2015 GPSA Research Day Committee

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AGENDA

7:00 – 8:00 a.m.	Check-in (see below for detailed schedule) Live Oak (students) and Grand Palm (judges and facilitators)
8:00 - 8:45 a.m.	Continental breakfast, Grand Palm Room
8:45 a.m.	Welcome remarks – Dr. Corey King, Vice President for Student Affairs and Dr. Deborah L. Floyd, Dean of the Graduate College – Live Oak
8:55 a.m.	Overview of the day and announcement of rules – Brandon Langenberg, Chair of Graduate and Professional Research Day – Live Oak
9:00 - 11:45 a.m.	**Poster Competition** – **Live Oak**
11:45 a.m.	Break
12:00 - 1:30 p.m.	Luncheon – Grand Palm Room Recognition of judges, students and volunteers Welcome remarks by Dr. Gary Perry, Provost
12:25 p.m.	Luncheon keynote speaker – **"LIST TITLE"** – Dr. Dan Flynn, Vice President of Research - (Introduction by Dr. Floyd) – Grand Palm
1:15 p.m.	Awards Ceremony – Grand Palm
1:30 pm.	Closing remarks – Brandon Langenberg

Check-In and Set up Times are as Follows:

7:00 a.m.	Event set-up
7:30 a.m.	Facilitators and assistants check-in, Grand Palm Room (outside)
8:00 a.m.	Students and judges check-in, Live Oak (outside)
8:30 a.m.	Judges and facilitators meet to discuss scoring

KEYNOTE SPEAKER

Dr. Daniel C. Flynn
Vice President for Research
Florida Atlantic University

Daniel C. Flynn, Ph.D., Vice President for Research, oversees research administration in the Division of Research at Florida Atlantic University. The division works to expand and support the University's academic and research programs, promoting research, scholarship, creativity and collaboration with faculty and students.

Prior to joining FAU, Flynn served as Associate Dean for Research in the College of Health Sciences at the University of Delaware. He also served as the founding Associate Dean for Research and Economic Development at The Commonwealth Medical College, a new medical school in Scranton, PA. He oversaw all research activities at the college, including sponsored programs, research compliance, interactions with industry and technology transfer.

Flynn spent 17 years at West Virginia University, where he served as a Professor and Deputy Director of the Mary Babb Randolph Cancer Center. During his career, he has been awarded more than $40 million in research funding, mostly federal grants. During this tenure at WVU, he was Director of a Center of Biomedical Research Excellence for Cancer Cell Biology, developed mentoring programs for junior faculty, organized core facilities, served as principal investigator on a training grant in cancer nanotechnology and served as coordinator of the M.D./Ph.D. training program.

He has published 72 research articles and is the scientific founder of a successful biotech company, Protea Biosciences, Inc., based in Morgantown, West Virginia. Flynn has also served on an editorial board, advisory committees for NIH and Association of American Medical Colleges, and has been an active member of NIH study sections.

He obtained his B.S. in microbiology from the University of Maryland, College Park (1981) and his Ph.D. in virology from North Carolina State University (1988). Flynn conducted his post-doctoral studies at the University of Virginia (1992) in oncogenes and signal transduction.

ABSTRACTS

BDNF increases spine density of olfactory bulb granule cells in vivo

Brittnee McDole, Kathleen Guthrie and Ceylan Isgor
Charles E. Schmidt College of Medicine

There are two areas in the brain that produce new neurons throughout adulthood. Inhibitory granule cells are one population of adult-born neurons, and in the olfactory bulb they control activity of output neurons via dendritic synapses. A question surrounding these adult-born neurons is what factors help them survive and integrate into established neuronal circuitry. The neurotrophin brain-derived neurotrophic factor BDNF promotes dendrite maturation and plasticity of dendritic spines during development and adulthood. Granule cells express low levels of BDNF, and knockout of the BDNF receptor, TrkB, in new granule cells alters their dendritic maturation and reduces spine density, therefore impairing spine formation and possibly integration. To determine if increasing BDNF availability promotes dendritic spine formation or maintenance in the granule cell population, we examined bulbs from adult transgenic mice 2-3 months and 6-7.5 months old that over-express BDNF in the olfac tory bulb. Elevations in BDNF mRNA and protein were quantified and Golgi staining was used to visualize granule cells in their entirety. We reconstructed dendritic arbors and quantified dendrite lengths, branch number, and spine types and density. Comparison of measures from transgenic and wild-type mice at both ages showed that increased BDNF had no effect on dendritic length or branching. However, dendritic spine densities and numbers were significantly higher in the transgenic group compared to control mice. These differences likely reflect BDNF's effects on granule cells and their synaptic partners, and provide insights into how endogenous BDNF may regulate dendritic morphology and the integration of new neurons into the circuitry.

Allergic pulmonary inflammation accelerates breast cancer metastasis via increase of MDSCs in the lung microenvironment

Stephania Libreros, Ramon Garcia- Areas, Nathalia Gazaniga, Philip Robinson and Vijaya L. Iragavarapu- Charyulu
Charles E. Schmidt College of Medicine

Inflammation is known to contribute to tumor initiation and metastasis. Since it is not known the effect of pre-existing inflammation on metastasis, we combined a model of allergic pulmonary inflammation with a breast cancer model. Using this model, we found that allergen sensitized mice implanted with mammary tumors had a 5-fold increase in metastatic foci. More importantly allergic tumor bearing mice showed 3X faster tumor cell infiltration in their lungs with accelerated primary tumor growth and shorter survival. Since macrophages and myeloid derived suppressor cells MDSCs are known play a key role in the immunosuppressive processes associated with both inflammation and metastasis, we hypothesized that allergic pulmonary inflammatory microenvironment attracts myeloid cells that support incoming tumors cells and accelerates metastasis. We found an increase in the alveolar macrophages CD11b-CD11CCD68F4/80Ly6G-, interstitial macrophages CD11bCD11C-CD68F4/80Ly6G-, monocytic MDSCs CD11bLy6ChighLy6G-F4/80-, and granulocytic MDSC CD11bLy6ClowLy6GF4/80- subpopulations in mice with allergic pulmonary inflammation prior to tumor inoculation. These populations were further increased after tumor cell inoculation with the exception the granulocytic MDSCs. Depletion of macrophages and MDSCs prior to tumor cell inoculation in allergen mice decreased tumor growth and metastasis in allergic tumor bearing mice. Targeting specific immune populations could lead to safer and more efficient strategies against breast cancer metastasis.

Selected TLR agonists improve the ability of nicotine-exposed dendritic dells to generate effector T cells

Saba Tamjidi, Erika Nourishirazi, Brittany Bible, Menghua Zeng and Mahyar Nouri-Shirazi
Charles E. Schmidt College of Medicine

BACKGROUND: There is compelling evidence that smokers are less responsive to vaccination. We reported that both therapeutic and prophylactic vaccines fail to protect and cure animals from disease due to negative effects of nicotine on DCs' ability to generate effector T cells. We have been investigating whether vaccine formulated with TLR agonists could potentially overcome the immunosuppressive effects of nicotine on human DC-NK cross talk essential for effector T cell generation. Among the panel of TLR agonists tested we found that TLR-3, -4, and -7/8 effectively restore the expression of the costimulatory molecules and the cytokine production by nicDCs, respectively. HYPOTHESIS: We hypothesize that treatment with these TLR agonists improves the ability of nicDCs to generate effector T cells. METHODS: Monocyte-derived DCs and nicDCs were stimulated with individual and combined TLR agonists prior to co-culture with purified T cells. The phenotypes and cytokine profiles of T cell were assessed using flow cytometry and ELISA, respectively. RESULTS: We found nicDCs matured with TLR7/8 alone or in combination with TLR3 and TLR4 produce quantitatively and qualitatively similar IFN-γ producing effector T cells when compared to control DCs. CONCLUSION: Our data suggests that the addition of appropriate TLR agonist to vaccine formulation could potentially overcome the immunosuppression seen in smokers thereby, containing the spread of infectious disease to vulnerable population.

Role of human polynucleotide phosphorylase hPNPase in controlling oxidized RNA

Sulochan Malla and Zhongwei Li, Ph.D.
Charles E. Schmidt College of Medicine

hPNPase is a human homologue of polynucleotide phosphorylase PNPase that has 3'→5'phosphorolytic exoribonucleases activities. PNPase exhibits multiple biochemical activities including RNA degradation, synthesis of RNA, RNA binding, etc. hPNPase was found predominantly in the mitochondrial intermembrane space IMS, however, transient localization in the mitochondrial matrix or cytosol was also proposed. hPNPase functions in multiple aspects of RNA metabolism including mitochondrial RNA processing/import and degradation of mitochondrial and cytosolic mRNAs and microRNAs. Recently, hPNPase has been shown to reduce oxidatively damaged RNA. It binds to RNA made of an oxidized form of guanine, 8-hydroxyguanine 8-oxoG, with high affinity. Overexpression of hPNPase in HeLa reduces 8-oxoG levels in cellular RNA. Moreover, HeLa cells lacking hPNPase contain elevated levels of 8-oxoG in RNA and become hypersensitive to oxidative stress. RNA oxidation is strongly implicated in a number of human diseases, suggesting that hPNPase may play an important role in preventing the diseases through RNA quality control. Like other biomolecules such as DNA, lipids and proteins we showed that mitochondrial RNA are highly oxidized than cytosolic RNA due to ROS vicinity and hPNPase reduces 8-oxoG in both locations. In addition, hPNPase forms a stable complex with RNA helicase hSUV3, and interact with the mitochondrial poly A polymerase mtPAP. Both the latter enzymes including phosphodiesterase 12 PDE12 are known to facilitate RNA degradation. In this study, we also showed the role of PDE12, hSUV3 and mtPAP in controlling RNA oxidation by facilitating the activities of hPNPase.

Ex vivo **generation and comparison of free-ranging Atlantic bottlenose dolphins (*Tursiops truncatus*) and dolphins under human care dendritic cells (DCs)**

Brittany Bible, Menghua Zeng, Saba Tamjidi, Gregory D. Bossart, and Mahyar Nouri-Shirazi
Charles E. Schmidt College of Medicine

An increase in marine mammal mortalities, especially Atlantic Bottlenose dolphins, *Tursiops truncatus*, could be warning us about the health status of our marine ecosystem. Studies have demonstrated that free-ranging dolphins exhibit immunosuppression due to exposure to environmental contaminants or infectious microorganisms. However, research has been limited to peripheral blood mononuclear cells (PBMCs) and nearly no research has been done on dolphins' dendritic cells (DCs), which are essential for initiating an immune response. In this study we took advantage of well-known human and mouse DC generation techniques along with terrestrial-specific growth factors and DC surface markers to generate and characterize ex vivo dolphin DCs from PBMCs. We found that the methodology used to generate human monocyte derived DCs with rat-specific growth factors generated dolphin DCs with higher yield, better morphology, and expression of classical DC surface markers. In addition, DCs generated from free-ranging dolphins using the same methodology showed differences in their profile, expression of markers, and ability to uptake antigen when compared to dolphins under human care. In summary, this study will allow us to evaluate and compare the strength of the immune response generated by the DCs obtained from free-ranging dolphins and dolphins under human care.

Hypoxia Inducible Factor-Alpha Promotes Expression of Pro-tumorigenic SEMA7A in Mammary Tumor Cells

Joseph Karram, R. Garcia-Areas, S. Libreros, C. Castro, P. Keating and Vijaya Iragavarapu-Charyulu
Charles E. Schmidt College of Medicine

It is estimated that one in eight women will be diagnosed with breast cancer. Developing an understanding of the tumor microenvironment is critical for developing treatments for breast cancer patients. It has been well established that hypoxia, or a lack of oxygen, is fundamental in creating a microenvironment that enables metastasis via eliciting angiogenic processes. Poorly differentiated blood vessels can fashion an oxygen-deprived microenvironment that triggers the expression of transcription factor Hypoxia Inducible Factor alpha HIF-1alpha that in turn can up regulate genes mediating a pro-tumor effect. Our laboratory has discovered that mammary tumors express Semaphorin7a SEMA7A, a HIF-1alpha inducible protein. This study's objective is to delineate the mechanism for hypoxia induction in mammary cells. Cobalt Chloride CoCl2 was used to mimic hypoxia in mammary tumor cell cultures. Flow cytometry was used to determine HIF-1alpha activity in the mammary cells. Benign EpH4 mammary cells expressing low SEMA7A greatly increased its expression after response to hypoxic stimuli as determined by qPCR and SEMA7A-specific ELISA. Pretreatment of EpH4 cells with a HIF-1alpha inhibitor Chemotin blocked induction of SEMA7A. Paradoxically, CoCl2 did not raise expression in the highly metastatic 4T1 cells which experience high levels of SEMA7A. Treatment of 4T1 cells with Chemotin under normoxic conditions inhibit HIF-1alpha activity and decrease SEMA7A levels. Determining the role of SEMA7A in the hypoxia axis could further elucidate novel pathways in breast cancer, suggesting that malignant tumor cells can utilize HIF-1alpha in a hypoxic independent manner.

Fire Ants and the Endangered Florida Grasshopper Sparrow in the Dry Prairies of Central Florida: an analysis of habitat overlap and impacts of exotic species

Danielle Romais
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The dry prairies of central Florida have been greatly reduced due to its conversion into agricultural areas, causing a dramatic decrease in the population of the endemic Florida grasshopper sparrow - FGSP Ammodramous savannarum floridanus. Habitat overlap with the red imported fire ant - RIFA Solenopsis invicta was suggested as one potential cause for this decline. We propose to: 1 determine presence/absence of RIFA and FGSP at KPPSP and TLWMA; 2 determine the influence of abiotic and biotic factors on the presence of RIFA and FGSP at KPPSP and TLWMA; 3 determine the influence of seasonal changes in management practices on the presence of RIFA and FGSP at KPPSP and TLWMA. Subsurface temperature, soil moisture, elevation, percentage of open area, vegetation type, vegetation height and correlations between management practices and the presence of the RIFA and FGSP will be measured in the field. A habitat suitability index HSI will be derived from the data collected, potential habitat overlap and impact of the invasive RIFA over the endangered FGSP may be determined.

A Survival Analysis of Adolescent Friendships: The Downside of Dissimilarity

Amy C. Hartl, Brett Laursen and Antonius H. N. Cillessen
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Friendships are important for adolescent adjustment and development; however, adolescent friendships are fleeting. Friend dissimilarity and undesirable individual attributes have been hypothesized to predict friendship dissolution. The present study tests each as predictors of adolescent friendship dissolution. A sample of 410 U.S. adolescents participated in a total of 573 reciprocated friendships originating in the 7th grade. These friendships were followed annually from 8th-12th grade to determine when each friendship dissolved. In the 7th grade, participants completed a peer-nomination inventory, and teachers completed a survey of each participant's school competence. Discrete-time survival analyses used 7th grade friend dissimilarity and individual characteristics of sex, age, ethnicity, number of friends, peer acceptance, peer rejection, leadership, physical aggression, relational aggression, peer victimization, and school competence as predictors of the occurrence and timing of friendship dissolution. Friendships originating in the 7th grade were at greatest risk for dissolution during the first year. Only 1 percent of friendships that started in the 7th grade lasted 5 years. Friend dissimilarity on sex, peer acceptance, physical aggression, and school competence predicted friendship dissolution. At each grade, the odds of friendship dissolution were higher for friends dissimilar on these characteristics. Individual characteristics failed to predict friendship dissolution. The findings suggest compatibility is a function of similarity between friends rather than the presence or absence of a specific individual trait. Adolescents seeking friendships with individuals dissimilar from them on school-related characteristics risk suffering the downside of dissimilarity, namely rapid friendship dissolution.

Utilizing Hyperspectral Reflectance to Analyze Sand Composition

Molly Smith and Donna Selch
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Spectral signatures quickly aid the analysis of sand composition because specific wavelengths correspond with distinct minerals. This provides objectivity to traditional microscopic methods, with the option to create a custom spectral library for Hyperspectral Remote Sensing HRS applications. Removal of salt as a precipitated solid from sea water is useful for clearer microscopic viewing of sand because certain grains are less likely to be misidentified as crystalized salt. Though removal of salts aids in qualitative visual identification, it is problematic for studies requiring spectral reflectance data to match real-life conditions. Spectroradiometric techniques were used to assess the effects of salt in spectral signatures of sand. Sand samples of mixed siliciclastic-carbonate composition were collected from 15 locations across the southeastern Florida coast. Spectral plots were generated from laboratory collected data with an ASD Spectroradiometer. Spectral data was collected before and after samples were prepared for microscopic study. Laboratory-prepared samples show negative slope at approximately 1500 nm and 2000 nm ranges on the generated plots. These wavelengths are indicative of grains having either predominately carbonate or siliciclastic compositions, which agrees with the microscopic analysis. Salts present in a sample affect the spectral signature, thus salt removal yields spectral plots not necessarily concurrent with plots generated from raw, unprepared samples. For studies utilizing airborne HRS data, the order of data collection and preparation is important. To ensure a more precise match between the spectral library and the hyperspectral imagery, spectral data must be collected before the sample is prepared for microscopic analysis.

Examination of the use of Floating Individuals of Halodule wrightii for Restoration

Jacob J. Berninger
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This exploration of using floating individuals of Halodule wrightii provided very encouraging results. Floating individuals were collected in the Indian River Lagoon around the area of Fort Pierce, FL in the spring of 2014 and planted in a former dredge hole West of Fort Pierce Inlet. 32 individuals were attached to 25cm x 25cm biodegradable mesh for each of 30 plots distributed with 2 plots to each block. 66.66 of these plots survived over the 6 months that the experiment took place. The average area covered by the seagrass tripled by week 17. At that point, the seagrass was cut back to maintain the integrity of the experiment, and by week 25 there was double the area covered by seagrass compared to what was originally planted. This method can provide a more environmentally friendly alternative to traditional transplanting.

Effects of elevated pCO2 and light on photosynthesis and calcification in Halimeda discoidea

Katherine Peach Marguerite Koch and Patricia Blackwelder
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We hypothesized that ocean acidification OA effects on calcifying benthic macroalgae are inextricably linked to light availability. To address this supposition, we examined OA and light effects on the calcifying green macroalga Halimeda discoidea, an important carbonate sediment producer in tropical reef ecosystems. An aquaria experiment was conducted to examine elevated pCO2 and light saturating vs. sub-saturating effects on photosynthesis, growth, calcification and crystal morphology. Photosynthetic rates were enhanced under elevated pCO2 and saturating light. This upregulation of photosynthesis did not enhance calcification of new segments or the number of new segments

produced. The lowest number of new segments was produced in the saturating light treatment. Scanning electron microscopy of new segments confirmed net calcification and production of aragonite crystals at 2100 pCO2 levels. Aragonite crystal size and abundance were unaffected by CO2 or light treatments. We also examined dissolution of nonliving segments and observed that without photosynthesis dead segments experienced greater dissolution and possessed smaller crystals under elevated pCO2. Our findings support the hypothesis that light plays a crucial role in calcifying macroalgal responses to OA. We further suggest that H. discoidea will maintain its role as a dominant reef sediment producer under year 2100 pCO2 levels.

Hotspot Analysis of Wildlife Vehicle Collisions of Br-262, Mato Grosso Do Sul, Brazil and Recommendations for Mitigation Efforts

Rebecca Dougherty
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Wildlife vehicle collisions are rampant and widespread across the world's roads. Most analyses of North American and European collisions focus only on large species and the effect that this faunal size class has on human damages and mortality. Yet, the quantitative loss of faunal biomass from the natural environment worldwide is often overlooked, especially when referring to threatened and endangered species Clevenger et al. 2006. Road ecologist have long understood that road networks and their design have a significant impact on the surrounding biodiversity and biological life history van de Ree, 2007. In the last decade, extensive research has been conducted worldwide as to the spatial and biological patterns of these collisions in order to better understand the effect these roadways have on ecosystems and to best inform transportation planning in mitigating these threats van de Ree et al. 2007. This study seeks to evaluate the concentrated spatial clustering of occurrences of wildlife vehicle collisions along highway BR-262 that bisects important habitat of the Brazilian Cerrado and unique Pantanal in southwest Brazil. It is proposed that certain areas and times are more susceptible to incidence of occurrence and that identification of these hotspots will prove useful for best management practices and mitigation strategies in order to protect and conserve critical biodiversity. Of 518 wildlife vehicle collisions found on the roadway for the study period, significant clustering was observed and mitigation options recommended based on the various biological, physical and anthropogenic factors driving these collisions.

Tunicates as a potential bioremediator of the brown tide alga Aureoumbra lagunensis in the Indian River Lagoon

Phyllis A. Klarmann
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Filtration rates of the pleated tunicate *Styela plicata* were measured in order to determine its use as a potential bioremediator against the brown tide pelagophyte *Aureoumbra lagunensis*. These algae blooms caused heavy impacts to north Indian River Lagoon (IRL) in 2012 and 2013, including seagrass die-offs (light attenuation), fish kills (hypoxia), and reduced growth and grazing effects on ecologically important bivalves. Filtration rates of *S. plicata* were calculated provided a diet of *A. lagunensis* (CCMP 1510) and compared to a control species diet of *Isochrysis* sp. (clone T-Iso) at cell concentrations of 5.0×10^5 cells mL^{-1} for both species, which replicate approximate bloom concentrations. The calculated hourly filtration rates and the average filtration rates over the experimental period for individual tunicates were significantly lower in the *A. lagunensis* treatments when compared to the control ($p < 0.0001$). These results are consistent with previous studies on clearance rates of bivalves exposed to *A. lagunensis*, and speaks to the breadth of brown tide effects on a variety of IRL species.

Repairing spherical aberration during in vivo two-photon imaging

Gerardo Estrada and James Schummers
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In vivo two photon microscopy generally requires a cranial window implant to aid in stabilization of the brain. These windows introduce aberration into the optical excitation, due to the use of glass coverslips and other media with different refractive index than that for which the microscope objective is designed. These mismatches introduce spherical aberration which can have dramatic effects on the axial point-spread function psf. We have developed a framework for computational simulations of typically used configurations including up to five media interfaces, as a means to understand the impact of spherical aberration, and to search for experimental solutions to correct for it. Our simulations suggest that spherical aberration even from a single glass coverslip ~170 microns can introduce a substantial loss of z-axis resolution, and blurring of signals from neighboring neural elements. We propose the use of opposite refractive index mismatch to correct for spherical aberration. Our simulations suggest that an appropriate magnitude of opposite refractive index can almost fully recover the ideal psf, and our experimental tests support these simulations.

Will CyberKnife M6™ Multileaf collimator offer advantages over IRIS™ collimator in prostate Stereotactic Body Radiation Therapy?

