# Spring Undergraduate Research Forum

## Welcome to SURF 2013

***The 20th Annual Celebration of Achievements in Undergraduate Research at Elon University***

The **S**pring **U**ndergraduate **R**esearch **F**orum is a time each year when we suspend our other campus activities to celebrate the academically-centered creative endeavors and research efforts of Elon's students. This year, over 155 proposals for presentation were submitted for consideration, and over 150 faculty members representing all disciplines on campus provided over 625 reviews of the submitted abstracts. Students were invited to present at SURF at the recommendation of that body of reviewers.

SURF is an integral part of CELEBRATE! STUDENT ACHIEVEMENTS IN ACADEMICS AND THE ARTS – a weeklong series of events that brings to light the wonderful diverse academic and creative pursuits in which our students engage each year.

We invite you to join and support the student presenters and performers as they share the joy of exploration and discovery that are the hallmarks of an intellectual community.

**UNDERGRADUATE RESEARCH PROGRAM ADVISORY COMMITTEE**

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|---|---|
| Dr. Eric Hall | Prof. Joel Hollingsworth |
| Dr. Paula Rosinski | Prof. Lauren Kearns |
| Dr. Byung Lee | Dr. Kyle Altmann |
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| Dr. Meredith Allison | Dr. Ryan Kirk |
| Dr. Yuko Miyamoto | Dr. Barbara Miller |
| Dr. Sarah Glasco | Dr. Rebecca Pope-Ruark |

Dr. Paul Miller, Director, Undergraduate Research Program

Undergraduate Research & Creative Endeavors includes activities undertaken by undergraduate students with significant faculty mentoring that: (1) lead to new scholarly insights and/or the creation of new works; (2) add to the discipline; and (3) involve critical analysis of the process and/or outcome of the activities. Quality undergraduate research and creative activity result in a product that has potential for peer-reviewed dissemination in the form of presentations, publications, exhibitions, or performances.

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## PROGRAM LISTING by SESSION and TIME



## ABSTRACTS BY DEPARTMENT

# Poster Session I

8:30am - 10:30am; Authors Present 9:00am - 10:30am

## ***McKinnon Hall***

**Jessica Katschke & Lauren Packard** (Dr. Amy A. Overman)
An Investigation of Audiovisual Integration in Speech Perception

**Benjamin P. Schwartz & Garrett B. Tante** (Dr. Amy A. Overman)
The Influence of Multiple Repetitions and Perception of Control Over Memory on Memory Performance

**Kate Sidwell & Victoria Lipinski** (Dr. Catherine A. King)
Psychological Development and Well-Being of College Students

**Christine Pacewicz & Sarah Basiliere** (Dr. Barry B. Beedle)
Characteristics of Metabolic Syndrome in Male Collegiate Athletes

**Kyle M. Herbert** (Dr. Suzanne E. Fenton)
The Effects of Perfluorooctanoic Acid (PFOA) on Branching Morphogenesis

**Kristen M. Grater** (Dr. Joyce A. Davis)
Exercise and Cognition: Effect of Low Volume Exercise on Executive Function in Older Adults

**Annie R. Chan** (Prof. Elizabeth K. Bailey)
The Effect of a Facebook Based Nutrition Education Program on Knowledge, Behaviors, and Weight of First Year College Students

**Meredith S. Gwaltney** (Prof. Elizabeth K. Bailey)
Changes in Perceived Body Image, Self Esteem and Competence in Young Girls Following Participation in a Health Education Program from the Perspective of the Participant and Their Parent

**Hannah McHugh** (Prof. Elizabeth K. Bailey)
Influences on Quality of Life in Older Community Dwellers

**Grant Fisher** (Prof. Amanda S. Tapler)
Healthy Mouths Promote Healthy Bodies

**Miles W. Grunvald & Alexandra Pedicone** (Dr. Antonio D. Izzo)
Resistance and Succession of Fungal Spores After Simulated Heat Shock

**Elaina M. Kalyvas** (Dr. Antonio D. Izzo)
Diverse Antimicrobial Activity Observed in Actinobacteria Isolated from a Piedmont Forest in North Carolina

**Chelsea Jacobs** (Dr. David B. Vandermast)
Control of Kudzu (Pueraria Montanta) of the Elon University Forest with Seasonal Shading Techniques

**Jillian Kelly** (Dr. David B. Vandermast)
The Effect of Beaver Herbivory on Forest Composition on the Haw River, Central North Carolina

# Poster Session II

12:00pm - 2:00pm; Authors Present 12:30pm - 2:00pm

## ***McKinnon Hall***

**Hannah Peel** (Dr. Eugene B. Grimley)
Mass Spectra Fragmentation Patterns of Mono-Substituted Triphenyl Phosphines, Arsines and Amines

