5 hear four counterbalanced fictional stories regarding a fictional child, two including social obligations and two including precautionary rules. One story from each condition is obligatory, while one is descriptive and non-obligatory, resulting in four total story conditions: Precautionary, Precautionary Descriptive, Social, and Social Descriptive. A change blindness paradigm is implemented to assess the subtle differences in children's attention to information in scenes depicting social obligation or precautionary rule violations. Each story is followed by sixteen changes embedded in computer animated scenes depicting the fictional child engaging in various conditions of adherence and violation to the rule. Changes occur in four types: background, action, object, and person. Reaction times to change identification are recorded. This study uses a novel paradigm to further our understanding of; (1) the development of proximate mechanisms associated with deontic reasoning in social situations, (2) the breadth (and narrowing) of the social contract domain across development, and (3) children's moral judgments of violators of precautionary rules versus social obligations.

The NSAID, Sulindac confers protection against oxidative stress induced damage in retinal pigmented epithelial cells

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The retinal pigmented epithelial (RPE) layer is one of the major areas affected by oxidative stress in ocular diseases. In our study we tested the non-steroidal anti-inflammatory compound (NSAID) sulindac for protection against oxidative stress induced damage in RPE cells. Besides its known anti-inflammatory activity, recent studies have shown that sulindac can protect cardiac cells against oxidative damage by a preconditioning mechanism. The ability of sulindac to protect RPE cells against oxidative stress was determined by treating cultured RPE cells with sulindac, before exposing them to oxidative stress. Following 48hrs exposure of RPE cells to sulindac, cells were exposed to either a range of tert-Butyl Hydrogen peroxide (t-BHP) or Hydrogen peroxide (H₂O₂) concentrations to induce oxidative stress. For inducing hypoxia, RPE cells were exposed to less than 0.5% oxygen environment in a hypoxia chamber. Cell viability was determined using colorimetric assay utilizing tetrazolium salt.

The results show that exposure of cultured RPE cells to oxidative stress using t-BHP or H₂O₂ or hypoxia causes a decrease in cell viability. Pretreatment of RPE cells with sulindac for 48hrs, protects against these insults and enhances survival. In future experiments we plan on showing that the mechanism of protection, and also test whether, sulindac is functioning as a preconditioning agent. To understand this protective mechanism we will evaluate changes in preconditioning markers, role of reducing enzymes and mitochondrial function. In conclusion we believe that sulindac may represent a novel therapeutic agent for oxidative stress induced ocular diseases.

Remarks on Stability Analysis for Delayed Systems with Applications

Shanaz Tiwari and Yuan Wang

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The goal of this work is to develop some stability results for nonlinear systems with time-delays. Stability analysis has been one of the central issues in nonlinear control theory. However, most of the past work in this area has been done for systems without delays. The presence of delays adds an additional layer of challenge to stability analysis because, unlike the case of systems without delays, the underlying state spaces for systems with delays are not finite dimensional spaces, but rather infinite dimensional function spaces. Imitating techniques used in finite dimensional space has led to the development of the Lyapunov-Krasovski functional, analogous to the Lyapunov function used in finite dimensional spaces. But constructing a Lyapunov-Krasovski functional can be very complicated in practice. We explore an alternative approach motivated by Lyapunov-Razumikhin functions. The key idea is to treat state variables with time-delays as disturbances, so that familiar tools from the context of robust stability analysis for systems without delays can be used to obtain various results on boundedness and stability properties for systems with time-delays. As an application in biological models, our results are used to obtain some boundedness and stability properties in a blood cell model. It turned out that our method significantly improved the past results based on the linearization method.

Climate change impacts on the secondary metabolite production in Caribbean coral reef sponges

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Coral reef ecosystems will be greatly affected by climate change, but the impact of warmer, more acidic water on sponges is unknown. Explants of four common Caribbean coral reef sponges – *Aiolochoia crassa*, *Aplysina cauliformis*, *Ectyoplasia ferox*, and *Iotrochota birotulata* - were grown for four weeks in tanks with seawater conditions ranging from now to those expected to occur by 2100. For each species, crude extracts were created using HP-20ss solid phase extraction methods. ¹H NMR spectra of the extracts with a standard were collected to identify variability in secondary metabolite production (concentrations and compositions). The quantification method and results will be discussed.

Exploring the stability of an eigenvalue problem approximation technique used to define the angular momentum of almost spherical black holes

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A precise definition of the angular momentum of a black hole in general relativity is possible only when its horizon possesses an axial symmetry. However, most manifolds have no such symmetry. Nonetheless, it is possible to pose an eigenvalue problem on a 2-sphere with lowest eigenmodes corresponding to geometric symmetries. This eigenvalue problem can also be introduced to a non-symmetric geometry to approximate its symmetries. This work, still in progress, investigates how sensitive this definition of an approximate symmetry is over a 2-sphere. This approximation is used to define the angular momentum of a symmetric black hole with small deformations of its horizon geometry. This research ultimately seeks to determine if this definition of angular momentum is perturbatively stable. We will discuss potential applications to numerical relativity and quantum gravity.

Power Based Wide Collision Attacks on AES

Xin Ye and Thomas Eisenbarth

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Secure cryptographic algorithms are the cornerstone of today's IT infrastructure. Implementations of algebraically secure cryptographic algorithms such as AES may still be broken by powerful physical attacks. For hardware implementations of AES, the physical behavior of the implementation is key-dependent. This gives rise to certain side channel leakage, such as power consumption or timing behavior. A malicious adversary able to detect these slight differences in behavior can use the leaked information regarding the key to reduce the possible key space to an exhaustively searchable dimension. The wide-collision attack is one of such methods. Four pairs of successful detection of wide collision can significantly reduce the attack complexity to an easily searchable space. It has successfully been applied to implementations leaking information through key-dependent timing behavior. In this work, we explore how this attack can be applied on information leaked through the power consumption of an implementation. We use uni-centered Euclidean distance over the leakage to measure the distance between power traces and to distinguish wide collision traces from non-wide-collision ones. Based on the detected wide collisions, we apply an algebraic method to derive the key from the four equations in the AES MixColumn step.

The advantage of this approach is that as little as one observation of a collision can reveal a significant portion of the key. The whole key can be revealed by a few hundred measurements, which is a huge improvement over the previous work, which needs several millions of observations. All work is verified by actually breaking an industry-grade FPGA implementation of AES.

Visual wavelength discrimination by the loggerhead turtle, *Caretta caretta*

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Very little is known about the visual capabilities of marine turtles. Studies have explored temporal resolution and spectral sensitivity differences among species but the ability to discriminate between colors has not been adequately demonstrated on the basis of behavioral criteria. In our study, we used a three-part methodology to determine if color discrimination occurred. First, we exposed naïve, light-adapted hatchlings to either a blue, green or yellow light presented in one arm of a Y-maze. These induced the hatchlings to crawl toward the light source. We manipulated light intensity to obtain a behavioral phototaxis threshold to each color. These responses provided us with a range of intensities for each wavelength that we knew the turtles could detect. Second, and using the same light sources, we used food to train the turtles to swim in a seawater-filled Y-maze toward one light color, and then to discriminate between the rewarded light and another light color that was not rewarded with food. Both lights were presented to the turtles at an intensity that was equally (usually, 1 log unit) above the phototaxis threshold. In the third part of the experiment, we will expose the trained turtles to paired lights of different colors in which intensity of the rewarded, and then the unrewarded, light is varied so that brightness cannot be used as a discrimination cue. To date, three turtles have completed this task and shown a clear ability to select a rewarded color over a non-rewarded color, regardless of stimulus intensity.



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