Vindu Kathriarachchi, Georgios Kalantzis, Charles Shang, Theodora Leventouri and Grant Evans
Charles E. Schmidt College of Science

New CyberKnife M6™ with InCise™ multileaf collimator MLC has ability to form irregularly shaped beamlets which offers a potential for more efficient dose optimization and treatment delivery compared to IRIS™ dodecagon beams. This study is focused on quantification of such timesaving ability in prostate stereotactic body radiation therapy SBRT with comparable dosimetry plans. Eight prostate cancer patients were planned in MultiPlan™ 5.1.2 respectively utilizing IRIS and MLC for 36.25 Gy in 5 fractions. All plans were evaluated by dose conformity index CI, homogeneity index HI, new conformity index nCI and planning target volume PTV coverage. In addition, maximum doses Dmax at the bladder and rectum, calculated treatment time per fraction and planned monitor units MUs were also compared and tested for significance with the Wilcoxon test. In both IRIS and MLC plan groups, PTV Dmax was scaled to 115. The mean V100 was 95.42 for IRIS, and 95.36 for MLC p0.48; mean CI: 1.08 vs. 1.05 p0.09; and mean nCI: 1.13 vs. 1.11 p0.11. Between the groups, the differences of Dmax for the bladder and rectum were found insignificant p0.4. Changing from IRIS to MLC, the average treatment time per fraction was reduced by 35 43.5 ± 2.6 min vs. 28.3 ± 1.6 min, p0.01 and the planned MU's were decreased by 40 50318 ± 8976 vs. 30286 ± 2211, p0.01. This investigation demonstrated a significant 35 reduction in treatment time and 40 reduction in number of MUs by replacing IRIS with MLC without compromising the plan objectives.

A Robust Converse Lyapunov Theorem for Systems with Disturbances Taking Values in a Banach Space

Hasala Senpathy Gallolu Kankanamalage
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This paper presents a converse Lyapunov theorem for robust global asymptotic stability. The main result extends previous converse Lyapunov theorems to systems with disturbances taking bounded values in an arbitrary Banach space.

Vegetation Community Changes in Response to Hydrology at the A.R.M. Loxahatchee National Wildlife Refuge

Janna Ellis Kepley
Charles E. Schmidt College of Science

A spatial analysis of vegetation community changes over time at the Arthur R. Marshall National Loxahatchee Wildlife Refuge will be conducted in order to identify relationships with variations in water level and water quality. The analysis will use existing current and historical data in the refuge, including water gages, vegetation surveys, fire burn data, Lidar based digital elevation data and aerial photography acquired from the United States Fish and Wildlife Service, Everglades Depth Estimation Network EDEN, South Florida Water Management District and other sources. Understanding how vegetation boundaries and dominant species shift over time in response to water level changes and other hydrological factors will allow the National Wildlife Refuge, and other scientists, to create more responsive conservation and maintenance plans for the wetland refuge.

New LS[3][2,3,2^8] Geometric Large Sets

Michael Hurley, Balkumar Khadka, and Spryos Magliveras
Charles E. Schmidt College of Science

Let V be an n-dimensional vector space over the field of q elements. By a geometric t-[qn,k,λ] design we mean a collection D of k-dimensional subspaces if V, called blocks, such that every t-dimensional subspace T of V appears in exactly λ blocks in D. In a recent paper Braun, Kohnert, Östergård, and Wassermann constructed the first ever known large set LS[N][2,k,qn], namely an LS[3][2,3,28] under a cyclic group G of order 255. In this work we construct an additional 8 large sets with the same parameters, using the L3 algorithm for lattice basis-reduction.

Development of a novel approach to identify the sex of marine turtles

Boris Tezak
Charles E. Schmidt College of Science

Marine turtles exhibit temperature-dependent sex determination (TSD). During critical periods of embryonic development, the nest's thermal environment directs whether an embryo will develop as a male or a female. At warmer sand temperatures the nest tends to produce female-biased sex ratios. The rapid increase of global temperature highlights the need for a clear assessment of effects on sea turtle sex ratios. However, identifying hatchling sex ratios at rookeries remain coarse estimates due to the lack of any external gender markers. We rely mainly upon laparoscopic procedures to verify a hatchling sex; however, in some species, morphological sex can be ambiguous even at the histological level. Recent studies using immunohistochemical techniques identified that red-eared slider (*Trachemys scripta*) embryos over-expressed a particular cold-induced RNA binding protein in the ovaries in comparison to the testes. This principle allows the distinction between females and males. We developed a variation of this technique and successfully identified the sexes of loggerhead sea turtle (*Caretta caretta*) hatchlings, as confirmed by standard histological and laparoscopic methods that reliably identifies the sex in this species. Next, we tested a more challenging species, the leatherback turtle (*Dermochelys coriacea*), which retains many neotenic features. The morphology of leatherback hatchling gonads remains difficult to interpret, particularly when dead-in-nest hatchlings and embryos are the source tissues. In summary, this new and more efficient technique enhances our ability to

investigate and identify baseline hatchling sex ratios, a critical progression in assessing global climate change on sea turtle populations.

Object-specific activity recorded from the hippocampus of male C57BL/6J mice and a novel behavioral paradigm to assess discrimination of moving 3D objects

Herborg Asgeirsdottir
Charles E. Schmidt College of Science

The cognitive map theory states that the hippocampus creates representations of locations where relevant nonspatial items or objects are encountered and where specific events occur within a spatial reference frame. The rodent hippocampus is an essential neural substrate for spatial memory and the CA1 region has been shown to play a vital role in object memory dependent and independent of context; findings consistent with the cognitive map view. In vivo extracellular recordings from the distal band of dorsal CA1 in freely moving C57BL/6J mice, yielded recordings of both place cells and cells that demonstrated object-specific activity over consecutive sessions with objects present. Object-specific activity was observed when the mouse explored novel and familiar objects, independent of spatial location or object identity. The firing frequency of these cells increases over time as mice explore the objects and they become more familiar. These results raise questions regarding 3D objects in motion and how they are processed within the rodent hippocampus. We developed a novel behavioral paradigm to test the influence of motion on object memory. The "Knowing your enemy" paradigm trains mice to discriminate between two moving objects and avoid proximity to only one of them to avoid a foot shock. The task requires the mice to both identify the objects and continuously update their location in space, both of which are believed to be hippocampal dependent. Temporary inactivation of the mouse hippocampus during the "knowing your enemy" task results in impaired avoidance, further supporting hippocampal involvement in non-spatial object memory.

Inhibitory processing in relation to age of first substance use and age of first regular substance use

Andres L Paz, J. Conniff, and B. Gonzalez
Charles E. Schmidt College of Science

The current project aims to identify age of first regular substance use (AFRU), compared to age of first substance use (AFU), significantly predict poor performance on three inhibitory processing subcomponents. Analysis consisted of preliminary baseline data of a 6-month longitudinal research study investigating the relationship between inhibitory processing and substance use. 186 young adults (109 females), ranging from 18-25 years old, were recruited from three undergraduate universities in South Florida. Participant's inhibition (via Stop Signal, Go-No Go, and Simon task) and drug use history (e.g., alcohol and illicit drugs) were assessed at baseline. AFRU significantly differed from AFU for the following substances: alcohol consumption [$t(167)= -14.32$, $p<.001$], binge drinking [$t(117)= -6.41$, $p<.001$], marijuana [$t(72)= -7.99$, $p<.001$], and cigarettes [$t(277)= -4.80$, $p<.001$]. Among male users, AFRU for binge drinking significantly predicted poor performance on the Simon task, measured as the number of incongruent response errors, $b= -.426$, $t(81)= -3.26$, $p<.001$. Similar results were found with AFRU for marijuana, $b= -.480$, $t(25)= -2.68$, $p<.01$. Among female users, AFRU for alcohol consumption significantly predicted better performance on the Simon task, measured by the Simon effect, $b= .204$, $t(98)= 2.06$, $p<.05$. In conclusion, AFRU significantly predicted poorer inhibitory performance among male binge drinkers and marijuana users, while AFU did not. These findings, in combination with the significant differences found between AFRU and AFU, suggests that initiation of regular drug use is a

better predictor of future inhibitory functioning among males than the age in which the substance was used for the first time.

Early Detection of Plant Stress using Hyperspectral Remote Sensing

Donna Selch and Caiyun Zhang
Charles E. Schmidt College of Science

In ecosystems such as the Florida Everglades stressors to plants include flooding, unnatural nutrient levels, and salinity changes. These plants cannot flee to safer areas and thus must attempt to endure the stress. Traditionally plant stress is visually indicated by color changes, wilting, and lack of growth. These visual indicators imply it is too late to remove the stressor from the environment and revitalize the plant. However, recent studies indicate that hyperspectral remote sensing may detect plant stress before visual clues emerge during the early stages of plant stress. This research aims to examine the response of a salt marsh plant, Juncus roemericanus, using remote sensing techniques from common stressors in the Florida Everglades. With this knowledge increased protection and stress diversion may be possible for high-risk areas.

A Quadratic Regression Approach to Computing the Cauchy Green strain tensor.

Shane Kepley
Charles E. Schmidt College of Science

The Cauchy Green strain tensor provides an effective tool for understanding unsteady flows. In particular, the dominant eigenvalue of this tensor has been seen to be a reliable estimator of the finite time Lyapunov exponent. We propose a new method for computing the CG strain tensor using a local quadratic regression LOESS technique. We compare this LOESS method with several classical methods using closed form flows, noisy flows, and simulated time series. In each case, the CG strain tensor produced by the LOESS method is remarkably
accurate and robust compared to classical methods.

Variations of Cardiac Dose at Different Respiratory Status in CyberKnife M6™ Treatment Plans for Accelerated Partial Breast Irradiation APBI

Samanthia C Long
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Cyberknife robotic assisted radiation delivery has become a choice for accelerated breast RT, while a slightly increased cardiac dose has been reported. However, the dose dynamics throughout the respiration cycle has scarcely been explored. This study was designed to investigate the dose changes at each respiratory phase or status during respiration cycle. Two patients with 4DCT studies and two patients with a pair of free- breathing and deep breath-hold CT sets were used for dosimetry comparisons. 4DCT sets were obtained by Siemens™ CT and
its respiratory gating system, comprising of 8 phases. Standard APBI plan at 340 cGy was done per fraction per NSABP B-39/RTOG 0413 and modulated with Cyberknife M6™ on MultiPlan™5.1.2. For the purpose of this study, the tumor volume was outlined in the media-lower quadrant of the left breast. The heart doses are significantly reduced in well inhaled phases, especially for 1-3 cc higher dose regions with 18.7±4.2 p0.01 reduction from averaged doses in other less inhaled phases. Since the dose conformity in lower dose levels are degraded due to its less toxic nature, D5cc of the heart showed a less sensitive to phase changes during respiratory circle. Compared with free breathing, the

deep inhaled breath hold reduces the cardiac dose by 80 and 55 respectively in case 1 and case 2. The cardiac dose reduction was seen in well inhaled breathing phases and, more significantly in plans with BH CT. This provides practical guidance for cardiac dose reduction applicable with CK M6 APBR.

The history and current census of Chlorocebus sabaeus in Dania Beach, Florida

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Florida is home to over 500 exotic species with most being introduced by humans, including three primate species. The Florida Fish and Wildlife Conservation Commission reports breeding populations of rhesus macaques Macaca mulatta in Silver Springs State Park, Ocala, squirrel monkeys Saimiri sp. in three counties, and green monkeys Chlorocebus sabaeus in Dania Beach. Multiple media reports exist about green monkey sightings in urban areas and little is known about their origins or behavior. Therefore, goals of this study were to 1 investigate historical records to understand the origins of this introduced vervet population, and 2 conduct a census to document the current population size. Evidence suggests that a group of vervets escaped from the Anthropoid Ape Research Foundation in 1948. This facility, established in the early 1940's, also known as the Chimpanzee Farm, imported primates to be sold for medical research. In 1957 the farm closed when Florida Power and Light bought the land. Through local reports and direct counts of monkeys we documented four groups 39 monkeys total occupying the urban landscape and protected mangroves of Dania Beach. These groups live adjacent to businesses that offer provisioning year round. We are currently investigating the ecology and behavior of the monkeys to understand how they have adapted to the South Florida mangrove habitat, and examine the dynamics of the human/nonhuman
primate interface.

What Controls The Nocturnal Emergence Rhythm Of Hatchling Marine Turtles?

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Most marine organisms partition particular activities, such as growth, migration, reproduction, and hatching, to particular seasons, times of the day or night, or phases of the lunar cycle. The result is characterized as a "rhythm". Scientists who study these rhythms generally ask two kinds of questions: why do they occur when they do that is, what is their survival value, and how are they controlled, physiologically? Hatchling marine turtles almost always emerge from their nests at night, then crawl down the beach to the sea and migrate offshore. By doing so at night they avoid lethally warm beach sands and diurnally active predators in the shallows. But these "survival value" explanations do not account for how the turtles, digging their way upward inside the nest toward the beach surface, know that it's dark and time to emerge. The classic explanation for how they "know" is based upon surface sand temperatures. During the day, these sands can be very warm 50° C. When hatchlings digging upward encounter these heated sands, they stop digging until the sand cools, after sunset. But these observations fail to explain why in most studies, hatchlings rarely emerge from their nests at dawn or in the early morning, when the sand is still cool. To account for those observations, we hypothesize that the turtles must also possess a time sense that inhibits emergence during inappropriate times, such as shortly before or after sunrise.

Swimming Kinematics of Juvenile Sphyrna Lewini

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The head of Sphyrnid sharks is an exaggerated dorso-ventrally compressed cephalofoil, which likely influences their swimming kinematics. Previous researchers hypothesized that the cephalophoil may act as a stabilizer during turning to maintain the shark's position parallel to the substrate. Sphyrnid sharks have also been shown to be highly maneuverable and more flexible when compared to other shark species. Here, we explore swimming performance variable of Sphyrna lewini scalloped hammerhead during swimming. We obtained video of juvenile Sphyrna lewini swimming from dorsal and lateral views. We assigned 15 anatomical landmarks on the shark and tracked the movement of each during swimming. Anatomical landmarks included points on the cephalofoil, pectoral fins, caudal fin, and along the body midline. The movements of these points were correlated with swimming performance variables such as velocity, tail beat frequency, and tail beat amplitude. We also examined variables such as head yaw and body curvature along the length of the body.

Inhibition of Emotions as a Moderator of the Relation Between Victimization Experiences and Aggression in Preadolescence

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Chronic victimization by peers sometimes fosters aggression in children (Dodge, 2011; Hodges & Perry, 1999). Recent data suggest that cross-gender victimization is more common in girls during middle childhood (Benbenishty, & Astor, 2005). That is, girls are picked on by boys at a proportionally higher rate than boys are picked on by girls. However, the possibility that enduring cognitive structures moderate effects of victimization on aggression—by serving as processing filters through which children perceive, interpret, and respond to the adverse experiences—remains unexplored. In this study, we assessed whether victimization experiences at the hands of the other sex increased aggression over the school year. We measured peer-nominated aggression toward the other sex and victimization by the other sex in 195 children (94 girls, 101 boys; M age 10.1 years). We also examined self-reported inhibition of emotions as a possible moderator. Results suggest that aggression did not increase over time if boys were victimized by other boys, but the more that boys were victimized by girls, the more their aggression increased girls' aggression was unaffected by victimization by peers of either sex as a main effect. However, inhibition of emotions moderated the effect of victimization on aggression in both sexes. Thus, the experience of being victimized by the other sex led to an increase in aggression toward the other sex only when inhibition of emotions was high, rather than low. These findings highlight the importance of examining interactive models that contribute to aggression in children.

Effects of fire on ridge slough patterning in the central Everglades

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Wildfire plays a crucial role in the maintenance of landscape heterogeneity and patterning, particularly in the Florida Everglades. The frequent fires in the marsh wetlands typically remove much of the standing biomass and sometimes the surface soil layer, catalyzing plant community change. As the plants recover, the accumulated aboveground biomass contributes to fuel loading for future fires.

Feedback loops between environmental and vegetation conditions help maintain the characteristic ridge and slough landscape of the Everglades. In this study, I will investigate the influence of fire history and behavior on ridge-slough patterning in the central Everglades. I will use historical fire and hydrologic data to identify sites with frequent vs infrequent fire under different hydroperiods.Using survey transects, I will quantify the distribution of soil surface elevations and vegetation composition, as well as shape of ridge landforms. These patterns will be used to assess fire's role in the maintenance of ridge-slough patterning. Quantifying the feedbacks responsible for maintenance of landscape heterogeneity is critical in the restoration and management of the Florida Everglades.

Revealing Pre-Historic Native American Belle Glade Earthworks in the Northern Everglades utilizing Airborne LiDAR

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Locating and mapping methodology of archaeological earthworks for the pre-historic Native American Belle Glade culture can be improved by applying airborne LiDAR Light Detection and Ranging employing FUSION software and the Ground Filter program to these remote areas. This study compares the standard utilization of vendor created classes for ground classification to FUSION's software ground filter program. The two case study locations contain Belle Glade type B circular-linear earthwork formations that were utilized for quantifying the results of each LiDAR processing methodology and visualization method through comparison of identifiable formations. Florida's northern Everglade's landscape and South Florida's tropical climate make traditional methods for archaeological earthwork identification difficult. However, FUSION ground filter program provides more data and discernible features that were not possible from the standard method in both study sites in addition to providing reference points for geo-rectification of the original scaled maps.

Diet and Selectivity of the Purple Swamphen in South Florida

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The goals of our project are to compare the diet of the Purple Swamphen (*Porphyrio porphyrio*) across three different areas of South Florida and investigate whether swamphens are selecting particular types of food. We analyzed the carcasses of 91 swamphens collected by The Florida Fish and Wildlife Commission from Stormwater Treatment Area 1W (STA1W), Water Conservation Area 2B (WCA2B), and Lake Okeechobee. We measured morphological characteristics of each bird and sorted and identified the contents of its proventriculus and gizzard. In addition, we quantified the vegetation community in WCA2B so that we could calculate diet selectivity. We found that the swamphens differed in size among the study sites with the larger birds originating from STA1W compared to the other two sites. The primary food item of the swamphen at all three sites was Gulf Coast spikerush (*Eleocharis cellulosa*), comprising 79%, 72%, and 49% mean dry weight for WCA2B, Lake Okeechobee, and STA1W, respectively. Accounting for food availability, swamphens were strongly selective for spikerush. Like many invasive species, swamphens are considered to have an opportunistic diet. However, the birds in South Florida heavily selected for spikerush. High selectively is not likely to limit the expansion of swamphens, because of the plant's prevalence throughout Florida and the southeastern U.S. Potential impacts to native species would likely depend on the degree to which they are dependent on spikerush and the amount that spikerush is reduced by swamphens.

Breast quadrant analysis of out-of-field surface doses with tumor locations for five breast cancer irradiation modalities.

Suraj P Khanal and Dr. Theodora Leventouri
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The radiation induced secondary cancer due to primary treatment is a major concern in radiotherapy. The magnitude of the radiation dose due to scatter and leakage radiation outside treatment area is evaluated using thermoluminescenct dosimeters TLDs. Twenty five breast cancer patients and the following modalities were included in this study: Strut-Adjusted Volume Implant SAVI, Mammosite Multi-Lumen ML, Accuboost, Electron boost and Photon boost. The surface doses had been measured in a single fraction. The delivered target doses were normalized to 200 cGy. The breast quadrant analysis was performed to investigate possible correlations between the out-of-field surface doses at each point of interest POI with the tumor location.

Utilizing the Drosophila melanogaster giant fiber system for the functional characterization of peptidic natural products

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The escape response of the Drosophila melanogaster is mediated by the giant fiber system GFS. This neuronal circuit ends in the stimulation of the Dorsal-Longitudinal muscle DLM and Tergotrochanteral muscle TTM via two pathways containing mixed electrical GAP junctions and chemical cholinergic and glutamatergic synapses, as well as various ion channels and receptors. The circuitry of the D. melanogaster GFS can be utilized to find novel neuronal probes by pairing electrophysiology with the nanoinjection of animal and plant produced peptides; specifically, toxins produced for predation and self-defense by venomous marine mollusks conotoxins and plants cyclotides, respectively. Conotoxins are promising drugs leads with great prospects in the treatment of diseases and disorders such as chronic pain, multiple sclerosis, and Parkinson's and Alzheimer's diseases, due to their specificity and potency towards receptors and ion channels. Cyclotides have a wide range of biological activities, such as anti-HIV, uterotonic, antimicrobial, and insecticidal. Presented are the details of the in vivo characterization of conotoxins from Conus brunneus and Conus glorimaris and cyclotides from Oldenlandia affinis and Viola tricolor in the GFS neuronal circuit.

The Role of Nonradiative Decay Mechanisms in Luminescent Lanthanide Coordination Polymers

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Tailoring light emission through the manipulation of lanthanide containing coordination polymers is an active area of research in materials chemistry. These materials are high dimensional solid-state compounds composed of metal centers tethered together by organic moieties called linkers. Using lanthanide ions as the metal imparts luminescent features to the coordination polymer, producing sharp color-pure emission profiles; however, direct excitation of the lanthanide ion is inefficient. Instead, a process commonly referred to as the antenna effect can be used to sensitize luminescence of the lanthanide. Here, the organic linker absorbs incident radiation and transfers the energy to the lanthanide's excited state, often resulting in radiative decay to produce luminescence. This process can be deactivated by nonradiative pathways, such as the oscillation of bound water molecules. Overall, understanding the parameters by which this sensitization occurs within coordination polymers is crucial

in the development of these materials for applications in display technologies, sensing, and bioimaging. To this end, a new coordination polymer, [EuC15H9O53H2O3]n , based on benzophenone-4,4'-dicarboxylic acid has been hydrothermally synthesized and possesses abnormally high luminescence despite the presence of three bound water molecules. Photophysical measurements performed on the system are presented here in order to understand this behavior.

Rapidly and Automatically Assessing Situation Characteristics from Limited Linguistic Information

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How a person feels or behaves is importantly associated with his or her situation. However, assessing situations that people actually experience in real-life is challenging. This study developed an algorithm for assessing the psychological characteristics of situations described in Tweets. Specifically, research assistants rated 5000 Tweets for the degree to which the situations described therein were characteristic of Duty, Adversity, Intellect, etc. (DIAMONDS; Rauthmann et al., in press). Machine learning was employed to develop scoring algorithms for the DIAMONDS based on linguistic information in the Tweets. Predicted scores correlated between $r = .14$ to $r = .57$ (mean $r = .30$) with coder ratings on test data, despite the brevity of Tweets (i.e., 140 characters). This algorithm was applied to 4.3 million Tweets from the continental US. Results show both regional and temporal differences in situation experiences. The prospects for rapidly and automatically assessing situation information at various times and locations are discussed. 4 .3 million tweets from the all over the continental US were used to extract information about the situations that people experience in different geographical regions. Trained coder ratings on 5000 tweets were used to estimate scores for all 4.3 million tweets. Results show geographic, temporal and contextual differences in situations.