**Alexander W. Bruch** (Dr. Joel M. Karty)
Determining the Mechanism Leading to Periodic Precipitation (Liesegang) Reactions

**Russell Davidson** (Dr. Karl D. Sienerth)
Synthesis of a Series of BIS-BPCA Metal Complexes as Potential Co2 Reduction Catalysts

**Cecilia Smith** (Dr. Karl D. Sienerth)
Electrochemiluminescence Quenching for Determination of Nitrate Explosives

**Colette Dong** (Prof. Lauren W. Kearns)
Comparing the Activation of Four Different Muscles During a Passe Releve at and Away from the Barre

**Greg Nantz** (Dr. Stephen DeLoach)
Savings, Dependency, and Credit Constraints

**Kyle P. Meredith** (Prof. Stephen R. Moore)
Comparing the Productivity, Nutritional Value, and Profitability of a Monocropped System to an Intercropped System Using Intensive Practices

**William Wollman** (Dr. David B. Vandermast)
Effect of Castor Canadensis Herbivory on Invasive Plant Species Richness and Ground Cover

**Anna Wilkes** (Dr. Benjamin A. Evans)
Magnetic Separation of Targeted Cell Populations in a Microfluidic Channel

**Nina Boston** (Dr. Aunchalee E. L. Palmquist)
Exploring the Cultural Consequences of Oil Drilling on Sacred Native American Sites

**Jennifer Proto** (Dr. Aunchalee E. L. Palmquist)
Breastfeeding Narratives Among WIC Participants in Alamance County, North Carolina

**Joshua Michael Kaufmann** (Dr. Alexis T. Franzese)
Authenticity and Sexual Orientation

**Lauren Oldham** (Dr. Anthony G. Weaver)
The Exploration of Diversity Among Division I Softball Coaching Staffs

# Poster Session III

3:30pm - 5:30pm; Authors Present 4:00pm - 5:30pm

## ***McKinnon Hall***

**Shannon B. Diehl** (Dr. Caroline J. Ketcham)
Physical Activity, Nutrition, and Self-Concept Intervention at a Week-Long Girl Scout Camp

**Jessica Simermeyer** (Dr. Caroline J. Ketcham)
Motor Planning and End State Comfort in Children with Autism Spectrum Disorders

**Kaylie E. Chrismon** (Dr. Paul C. Miller)
The Effects of Chocolate Soymilk on Recovery in Recreationally Active Women

**Elizabeth Anne Perdue** (Dr. Eric E. Hall)
Evaluating Motivational Climate in Youth Sport Atmospheres: Are Aggressive Tendencies in Youth Soccer Intrinsically or Extrinsically Motivated?

**Rachel Shulder** (Dr. Eric E. Hall)
The Influence of Exercise and Caffeine on Cognitive Function in College Students

**Suzanne Stranzl** (Dr. Eric E. Hall)
Does Personality Influence Physical Activity and Nutrition Behaviors in College Students?

**John Hollander, Hayley D'Antuono, Caitlin Tarantiles, & Tara Corbett** (Dr. L. Kimberly Epting)
Linguistic Relativity: Writing and Editing of Bilingual Students

**Cara McClain** (Dr. Maureen Vandermaas-Peeler)
The Role of Teachers and Parents in Supporting Preschoolers' Nature Experiences

**Caroline Pittard** (Dr. Maureen Vandermaas-Peeler)
Parental Guidance of Children's Numeracy Across Contexts

**Lauren A. Culy** (Dr. Cynthia D. Fair)
Sexual and Reproductive Health Information Offered to Adolescents with Perinatally Acquired HIV: A Qualitative Study of Provider Perspectives

**Becca L. Goldstein** (Dr. Cynthia D. Fair)
Congruence of Transition Preparedness Between Adolescents with PHIV and Their Guardians

**Kelly C. Allen** (Dr. Gregory J. Haenel)
Turning Up the Heat on Mitochondrial DNA Evolution: Comparison of Mutation Rates in Two Lizard Species

**Ian Rosen** (Dr. Gregory J. Haenel)
Life History and the Age to Size Relationship in Turtles at Elon Homes Pond

**Alexander Roland Zito-Wolf** (Dr. Jennifer K. Uno)
The Microflora and Neuroendocrine Regulation in Zebrafish

# Poster Session III….*continued*

**Anthony Fata** (Dr. Srikripa Chandrasekaran)
Effect of Environmental Stressors on Molecular Pathways That Control Ion Homeostasis in Saccharomyces Cerevisiae

**Janelle McNeil** (Dr. Yuko J. Miyamoto)
Evaluation of Three Transfection Agents to Incorporate Green Fluorescent Protein (GFP) into T Cells