Should we use RapidArc (VMAT) for breast treatments? A Dosimetric comparison of IMRT versus VMAT optimization in whole breast irradiation of early stage breast cancer

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Purpose: The purpose of this study is to compare the dose-volumetric results of intensity modulated radiation therapy (IMRT) with RapidArc (RA Varian Medical Systems, Palo Alto, CA) for whole breast irradiation. Methods: 25 patients previously treated for whole left breast (either RapidArc plan or IMRT) were the subjects of this planning study. Eclipse v 11.0.47 was used to make all retrospective plans using the same contours, energy, machine and normalization. Prescription dose to the planning target volume was 5000 Gy in 25 fractions. All plans were normalized such that 100% covered 95% of planning target volume (PTV). Results: V10, V20 and Dmean Gy of left lung significantly differed between the two plans (p-value <0.0001, =0.0473 and <0.0001 respectively), but V30 Gy did not (p-value 0.463). V25, D33 and Dmean Gy of heart significantly differed between the two plans (p-value =0.034, <0.0001 and 0.01 respectively), but V10 Gy did not (p-value 0.058). V5 of both right breast and right lung significantly differed between the two plans (p-value <0.0007 and =0.0112, respectively). Also Dmean of both right breast and right lung significantly differed between the two plans (p-value <0.0001 for both). The mean conformity index did not significantly differ, p-value 0.142. There was a significant difference between the mean MUs of the two plans as well, p-value <0.0001.

Climate change effects in Nepal Himalaya: a focus on medicinal plants and people

Ripu Kunwar and Rainer Bussmann
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Intergovernmental Panel on Climate Change IPCC projected that the Himalayas are likely to experience some of the most drastic climate change effects in the world outside of Polar Regions, with temperature increases of 5-6°C and precipitation increases of 20-30 and rapid melting of snows and glaciers. Owing to highly heterogeneous geography, ecosystems and species along with pronounced altitudinal and humidity gradients, Nepal Himalaya is severely vulnerable in plight of climate change. In this communication, the status of climate change and its effects on medicinal plants and their dependent people is analyzed by reviewing published literature, walk-on-the-woods and participant observations. Like all living members of the biosphere, medicinal plants are not immune to the effects of climate change. Wild and indigenous medicinal plants, Fritillaria cirrhosa, Hippophae salicifolia, Zanthoxylum armatum, etc. are more vulnerable to climate change, which could put them at risk. Early flowering and budding and distribution upshifts are observed. Adjustments lead to increased competition for space and resources, causing further stress among Mountain people and plant populations. The growth sites of medicinal plants, particularly for collection of wild species are greatly diminishing and the harvesting calendar are no longer coinciding resulting in affecting local peoples abilities to collect and use those species.

Covering Small Alternating Groups with Proper Subgroups

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Any group with a finite noncyclic homomorphic image is a finite union of proper subgroups. Given such a group G, we define the covering number of G to be the least positive integer m such that G is the union of m proper subgroups. We present recent results on the determination of the covering numbers of the alternating groups on nine and eleven letters.

The Effect of Sea Level Rise and Nutrient Loading on Juncus roemerianus and its Ability to Indicate Saltwater Intrusion

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Juncus roemerianus, the black needlerush, has long been used in restoration projects throughout Florida due to its unique ability to thrive in both freshwater and saltwater environments. Models predict that many of the freshwater systems inhabited by J. roemerianus will be affected by salt water intrusion and inundation caused by sea levels rising consistently year after year, yet it is unknown how the species will respond to these changes in habitat. Previous research on the species has been comprised of either field studies alone or laboratory studies focusing solely on the affect salinity has on the physical characteristics of the plant. This study's advanced laboratory approach looks at the effects of salinity, nutrient loading, and inundation combined in a repeated split plot design to better understand the dynamics of this robust plant in scenarios of sea level rise and saltwater intrusion. Weekly assessments of shoot height, recruitment, senescence, and water quality were recorded and analyzed statistically to determine the effect of each variable independently and synergistically on the physical characteristics of the plant. Results of this study will help predict how the species will respond to sea level rise and ultimately indicate whether J. roemerianus can serve as a saltwater intrusion indicator species throughout this state in the face of climate change.

Infants Continue to Attend to the Mouth of a Talking Face at 14 & 18 Months of Age

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Lewkowicz & Hansen-Tift 2012 showed that once infants enter the canonical babbling stage - between 8 and 10 months of age - they begin to focus their selective attention on a talker's mouth and that they do so regardless of whether she speaks in a native or non-native language. Consequently, it is possible that new language/speech developmental processes e.g., lexical explosion cause infants older than 12 months of age to once again re-focus their selective attention on the maximally salient redundant audiovisual cues available in a talker's mouth to now extract more specific linguistic information. To test this hypothesis, we used an eye-tracker to measure the proportion of attention that separate groups of 14-month-old N23 and 18-month-old N25 English-learning infants allocated to the eyes and mouth of a female reciting an utterance either in their native language or in a non-native language Spanish and either in an infant- or adult-directed manner. The present results extend the Lewkowicz & Hansen-Tift findings past 12 months of age and are consistent with the theoretically reasonable hypothesis that infant selective attention to the perceptual cues associated with fluent audiovisual speech changes again after 12 months. They suggest that the emergence of new processing requirements - perhaps related to the initial acquisition of the lexicon - require infants to once again take maximum advantage of the greater salience of multisensory redundancy cues.

Post-Fire Succession and Carbon Storage In The Northern Everglades

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Fire plays a key role in the ecology of the Everglades and is a ubiquitous tool for managing the structure, function, and ecosystem services of the Greater Everglades watershed. Because fire historically shaped the Everglades' landscape, successful restoration relies on the implementation of fire management practices. This research will provide documentation of the trajectory of plant community succession as well as aboveground carbon storage post-fire in sawgrass marshes of the A.R.M Loxahatchee National Wildlife Refuge. Historical fire records were used to select sites along a chronosequence of time since the most recent prescribed fire. Sites were constrained to the northern part of the Refuge to minimize effects of regional hydrology and distributed between areas with relatively high and low phosphorous load to evaluate P effects on recovery trajectory. Vegetation surveys were performed in four transects consisting of five 1m x 1m plots at each site to assess the pattern of plant community compositional and structural change through succession. Aboveground plant biomass and leaf area were also nondestructively estimated in each plot, with additional destructively harvested samples for validation and to analyze total foliar C and N. Surface soil samples were collected to quantify the organic matter, C, N, and P content across the chronosequence. Results of this study will provide a greater understanding of the post-fire successional sequence and aboveground carbon storage by Everglades sawgrass communities as well as quantification of the effectiveness of fire management practices in the maintenance and restoration of quality habitat in the northern Everglades.

Impact Of Willow Invasion On Water And Carbon Exchange In The Vegetation Of A Subtropical Wetland

Michelle Budny and Brian Benscoter
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Carolina willow Salix caroliniana is native to the Florida wetlands, commonly found on drier landforms like levees and tree islands. Shortened periods of inundation due to water management have led to the encroachment and expansion of shrubs in sawgrass Cladium jamaicense marsh communities. Morphologically and physiologically differences between sawgrass and willow lead to possible consequences for microhabitat conditions and ecosystem function such as decreasing temperatures and light availability and changing primary productivity. Willow is often assumed to have greater rates of transpiration, affecting wetland water management, and may have differences in photosynthesis and carbon exchange. However, the ecophysiological impact of the willow invasion has not been quantified. We assessed differences in plant water and carbon exchange between willow and sawgrass in an impounded sawgrass peatland. Stomatal conductance gs and net CO_2 exchange Anet; photosynthesis and autotrophic respiration were measured on fully expanded, non-damaged leaves of sawgrass and willow using a portable infrared gas analyzer. Willow had higher rates of gs and Anet than sawgrass. However, sawgrass had greater intrinsic water use efficiency WUE than willow. This suggests that willow is capable of greater gas exchange and carbon assimilation than sawgrass but requires more water. The results of this study will provide a better understanding of ecophysiological changes within marsh communities with shrub expansion, which will have cascading impacts on soil carbon storage, microclimate, and water quality and availability. Understanding the implications of willow expansion will improve landscape models of wetland water and carbon exchange and inform water management decisions.

Categorization and Acoustic Characteristics of Florida Manatee Vocalizations

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Endangered Florida manatees (*Trichechus manatus latirostris*) face challenges from climatic and anthropogenic sources. Monitoring manatee distribution, density and demographics are important tools for population biology and conservation efforts. Manatees vocalize frequently under certain social conditions and group structures. Specifically, vocal exchanges occur more often between mothers and calves, and among aggregations of adults and juveniles. These vocalizations could be used to localize, and track manatees, as well as estimate density and group composition. This project is designed to statically categorize vocalization call types using signal processing techniques, and document call rates and call type distributions and investigate sequence patterns for each of the call categories. These will be evaluated with respect to manatee group size, composition, behavior, and diurnal variables. Vocalizations have and are being recorded using calibrated omnidirectional hydrophones from multiple sites in Florida. Preliminary analysis suggests six distinct call categories derived from number of inflection points and spectrographic images. Further analysis will elucidate call rates and sequential correlations of call types under varying conditions.

in-vivo Drosophila Drug-Screening for Determining Neuroprotective Effects of Polyphenolic Natural Products

Tanya Kelley
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One of the many challenges in modern drug design is overcoming poor translation of bioactivity from cellular based assays into rodent models. In recent years, the use of simple whole-animal models, such as Drosophila melanogaster, has become more widespread in attempt to better quantify candidate compounds. Herein, a simple, albeit powerful anoxic Drosophila behavioral assay has been designed for the evaluation of neuroprotective polyphenolic natural products. These compounds will be obtained through a direct collaboration with The Scripps Research Institute. Commercially available resveratrol was used as the template compound in order to optimize efficacy of the assay, and for the first time, demonstrated impressive neuroprotection against anoxic stress. The mechanism of action is thought to be owing to activation of Ser-2 and increased mitochondrial function, along with antioxidant effects. Currently, other commercially available Ser-2 activators and antioxidants are being evaluated. Our future direction will lead us to precious compound testing.

Empirical Beam Angle Optimization for Intensity Modulated Radiation Therapy in Lung Patients

Brian Doozan
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Empirical methods of beam angle optimization BAO are tested against the BAO that is currently employed in Eclipse treatment planning software. Creating an improved BAO can decrease the amount of time a dosimetrist spends on making a treatment plan, improve the treatment quality and enhance the tools an inexperienced dosimetrist can use to develop planning techniques. Using empirical data created by experienced dosimetrists from 69 patients treated for lung cancer, the most frequently used gantry angles were applied to four different regions in each lung to gather an optimal set of fields that could be used to treat future lung cancer patients. This method, given the moniker FAU BAO, is compared in 7 plans created with the Eclipse BAO choosing 5 fields and 9 fields. The results show that the conformality index improved by 30 or 3 when using the 5 and 9 fields. The conformation number was better by 12 from the 5 fields and 9 from the 9 fields. The organs at risk OAR were overall more protected to produce fewer nonstochastic effects from the radiation treatment with the FAU BAO.

Dynamical cosmological sector in loop quantum gravity

Matthew E. Hogan Christopher Beetle, Jonathan Engle and Philip Mendonça
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We introduce a set of diffeomorphism and gauge-covariant constraint functions on the gravitationa phase space whose vanishing imposes homogeneity and isotropy, and which form a first class system. We furthermore define a quantization of these constraint functions on diffeomorphism invariant states in full loop quantum gravity. The kernel of the resulting operators then defines a diffeomorphism-invariant homogeneous isotropic sector of full loop quantum gravity — that is, a sector in which the Gauss constraint, the diffeomorphism constraint, and homogeneity and isotropy hold. The kinematical Hilbert space of loop quantum cosmology LQC also represents states in which these same conditions hold. A strategy for constructing an embedding of LQC states into this full theory sector, and using this embedding to compare dynamics in the full and reduced theories, is presented.

Sex Identification in Sea Turtle Hatchlings By Hplc Assay Of Plasma Steroid Hormones

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All sea turtle populations present in U.S. waters are considered to be either threatened or endangered and are protected by the Endangered Species Act. Sex ratio monitoring is vital to conservation research because sea turtles exhibit temperature-dependent sex determination, which means that the nest environmental temperature influences the sex ratio produced; warmer temperatures produce more female hatchlings while cooler temperatures produce males. Variability in the environment caused by increasing global temperatures, increasing severity of storms, and anthropogenic changes such as beach renourishment may thus alter sex ratios, limiting future reproductive potential and hindering conservation efforts. Monitoring sex ratios allows us to minimize negative influences on reproductive potential. This research focuses on one aspect of conservation, a sex identification technique for hatchling sea turtles to monitor male: female sex ratios produced during incubation in the nest. As hatchlings do not exhibit external secondary sex characteristics, however, sex identification at the hatchling stage is difficult. As a result, several methods of sex identification in sea turtle hatchlings have been developed, though each has limitations such that a reproducible, less-invasive method would advance studies of sex identification. This study used High Performance Liquid Chromatography to separate and quantify plasma steroid hormones: estriol, estrone, estradiol, progesterone, and testosterone in a South Florida population of Loggerhead, Caretta caretta, and Green sea turtle, Chelonia mydas, hatchlings. Gender was ground-truthed by laparoscopy.

Niche partitioning by the common octopus and the mimic octopus in a tropical sandy habitat

Chelsea Bennice,Dr. Randy Brooks and Dr. Roger Hanlon
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Sympatric species have evolved ecological, morphological, and behavioral specializations in combination with spatial and temporal distribution to allow for coexistence. To determine how two species coexist, it must first be determined how each species exploits its niche and any occurrence of biotic interactions intra- and interspecific competition. Two species of octopus Octopus vulgaris and Macrotritopus defilippi with similar resource requirements overlap in an intracoastal habitat. This study assessed the spatial distribution of octopus home or "den" space and the potential importance of microhabitat heterogeneity. Octopus den location is marked by GPS to quantify spatial patterns of both species and their spatial relationship to each other. Substrate make-up of microhabitat and immediate den space previously has been reported for both species. The importance of habitat heterogeneity is measured by determining substrate make-up of the microhabitat and immediate den space for both species. Direct observations and underwater photoquadrats of microhabitat substrate make-up are analyzed in CPCe software to determine frequencies of substrate make-up. Results have identified spatial clustering of O. vulgaris. No spatial pattern has been identified for M. defilippi. This study identifies ecological and behavioral components that facilitate coexistence of sympatric species, provide insight into cephalopod ecology, and provide baseline conservation requirements for these unique sand-dwelling organisms. This site may serve use as a mating and nursery habitat.

Neuronal autophagy activity is essential for insulin growth factor signaling-regulated lifespan extension in C. elegans

Justin Minnerly, Kailiang Jia and Juili Zhang
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The conserved insulin growth factor IGF signaling pathway is one of the major regulators of lifespan in many species including C. elegans. In C. elegans the insulin/IGF-like receptor is encoded by the daf-2 gene, mutations in which result in lifespan extension. The daf-2 activity in the nervous system controls these phenotypes cell nonautonomously. Interestingly, the longevity phenotype of daf-2 mutant worms is dependent on macroautophagy hereafter autophagy. Autophagy is a highly conserved lysosomal degradation pathway involved in the removal of long-lived proteins and cytoplasmic organelles. During autophagy, cellular components are sequestered into the double-membrane autophagosomes and delivered to lysosomes for degradation. Increasing evidence has emerged that the autophagy process is a central regulator of lifespan that is required for the effects of DAF-2 signaling, dietary restriction and some mitochondrial mutations on C. elegans longevity. It is unknown however whether autophagy activity in every tissue or in a single tissue mediates the influence of these longevity signals. To address this question, we examined the tissue requirement of the autophagy gene atg-18 for the lifespan of wild type animals and the daf-2 mutant. We discovered that neurons and intestinal cells are two key tissues where atg-18 mediates the effect of DAF-2 insulin-like signaling on lifespan, suggesting autophagy acts cell nonautonomously in controlling C. elegans adult longevity. Moreover, we found that neuronal release of neuropeptides is required for the cell non-autonomous function of neuronal autophagy activity in controlling C. elegans lifespan.

Mindfulness from East to West: An examination of relationships between mindfulness, personality traits, and levels of anxiety and depression in American and Japanese populations

Melissa Stiksma, Masato Kanai, Shintaro Yukawa, Ryne Sherman and Laura Vernon
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Mindfulness - nonjudgmental awareness on the present moment - has recently garnered attention due to its association with positive well-being. Certain personality traits such as neuroticism, however, can serve as risk factors for higher levels of depression and anxiety. To date, no study has examined whether mindfulness mediates the relationship between personality traits and anxiety and depression in nonclinical populations. Nor has mindfulness been compared across age and culture. A total of nearly 400 participants recruited from two different samples—American undergraduates and Japanese undergraduates—self-reported their mindfulness engagement, personality, and level of clinical symptoms. Results demonstrated that mindfulness partially mediates the significant relationships between trait anxiety and personality extraversion, emotionality, and conscientiousness. Furthermore, differing levels of mindfulness, personality, and other variables are examined with possible explanations. These results bridge an important gap between Western conceived and Eastern religion mindfulness.

Effects of α-conotoxins from the venom of Conus purpurascens on the Drosophila α7 nicotinic acetylcholine receptor

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Cone snails use venom containing a complex mixture of peptides known as conopeptides and proteins. α -Conotoxins are a conserved family of conopeptides that inhibit nicotinic acetylcholine receptors nAChRs. The decreased functionality of nAChRs is associated with Parkinson's disease, Alzheimer's disease, epilepsy, and nicotine addiction. α7 nAChRs are expressed in the giant fiber system GFS of Drosophila melanogaster, which is a well-characterized neuromuscular circuit that is responsible for the escape response of the fly. In this study, conopeptides from C. purpurascens were extracted from live specimens. Known α-conotoxin, α - PIA, as well as novel α-conotoxins α-PIC and α-PIC[O7], were injected into D. melanogaster with simultaneous electrophysiological recording of the Giant Fiber system GFS to detect compound bioactivity. Our findings show that some α-conotoxins from the venom of C. purpurascens alter the synaptic transmission of the Dα7 nAChR-dependent D. melanogaster GF-DLM pathway.

Brevetoxin Metabolism and Physiology using a Freshwater Turtle Model

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The dinoflagellate Karenia brevis is a key organism present during harmful algal blooms. HABs, also known as Red tides, are increasing in frequency and duration worldwide. K. brevis produces a suite of neurotoxins collectively referred to as brevetoxins, PbTx. Brevetoxin binds to sodium channels which trigger a cascade of events, eventually leading to cells death. PbTx exposure affects marine life by interrupting neurological functions, decreasing immune function, and inducing inflammation. Brevetoxicosis is difficult to treat in endangered sea turtles, as the physiological impacts have not been fully investigated and the magnitude and duration of PbTx exposure is generally unknown. Freshwater turtles, Trachemys scripta, are being used as a model system for experimental toxin exposures. Analyzing uptake, tissue distribution, routes of excretion, immune function and neurological responses will give us insight into the fate of PbTx. PbTx-3 was widely distributed in all tissues and fluids of T. scripta and the toxin shows to clear within 24 hours, following both oral and intratracheal exposures. Lysozyme activity increased 1h and 24h post-exposures showing impact to the immune system. These short term exposures did not result in obvious tissue pathology. Preliminary results suggest turtle neurons are surprisingly resistant to PbTx. Cell viability decreased in a dose dependent manner across PbTx concentrations from 100- 1000nM; the LC50 was significantly higher than is seen in mammalian neurons. Understanding distribution, rates of clearance and effects of PbTx in these model turtles will allow us to design treatment strategies for threatened animals that become exposed to red tide events.

Interactions between foundation species and their critical role in structuring ecosystems

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Foundation species are habitat-modifying species that form the base of the community, have a disproportionate large effect on a community and typically promote increases in diversity, resilience, food web complexity, and productivity. Interactions between foundation species may be broad and cascading. Ecological research on foundation species has typically focused on systems where only one foundation species has been identified. A few studies have included a secondary foundation species

and in those studies the interaction between the species has always been studied in the context of the primary foundation species having a positive effect on the secondary foundation species. The creation of the Foundation Species – Biodiversity FSB model came from such research. The model looks at the intensity of the facilitation cascade on community structure and biodiversity. The FSB model though being more inclusive is still missing an integral interaction in multiple foundation species ecosystems. It is missing the interactions between the two foundation species. The Foundation Species Interaction – Biodiversity model modifies the FSM model by including such interactions. The interactions between the foundations species can be mutualistic, commensal, and parasitic. The mutualistic interaction is predicted to have the highest abundance and biodiversity, followed by commensalism and then parasitic interactions. In mutualistic systems where there is strong positive feedback there is the ability for the biodiversity of the system to be lower. Understanding what factors influence foundation species interactions is crucial for understanding ecosystems and how they will respond to climate change.

Individual and community level responses of tropical crustose coralline algae to high light and elevated pCO2

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Crustose coralline algae CCA are reef stabilizers, laying a framework of calcium carbonate in the form of high magnesium calcite creating a foundation for coral and other marine organisms to colonize. Due to atmospheric increases of anthropogenic CO2, the ocean is taking up CO2 leading to a decrease in ocean pH referred to as "ocean acidification" or OA. Several experiments have shown that the survivorship of coralline algae is severely reduced under projected pCO2 scenarios suggested by the 2013 IPCC. In order to examine the effects of ocean acidification marine macroalgal communities were examined on Little Cayman Island at the Central Caribbean Marine Institute CCMI. Settling plates taken from the reef after ~ 3 months with macroalgal community accretion were subject to a 5-week mesocosm experiment with 2 levels of pCO2 and 2 levels of light. Additionally, CCA lobes were harvested from the reef to assess growth and calcification and demonstrated 100 survival across all treatments Overall CCA coverage on the settling plate showed a strong response to high-light ~350 PAR decreasing by almost 50 cover in ambient pCO2 and 70 cover in elevated pCO2. The underside of the settling plate in the low light ~90 PAR treatment under elevated and ambient pCO2 conditions increased CCA cover by about 50-fold and 25-fold, respectively. In summary we found that CCA coverage on the reefs of Little Cayman are primarily driven by light and do not show a strong response to the future predictions elevated pCO2.

Simulated annealing algorithm for constraint optimization in radiation therapy treatment planning

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Simulated Annealing algorithm is utilized for Intensity Modulated Radiation Therapy IMRT optimization. The goal in IMRT is to give the prescribed radiation dose to the tumor while minimizing the dose given to normal organs.

Characterizing algal symbionts from mesophotic corals in the Gulf of Mexico

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Many coral species common in shallow habitats are also found in the mesophotic zone, from depths of approximately 50 m to the lower limit of the photic zone. Similar to corals in shallow environments, many corals in the mesophotic zone maintain important symbioses with photosynthetic microalgae called zooxanthellae. Despite the importance of the coral-algal symbiosis in corals' ability to thrive in multiple environments, few studies have focused on mesophotic zooxanthellae. This study aims to characterize the algal symbiont assemblages in the coral Montastraea cavernosa found at two MCEs in the Gulf of Mexico – Pulley Ridge MAPC and Flower Garden Banks NMS. Genetic profiles obtained using next generation sequencing of the ITS2 region and clade abundance information from qPCR, combined with overall symbiont cell densities, can provide a comprehensive assessment of symbiont community structure. Furthermore, this research addresses the issues of connectivity and photoadaptation by comparing mesophotic symbiont assemblages and chlorophyll concentration with those from neighboring shallow communities.

Mixed-management strategies for the removal of invasive willow Salix caroliniana in the Everglades

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Woody encroachment, or "shrubification", is a pervasive problem in many grass-dominated ecosystems, including the sawgrass Cladium jamaiscense-dominated communities of the Everglades where wetland drying has facilitated expansion of willow Salix caroliniana. Rapid resprouting and resistance to burning are common challenges to current management methods. Willow is capable of quickly regrowing from cuttings or stumps and herbicide treatments leave standing dead biomass that can facilitate reinvasion of willow or other invasive plants e.g., Lygodium rather than recovery of sawgrass. While intense fires are capable of spreading through willow stands, the conditions necessary are often in conflict with other land management or burn prescription guidelines. Land managers need effective strategies for removing willow and restoring native habitat, particularly along wildlandurban interfaces where high intensity burning is not an option. I will assess the effectiveness of mixedmanagement strategies on willow removal and habitat recovery at the A.R.M. Loxahatchee National Wildlife Refuge. Replicate plots will be treated with herbicide, manual cutting, or no treatment control with subsequent prescribed burning. Area burned and vegetation recovery will then be measured to evaluate the effectiveness of the management strategies. I anticipate the combination of herbicide and fire will be most effective for willow removal and native habitat recovery because the herbicide-killed plants will provide fuel conditions more conducive to sustained burning of the standing biomass, preventing willow resprouting and minimizing reinvasion. The results of this study will provide valuable information for the use of prescribed fire in the restoration and management of vegetation communities of the Everglades.

NL1 regulates spine neck diffusion coupling and dendritic arborization

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Mutations in cell adhesion molecules Neuroligins are associated with neurological disorder such as autism. Neuroligins are localized on the postsynaptic membrane and regulate the formation and maintenance of synapses between neurons. Previous research has focused on understanding function of neuroligin 1 NL1 at synapses, while the role of NL1 in dendritic arborization has been studied less extensively. However, dendritic arborization is of great importance to determining the boundary of incoming inputs and information processing and convergence onto dendrites. To determine whether NL1 controls the dendritic arborization in the mammalian brain, dendritic morphologies of wild-type neurons, knock-down shNL1 and overexpression hNL1 were analyzed in vivo using twophoton laser scanning microscopy. Our studies revealed that cells treated with shNL1 have significantly less dendritic branching and the maximum length of dendrites is shorter when compared to wild-type neurons. In contrast, dendritic branching pattern was similar in wild-type and in cells over-expressing NL1. In order to investigate whether the synaptotropic mechanism underlies dendritic arborization, the diffusion coupling between spine head and dendrite was examined. We found that it was significantly reduced in shNL1-transfected neurons, suggesting that signaling cascades from spines to dendrites are perturbed. We are currently investigating potential geometrical changes in spines in NL1 knock-down neurons using superresolution imaging. Studying further on synaptotropic mechanism that underlies dendritic arborization will identify mechanistic and functional elements that govern the development of dendrite in a mammalian brain.

Investigation of Dose Variation in High Dose Rate Brachytherapy Treatment Delivery Due to Small Range Motions of Gynecological Applicators

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High dose rate HDR brachytherapy dose distribution is highly localized and has a very sharp fall-off. Thus one of the most important parts of the treatment is the localization and immobilization of the applicator from the implantation to the setup verification to the treatment delivery. The smallest motions of the patient can induce a small rotation, tilt, or translational movement of the applicator that can result into missing a significant part of the tumor or to over irradiating a nearby critical organ. The purpose of this study is to revise most of the gynecological HDR treatments with their applicators and their localization challenges. Since every millimeter of misplacement counts, the study will look into the necessity of increasing the immobilization for several types of gynecological applicators. The study took 55 patient treatment plans created with the treatment planning system TPS looking into the applicator's placement in regard to the organ at risk, in the this case being the rectum, and simulated three possible displacements at the hottest dose point on the rectum to evaluate the variation of the delivered dose at the point due to the displacement. Many of the present immobilization devices produced for external radiotherapy can be used to improve the localization of HDR applicators during transportation of the patient and during treatment This study data indicates that an improvement of the immobilization devices for HDR is absolutely necessary. Better applicator fixation devices are required too. Developing new immobilization devices for all the applicators is recommended.

Matrix metalloproteinase-9 MMP-9 in vivo substrates in left ventricle remodeling process

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Matrix metalloproteinase-9 MMP-9 is involved in the early stages of wound healing, including the inflammatory reaction that follows myocardial infarction and neovascularization. However, its overexpression in the infarct zone leads to deleterious effects. Understanding MMP-9 function and modulation of its activity provides an opportunity to prevent excessive remodeling of the left ventricle. To assess the role of MMP-9 in remodeling process we employed a broad search of in vivo substrates. Based on comparative analysis of MMP-9 null and wild type mice, several peptides mimicking putative substrates were synthesized. The cleavage sites in the substrates were identified using high performance liquid chromatography and mass spectrometry. Peptide mapping studies revealed MMP-9 cleavage sites in several proteins, potential biomarkers of excessive remodeling. Specifically, osteopontin, thrombospondin and C-terminal telopeptide regions of type I collagen were susceptible to proteolysis by MMP-9. The best target for MMP-9 was fibronectin, which has multiple cleavage sites in its sequence. In addition to in vivo substrate screening, a selective triple-helical peptide inhibitor MMP-9i has been designed, synthesized, and utilized as an MMP-9 probe. The sequence of inhibitor was derived from the known MMP-9 substrate type V collagen. In the MMP-9i construct, the G~V scissile bond has been replaced with phosphinate moiety that mimics the transition state of hydrolysis but cannot be cleaved. MMP-9i's effect on MMP-9 activity in serum was tested in a mouse model. The administration of MMP-9i resulted in 30 loss of MMP-9 activity suggesting that MMP-9i can be utilized to regulate activity of MMP-9 in vivo.

Pyroelectrically Generated Very Low Dose X-rays Enhanced the Phytotherapeutic Effects of Betalapachone in Hormone Dependent Prostate Cancer Cells In Vitro

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In 2015, an estimated 220, 800 new cases and 27, 540 deaths are expected to occur due to prostate cancer in US men, thus adding to the economic burden of the over 2.6 million men currently battling the disease. Plethora of studies have demonstrated the phytotherapeutic potentials of beta-lapachone, a phytochemical compound derived from the bark of the lapacho tree, native to South America. Beta-lapachone (β-lap) has been shown to exhibit its anti-cancer effects majorly by the futile cycling between the oxidized and the two electron reduction of β-lap mediated by NAD(P)H:quinone oxidoreductase (NQO1) resulting in the generation of reactive oxygen species (ROS) using NADH or NAD(P) as electron sources. β-lap is known to selectively kill human cancer cells, since NQO1 is expressed more abundantly in numerous human solid tumors than in the adjacent normal tissues; NQO1 has been shown to be exceptionally under expressed in hormone dependent prostate cancer cells (LNCaP) compared to the hormone independent prostate cancer cells (PC3). This study was aimed to investigate the enhancing effects of very low dose radiation (VLDR (20mGy)) derived from a pyroelectric crystal generator on the phytotherapeutic activity of beta-lapachone in LNCaP cell line in vitro accessed by MTT and Trypan blue assay. Treatment-induced intracellular levels of ROS were also assessed using Nitro blue tetrazolium assay. NQO1 activities in LNCaP cells were also investigated following treatment with VLDR and/or β-lap using Dicoumarol (NQO1 inhibitor). Results indicate that LNCaP cells respond significantly to combined treatments compared to single treatments.

Histology of Parasitic Trematode Larvae in Marine Sponges

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Parasitic trematode larvae (cercariae and metacercariae) were discovered in a nearshore sponge habitat on Summerland Key, FL. This is a life cycle study of these consecutive larval stages in the sponge microenvironment. The goal of this research is to elucidate information on the life cycle of these trematodes by (1) identifying the trematode taxa present in the sponge microenvironment, (2) identifying the invertebrate host organism(s) preferred by each taxon, and (3) documenting the host-parasite histology. This presentation shows a combination of light and scanning electron microscopy (SEM) micrographs documenting the histology of trematodes in sponges. In future analyses, 18s rDNA sequencing will be used as a preliminary screening of the taxa present in sponge tissues, and oligonucleotide probes will be developed to detect these parasites in the invertebrate symbionts of the sponges. This combination of microscopy and molecular approaches will elucidate linkages between developmental stages and provide information on the pathway(s) these parasites use to reach their final host(s). These larval stages are important to study in trematode life cycles because they develop into endoparasites of vertebrates; which in this case are likely fish which eat the sponge. Reef fishes such as *Acanthostracion quadricornis* (scrawled cowfish), *Holocanthus ciliaris* (queen angelfish), and *Holocanthus tricolor* (rock beauty) opportunistically consume sponges of this particular genus (*Spongia*). Much is known about the health impacts of adult trematodes in fish, reptiles, birds, and mammals; however, there is little data directly linking diet choices with infection. Trematodes have not been reported in sponges in previous literature.

Externalizing Symptoms Anticipate Declining Support and Increasing Negativity Between Adolescent Friends

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This study examined longitudinal associations between externalizing symptoms and friendship quality in an ethnically diverse sample of 116 adolescents and their same-sex, same-grade best friends 70 female dyads. Target participants were in the 6th or 7th grade at the outset M11.76 years. For two consecutive years, participants provided self-reports of externalizing symptoms and best friends provided reports of perceptions of friendship social support, negativity, and intimacy. Results indicated that higher initial levels of participant externalizing symptoms predicted greater increases in friend perceptions of friendship negativity. Furthermore, in above average friendships only, higher initial levels of participant externalizing symptoms predicted greater decreases in friend perceptions of social support. The findings suggest that maladjustment adversely impacts friendship quality, particularly in the closest friendships.

Experimental assessment of the effects of moisture on loggerhead sea turtle sex ratios

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Nest sand temperature strongly influences development of sea turtle embryos and sex differentiation; however in nature eggs experience temperature along with other environmental factors. We tested the hypothesis that moisture effects sea turtle hatchling sex ratios. We studied the relationships among moisture, temperature, and loggerhead Caretta caretta sex ratios in an experimental study. Eggs were

incubated in sterile nest sand in the laboratory under different moisture regimes to test the role of humidity at a constant incubation temperature. Incubator temperature was set at 29.4 degrees C, a temperature that is slightly above the temperature that should yield a 1:1 sex ratio. Nest moisture was maintained by daily DI water treatments and high relative humidity was maintained with the aid of a mist humidifier throughout incubation. All hatchlings were collected, raised for several months and sexed laparoscopically to establish sex ratios for each treatment. The experimental treatments tested the effects of i very high moisture, ii moisture with potential for evaporative cooling, and iii moisture added at average rain temperatures plus the potential for evaporative cooling. The nests were expected to produce a moderate female bias if moisture played no role. We found 87-96 males across all experimental treatments. Our results support our hypothesis. High moisture conditions can produce shifts in developmental response from that
expected based on temperature alone.

Male C57BL/6J mice rely on relative navigational search strategy for goal location in novel land-based task

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A neural circuit that includes the hippocampus and its allied cortical and subcortical inputs supports spatial navigation in mammals, disruption of the circuity leads to cognitive impairments such as those associated with dementia and Alzheimer's disease. Our lab has reported that male C57BL/6J mice navigate in spatial tasks, Morris water maze MWM, by swimming in a particular direction to a location relative to pool-based cues relative responding, rather than to an absolute location defined by room-based cues absolute responding. Such relative or directional responding is reliant on intact anterior thalamic nuclei ATN. A subset of anterior thalamic neurons discharge according to the current directional heading of the animal, and such head direction HD cells are believed to support relative responding. Neural mechanisms supporting the bias of rodents for relative responding over absolute responding in spatial tasks are not yet understood. To facilitate studies of anterior thalamic HD cell responses during spatial search behavior, we developed and validated a modified land-based version of the MWM Oasis Maze for use with mice. Results indicate that mice navigate in a particular direction towards the goal using maze-based cues rather than navigating to an absolute spatial location, much like mice in the MWM. These results validate the efficacy of using the land-based task to further examine the underlying neural networks that are important for relative responding during spatial navigation. Current experiments testing the dependence of relative responding in mice on the ATN as well as the activation of HD cells within are under way.

Developmental effects of Sitagliptin in D. melanogaster: towards a high-throughput screen of DPP-IV inhibitors

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Dipeptital IV DPP-IV inhibitors have become popular treatments in the management of type 2 diabetes. Sitagliptin, the first FDA approved DPP-IV inhibitor, is used as an adjuvant treatment to increase insulin secretion. DPP-IV is a promiscuous catabolic enzyme, interacting with multiple pathways, including modulating insulin secretion through the regulation of Glucagon like peptide -1 GLP-1. As novel compounds are synthesized, effective early screening can reduce the number of failed clinical trials, decreasing the overall cost of bringing a new drug to market. Testing compounds in an invertebrate model such as Drosophila melanogaster provides an appealing combination of a potentially high

throughput model while being able to test bio effectiveness in a living organism. Previous research has shown that flies deficient in one of five Drosophila DPP-IV enzymes, omega, show developmental delays progressing from larval to adult stages. We hypothesize that this developmental delay can be used to test the bio effectiveness of DPP-IV inhibitors. Using a combination of genetic and pharmacological tools, we aim to show that Sitagliptin acts through the protein omega to cause dose-dependent developmental delays. Thus, a fly developmental assay can be used to screen the effectiveness of novel DPP-IV inhibitors. Furthermore, sitagliptin can be used to help discern biochemical pathways important to D. Melanogaster development. Using the drug in combination with tissue-specific expressed omega RNAi, we hope to clarify how DPP-IV impacts development in Drosophila.

Diet and trophic differences affect variation in biocontaminant accumulation rates for sympatric shark species

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A common problem in predatory fish is the accumulation of biocontaminants affected by biomagnification through trophic levels and bioaccumulation over time. Bioaccumulation of contaminants is strongly correlated to the increase in age, weight, or length of individual fish. Biomagnification is the increase of the accumulation rate in fish that are higher up in the food chain, such as sharks or tuna. Four sympatric shark species studied in Florida Bay had differences in mercury accumulation rates, and individuals of similar sizes across species accumulated mercury at different rates. Blacktip sharks had a strong correlation between mercury and length. Stable isotope analysis of this study suggested that dietary differences may cause these varied accumulation rates. These factors do not explain differences in accumulation rates between lemon sharks and blacknose sharks, which were not significantly different for diet or trophic position. Blacknose sharks accumulated significantly higher concentrations of mercury in their tissues, despite being significantly smaller. Since the main pathway for mercury into tissues is ingestion, we hypothesize that metabolism may play a role in these species accumulation rates. Since thyroid hormones are known to be associated with metabolism and growth in various species, we intend to test the relationship between the thyroid hormone concentration and biocontaminant accumulation rate on an individual basis, and metabolic differences between species to determine whether it accounts for species specific accumulation rates of contaminants such a s mercury.

Cell-Surface Glycan-Lectin Interactions for Biomedical Applications

Maria C. Rodriguez Mare Cudic and Predrag Cudic
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Carbohydrate recognition is one of the most sophisticated recognition processes in biological systems, mediating many aspects of cell-cell recognition. Consequently, lectin-glycan interactions have been studied in order to mimic their actions for potential biomedical applications. Galectins, a class of ß-galactoside-specific lectins, have been strongly implicated in inflammation and cancer. Galectin-3 is involved in carbohydrate-mediated metastatic cell adhesion via interaction with Thomsen-Friedenreich TF antigen on cancer-associated MUC1. However, the precise mechanism by which galectin-3 recognizes TF antigen is poorly understood. Our recent studies show that the presentation of the carbohydrate ligand by MUC1-based peptide scaffolds has a major impact on recognition, and may facilitate the design of more potent and specific novel galectin-3 inhibitors that can be used as tools in dissecting the precise role of galectin-3. Another lectin, odorranalectin OL, has a particular selectivity

for fucose and very low toxicity and immunogenicity, rendering OL an excellent candidate for drug delivery to targeted sites, such as: 1 tumor-associated fucosylated antigens implicated in the pathogenesis of several cancers; 2 the olfactory epithelium of nasal mucosa for enhanced delivery of peptide-based drugs to the brain. We have developed an efficient Fmoc-solid phase synthesis approach of native OL and its analogs, and shown that selectivity and affinity of OL can be tuned by sequence modification. In addition, our in vivo mice studies show fast
intranasal delivery of OL to mouse brain in amounts detectable by mass spectrometry, thus offering a novel brain drug delivery system for the treatment of central nervous system CNS disorders.

Personality traits in the Atlantic spotted dolphin Stenella frontalis: syndromes and neophilia

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Personality can be defined as different behaviors in response to external stimuli, with both interindividual variation and intraindividual stability. The study of non-human personality is a relatively new field, yet many traits have been measured across a wide variety of taxa. Two or more personality traits may be syndromes if they are correlated within a population, and can be used to predict behavior. Despite this body of research, little work has been done on one of the more cognitively-advanced social families: delphinidae. I am examining the expression of four different personality traits in free-ranging sub-adult Atlantic spotted dolphins Stenella frontalis: boldness, sociability, playfulness, and curiosity towards humans. These traits will be quantitatively measured by observing behavioral responses of approximately 20 individuals in their natural state. Boldness, for example, will be measured by the amount of time a juvenile spends away from its primary source of protection its mother. This study will attempt to quantify the baseline personality of juveniles in this population. I will also explore whether any personality phenotypes of those four traits can predict a fifth personality trait that has proven more difficult to measure: neophilia a curiosity towards novel objects. This trait has been extensively observed in four specific individuals, but is difficult to observe across the broader population. Preliminary video analysis suggests that there is both interindividual variation and intraindividual stability among these four traits, and I am expecting to find a personality phenotype shared among the four neophilic juveniles.

Connectivity and plasticity of mesophotic corals in the Gulf of Mexico

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Coral reef ecosystems worldwide are facing degradation due to disease, anthropogenic damage, and climate change. Mesophotic coral ecosystems (MCEs) have been relatively recently discovered and characterized as continuations of shallow reefs below traditional SCUBA depths. As MCEs appear to be sheltered from many of the stressors affecting shallow reefs, Glynn (1996) originally proposed that deeper reefs may act as a coral refuge by providing larvae to nearby shallow reefs. This research addresses key questions that underlie Glynn's theory and advances our knowledge of coral ecology and physiology at depth. We answer the following questions on MCEs in the Gulf of Mexico: (1) How well are MCEs connected to shallow reefs, and (2) Can corals adapt their morphology and gene expression to match changing environmental stimuli? by conducting analyses of genetic connectivity, corallite morphological plasticity, and gene expression profiling in the depth-generalist coral species, *Montastraea cavernosa*. Here, we present data on population structure of conspecific corals both within continuous shallow and mesophotic reefs, and across biogeographic regions in the Gulf of Mexico. Additionally, we show how microskeletal characteristics differ across depth and reef sites. This research aids in understanding the processes behind coral adaptation to new environmental conditions

by quantifying the influences of both environment and genotype control on coral's potentially plastic responses. Additionally, this research is designed to provide data for improved regional management of deeper coral reef ecosystems and strengthens collaborative marine research through the Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT).

Levels of reactivity between varying THP-1 cell populations and the complete library of PfEMP1 constructs from the 3D7 strain of *Plasmodium falciparum*

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Malaria accounts for approximately 600,000 deaths per year. Death occurs when side effects (i.e. fever, headache, and diarrhea) progress to severe malaria conditions, including stroke, organ failure, and low birth weight. The hallmark of severe malaria is *Plasmodium falciparum's* ability to sequester in blood vessels leading to blockage of vessels and evasion of immune recognition and clearance. A *P. falciparum* infected erythrocyte (IE) displays membrane proteins belonging to the Plasmodium falciparum erythrocyte membrane protein 1 family (PfEMP1). PfEMP1s are malaria-specific; therefore, the host's immune system recognizes them as foreign. Innate immune cells, monocytes and macrophages, recognize PfEMP1 proteins on sequestered IEs and attempt to clear the pathogen. Unfortunately, pathogen recognition leads to increased levels of cytokines, chemokines, and inflammation. An understanding of PfEMP1 interactions with specific receptors on immune cells is needed to fully combat severe malaria cases. We interacted a total of ~250 PfEMP1 domains, expressed as ~160 constructs, from *P. falciparum* strain 3D7 with THP-1 surface molecules to study the host's specific immune response. Undifferentiated THP-1 cells and differentiated THP-1 cells were used as a model of circulating monocytes and tissue specific macrophages, respectfully. The surface molecules from different THP-1 cell populations showed a common high reactivity to constructs PF08_0141 DBL4, PFD_00020c DBL1_CIDR1, and PF08_0142 DBL2_CIDR2. The discovery of highly reactive PfEMP1 domains leads to future experiments determining the specific immune cell surface receptors involved, the strength of the interaction, and ways to modulate the interaction.

Dosimetric Consequences of CT-to-CBCT Deformable Registration on Parotid Glands for Treatment of Head and Neck Cancer

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Patients receiving IMRT treatment for late stage Head and Neck cancer often experience anatomical changes due to weight loss, tumor regression and positional changes of normal anatomy. The actual dose delivered may vary from the original treatment plan. The aim of this study was to (1) evaluate the dosimetric consequences of the parotid glands during the course of treatment using the original plan and (2) determine an optimal timeframe for replanning. Nineteen Head and Neck (Stage III - IV) cancer patients who underwent IMRT were selected retrospectively. Each patient received an initial treatment planning CT and a weekly CBCT. Each CBCT was first registered rigidly with the planning CT, followed by a deformable registration using the Velocity deformation software. The weekly CBCTs were exported back to the Eclipse planning system and recalculated using the monitor units from the original plan. The evaluation of our method was established on four metrics: changes in volume, position in Center of Mass (COM), mean dose and Normal Tissue Complication Probability (NTCP) of the parotid glands. The studies indicated a reduction of the volume and alterations of the mean dose compared to the initial plans. Similarly, differences were observed for the NTCP values between the initial plan and our proposed method utilizing deformable registration-based dose calculations.

Use Of Molecular Techniques To Understand The Spatial And Temporal Features Of The Oceanic Stage In Hawksbill Sea Turtles, Eretmochelys Imbricata; A Thesis Proposal

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For highly migratory species, it is important to understand what habitats are used and what requirements are essential for growth and development. These migrations often span different political and regulatory boundaries, complicating conservation strategies. The hatchlings and post-hatchlings of most sea turtle species migrate to oceanic habitats where they remain for several years before returning to shallow developmental habitats. For critically endangered hawksbill turtle, Eretmochelys imbricata, most research has concentrated on nesting ecology and very little is known about the post-hatchling migration. Many sea turtles then spend years in different foraging habitats before reaching sexual maturity, and such foraging grounds typically represent a mixed stock of turtles from different nesting beaches. Mitochondrial DNA analysis can be used to estimate genetic stock structure of mixed-stock foraging populations for sea turtles, and the duration of the post-hatchling oceanic stage can be estimated using stable isotope analysis and satellite telemetry. Our objectives are to determine the duration of the post-hatchling oceanic stage of development, to determine if the turtles sampled in a particular foraging habitat represent a biased or unbiased assortment of matrilineages, and to infer potential migratory pathways by investigating ocean currents between nesting beaches and the foraging site. Here we discuss our methods, to determine the duration of the post-hatchling oceanic stage and stock structure for immature hawksbills at a developmental foraging ground.

Do bilinguals evaluate emotion laden words equally in both languages?

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Bilinguals commonly report experiencing emotions differently depending on which language are they speaking. Emotionally loaded words were expected to be appraised differently in first versus second language in a sample of Spanish-English bilinguals n117. English L2 ratings were subtracted from Spanish L1 ratings; the resulted scores were used as dependent variable in the analyses. Three categories of words positive, negative and taboo were appraised in both languages English and Spanish and two sensory modalities Visual and auditory. The differences in valence scores in Spanish L1 and English L2 were expected to be significantly higher when presented aurally than when presented visually. Additionally, taboo words were expected to yield larger differential scores than negative and positive words. The 2 X 3 ANOVA revealed no significant effect of sensory modality but a significant effect of word type. Analyses of the influence of language and sensory modality within each word category resulted in significant differences in ratings between languages. Positive word ratings were more positive in English than in Spanish. Similarly, negative words were judged as more negative in English than in Spanish. However, taboo words were rated as more negative in Spanish than in English. Additionally, the influence of a selected set of predictors Age of acquisition of English, percent of life lived in the United States, English proficiency, Spanish proficiency and, Latino and United States cultural identities over the differential scores was tested in multiple regression models which were significant only for the visual positive, visual negative and auditory positive categories.

Dosimetric comparison of Pencil Beam and Monte Carlo algorithms for a Heterogeneous and Homogeneous phantom to measured planar dose distributions taking with a 2-D diode array detector for Stereotactic Body Radiation Therapy plans

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In this research a Monte Carlo and a Pencil Beam algorithm are compared to their measured dose distributions using a 2-D diode array for plans created for lung Stereotactic Body Radiation Therapy SBRT. In addition to the dose algorithms, this research has investigated the planar dose distribution comparison for two different phantom types; an in-house heterogeneous phantom and a homogeneous phantom. This is motivated by a desire to mimic the human anatomy that is present during a lung SBRT treatment and incorporate these heterogeneities into the pre-treatment Quality Assurance process where measured planar dose distributions are compared to calculated planar dose distributions. Individual and combined field dosimetry has been performed for both a fixed gantry angle anterior to posterior and planned gantry angles. This is in effort to compare the differences between fixed field dosimetry and planned angle dosimetry for both combined and individual fields. A gamma analysis has been performed and compared, as well as central axis dose differences for all beams. The measurements were obtained using the 2-D diode array MapCHECK 2TM. The calculations for Monte Carlo and Pencil Beam were performed using the BrainLAB iPlan RT® Dose software. Further analysis is in progress. This is a preliminary report of raw data for the above mentioned comparisons.

Asymmetric isomerization of alkynyl to allenyl aldehydes bearing a traceless organo-manganese auxiliary

Animesh Roy
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We have previously demonstrated that an η^2-complexed organo-manganese auxiliary leads to excellent diastereoselectivities in reactions involving allenyl carbonyls. Normally, conjugated alkynyl carbonyls do not isomerize to the thermodynamically less stable allene isomer; however, when complexed to methylcyclopentadienyl manganese dicarbonyl MMD, mild bases are capable of carrying out this transformation. With the MMD auxiliary in place to promote allene formation, we next examined the use of aqueous bases in biphasic reaction solvent systems using chiral phase transfer catalysts PTCs. Generating good enantiomeric excesses in the synthesis of allenes axially chiral system spread over three carbon atoms has traditionally been very demanding in terms of catalyst design. In the present work, we further exploit the directing capability of MMD. Using inexpensive and commercially-available cinchonidine derived PTCs, a series of MMD-complexed alkynyl aldehydes were converted to their allene isomers in good enantioselectivities currently up to 78 ee. These allene aldehydes products are uniquely stable and well suited for diastereoselective nucleophilic 1,2-additions. Subsequent mild oxidative removal of the auxiliary reveals highly substituted allenols.

Dosimetric Consequences From Minimal Displacements In Abpi With Savi Applicators

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Purpose: To highlight the importance of provide proper solid immobilization initially and in every treatment in ABPI with brachytherapy. Materials and Methods: 100 patients receiving brachytherapy treatments in ABPI using the Savi applicators were considered for the study. The CT scans used in the initial plan was compared with every scan obtained before each treatment. Each of these scans were

exported in the planning system and registered with the initial plan. Dosimetric evaluations were performed with their consequences to the ribs and the skin surface. Results: Making the dosimetric comparison for the critical points on the ribs and skin due to very small changes in the inter-fractionation position revealed dramatic differences in the maximum dose to these critical organs. The cavity's volume manifested changes between fractions as well as the distances to the two critical organs. Therefore the maximum dose manifested variance between 10 and 32 in both of the sites Conclusions: This study demonstrates that using CT scan before each treatment will minimize the risk of delivering undesired high doses to the critical organs. This reveals the urgent need of increasing and improving the immobilization methods when treating ABPI with Savi. In 30 of the cases re-planning was necessary between fractions therefore we conclude that in each case the treatment and planning teams must be prepared for re-plan as needed.

Spectator Ion Directed Synthesis within Lanthanide-Based Metal-Organic Frameworks

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Metal-organic frameworks MOFs are solid-state materials in which metal centers are linked together via organicbased moieties linkers, extending in 2-3 dimensions with an open framework containing potential voids. Typically, the identity of the metal salt does not influence final structure formation when MOFs are synthesized, unless they are incorporated into the compound in a charge-balancing and/or templating role. However, when 1,2,4,5- benzenetetracarboxylic acid is used as a linker with lanthanide metal ions, two unique structures are observed under identical synthetic protocols except for the difference between chloride and nitrate metal salts. The rate of crystal growth appears to have an effect on these observed differences. The MOF synthesized from nitrate salts forms an intermediate compound at a faster rate than when synthesized from chloride salts. Despite this, both nitrate and chloride salts transform into the same compound after reacting for a total of five days. Details of these syntheses, material characterization, and crystallographic studies will be presented.

Activation of cGMP-dependent protein kinase reduces Drosophila S2 cell injury caused by chemical hypoxia and oxidative stress

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Ischemic stroke is one of the leading causes of human death worldwide. It occurs due to high susceptibility of neurons to hypoxia and reoxygenation. Unlike mammals, invertebrate Drosophila melanogaster withstands low oxygen levels without showing pathology. In the present study, Drosophila Schneider S2 cells were employed to investigate the role of the cGMP-dependent protein kinase PKG signaling pathway in Drosophila hypoxia-tolerance in vitro. This was accomplished by subjecting cells to chemical hypoxia and oxidative stress concurrently with treatments by pharmacological agents affecting specific targets of the PKG pathway and assessing cell membrane injury. In this study, direct and indirect activation of the PKG pathway preserved S2 cell plasma membrane integrity from the aforementioned stresses. Moreover, it was shown that PKG activation during hypoxia specifically targeted mitochondrial KATP ion channels. The results of this study may lead to a better understanding of fruit fly's innate hypoxia/reoxygenation-tolerance strategies. Subsequently, this knowledge may be used to identify potential therapeutic targets to prevent detrimental neurological effects of an ischemic stroke in humans.

Examining biogenic gas dynamics in peat soils of the Florida Everglades using capacitance moisture probes.

Cali Munzenrieder and Alex Garcia
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Peatlands are known to act as carbon sinks while representing major sources of biogenic gases such as methane CH_4 and carbon dioxide CO_2, two potent greenhouse gases. The overall warm temperatures when compared to boreal systems of the Florida Everglades have resulted in conditions conducive to biogenic gas releases throughout the entire year. Such releases are however not well understood and the temporal distribution and dynamics of biogenic gas release from peat soils of the Florida Everglades is uncertain. The majority of methods for estimating biogenic gas accumulation and release in peat soils tend to show limitations in terms of temporal resolution, which can be problematic for capturing rapid gas releases i.e. ebullition events. The objective of our work is to test the use of capacitance moisture probes to better constrain temporal changes in biogenic gas accumulation and release at the laboratory scale from several peat monoliths from the Florida Everglades. Moisture probes are coupled with data loggers that allow measuring moisture content variability at minute to subminute sampling intervals. Probe measurements to estimate changes in moisture content over time within the peat matrix are also coupled with gas traps in order to compare gas dynamics with direct gas releases. As a result, moisture probes are used to infer gas content variability and estimate gas fluxes at a temporal resolution previously unreported to our knowledge for peat soils in the Everglades that can be ultimately incorporated into current models of carbon flux. Furthermore, this work has implications for better understanding patterns of gas release from peat soils in the Everglades and how climate change may affect gas dynamics.

Securing Visual Cyptography for Face Images

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Visual cryptography is a vastly growing cryptographic technique which allows for secret sharing and encryption of visual data. Facial and fingerprint recognition systems are valuable border control tools, and are currently deployed by the United States via the Global Entry program as well as the German Federal Police at automated border patrols in the Frankfurt Rhein-Main international airport. On a smaller scale, the Recreation and Fitness Center at Florida Atlantic University offers fingerprint enrollment to members to expedite identification upon entry. Though these systems are more convenient for users, requiring no generation and memorization of passwords, there is a greater risk in the event that the database storing biometric information is compromised or hacked. One may always create a new password, but one cannot easily create a new face or fingerprint. Thus protection and encryption of biometric data is of supreme importance. In this paper we examine the notion of visual cryptography, encryption of face images, and formalize two security concepts regarding visual cryptography: indistinguishability and irreversibility. We then analyze the security of a visual cryptography protocol as it relates to these security notions. We conclude that the protocol has measurable and significant weaknesses, undermining some claims of the paper.

Physiological Effects of Disorientation in Loggerhead and Green Sea Turtle Hatchlings

Karen Pankaew and Sarah Milton
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The first 24 hours after hatching are incredibly dangerous and important for sea turtle survival. Hatchlings emerge at night from their nests on coastal beaches. From the nest they locate the sea by orienting away from the dark, dune vegetation and crawling toward the brighter, lower oceanic horizon. However, hatchlings can be misoriented landward by localized artificial light sources or disoriented by diffuse urban skyglow, causing them to wander the beach without direction. Even in cases where mis/disoriented animals reach the ocean, the increased distances hatchlings crawl consumes valuable energy and exhausts animals, potentially decreasing the likelihood of survival. This study examines the energetic cost of these mis/disorientation events to loggerhead, Caretta caretta,and green, Chelonia mydas, sea turtle hatchlings, using laboratory simulations of extended crawl distances.Oxygen consumption, blood glucose levels, and lactic acid concentrations were measured as well as crawl behavior and swim performance following crawl trials. Oxygen consumption rates were up to 3 times higher for extended crawl trials than for swim trials. While crawling required more energy than swimming, lactic acid concentrations and glucose blood levels did not differ between trials and controls due to hatchling rest behavior. Crawl distances of 200m impacted green hatchling swim performance. This suggests that lactic acid accumulation and the energy consumed during mis/disorientation events affects hatchling ability to swim offshore. This research provides managers with physiological data to determine the best practices for sea turtle conservation and adds to the current biological knowledge of these animals.

A computational approach to lattice structures of attractors and analyzing global dynamics

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We describe the lattice structure of attractors in a dynamical system and the lifting of sublattices of attractors, which are computationally less accessible, to lattices of forward invariant sets and attracting neighborhoods, which are computationally accessible. We also show how the use of these algebraic structures of lattices to help us to capture the information about underlying dynamical system in a more elegant way and with lesser computational cost. For example, they can be used to develop a much efficient algorithm to compute a global lyapunov function
that describes the overall gradient dynamics.

Quantifying the transport of methane from organic soils to the atmosphere in a freshwater marsh

Tristan Froud
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Methane emissions to the atmosphere can have a significant effect on radiative forcing. Methane is produced from mineralization of organic matter under anaerobic conditions, making the waterlogged soils of wetlands a highly suitable environment for methanogenesis. As a result, wetlands are responsible for 20-40 of natural wetland emissions globally. Methane can also be consumed through aerobic metabolic pathways, reducing net emissions to the atmosphere. Therefore, the fate of methane produced in wetland soils as they pass the water column, plant canopy, and eventually into the atmosphere is of great importance for understanding the methane cycle of wetland ecosystems.

However, the transport, release, and consumption of methane throughout this continuum is not well understood. Using incubation methods, I will quantify soil methane production, dissolved methane within the water column and emission from the water surface, and exchange between the plant canopy and the atmosphere. By partitioning the soil-to-atmosphere continuum, this study will examine the relative influence of the water column and plant canopy on net methane emissions as well as provide insight into pathways of methane transport. These patterns will provide key information on methane emission form sawgrass-dominated subtropical wetlands,facilitating an improved understanding of the implications of climate or management scenarios on landscape carbon cycling in the Everglades and incorporation of these important subtropical wetlands in Earth System models.

Growth Rates And Body Condition Of Green Turtles Chelonia Mydas In Dry Tortugas National Park, Florida

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Dry Tortugas National Park consists of 100 square miles in the Gulf of Mexico and provides protection to marine species facing a multitude of threats from over harvesting to habitat degradation. Among the many species that utilize this area is the green sea turtle Chelonia mydas. Adult green turtles use the islands of the Dry Tortugas as nesting grounds, while the surrounding waters are home to a resident population of both juvenile and adult green sea turtles. We examined seven years of capture-recapture data including measurements of mass and straight carapace length and width to determine how the body condition using Fulton's equation, K M/L3 and growth rate for juvenile green turtles 28 - 70cm vary within, and among size classes in the Dry Tortugas, and how those rates compare to similar populations in other locations. Body conditions ranged from 0.77 to 1.71 mean 1.32 SD ± 0.16. Growth rates ranged from 2.5 to 9.9cm/yr mean 5.33cm/yr SD ± 1.25. This is a higher rate of growth than previously found in sampled populations in The Virgin Islands, Bahamas, and Florida. Establishing growth rates and body condition for a specific population can provide insight into life history and health of that population. Additionally, establishing body condition and rates of growth for a resident population in a protected area may provide important data for comparison to populations in other areas.

Multiple-season, field scale exploration of biogenic gas dynamics in two peat soils of the Florida Everglades using hydrogeophysics

William Wright, Greg Mount, Matthew Mcclellan And Xavier Comas
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Peatlands are known to release significant amounts of methane CH4 and carbon dioxide CO2 to the atmosphere. However, uncertainties still remain regarding the spatio-temporal distribution and triggering mechanisms of gas releasing events from peat soils. Furthermore, most research regarding peatland gas dynamics has historically been focused on high latitude peatlands, while recent works have suggested gas production rates from low latitude peat soils may be higher than those from colder climates. Varying temporal and spatial scales have also shown marked differences in flux rates, thus questioning the appropriate scale for gas flux quantification. Ground penetrating radar GPR is a geophysical tool that has successfully been used in the past to non-invasively investigate the release of biogenic gasses from northern peat soils, and has only recently been used in the subtropical Florida Everglades. This study is based on an array of measurements at four field sites, spanning two different peat types Loxahatchee and Everglades peats of the Florida Everglades over a period of two years. At each site, gas contents within the soil are monitored using the GPR method, which is supported by direct gas flux measurements using flux chambers and time-lapse photography, and surface

deformation is monitored using differential leveling. Resulting data highlight the variability of gas dynamics based on spatial, temporal, and soil compositional differences.

PI3K/AKT signaling in breast tumors increases Semaphorin7A expression to enhance tumor cell survival and motility

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Introduction: The study of breast cancer relies heavily upon the identification of tumor-associated proteins involved in tumor growth and metastasis. Our laboratory discovered that mammary tumor cells express high levels of the axonal guidance molecule Semaphorin7A SEMA7A. SEMA7A expression has been shown to be induced by activation of the PI3K/AKT pathway in murine models of fibrosis. Materials and Methods: TGF-beta1 was used to induce PI3/AKT signaling in mammary cells. The SEMA7A gene was silenced in 4T1 mammary tumor cells using shRNA. Cytoskeletal changes and motility were assayed by atomic force microscopy. In vitro proliferation and apoptosis were quantified using flow cytometry. BALB/c mice were inoculated with mammary cells with altered SEMA7A expression. Immunohistochemistry and qPCR were used to correlate SEMA7A and ki67 expression in human breast tumors. Results and Discussion: Activation of PI3/AKT significantly up-regulates SEMA7A expression. SEMA7A may promote tumor cell survival as an effector of the PI3K/AKT pathway. Gene silencing of SEMA7A in 4T1 cells decreased mesenchymal qualities. SEMA7A silenced 4T1 cells showed decreased ki67 proliferation, decreased activation of the PI3/AKT pathway and increased apoptosis. In vivo, inhibition of SEMA7A resulted in reduced tumor growth, reduced metastasis and enhanced survival. Increased SEMA7A expression positively correlated with high ki67 25 in human breast tumors biopsies. Unraveling the role of SEMA7A in breast cancer progression may elucidate new mechanisms specific to breast cancer metastasis and aid in the development of novel therapeutic targets.

Isometric mappings and Wang-Yau quai-local energy

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Local gravitational energy density has yet to be given a solid definition in general relativity. Due to properties of the metric tensor, energy densities have only been successfully defined at null and spatial infinities. A recent definition created by Mu-Tau Wang and Shing-Tung Yau require isometric embeddings of compact two metrics homeomorphic to a sphere in Euclidean 3-space. We present a means for producing these embeddings and how they relate to the Wang-Yau energy.

Estimating carbon stocks along depressional wetlands using ground penetrating radar GPR in the Disney Wilderness Preserve (Orlando, Florida)

Matthew D. McClellan, William Wright and Xavier Comas
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Peat soils store a large fraction of the global carbon (C) in soil. It is estimated that 95% of carbon in peatlands is stored in the peat soil, while less than 5% occurs in the vegetation. The majority of studies related to C stocks in peatlands have taken place in northern latitudes leaving the tropical and

subtropical latitudes clearly understudied. In this study we use a combination of indirect non-invasive geophysical methods (mainly ground penetrating radar, GPR) as well as direct measurements (direct coring) to calculate total C stocks within subtropical depressional wetlands in the Disney Wilderness Preserve (DWP, Orlando, FL). A set of three-dimensional (3D) GPR surveys were used to detect variability of the peat layer thickness and the underlying peat-sand mix layer across several depressional wetlands. Direct samples collected at selected locations were used to confirm depth of each interface and to estimate C content in the laboratory. Layer thickness estimated from GPR and direct C content were used to estimate total peat volume and C content for the entire depressional wetland. Through the use of aerial photos a relationship between surface area along the depressional wetlands and total peat thickness (and thus C content) was established for the depressions surveyed and applied throughout the entire preserve. This work shows the importance of depressional wetlands as critical contributors of the C budget at the DWP.

Selective inhibition of matrix metalloproteinase-9 reduces clinical severity in a murine model of Multiple Sclerosis.

Lillian Onwuha-Ekpete and Dorota Tokmina-Roszyk
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Matrix metalloproteinases MMPs are a family of proteolytic enzymes that mediate the degradation of various components of the extracellular matrix. Their functions are essential for normal physiological processes such as wound healing, but their dysregulation is associated with various pathologies including autoimmune diseases such as Multiple Sclerosis MS. Experimental Autoimmune Encephalomyelitis EAE is a well-established murine model of MS that is mediated by CD4 T-cells. These cells penetrate the blood-brain-barrier BBB, recruit other immune cells, initiate destruction of the myelin sheath, and cause axonal loss. MMP-9 is a hallmark enzyme in progression of MS that is required for penetration of the BBB and generation of autoantigens in EAE. In addition, recent studies have demonstrated that MMP-9 contributes to normal intracellular function of various cell types including antigen activated T-cells; however, the intracellular role of MMP-9 in immune cell activation during EAE pathogenesis is not known. In this study, we used a highly selective MMP-9 triple-helical peptide inhibitor THPI that is a phosphinate transition state analog to examine antigen specific T-cell responses. We found that selective inhibition of MMP-9 can mitigate pathogenic T-cell activity and cellular trafficking as well as the clinical severity of EAE, suggesting that selective MMP-9 inhibition in MS can be a potent therapeutic option.

Sparse Filtering and Locally Competitive Algorithms

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Here we present a novel neural network architecture combining sparse filtering with locally competitive algorithms and demonstrate the network's ability to classify human actions from video. Sparse filtering is a unsupervised feature learning algorithm designed to optimized the sparsity of the feature distribution directly without having the need to model the data distribution. Locally competitive algorithms are defined by a system of differential equations where the initial conditions define an optimization problem and the dynamics converge to a sparse decomposition of the input vector. Inputs to the network are small 3D patches taken from frame differences of human actions videos. An example of unsupervised feature learning the sparse filtering algorithm easily extends to RGB video, RGBD video, hyper-spectral video, and multi-sensory streams. We will discuss forming overcomplete dictionaries from human action videos and using a dynamical systems approach to classify unseen videos.

Compressed Sensing and Medical Imaging
Stephanie Lewkowitz
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MRI is one of the most prevalent non-invasive medical imaging modalities. An example of indirect imaging, MRI measures samples in frequency-space. Often refered to as the fundamental theorem of signal processing, the Nyquist/Shannon sampling theorem requires that the sampling rate has at least twice the frequency of the desired resolution. Sampling at twice its highest frequency allows the signal to be recovered exactly. New results in nonlinear signal modeling have allowed for accurate reconstructiuon with sub-Nyquist sampling, which would traditionally leave the reconstructed image with aliasing and artifacts unassociated with the actual signal. These results derive from the observation that natural images are low dimensional, meaning the intrinisic information can be less than the number of pixels in the image. The ordered structure of natural images implies the existence of a sparse representation in some basis. The restricted isometry property showed that a random matrix with high probability permits recovery of a sparse signal with far fewer measurements than traditional theory would suggest. This research explores possibilities of compressed sensing in medical imaging. We verify the inadequate image reconstruction from under-sampled and noisy signals when working with traditional plane wave and wavelet bases. We quantify and discuss the accuracy of image reconstruction from under-sampled and noisy signals reconstructed with compressive sensing techniques.

Parity in loop quantum gravity

Xuping Wang
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In this presentation we extend the parity reversal operation from Newtonian Physics on flat space to general covariance theory on curved manifold. Then the parity symmetry of loop quantum gravity is examined and we come to the conclusion that the theory of LQG requires a background orientation.

Neural field dynamics and brain connectivity

Vahid Tayefeh
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The neuronal ensembles in cortical tissue, which tend to behave as single functional units, communicate with each other and process information over time. Neural activity fields, in form of spatially continuous networks, can be used to model a variety of neurobiological phenomena. The connection topology of brain tissue is such that a cortical area is not only connected to its neighbors locally, but also has global projection to distant areas via a fiber system. Such projections not only serve to organize local dynamics within cortical areas but timing of these processes at different sites will affect the overall emerging pattern and contributes to the macroscopic organization and global dynamics of neural activity. The dynamics of this neural field activity gives rise to pattern formation phenomena and self-organization. Our macroscopic spatiotemporal pattern formation approach assumes the existence of an order parameter dynamics and leads to phenomenological models to understand the collective phenomena even though the microscopic dynamics is not completely known. We are investigating how the emerging patterns depend on the space-time structure of the coupling between functional units i.e. long-range heterogeneous pathways coupling strength (space) and the axonal time delay due to propagation with finite speed between areas (time). We analyze the stability of the rest-state activity of a neural field as manipulating heterogeneous two-point connections varies network connection topology in two

geometries with periodic boundary conditions: a closed one-dimensional loop and a closed spherical 2-D cortical surface.

The modulation of visual awareness via auditory semantic information

Dustin Cox and Sang Wook Hong
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To reveal the mechanisms underpinning the modulatory influence of auditory input on visual awareness, we examine, 1 if visually suppressed stimuli can have preferential access to visual awareness due to the integration of congruent audiovisual semantic information, and 2 whether semantic priming induced by auditory input mediates the auditory influence on visual awareness. Using continuous flash suppression CFS, dynamic and familiar visual events e.g., videos of an approaching train, a person playing guitar, and race-cars circling a racetrack were initially inaccessible to the visual awareness of observers. We manipulated the semantic auditory context of the videos by concurrently pairing them with a semantically matching soundtrack congruent audio-visual condition, a semantically non-matching soundtrack incongruent audio-visual condition, or with no soundtrack silent video condition. We also manipulated the temporal congruency of the soundtracks by presenting them prior to video presentation. We measured the time to breakup suppression, which was the indicator of the strength of the visual information. We found that participants discriminated videos significantly faster a relatively earlier breakup of suppression in the congruent audio-visual condition compared to the incongruent audio-visual condition and video only condition. However, the modulatory influence of the semantic auditory input was more strongly observed when audio-visual stimuli were concurrently presented in comparison to when presented separately in time. Our results suggest the semantic auditory influence on visual awareness during concurrent audiovisual stimulation was mediated mainly by audio-visual crossmodal processing, but crossmodal semantic priming may also contribute even when visual information is not available to visual awareness.

Effects of soil heating on Brazilian pepper (*Schinus terebinthifolius*) seed bank germination

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Schinus terebinthifolius, Brazilian pepper, is an aggressive and widespread invasive plant species of Florida. Prescribed fire is commonly used in the management of invasive plants. While burning may remove mature plants, the resulting open habitat may support reinvasion from soil seed banks. In this study, I examined the threshold level of soil heating at which seed viability is reduced and whether this differed by soil type (sand vs loam). Replicate pans (n=3) of sand and loam were each planted with 100 *S. terebinthifolius* seeds. The planted pans were randomly assigned to heating treatments (to 60°C – 270°C at 30°C increments) and heated in a muffler furnace for 5 minutes. Germination rate of each pan was recorded for 6 weeks. Germination rates decreased with increased temperature exposure for both the sand and loam treatments. These results correspond to the effect of fire on seed viability: as temperature increases, damage to seeds is more likely to occur. Examining the relationship between soil heating and *S. terebinthifolius* seed will provide valuable information for using prescribed burning in the management of invasive species in South Florida, although future research is needed to determine whether the temperatures needed to kill the seeds of invasive plants exceed the tolerance of desirable native species.

Task Decoding using Recurrence Quantification Analysis of Eye Movements

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In recent years, there has been a surge of interest in the possibility of using machine-learning techniques to decode generating properties of eye-movement data. Here we explore a relatively new approach to eye movement quantification, Recurrence Quantification Analysis RQA— which allows analysis of spatio-temporal fixation patterns — and assess its diagnostic power with respect to task decoding. Fifty participants completed both aesthetic-judgment and visual-search tasks over natural images of indoor scenes. Six different sets of features were extracted from the eye movement data, including aggregate, fixation-map, and RQA measures. These feature vectors were then used to train six separate support vector machines using an n-fold cross validation procedure in order to classify a scanpath as being generated under either an aesthetic-judgment or visual- search task. Analyses indicated that all classifiers decoded task significantly better than chance. Pairwise comparisons revealed that all RQA feature sets afforded significantly greater decoding accuracy than the aggregate features. The superior performance of RQA features compared to the others may be that they are relatively invariant to changes in observer or stimulus; although RQA features significantly decoded observer- and stimulus-identity, analyses indicated that spatial distribution of fixations were most informative about stimulus-identity whereas aggregate measures were most informative about observer-identity. Therefore, changes in RQA values could be more confidently attributed to changes in task, rather than observer or stimulus, relative to the other feature sets. The findings of this research have significant implications for the application of RQA in studying eye-movement dynamics in top-down attention.

The temporal and spatial use of home range by immature green turtles Chelonia mydas in a shallow neritic foraging ground: a thesis proposal

Meagan Gary, Annabelle Brooks and Michael Salmon
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Green turtles Chelonia mydas forage in coastal seagrass beds. As juveniles, they undergo a habitat and diet shift when they recruit to these areas, changing from an omnivorous diet to mainly seagrass and algae. In these foraging grounds immature turtles must maximize foraging opportunities and minimize predation risk. Studies have found different size and age classes of green turtles using adjacent but different foraging habitats. Adults and large juveniles feed in deeper areas than smaller juveniles. This may reflect differences in turtles' vulnerability to predators. Adults may be better able to avoid predators with an ability to outmaneuver the sharks in deeper, open water. Smaller juveniles may be more vulnerable and seek protection by occupying areas where the water level istoo shallow for sharks. This project will be conducted on the edge of a semi-enclosed sound off of Eleuthera, The Bahamas. Starved Creek is a 2.5 km long tidal creek system that contains mangroves, rocky shoreline, seagrass beds, and sand flats at depths ranging from 0-3 m depending upon the tidal cycle. The purpose of our study will be to quantify the movements of different size classes of turtles in Starved Creek, focusing how feeding time budgets are affected by tidal, temperature, and depth fluctuations. Emphasis will be placed on how the movements of individual turtles relate to core areas within the creek, how the turtles of different size classes differ in behavior, especially in the use of space, and how those differences affect their foraging time budgets.

Impact of vitamin C on genistein induced apoptosis in treatment of prostate cancer

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Background: Prostate Cancer, in the absence of skin cancer, is the most prevalent type of cancer found in the male population. Reactive Oxygen Species (ROS) can promote cancer cell proliferation when they are at elevated levels. Vitamin C is a water-soluble antioxidant capable of inhibiting the formation of ROS. Genistein, an isoflavone found in plants, also possesses the ability to inhibit ROS formation. Objective To determine the potential therapeutic synergy between genistein and vitamin C and investigate mechanism of action of genistein and/or vitamin C. Methods: Trypan blue assay was carried out to know the % of viable cells. Varying concentrations of genistein with a constant concentration of Vitamin C was used to treat LNCaP cells. After treatment of the cells with genistein and Vitamin C, MTT assay of the cancer cells was performed and absorbance read through an ELISA reader. This gives the values needed for interpreting cell viability after treatment. A statistical analysis performed to determine whether the obtained results are statistically significant. Results: The results obtained from our experiments are inconclusive with regards to the impact of Vitamin C on apoptotic cancer cell death following genistein treatment. However the combination of genistein and vitamin C was more efficient in tumor suppression than when the drugs were given separately. Conclusion: This study suggests that treatment of prostate cancer using genistein can be enhanced by adjuvant treatment with vitamin C. This study is of potential clinical success in reducing the cell death by necrosis.

Global assessment of individual's life situation corresponds with daily experienced situations: Evidence from an experience sampling study

Rachel Rosen, Nicolas Brown and Ashley Jones
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Previous research has established the importance of individual's perception of their everyday situations e.g., Sherman, Nave, & Funder, 2010. However, no research has examined if individuals assessment of their daily experienced situations matches their perception of their overall "life situation." In this study, participants N210 described their personality using the 60-item HEXACO and rated their overall life situation with the 32-item Riverside Situational Q-set RSQ. Next, participants were text-messaged eight times a day for one week and asked to rate their current situation, including how they felt and behaved. Results revealed that individuals' global assessment of their life situations did in fact predict their moment-to-moment experienced situations. Furthermore, personality traits did not interact with individuals' global "life situations" to predict perception of everyday situations.

In vivo Analysis of Conotoxin α-PVIIA in Shaker Channels of Drosophila melanogaster

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Conotoxin α-PVIIA is a 27-residue peptide toxin derived from the venom of the marine cone snail Conus purpurascens. α -PVIIA is a blocker of the Shaker channel, a voltage-gated, homotetrameric membrane potassium channel expressed at the Drosophila melanogaster neuromuscular junction. The mammalian homolog of the Shaker channel is the Kv1.3 channel, which in humans, is highly expressed in effector memory T-cells. Using α;-PVIIA as a possible Kv1.3 channel blocker has implications for treatment of autoimmune diseases such as multiple sclerosis and amyotrophic lateral sclerosis due to the reduction of activity in effector memory Tcells, cells highly involved in the autoimmune response.

The peptide was isolated through Reverse-Phase High- Performance Liquid Chromatography and its identity was confirmed using Matrix-Assisted Laser Desorption- Ionization Time-of-Flight Mass Spectrometry. Since α -PVIIA blocks the Shaker channel in vitro in Xenopus laevis oocytes, it will be tested in vivo in D. melanogaster using intracellular electrophysiological recordings from the flight and jump muscles of D. melanogaster to determine if α -PVIIA blocks the Shaker channels at the neuromuscular junction. This will determine whether in vivo results are consistent with the in vitro results that indicate a blockage of the pore of the Shaker channel by α -PVIIA. The conotoxin will then be tested in Kv1.3 channels expressed in X. laevis oocytes and it will also be tested in mammalian effector memory T-cells. This will be used to determine whether α-PVIIA is an effective blocker of the Kv1.3 channel and whether it produces a significant reduction of activity in effector memory T-cells.

Breeding sex ratios of three imperiled marine turtles nesting in southern Florida

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Sound assessment of the status of a threatened or endangered organism depends on understanding key aspects of behavior throughout its life history. Sometimes organisms can be difficult to observe and key aspects of behavior may not be accessed directly. Alternative assessment techniques include using molecular markers to identify fundamental relationships among males and females. In the context of assessing the status of imperiled populations' sex ratios, population size and the relatedness of the individuals are important metrics. Environmental sex determination directs developing marine turtle sex so that primary sex ratios depend upon weather and climate; those sex ratios are estimated by proxies. Adult population sizes are inferred from numbers of females nesting on the beach, but numbers of males are unknown. Male breeding population size can be estimated from subtracting maternal genotypes from genotypes of offspring exclusion analyses. The resulting adult sex ratios differ greatly from those estimated for hatchlings. To refine current adult sex ratios in ways that are relevant to production of future generations and add to our understanding of effective population size we compare the breeding sex ratios the number of males and females contributing to a population of three species of sea turtles nesting in southern Florida. We will use the same genetic data to measure relatedness of the female nesters and the male contributors and describe how that relates to genetic flow and population structure.

Developing a Spatio-Temporal Occupancy Model for A Declining Nesting Population Of Bald Eagles Haliaeetus Leucocephalus In Florida Bay, Everglades National Park

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Bald Eagle territory use in Florida Bay, Everglades National Park has declined by as much as 43 with a significant increase in year-to-year variation despite a historically stable population. We describe these changes in territory dynamics using Markov chain models based on observed frequencies of territory use collected from a long-term monitoring program beginning in 1958. Over the monitoring period, a total of 49 annual transition matrices were constructed, considering four possible fates unoccupied, occupied, active, or successful. Using loglinear analysis to detect and quantify spatio-temporal variation we explore the ecological importance of time and location on transient dynamics for this population. Changes in territory patchiness and more frequent territory abandonment coincide with changes in hydrology and the prey availability for Florida Bay. Compounding effects of time and location manifest most significantly over the last 15 years along an east-west gradient with effects most severe at the eastern portion of the bay. Our Markov chain models predict similar equilibrium composition and rates

of convergence, as measured by the damping ratio, supporting evidence for an increasingly unstable population with greater sensitivity to changes impacting overall productivity. The proposed model establishes relative importance to transition probabilities that increase the number of successful territories and maximize productivity, provides useful insight into the effects of stochastic and anthropogenic changes, and can be used as a resource to help direct ongoing management actions related to the recovery of other territorially breeding wildlife and their respective habitats.

Effect of a Spiritually-Guided Intervention on Breast Health Attitudes

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Spiritually guided health risk interceptions provide impetus-in-action to achieve healthy balance through the integration of spiritual, physical and emotional dimensions of self. These interventions are devised with the intention of intercepting risky health behaviors. What is the affiliation between one's spirituality and health care practices? Are there salient features centered on core spiritual principles which determine decisions, explain actions and depict health outcomes? Central ideologies of spirituality provide a viable platform upon which health promotional activities can be acquired and maintained. The purpose of this study is to examine the influence of a spiritually-guided intervention on breast health attitudes in Afro-Caribbean women ACW residing in the South Florida.

The Heart Failure Nurse Navigator: Reducing Hospital Readmissions?

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The aim of this study is to compare readmission rates for patients who transition home from the hospital under the care of the Heart Failure Nurse Navigator (HFNN) with patients who receive usual home health care. Heart failure (HF) accounts for 20% of all hospital admissions and is the most common diagnosis associated with a 30-day readmission of Medicare patients. Nationally, 24.7% of patients with HF are readmitted within 30 days. The AHA and ACCF recognize a critical need for evidence identifying best processes of care in transition from hospital to home. The comprehensive NN role not only teaches the patient to adapt to the prescribed medical protocol, but also provides connectedness and relationship. Home health nurses taught to perform the role of a HFNN may improve coordination of post-hospital care and patient outcomes. The research design will be sequential mixed-method. Phase I will be a quantitative, quasi-experimental randomized study of the effect of HFNN on 30-day readmissions. Pre- and post-testing for HF self-care knowledge and quality-of-life will be analyzed by repeated ANOVA. Independent T-tests will compare readmission rates between groups. Phase II will be a qualitative study of transitioning home under the care of the HFNN. Intervention patients will be invited to focus groups, and their responses to semi-structured questions will be coded using conventional content analysis. It is hoped that the quantitative portion of the study will demonstrate that the HFNN intervention will keep more patients out of the hospital for at least 30 days and improve the HF self-care knowledge and quality of life. The qualitative portion may uncover unknown elements of the HFNN/patient dynamic, as well as themes helpful in formulating further questions about care of the patient with HF.

Exploring the Potential for Schizophrenia in at Risk Afro-Caribbeans in the United States: A Meta-Synthesis

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Aim: This meta-synthesis explores the potential for schizophrenia in at risk Afro-Caribbeans living in the United States U.S. Background: African Americans are diagnosed with schizophrenia 9 to 32 more than Caucasians. However, this percentage does not distinguish the percentage of schizophrenia in Afro-Caribbeans from the Afro-Caribbean population. Extensive studies conducted in the United Kingdom U.K. reported higher rates of schizophrenia in Caribbean Blacks in Britain when compared to White

British citizens. However, there is a paucity of information about schizophrenia in Caribbean Blacks living in the U.S. Method: A review of literature conducted between 1990 and 2014, using a qualitative approach, identified four journal articles; the results of which were analyzed with the aid of NVivo software, using thematic synthesis. Results: The analysis identified six themes; racism and drug use were themes consistent with those identified in some of the primary studies. However, four new themes emerged: Effects of migration; disintegration of family; powerlessness and a rush to diagnose; all were acknowledged as significant factors that may have contributed to the onset of schizophrenia.Discussion: The themes unveiled by this review exposed a number of complex sociopolitical and economic factors that can possibly potentiate schizophrenia. However, these studies were the experiences of Afro-Caribbeans in the U.K. There is a great need for research in the U.S. to further explore the risk factors for schizophrenia in Afro- Caribbean communities.

Evolution of Stress in Day Program Enrollees with Alzheimer's Disease during the First Three Months of Attendance

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Objectives: Persons experiencing cognitive impairment face internal and external demands that trigger a whole bod response to cope (Goldstein, 1963). This study for participants diagnosed with Alzheimer's disease attending Memory and Wellness Center (MWC) explored the use of salivary cortisol as a biomarker of stress. We hypothesized that individuals with AD would have a greater physiological arousal on enrollment than at 1 and 3 months following admission. *Design and methods:* This study is a prospective, repeated measures design. A convenience sample of adult memory center enrollees (N=36) were recruited at the MWC. Twelve morning and evening saliva samples were collected over 6 days: 2 day at enrollment, month and 3 months. *Results: T*he participants had significant decrease in their levels of cortisol over time. Hierarchical Linear and Nonlinear Modeling (HLM, version 7.1) was used for analysis to measure changes across time. The individual results for fixed effect and random effects for changes in cortisol levels were identified. There was a significant time effect for the levels of cortisol for the participants. The fixed effects measure indicated a significant decrease (p = 025) and an average 0.13 decrease at each data point. *Conclusion:* This study suggests cortisol could be a useful outcome measure for measuring stress in individuals with memory impairment attending a day center. Recommendations for education and practice include, improving nurse and family members' awareness that enrolling in a program can be challenging and that additional support is needed and stress may decrease over the first three months.

Critical Theory: A case Study of Public Policy and women with Disabilities in Nepal.

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Disability is built on the social and cultural environments. They shape our understanding and perception of what it means to be disabled and how it is different from the concept of able body. The idea of disability is gendered, and it clashes with cultural ideas about gender in specific ways. Particularly, in the case of women, as they are already considered "the second sex" or "the other, female disability is even more prevalent and transparent. This ideology of disability regarding ability preserves and authenticates what it means to be normal and this definition limits women to certain "normal" standards. Regarding this socially and culturally-based concept of disability, Garland-Thomson writes, disability provides for the able-bodied "cultural capital to those who can claim such status, [and] who can reside within these subject positions" 1997, p. 25. It is clear from these words that, the ideology about disability will rather produce more disabilities and create the binary normative standard of ability vs. disability, able vs. disable.The "ideology of ability" is a concept Tobin Siebers discusses in his book, Disability Theory 2010. This ideology of disability is a concept which is created in specific cultural and social contexts. One is able if one fit in the categorization of what it means to be able and the other who does not fit in the category will be discarded. To reiterate, a human being is abled only when s/he fits into the category of what it means to be an able human being, and if s/he does not fit in that category, s/he deemed abnormal, not fully human, different, deviant, other, and therefore disabled, beings fallen from the "baseline of humanness" Siebers, 2010, p. 10. In the Context of Nepal, religious and cultural values disable women's autonomy in general, and create even greater disadvantages for women who are physically disabled. This paper discusses Public Policy and women with disabilities in Nepal as case studies.

Propagation of Risk in the Supply Chain: An Analysis of the Impact of the Japanese Tsunami

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On March 11, 2011 there was an underwater earthquake off the Japanese coastline, and the resulting tsunami impacted Japanese firms. That impact also rippled through supply chains across the globe. The electronics industry was significantly impacted because Japan plays a prominent role in the global electronics industry. This study investigates the impact of the disruption caused by the Tsunami in the global electronic industry supply chain. Specifically, Bloomberg financial data was analyzed to understand the relationships involved in this supply chain, and then used to investigate the impact on key companies in that chain. The study linked companies in Japan, Taiwan, and the United States, and analyzed the impact of the Tsunami on their immediate and short term stock prices. Results showed the expected immediate negative impact on the stock prices of the companies involved. But it was interesting to note an increased dampening effect was evident as the distance from the location of impact increased. Further, the study also identified a surprising second negative impact on stock prices of the companies in the supply chain. We propose that it is due to temporal memory of the markets to disruptive events. Further research directions are proposed.

Promoting Daily Living Skills for Adolescents with Autism Spectrum Disorder via Parent Delivery of Video Prompting on the Ipad

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Autism Spectrum Disorder (ASD) is characterized by persistent deficits in social communication, social interaction, and restricted, repetitive patterns of behavior, interest, or activities which together limit and impair everyday functioning. Research has shown that the use of video modeling procedures can support individuals with ASD to acquire and maintain a variety of daily living skills (DLS) leading to enhanced levels of independence. A variety of technological devices have proven to be effective tools for the delivery of videos aimed at promoting independence among individuals with ASD while reducing the need for external prompts provided by parents and professionals. As technology advances, devices have become more portable and, ultimately, affordable. Parents and caregivers have not only attained these devices, but actively seek to become more competent in using them to assist their children with ASD. Relatively few studies have examined whether parents can be trained to effectively deliver video modeling interventions through the use of mainstream devices. The current study sought to evaluate the impact of parent delivery of a video modeling procedure using an iPad as taught during behavior skills training. A multiple baseline across participants' design was used to determine if adolescent children with ASD were able to acquire and master the steps of a targeted DLS as delivered by their parents. Results indicated that parent delivery of the training procedures was successful in teaching their children to correctly and independently complete the DLS with high accuracy. Implications for parent training and future research are discussed.

Perceived Swallowing Disorders in Healthy Aging Individuals: Impact on Quality of Life

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With large numbers of Americans over 65 years of age, millions of elderly individuals could be at risk for swallowing disorders or dysphagia. These disorders can greatly affect a person's quality of life and health. While the aging process in a healthy individual does not necessarily lead to impaired swallowing, aging can lead to changes in the swallowing process, known as presbyphagia (Robbins, et al., 1992). Further data is needed regarding prevalence, effects of lifestyle, and relationship with fatigue and swallowing abilities in healthy aging individuals. The purpose of this study was to: investigate the prevalence of self-reported swallowing difficulties in a healthy aging population; determine if age, ethnicity, or gender impact whether healthy aging individuals perceive swallowing problems; and, if individuals reporting swallowing difficulties experience avoidance of social situations or if fatigue relates as a factor in presbyphagia. A significantly greater proportion of Hispanic Americans indicated swallowing difficulties than expected by chance, 18.8% "No" vs. 40.5% "Yes" (p = .0035). Further analysis indicated those who self-reported swallowing difficulties were less socially engaged (t = 1.75, p = .048) and, for people who self-reported swallowing difficulties a significant correlation between reduced social aspects of life and increased level of fatigue (r = -.473, p = .003).Previous studies have reported mealtime anxiety and avoidance of eating with other people in elderly individuals (Ekberg, 2002). Overall, the negative social impact from presbyphagia can seriously affect an individual's quality of life, however, early identification of swallowing difficulties and remediation may be beneficial.

Summary of Findings from a Case Study of Policy Entrepreneurship in Higher Education: A Descriptive Portrait

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The call for higher education reform in the U.S. intensifies as the gap between the haves and have-nots widens. Policy actors from across the political spectrum advocate for various policy solutions creating a policy environment that is complex and often contentious. In such environments, policy entrepreneurs—those individuals who advocate for policy innovation from within and without government—try to break through the barriers of incremental politics to create reform. As important as this role is in structuring higher education policy, it has not yet been explored. This study fills a gap in the extant literature by cataloging the traits, values, motivation, skills, and strategies that enable higher education policy entrepreneurs at state and national levels to accomplish sustainable and innovative higher education reform. This study employed a descriptive, revelatory, singlecase study research design interpreted from the postpositivist paradigm. Data drawn from interviews with 23 policy entrepreneurs from across the U.S. were triangulated with document reviews and a multi-level coding strategy. Data were then juxtaposed against nine propositions extracted from the extant literature to derive the findings. Policy entrepreneurs in this study are creative political leaders with a passion for improving educational opportunity. They are pragmatic, resourceful, perseverant, strategic, and influential actors who don't work in isolation; rather, they are network dependent and value collaboration, compromise, and listening. They reach across the aisle, work hard to build credibility and trust, recognize windows of opportunity, create opportunities to advocate for policy innovation, take calculated risks, and make sacrifices for their cause.

Swimming Upstream: Summary of Findings from The Writing Hour Micro-autoethnography

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This qualitative, micro-autoethnographic study explored the perceptions of four female doctoral students at FAU that made up the founding and consistent membership of a self-created, self-directed, and self-sustaining blendedlearning cohort focused on doctoral dissertation completion. The participants also served as co-researchers of this study that investigated their motivation to persist through their doctoral programs in educational leadership with a focus on the dissertation phase. This study utilized group and individual interviews, spontaneous drawing, document review, and the SDLRS instrument to collect and analyze data on the group's formation, development, challenges, culture, sustaining factors, and outcomes. Findings show that while this group of doctoral students faced substantial challenges and distractions, their self-created cohort evolved through the stages of group development into a viable and supportive community of practice based on their learner motivation orientations achievement and affiliation, personal strengths, and strategies that included dependence on technology; meeting structure, time management techniques, rules, sharing, critiquing, accountability, artificial deadlines, and emotional support. This study fills a major void in the literature. While research exists that examine doctoral cohorts, graduate student retention factors, and graduate student peer mentoring, literature is sparse regarding the outcomes of self-created and self-sustaining graduate student cohorts. Given the high rate of attrition among doctoral students across disciplines in the U.S., the implications of this study include improvement of graduate student advising, suggestions for supportive restructuring of graduate study programs toward increased retention, and the creation of an empowering model for student cohort formation to be validated through further research.

Are Attachment Strategy and the Quality of infant care Moderated by Cortisol? A study on the attachment strategies of breast feeding woman from the Dynamic Maturation Model approach to attachment development

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Attachment strategies are patterns of attachment that develop over the lifespan, and provide a description of interpersonal behavior along with a functional system for diagnosing psychopathology. Genetic factors, in the context of development and the environment regulate the maturation process. As the brain matures, it synthesizes past memories with present experiences in order to judge the behavior of others in future relationships. This is significant because the purpose of the attachment figure is to provide protection and aid the child in "making sense" of information made available to them. Research in adult psychopathology continues to show a correlation between adult psychopathology, cortisol, and disruptions in the childhood attachment system. This study will examine how the Dynamic Maturation Model theory of attachment strategies influence care that mothers give to their infants, and if cortisol serves as a moderator. The Adult Attachment Interview and Infant Care Index will be administered to mother/infant dyads. Attachment strategies and quality of infant care indicated by both measurements will be coded , correlated, and cortisol measured. If findings indicate a correlation, treatment interventions can be designed for post- postpartum mothers to prevent long term child and adult mental health psychopathology and associated social problems that may have their etiology in childhood.

Educational Video Games: Impact on Students' Performance, Attitudes, and Motivation in Mathematics.

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Introduction: Mathematics has become increasingly important in today's world. With the advancement of technology, an increasing number of career choices require individuals to possess a solid command of basic mathematics concepts. At the same time, the majority of students are entering college unprepared or under-prepared for rigorous work in mathematics (Hoyt & Sorensen, 2001; Stebleton & Soria, 2012).Purpose of the study: In this study, the researchers plan to investigate how educational video games affect students' achievement, their motivation to learn mathematical concepts, and their attitudes towards mathematics learning in intermediate algebra. Project description: The project will consist of creating basic interactive games for instructional purposes in mathematics. The games' learning objectives will be to teach prospective and current college students the skills necessary for successful completion of intermediate algebra.Research Methodology:Both quantitative and qualitative data will be collected. Test scores will be collected from students enrolled in gamified and non-gamified intermediate algebra courses. In addition, the students in both the gaming and the non-gaming group will be asked to complete Likert Scale surveys at the beginning and end of the semester. Based on the responses obtained from the surveys, a subset of the students will be chosen for an interview.

Fluid-Structure Interaction and Morphing Ocean Structure Deployment

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As human explore deeper into ocean, more and more subsea structures need to be installed. Deployable structures, a folded package which could be drop from surface and at destination morphing into its final structure form have significant advantages like its counterpart in space structures. More recently, many space missions have proposed large inflatable structure for different proposes. In lieu of the difference between outer space and underwater environment, it is necessary to include the fluid structure interaction in underwater deployable inflatable structures application to study the effect of dense liquid environment on the inflating dynamics of ocean structures. The purpose for the present research is to demonstrate, through a numerical simulation and a small scale water tank test, a Deployable Structure for Intervention on Oil Seeps DISIOS, which could form an underwater dome and collect lower density chemicals from oil seep. DISIOS prototype are formed by membranes and inflatable tubes, where tubes act as framework to support the membranes to construct a dome. The study begin with simulate water injection into flatted structures to verify the ability of LS-Dyna software. Deflection and velocity of membranes are recorded to compare with experiment data. Then we turned to inflate process of folded structure by different folded methods. From unfolding process simulation, we could determine which type of fold method works best for our predesign shape of tube. We are now conducting the dynamic analysis of inflatable tube, which is the elementary component of DISIOS framework.

Improving design of autonomous underwater vehicle for operating in a strong current environment

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Ocean is human's last frontier on Earth with most of its space inaccessible to human and remains largely unexplored. For the protection of our ocean and its sound development, unmanned autonomous underwater vehicle AUV, plays an increasingly important role. However, today's AUV can't function in a strong current environment. Propeller-driven AUVs typically move at speeds of up to 1.5-2.0 m/s, and thus strong ocean currents could push AUVs way from the planned paths. And their control surfaces may not work properly, especially when AUVs are maneuvering. Extra thrusters may be added to improve the maneuverability, yet the endurances of the vehicles will be shortened since extra thrusters consume more power. On the other hand, buoyancy-driven underwater gliders, using internal actuators, are characterized by long endurance. However, gliders typically move at horizontal speeds of about 0.3 m/s, which make gliders unsuitable for the missions in strong ocean currents. In the present research, a hybrid AUV design will be studied which combines the capabilities of both AUVs and underwater gliders. The proposed AUV will be propeller-driven yet the maneuverability of the vehicle in both horizontal and vertical planes will be achieved by using internal actuators instead of control surfaces and extra thrusters. The research will mainly focus on the control strategy of an AUV in a horizontal plane by using internal actuators to exploit the vehicle's coupling effect of the roll motion on horizontal motions to maneuver AUV in a strong current environment.

Optimal Operation of a Microgrid Including Gas Turbine, Wind, PV and Battery Storage to Achieve Cost and Emission Targets

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This paper presents a new approach for the optimization of photovoltaic-wind hybrid systems with battery storage to meet the load requirements. In this study, a 24-hour ahead energy management for a micro grid is utilized. The objectives are to raise efficiency of energy utilization, to minimize operational cost and to reduce environmental effects of energy utilization. Also a demand response DR program is considered in this research as one of the cost-effective energy alternatives. Based on the prediction of the energy available from the PV and wind generators, battery storage availability, the load prediction, the micro-gas turbine μGT and main grid emission characteristics, a central energy management system is computed. It calculates a day-ahead plan of the power references for gas turbine, power purchased from the gird, power sold to the grid, status of the battery and controllable loads. A multi-objective optimization is implemented in order to minimize the energy cost and greenhouse gas emissions.

Development of Simulation Tool Used To Predict Performance of Mobile Docking an Unmanned Underwater Vehicle to an Unmanned Surface Vehicle Using Usbl Acoustic Positioning System

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This paper presents the development of a simulation tool that has been created to evaluate the ability of homing and docking an unmanned underwater vehicle Hydroid REMUS 100 UUV to a moving unmanned surface vehicle Wave-Adaptive Modular Surface Vehicle USV using a Hydroid Digital Ultra-Short Baseline D-USBL acoustic positioning system APS as a primary navigation source. The development of an APS homing simulator model has allowed the ability to forecast the UUV's position and the estimated track line of the USV as determined by the DUSBL acoustic sensor. An understanding of how the UUV can rendezvous with, both, a stationary and moving platform is presented in this paper. Inherently, the DUSBL-APS is susceptible to error due to the physical phenomena of the underwater acoustic channel e.g. ambient noise, attenuation and ray refraction. The model also provides the associated cross-track horizontal, down-range vertical, and along-range projected body-fixed errors to be expected in discrete periods of time for any sound velocity profile. In this model, focus is placed on three main elements: 1 the acoustic channel and sound ray refraction when propagating in an in-homogeneous medium; 2 the detection component of an ideal DUSBL-APS using the Neyman-Pearson criterion; 3 the signal-to-noise ratio SNR and receiver directivity impact on position estimation. The simulation tool is compared against actual open water homing results in terms of the estimated source position between the simulated and the actual USBL range and bearing information.

Sparse Channel Estimation for Time-Varying MIMO Underwater Acoustic Channels at Very-High Frequencies

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We present a time-varying underwater channel estimation method based on the channel sparsity characteristic. The proposed algorithm is applied to provide both an accurate and fast channel estimate to a multiple-input multiple-output MIMO channel and to isolate each of the channel's echoes. The technique is demonstrated in a fully controlled environment using experimental data. The need for a robust method for channel estimation became apparent while exploring the possible conversion of the Hermes modem into a MIMO device and the presence of Doppler spread affected the performance of the Least Square LS channel estimation routine that was first chosen to estimate the time-varying impulse response. In addition, the underwater acoustic UWA channel exhibited a limited number of echoes so that the channel could be classified as a sparse channel. Several channel estimation techniques have been developed to exploit the sparsity of the UWA channel. In this research, we derive a time-varying MIMO single carrier channel estimation technique based on the orthogonal matching pursuit OMP algorithm and analyze its performance in an experimental MIMO setup.

Single Input Multiple Output System for High Frequency Shallow Water Communications

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A Single Input Multiple Output (SIMO) acoustic communication system is developed to improve high data rate communications at short range in the shallow water acoustic channel. The proposed communication system operates at very high frequency and combines spatial diversity and decision feedback equalizer in a multilevel adaptive configuration. In the first configuration, symbols collected at each receiver are equalized using a decision feedback equalizer and combined using selective combining. The results are used as decision symbols in the second configuration, which is a form of turbo equalization: the process can be repeated over and over, leading to a better estimate of the received signal as the number of iterations increases. The number of iterations required to achieve optimal results depends on the number of receivers and level of corruption of the individual messages. The adaptive configuration is evaluated using experimental and simulated data and SIMO system with three, four and five receivers. The simulated data are generated using a simulation model based on experimental channel and Rician fading channel model. The performance of the channel is evaluated in terms of Bit Error Rate (BER) and Signal-to-Noise-and-Interference Ratio (SNIR). Using experimental messages with non-zero BER, adaptive spatial diversity can achieve BER of 0% and SNIR gain of 3 dB. The simulation results show that the average BER and SNIR after combining improve dramatically, even in case of extremely high BER of individual messages and demonstrate that the proposed SIMO system can significantly improve the reliability of the shallow water acoustic channel.

Prosthetic Thumb Design with Superelastic Plates and Wet Shape Memory Alloy Tubes.

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This project entails a prosthetic thumb that actuates using shape memory alloys, SMAs, instead of the traditional tendon and motor driven devices. SMAs are metals that can bend with the application of heating and cooling. For this application, two Nickel-Titanium SMA tubes will be used for flexion of the

thumb and a Nickel-Titanium-Copper SMA plate will be used for extension. The tubes behave as described above but the plate behaves more like a super elastic spring, forcing the tubes to return to the original position upon cooling. Using the opposing properties described above, this prosthetic thumb is expected to obtain the flexion and extension necessary to articulate the range of motion needed to replicate a human thumb. There will also be monitoring of the position, temperature and applied force as well as pumping a liquid through the hollow tubes to allow for cooling. With active heating and cooling the prosthetic thumb is expected to be able to track position and applied force through an interface of the users' choice.

Revisiting Bresse-Timoshenko theory for beams

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In this study, a variational derivation of the simpler and more consistent version of Bresse-Timoshenko beams equations, taking into account both shear deformation and rotary inertia in vibrating beams, is presented. Whereas Timoshenko gets his beam equations in terms of the equilibrium, the governing equations and the boundary conditions are here derived using the Hamilton's principle. First, a list of the different energy contributions is established, including the shear effect and the rotary inertia. Second, the Hamilton's principle is applied demanding the stationary of an appropriate functional, leading to two different equations of motion. The resolution of these equations provides the governing differential equation. It turns out that an additional term appears. The derived equations are intended for dynamic stability applications. Specifically, the parametric vibrations will be studied when the axial force varies periodically. This problem has important aerospace applications.

Closed-form solution for vibrations and buckling of functionally graded rotating beams

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In this study we provide closed-form solution for natural frequencies of inhomogeneous, functionally graded rotating beams. We resort to the semi-inverse method using bubnov-galerkin technique: first the mode shape is postulated as an arbitrary-order we concentrate on fourth and higher orders polynomial function. The flexural rigidity is sought as the compatible fourth-order polynomial. It is demanded that the mode shape and flexural rigidity satisfy the governing differential equation and that these yield the sought natural frequency for each case. Natural frequency for each case is used to determine the conditions under which buckling occur. Two cases of boundary conditions are considered: clamped-free beam, and the beam that is simply supported at both ends.

Bitwise Controlled Brain-Computer Interfaced Robotic Arm

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For individuals suffering from Amyotrophic Lateral Sclerosis or other paralyzing ailments, the ability to regain environmental interaction is a desired advancement. Proposed is an opportunity to create a brain controlled robotic arm that will reestablish interaction with their environment. Electroencephalogram signals will be recorded and analyzed in real time utilizing MATLAB/Simulink. The desired electrode positions are the C3 and A3 locations following the international 10-20 layout. The electrodes will detect excitation caused by imagined movement of the right hand, and will act as a ground reference respectively. Two electrodes were chosen instead of larger arrays in an attempt to

minimize processing power, setup requirements, and cost. The robotic arm will possess 4 degrees of freedom relating to horizontal base rotation, vertical shoulder and elbow rotation, and a claw end effector. These joints along with the end effector constitute 7 required movement types, with each joint counting for two, and the claw needing only one alternating between a closed or open state. While utilizing only two electrodes, these 7 movement commands will be controlled through a 3 bit classifier. The program will cycle through the bits presenting the user with 1 second to excite each bit with 1 second delays between bits. The resulting bitwise number will be relayed to a microcontroller which will execute a specific robotic arm movement. Excitation will be determined using threshold classification post filtering. This bitwise and minimal electrode approach will preserve accurate control while mitigating the large requirements of more complex systems.

Architectural Solar

Jason William Brandes and Dr. Amir Abtahid
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Architectural Solar, a independent study performed to review solar engineering principles for both thermal and electrical systems, methods of incorporating solar within architectural systems will be studied, explored and implemented. Models in computer as well as physical models studying light, opacity, translucent and opaque materials. Retrofitting energy sufficient applications such as photovoltaic cells, and how these solar applications/components interact with architectural elements in a tropical/subtropical environments. Trying to fit within the context to find something that is uniquely adaptable to the site, creating a meaningful art form and is integrated well within the urban context. Solving structural issues and energy balance by preserving regional architectural elements, as well as being cognizant with an understanding and respect of local architectural characteristics.

The Effect of Flexibilities and Aspect Ratios on Ribbon-Fin-Propulsion

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Ribbon-fin-based propulsion has the potential to improve the maneuverability of underwater vehicles in complex environments. In this type of propulsion a series of rays are used to send traveling waves along an elongated fin, which is referred to as ribbon fin. In this work, in order to know the effect of flexural rigidities and aspect ratios on undulating ribbon fin propulsion; we built a robotic ribbon fin, and tested the physical model in a water flume. In a series of experiments we measured the propulsive force, power consumption and the free-swimming speed of the robotic fin as a function of wave frequency for fins with different ray stiffness and aspect ratios. The propulsive performance of the robotic ribbon fin was based on the propulsive force generated and power consumption. A series of kinematic experiments were performed using a high-speed camera. Based on the fin kinematics, the natural frequencies of the ribbon fin with different stiffness were determined. We found that the flexible rays would improve or worsen the propulsive performance compared to a rigid counterpart depending on the actuation parameters. For the aspect ratios considered, the propulsive efficiency improves with increase in the fin height. Our data suggest that, the ribbon fin can yield best propulsive behavior close to its natural frequency.

Autonomic Software Systems: A Case Study in Developing for Self-Managing Legacy Systems

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Modern software systems have grown in complexity and expense, even while costs for the supporting hardware have decreased. Humans still comprise a significant cost from the development to operation and evolution of software, and must be increasingly more skilled as systems grow more complex. Further, legacy software has become more prevalent, as sophisticated enterprise systems developed over many years approach complexity that is too expensive to replace or re-engineer. One of the major software engineering challenges today is the maintenance and evolution of these existing legacy systems to extend the business value of the software, while mitigating the costs and increased complexity. Approaches practiced by researchers and engineers include software reuse, service-oriented architecture, and autonomic computing principles to improve the reliability of systems, while removing the need for human monitoring and intervention where possible. In this paper, we describe a real-world project in which a multi-channel vendor of musical equipment sought to extend their legacy enterprise system to automatically process customer orders originating from a third party retailer specializing in ecommerce. To realize the solution, an addition to the existing enterprise system was developed using autonomic computing, software reuse, and service-oriented architectural approaches, producing a highly automated order processing stream that was self-monitoring, self-adaptive, and fault-tolerant, while minimizing the need for additional human resources to monitor the system and process the data.

Multi-Axis Precision Grip Control for a Prosthetic Hand

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Many myoelectric prosthetic hands do not allow simultaneous control of the wrist joint and grip force of grasped objects. This scenario can lead to frustrating situations where objects are inadvertently dropped as the user cannot directly feel if there is a sufficient grip force to prevent slip as the object is being rotated by the wrist. The goal for this project is to investigate the performance of a non-invasive control scheme used to adjust precision grip of a prosthetic hand based on its orientation. Grasping capabilities of a prosthetic hand adapted with sliding mode control were investigated with and without grip-plane orientation feedback, GOF. Benchmark tests involved using the automated control system to grasp a number of common objects varying in shape, texture, and weight, including a foam ball, soda can, paintbrush, copper tube, and compliant sheet metal, with a precision grip, and repeatedly rotate it in and out of the plane of gravity. Benchmark test results showed a significant improvement of the performance metric using GOF. EMG sensors which controlled the hand's grip action were placed on the forearm of 12 human subjects. An object designed to be repeatedly breakable was grasped and rotated as before. Break and drop failures were recorded while the subjects performed with and without the aid of GOF while either focusing on the test or distracted with a part sorting task. From the testing procedure, GOF offered an effective method for reducing object drops while maintaining a minimum grip force.

Impact of Mobility on the Performance of Dual-hop Relaying in Nakagami-m Fading Channels

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Cooperative communication in wireless communication has been extensively studied for static terminals in the literature. Two of the common used dual-hop relaying schemes are Amplify-and-forward and decode-and-forward. In most of these cases the average received signal power is considered to be fixed and follows a well know power distribution. However in many of the wireless communication applications such as down-link cellular networks, the receiving terminals follow random mobile patterns. In this paper, we evaluate the dual-hop performance of such mobile systems where the received signal is not fixed and the terminals' locations follow the Random direction RD model. We derive the outage probability and average BER of general modulation schemes in presence of Nakagami-m fading. The results can easily be extended to Random-Way-Point RWP mobility model. The analysis offers an insight during designing and implementation of such mobile networks on the effects of mobility, path-loss coefficient, and fading on the performance of the mobile terminals.

Multitaper Smoothed Minimum Statistics Noise Power Estimation

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Speech communication devices and digital hearing aids must perform in the presence of high levels of ambient noise. Speech enhancement is a denoising process where Wiener-like filters are developed that require the estimation of the background noise spectrum from an additive combination of speech and noise. To follow statistical variations over time, the processes must be performed over short and overlapping frames of data resulting in time varying filters and spectra. Tracking of non-stationary noise is a difficult task for singlemicrophone systems because of the shared characteristics of some speech segments and noise. The minimum statistics approach to noise power estimation relies on a biased estimate of the noise floor at a given frequency as the spectral minimum of a number of consecutive frames. The spectral sequence is smoothed by a recursive filter with time and frequency dependent parameters. The resulting estimate is biased toward lower values. The bias depends on the variance of the smoothed power and the smoothing filter coefficients which are empirically chosen. We propose an alternative formulation to tracking the noise power that replaces the smoothing filter coefficients with MultiTaper Autoregressive filter coefficients. The resulting filter coefficients are derived from the data and show superior tracking of the time-variation of the spectra. The smoothed minimum spectrum output has low variance and low bias.

A misuse pattern for denial of service in TLS using a message drop attack

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Transport Layer Security TLS is a cryptographic protocol that provides a secure channel between a client and a server. TLS is the successor to the Secure Sockets Layer SSL protocol. The client/server secure connection prevents an attacker from eavesdropping an established connection. The SSL/TLS security protocol is layered between the application protocol layer and the TCP/IP layer. It is used in most internet communications for enabling secure web browsing. We present a Denial of Service Misuse Pattern Using a Message Drop Attack, where the attacker impersonates the client to intercept and drop the ChangeCipherSpec message which causes the server to never leave its pending state and the communication will never happen, producing a DoS misuse.

The flow structure behind a mangrove-like vegetation

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Mangrove trees are abundant in the coastlines of the subtropic regions where hurricanes are frequent. Thus, mangroves roots have to sustain high winds and wave conditions. The purpose of this work is to study the behavior of the fluid dynamics behind a patch of a circular cylinder which represents a mangrove-like vegetation. Mangrove roots are modeled with a number of rigid cylinders. Five cases are considered by changing the number of cylinders in the patch with the same outer diameter which results in various porosities. For each case, numerical result is used to study the difference between flow around one cylinder with no porosity and around a porous patch of cylinder with the same outer diameter to determine the impact of the porosity in the patch. Numerical simulation which is the contribution of this work is conducted in Ansys Fluent for a two-dimensional laminar steady condition for different porosities and Reynolds numbers. The complex two dimensional flow structure of the cylinder wake is also reasonably captured. According to results, if the porosity grows, the drag force on the patch decreases and velocity exiting the patch increases which lead to delay the initiate of von Karman street vortex. The information obtained from the fluid flow through CFD allows to determine required improvements in better understanding of the flow structure behind the patch. More importantly, CFD plays an important role in addressing variation in parameters pertaining to the exposure of a different geometry as well as upstream water velocity.

Heat Transfer Characterization of Shell-and-Tube Heat Exchangers

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Shell-and-tube heat exchangers (STHXs) are a popular choice in the petroleum refining industry, chemical industry, food processing industry and in power generation plants. This kind of heat exchanger is made up of an array of baffles that redirects the working fluid to increase heat transfer. The objective of this work is to understand the underlying physics of the heat transfer in a shell-and-tube heat exchanger and its interconnection to the fluid structure associated with their design. This research focuses on the steady state three dimensional analysis of the time averaged turbulent flow and heat transfer characterization of the shell side of a small scale single segmented baffle heat exchanger. The study is carried out using the computational fluid dynamics (CFD) software package ANSYS: FLUENT 15.0 on a hybrid unstructured mesh. The CFD results are then compared against experimental results. The Reynolds averaged-Navier-stokes (RANS) based turbulent model realizable is used to model the turbulence inside the heat exchanger. The results obtained from CFD and experiment from the shell side wall outlet temperature differ by 5 %. Based on the computational results it is found that the regions of highest velocity at the inlet and in the core flow lead to a higher local heat transfer enhancement. A better understanding of the complex flow and heat transfer regimes inside a shell and tube heat exchanger given by this work would aid to further the development of more cost efficient and effective heat exchanger designs.

Sperm sorting in microfluidic channels utilizing chemotaxis

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Current sperm sorting methods used for in vitro fertilization most commonly use a centrifugation step, which has been shown to produce reactive oxygen species, which hinders sperm function and damages DNA. The purpose of this study is to eliminate the centrifugation step in sperm selection via the use of a microfluidic device that mimics the natural chemoattractant gradient found in the female genital tract to attract healthy sperm to the egg. The hormone progesterone has been proven to be a chemoattractant, and two other molecules, hyaluronic acid and RANTES have also been implicated in the chemotactic response of sperm. The motility and morphology of sperm will be compared at different time points after being exposed to a chemoattractant gradient. The developed microfluidic device will enable selection of healthy sperm with lower DNA defects and oxidative stress, and will potentially reduce the birth defects.

A Framework for Modeling Ship‐Wake Turbulence from a Database for Analysis and Simulation

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Wake turbulence is shed from the superstructure of a moving aircraft carrier; this turbulence presents a high level of risk for helicopter shipboard operations. CFD-modeling along with wind tunnel and full scale tests has generated a voluminous database of flow velocity points. However, discrete numerical data of wake turbulence statistics from this database does not help understand the fundamental features of wake turbulence. Accordingly, earlier studies have developed a mathematical framework for extracting analytical models of one-point statistics of autospectrum. The present ongoing study extends this framework for extracting the analytical models for twopointstatistics of coherence also referred to as spectral correlation coefficient between two points. As for the approach, the cross-correlation is expressed by a perturbation series, in which, the first term has the form of a von Karman longitudinal or lateral correlation function. The initial phase of this ongoing research seems to offer considerable promise.

Development of Automated Microfluidic Platform for Ebolavirus Detection at Point-of-Care Settings

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Ebola Viral Disease EVD is a devastating illness with high infectivity and mortality rates. The disease is endemic to regions of Central and West Africa, where resources may be limited or become constrained. The 2014 West Africa EVD outbreak has been unprecedented with case numbers reaching 13,969 and a high fatality rate between 60-70 percent amounting to 9,194 fatalities. EVD has proven to be a potential threat to the world, as a source for the following Spain, Mali, Nigeria, Senegal and US outbreaks in 2014. The urgent need for rapid and affordable means of detecting Ebolavirus is crucial to control the spread of EVD, and prevent the devastating number of deaths and subsequent immense socioeconomic impact. A flexible microchip platform for finger-prick sampling of whole blood has been developed to isolate viruses, and is able to move samples fixed to magnetic beads using a guided system of electrodes. Preliminary data shows this platform is able to capture and detect viral lysate

using impedance spectroscopy; which, shows potential to develop this platform for point-of-care testing to help prevent and minimize the spread of future EVD outbreaks.

Travel-time Based Signal Performance Measures

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Vehicle travel time on arterial roads with signalized intersections is an essential parameter for traffic management. There is an increasing interest in signal performance measurement for signalized intersections in the United States. Reducing the journey times and increasing the capacity are some of the fundamental aims with potential benefits in environmental pollution, and energy utilization. The Travel-time Based Signal Performance Measures application is a tool for estimating signal performance measures based on upstream-link travel times. The application utilizes well known concept of Volume-Delay Functions to convert measured travel times into signal performance measures. Based on this functionality, it can estimate the performance measures for 7 signalized intersections on Glades Road, Boca Raton, Florida. Available performance measures for the major through movements are: volume-to-capacity ratio, Level of Service LOS, and the number of cycles to wait. The derived measures can be graphically visualized on Google Maps. The travel time data acquisition is performed using BlueTOAD devices. The goal is to introduce automated assessment tool, visualization and evaluation of the intersections' performance measures simultaneously at multiple intersections. The main objective of this web application is to help traffic operators/engineers to evaluate performance of the signalized corridors exploiting the archived measured travel times.

Research Topic Discovery and Forecasting Using Social Network Analysis
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In this research, we intend to use data mining and social network analysis to automatically discover new research topics and forecast their popularity in a near future. In order to discover new research topics, we collect publications from a particular domain we use data mining and machine learning as our research domain, and further employ text mining to discover a set of topic candidates. A temporal correlation analysis will help discover correlations between topics, and help identify a network of topics and communities. An ensemble forecasting approach is proposed to finally predict the popularity of the research topics.

Building, Calibrating, and Validating a Large-Scale High-Fidelity Microscopic Traffic simulation Model

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Microscopic traffic simulation models are considered to be valuable and powerful tools for analyzing traffic operations in a wide range of planning and modeling tasks. However, modeling large-scale urban traffic networks is particularly challenging task even on a macroscopic level. The challenges are multifold when attempting to represent large urban networks in high-fidelity manner with operational details. While many previous studies have proposed various simulation model calibration and validation

methods, these processes are still considered to be more an art than science, especially if performed manually. This study describes such a manually-crafted simulation building, calibration and validation process that features a major urban grid network, encompassed with 6 busy arterials and 160 signalized intersections. A VISSIM model was calibrated and validated by using variety of traffic data, from two temporally, spatially, and characteristically different field data-collection campaigns. The accuracy and sensitivity of the model was repetitively fine-tuned and tested, until a chosen calibration criteria for several variables volume, speed and travel times was successfully met. Validation tests were performed with a completely fresh dataset at the end of the process. While the calibration efforts were a full success, the validation results were only half successful. There are several potential factors that could have impacted the mixed validation results, including: higher sensitivity of the validation data, seasonal shifts in traffic demand and distribution, etc. Future research will focus on collecting and testing new validation data sets, which will improve robustness and reliability of the simulation model.

Multimodal Traffic Control for Large Urban Networks with Special Priority for Light Rail Transit

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Developing optimal traffic control for multimodal operations is more challenging than ever before. While traffic demand for private cars continually grows, the impact of multimodal users increases the complexity of finding good signal control solutions for the urban traffic environment. One of the major issues is how to develop 'equity' in signal control for multimodal operations and address practical and operational constraints for optimal solutions to be applied in the field. This study addresses such a combination of theoretical and practical signal control objectives. While a Genetic Algorithm formulation is used to optimize traffic control for multi-modal operations in a large urban network, the solutions are practically constrained to preserve existing and well-performing Light Rail Transit predictive priority strategies in a Software-in-the-Loop environment. The latter part ensures acceptance and verification of the solution by the signal-operating agencies while the former part opens new horizons for deciding how to equitably split signal's green time between various multimodal users drivers, transit passengers, and pedestrians. The case study is a downtown Salt Lake City network with multimodal operations executed in a well-calibrated simulation model. The methodology works with complex Software-In-the-Loop platforms that accurately replicate field signal controller operations . The optimal solution, achieved after 1200 trials, reduces delay per person by ~8 without affecting any other vital performance metrics e.g. capacity of the network or overall traffic progression. Future research should include more multimodal operations with fewer constraints and different social costs.

A Reference Architecture For Mobile Cloud Systems

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Mobile devices are powerful, convenient, multi-purposed machines that are capable of accessing data through software such as email, GPS, and videos. These applications add a new level of complexity to mobile devices but also place a strain on physically limited resources such as battery life, storage capacity and processing power. Mobile cloud computing can address these limits by bringing the power of the cloud to mobile devices to provide resources on demand. However this combination of mobile and cloud computing can have as many challenges as it does benefits, especially in areas of security and privacy. Bring Your Own Device BYOD and Mobile Device Management MDM are two aspects of security which must be considered when introducing mobile devices to the cloud. Due to the complexity of the interaction between mobile devices and the clouds, it is often helpful to describe and solve

security concerns within that system using a means of abstraction. For such a case a Reference Architecture RA can be very useful, but since attacks that exploit the cloud are becoming more diverse, existing architectures must evolve to fit the mold of mobility. In this thesis we discuss the background of mobile devices and the cloud, explain the need for mobile cloud computing, survey existing cloud architectures to discover security vulnerabilities, explore existing approaches of BYOD and MDM, and propose a reference architecture which can be used to expand upon an existing one.

Campus 2020: Context-Aware Navigation for Florida Atlantic University Campus

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This project envisions a university campus where technology assists students and visitors in their daily activities. The parking component of the system constantly monitors occupancy and automatically updates information in the back end. We developed Android application that provides weighted shortest-path route for pedestrians and drivers allowing them to efficiently find parking and reach destination.

Visual Information Retrieval Techniques Applied to Veterinary Radiology

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This study assesses the difficulties involved in implementing visual information retrieval VIR systems for veterinary images such as x-rays. Moreover, we examine some common occurrences in the sharing and comparing ofveterinary information that can provide obstacles that impede the use of mobile visual search and retrieval techniques, and how these obstacles can be overcome. One such obstacle is the casual sharing of x-rays between professionals; x- rays that are usually captured by cell phone and transferred as JPEG images attached to messages. A change in the subject's position from one x-ray to the next can limit the effectiveness of visual search and comparison techniques. X-rays taken of the same animal from one period to the next can vary widely in position, intensity, and perspective. While these practices are common methods of examination and information sharing between veterinary professionals, these irregularities, while almost inconsequential to the human eye, can become a major stumbling block when applying VIR algorithms intended to analyze and process these images. This study proposes to analyze the effectiveness of existing MVS techniques, including algorithms that help reduce or eliminate angular distortions, or levels or intensity or magnification, so that comparison can be conducted on a level playing field for maximum effectiveness.

Autism Learning Tool Development and Research

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Affecting one in every 68 children, Autism Spectrum Disorder ASD is one of the fastest growing developmental disabilities. Scientific research has proven that early behavioral intervention can improve learning, communication, and social skills. Similarly, studies have shown that the usage of off-the-shelf technology boosts motivation in children diagnosed with ASD while increasing their attention span and ability to interact socially. Embracing perspectives from different fields of study can lead to the development of an effective tool to complement traditional treatment of those with ASD. This project documents the re-engineering, extension, and evolution of Ying, an existing web application designed

to aid in the learning of autistic children. The original methodology of Ying combines expertise from other research areas including developmental psychology, semantic learning, and computer science. Using cutting-edge software technology in areas like voice recognition and mobile device applications, this project aspires to use software engineering approaches and audio-visual interaction with the learner to enhance social behavior and reinforce verbal communication skills in children with ASD, while detecting and storing learning patterns for later study.

To Bump or Not to Bump: Innovative ways to influence vehicle behavior.

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This research describes a problem-based design project that relates to easing a real annoying experience for most drivers: the speed bump. It focuses on an engaging, mentoring-based learning process from inception to prototyping, while bearing in mind aspects of commercialization. The process starts with observation –an essential first step in problem solving – of what we take for granted, in this case, the solid, static, annoying speed bump. The next step is discussing and thinking critically, identifying pros and cons of existing solutions. It is followed by a more broad definition of the problem as a "vehicular speed reducer" instead of "speed bump", focusing on the real problem. This is followed by a re-representation of the problem, performing inquiry-based focused research, thinking divergently to generate multiple alternatives, experimenting, testing, and evaluating multiple relevant solutions. In addition, non-technical aspects of the project were considered such as sustainability, commercialization, as well as political and environmental friendliness. The problem with existing speed bumps is multi-faceted: they cause vehicle damage, driver discomfort, and interfere with emergency response vehicles just to name a few. Most importantly, the design of the speed bump has remained unchanged for over half a century, and for the most part it is an ad-hoc design. Redefining the problem allows for innovative ideas to flow, taking off from the current inside-the-box thinking. The status of the research has evolved from hands-on designs and prototyping to working on publishing a book showcasing the work done and information gathered.

Channel Assignment in Multi-Radio Networks

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Channel assignment in multi-radio networks is a topic of great importance because the use of multiple channels and multiple radios reduces interference and increases the network throughput. The goal of our research is to design algorithms that maximize the use of available resources while providing robustness to primary users that could reclaim one or more channels. Our algorithms could be used in ad hoc networks, mesh networks, and sensor networks where nodes are equipped with multiple radios. We design algorithms for channel assignment which provide robustness to primary users that could reclaim one or multiple channels. We also compute bounds for capacity in grid networks and discuss how the capacity of a network changes when multiple channels are available. Since preserving energy is very important in wireless networks, we focus on algorithms that do not require powerful resources and which use a reduced number of messages.

E-Medi Care

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This poster presents an approach to create mobile application of a basic EMR Electronic Medical Record portal. To develop this portal I have studied different other EMR systems which are available online. This portal is like a medical hub for the patients; they can create, manage and export their profiles to physicians. Similarly physicians can see list of patients assigned to them and when he clicks on a particular record, he would be navigated to the patient's profile page. EMRs reduce wait time for patients, increases patient participation in their care, significantly fewer errors are found. Due to the numerous advantages of EMR, the government of United States made it as a mandate from the year 2014.

Paleoenvironmental Reconstruction at the Jupiter Inlet I Site: An Archaeomalacological Approach

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For several decades, archaeologists have studied the utilization of marine, estuarine, and riverine resources by Florida's prehistoric people. Looking into the past to see how prehistoric people utilized their environment helps to lend insight into the effects on human and non-human populations. My research aims to reconstruct the environmental habitat zones present at the Jupiter Inlet I Site at the time of occupation based upon the molluscan, or shellfish, species identified. Furthermore, I will show preliminary data from archaeological excavations in order to determine whether there are changes in the kinds and quantities of molluscan species through time at this archaeological site.

Food and Fanfare: The Impact of Cuisine on Theme Park Tourist Immersion Experiences and Perceptions of Authenticity

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Each year over 300 million people visit theme parks, making them the major vacation destination worldwide. Theme parks are known for their elaborate spectacle, the creation of artificial realities through intricate immersive experiences including costumed characters, stage shows, and extravagant decor. A unique avenue of research, themed spaces are becoming of greater interest to scholars particularly in regards to the authenticity of the experience and the creation of a hyperreality. Though many aspects of the theme park experience have been reviewed, little focus has been given to the role of food in the overall immersion, particularly how food extends the spectacle theme into a created reality. This study examines the function of food within a highly immersive theme park setting, and how it contributes to the spectacle. Research was conducted from December 2014 to February 2015 at The Wizarding World of Harry Potter, Universal Orlando Resort. A total of 363 survey responses and 21 semi-structured interviews were collected. Themed food was found to further immerse the guest in the themed experience, though visual cues remained the primary sensory stimulus. However, guests considered the location to be more authentic when coupled with a themed food item, as opposed to a generic food choice. This study determined that themed food functions as an extension of the spectacle by means of maintaining the illusion, and contributes to the overall exhibition of the themed space. Further research is needed to understand the overall function theme parks serve to society.

Paleodemography of Highland Beach: Reexamining the Demographic Parameters of a Native American Population from Southeastern Florida.

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The field of paleodemography has long been debated by those who wish to discredit the field and those who practice it. In 1999 and again in 2000, researchers who performed paleodemographic analysis met in Rostock, Germany to fix the clearly present issues and change the way research is conducted in the future Hoppa and Vaupel 2002. The product of these meetings resulted in what is now known as the Rostock Manifesto. While many scholars accept the change in the suite of methodologies carried out

under the new guidance, little has been said on the effectiveness of the manifesto. This research argues the manifesto is not a fool-proof adaptation to paleodemography. This is exemplified through the comparative examination of previous and current paleodemographic research conducted on the same archaeological sample using the new methods that work in conjunction of the Rostock Manifesto. Using the specific age-at-death estimation technique outlined by the Rostock Manifesto, a large number of individuals, in a sample of 128, could not be examined by the strict methodological constraints. This preliminary conclusion argues the need for more useful methods to determine the demographic parameters of pre-historic societies and ultimately the ineffectiveness of the Rostock Manifesto. More research should be performed to test the reliability and accuracy of these findings.

A Comparative Stable Isotope Analysis of Two Archaeological Sites in Broward County

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Understanding people through the foods eaten has proven a formidable method to uncover subsistence patterns and infer lifestyle of the earliest inhabitants of an area. With previously examined paleodiet from East Okeechobee Area, Tatham Mound, and Fort Center, particular areas of Florida's prehistory have begun to resurrect thorough the eye of the scientist. When we understand the foods consumed, we also corroborate that with the environment where the individual resided. Reconstructing foods eaten not only helps researchers understand the ecology of the habitat, but also the social structure of the group the person belonged to. The conglomeration of these factors enables investigators to understand the people, culture, and environment of a region when photographs and written records are unavailable and unaccountable. Using the stable isotopes of carbon, nitrogen, and oxygen, a molecular analysis of the collagen and apatite of bones and tooth enamel signifies the quantities and
qualities of proteins and carbohydrates eaten by an individual. This method will be utilized and highlighted in the paleodietary analysis of two sites from the inland zone of southeastern Florida. Two South Florida archaeological sites were discovered housing human remains in the early 1970s. Markham Park and Lauderhill Mound are the two sites used for this analysis. Because of the pottery sherds associated in chronological stratigraphic layers, the date range for each site has been shown to differ by about 500 years. This is significant to assess if the diet
compares or contrasts throughout the different time periods.

Near Infrared Reflectance Spectroscopy and Fecal Glucocorticoid Metabolites: Exploring an Alternative Method for Measuring Stress Markers in Chimpanzees

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The recent downturn of wild chimpanzee populations has been attributed to habitat destruction, resource competition, poaching, climate change and other anthropogenic influences on primate habitat and behavior. To primates, these circumstances manifest as stressors and elicit neuroendocrine responses that disrupt activities essential for survival. Accordingly, increasing numbers of primate studies are utilizing data from stress hormones (i.e. glucocorticoids) as potential indicators of individual and/or group welfare. However, the standard technique for measuring glucocorticoids, Enzyme immunoassay (EIA), is time-consuming, costly, requires chemical manipulation and sample destruction. The purpose of this research is to assess the performance of near-infrared reflectance spectroscopy (NIRS) as an alternative approach for measuring glucocorticoid metabolites in chimpanzee feces. NIRS

is an expeditious technique that can be used at a low cost, without reagents and, potentially, in resource-limited field conditions. Given that NIRS is a predictive method of analysis and necessitates the development of calibration models against standard laboratory methods, the relative performance of this new technique is determined by correlating spectral results with the results of EIA analysis on the same samples. In order to achieve this, lyophilized chimpanzee fecal samples (n=20) are separated into two equal portions: one portion is assayed using standard EIA methods and the other portion is analyzed using NIRS. For chimpanzee populations that are facing rapid decline and require dynamic and continuous monitoring, the use of NIRS has considerable implications for advancing the practical application of conservation-endocrinology in the field of primatology as well as furthering interdisciplinary cooperation in anthropological research.

Peace, Justice and Human Rights: Constructing an Inequality Index for South Florida

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South Florida's racial and ethnic diversity make it an interesting, as well as significant region to examine issues of inequality. Palm Beach, Broward, Miami-Dade and Monroe counties represent a unique demographic and cultural milieu that composes south Florida. As part of Florida Atlantic University's Peace, Justice and Human Rights Initiative, we are working towards creating a report card that reveals various health, social, economic and other disparities experienced by local populations. This project promotes a greater awareness centered on the issues of inequality by looking specifically at datasets that highlight demographic information within south Florida. Constructing a human rights report card requires an assiduous effort in locating and analyzing relevant and available data. Healthcare, education, crime and poverty were among the indicators for which data was collected. All data was gathered from various government agencies including the U.S. Census Bureau, Florida Department of Education, National Vital Statistics, among others. Statistics were then compared between the four
counties, the state of Florida, and the United States to demonstrate south Florida's current status as it relates to state and national levels of inequality. This report card highlights the various areas of socioeconomic disparities present between south Florida's communities by analyzing county-level demographic data. The analysis of various health, social and economic data contributes towards a more comprehensive understanding of the adversities that local populations experience.

The relationship between tonotopy and the cortical representation of pitch in human auditory cortex: an fMRI Study

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A salient feature of non-chemical sensory systems is their topographic arrangement of neurons based on their stimulus response properties i.e., tonotopy, retinotopy, and somatotopy. Each of these systems have neurons that are arranged spatially based on the stimulus properties to which they respond most strongly; in the auditory system, tonotopic activation occurs as a result of the frequency spectrum of auditory stimuli. However, the relationship between neuronal activation in tonotopic patterns and the perception of such qualitative categories as musical pitch is still under investigation. Although neurons in auditory cortex have different frequency bands to which the respond, the gross response to complex tones is not the simple linear sum of their constituent tones. This study proposes to differentiate areas

of auditory cortex that are strictly frequency-responsive tonotopic versus those that also display differential responses to different musical pitches. The stimuli will be sine waves and square waves that have those sine waves as Fourier series constituents but are of a different pitch fundamental. Because the original sine wave persists in the more complex square wave stimuli, those voxels which show activation to the sine wave but not to Fourier series which contain it are of interest as potentially pitchsensitive. An fMRI study of cortical response will be conducted with Dr. Donald Robin of UTHSCSA who has agreed to provide the laboratory resources. Pitch sensitive voxels are expected to be found in lateral Heschl's gyrus as noted in previous studies. A complete mapping of all VOI's will be created.

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