**Natalie Clark** (Dr. Kathryn M. Matera)
Binding Affinity of Estrogenic Hormones and Lactoperoxidase

**Mark Dalgetty** (Dr. Kathryn M. Matera)
Alzheimer's Disease: Analysis of Amyloid-Beta Aggregation

**Jessica W. Harris** (Dr. Sara B. Triffo)
Lipid Anchor Influence on the Organization of the Cell Membrane

**Tadas Rimkus** (Dr. Sara B. Triffo)
Study of Lipid-Anchored Protein Organization in Yeast Cell Membranes by Fluorescence Microscopy

# Session I (10:40 am - 12:20 pm)

## *LaRose Digital Theatre (Moderator: Dr. Amy A. Overman)*

**10:40 am** **Elise Noyes** (Dr. Alexa N. Darby)
Students' Emotions in Academic Service-Learning Experiences

**11:00 am** **Ursula Grace Saelzler** (Dr. Amy A. Overman)
The Influence of Congruent Information on Associative Memory in Young and Older Adults

**11:20 am** **Michelle Pebole & Benjamin Unger** (Dr. Buffie Longmire-Avital)
When the Gym Stresses You Out: The Mediating Role of Fitness Stress on the Relationship Between Depression and Emotion-Based Eating

**11:40 am** **Nichole E. Schulz** (Dr. Buffie Longmire-Avital)
Checking Every Box: The Stress Adolescents Face in Pursuit of Being a First Generation College Student

## *Koury Business Center 200 (Moderator: Dr. Svetlana Nepocatych)*

**10:40 am** **Kelsey Michelle Evans** (Dr. Caroline J. Ketcham)
Relationship Between Information Processing and Postural Stability in Collegiate and High School Athletes

**11:00 am** **Andrea G. Gross** (Dr. Paul C. Miller)
Does Gatorade G3 Facilitate Recovery in Male Collegiate Athletes?

**11:20 am** **Cristina DiCostanzo, Mollie Hughes, & Katherine Szabo** (Dr. Svetlana Nepocatych)
Dietary Intake, Body Composition and Fitness among College Female Athletes During In- and Off-Season

**11:40 am** **Marissa Mastrocola** (Dr. Walter R. Bixby)
Effects of Acute Exercise on Retention and Learning

# Session I (10:40 am - 12:20 pm) ...*continued...*

## *Koury Business Center 208 (Moderator: Dr. Rissa M. Trachman)*

**10:40 am** **Maggie Frates** (Dr. Rissa M. Trachman)
Material Culture and Social Organization: Indications of Social Status at the Ancient Maya Site of Dos Hombres, Belize

**11:00 am** **Rosemary Towchik** (Dr. Thomas S. Henricks)
Football and Identity: Fantasy Football in the United States

**11:20 am** **Erin Mellett** (Dr. Tom C. Mould)
Tourism as a Force for Economic Growth and Cultural Revitalization: A Case Study of the Occaneechi Band of the Saponi Nation

**11:40 am** **Caroline Miller** (Dr. Tom C. Mould)
Playing Poor: Images of Irish Travellers in Settled People's Narratives

## *Koury Business Center 211 (Moderator: Dr. Jennifer K. Uno)*

**10:40 am** **Michael Berg** (Dr. Benjamin A. Evans)
Biomimetic Cilia as a Model Ependymal Cilia System

**11:00 am** **Stephanie Lindeman** (Dr. Brant W. Touchette)
Analyzing the Interactions between the Mother and Daughter Ramet of Justicia Americana in Varied Drought Conditions

**11:20 am** **Lea S. Abel** (Dr. David B. Vandermast)
Assessment of Invasive Plant Species Threat on Elon University Forest

**11:40 am** **Emily Neidhardt** (Dr. David B. Vandermast)
Geographic Variation in the Allelopathic Potential of American Beech (Fagus Grandifolia)

**12:00 pm** **Jillian A Somero** (Dr. Jennifer K. Uno)
The Effects of an All Liquid Diet on the Gut Microbiotia

## *Koury Business Center 242 (Moderator: Dr. Cassandra L. Kircher)*

**10:40 am** **Chris Sonzogni** (Dr. Cassandra L. Kircher)
The Quest for Walden Pond: The Arthurian Motif in Thoreau's Walden

**11:00 am** **Sarah Lentz** (Dr. Janet C. Myers)
"Half Agony, Half Hope:" Letters of Courtship in Persuasion

**11:20 am** **Jane Louise Siegel** (Dr. Jean D. Schwind)
Sherman Alexie and Modern Native American Nostalgia

**11:40 am** **Jacqueline Alnes** (Dr. Jean D. Schwind)
Cleanliness is Next to Impossible: A Study of Health and Cleanliness in My Antonia

# Session I (10:40 am - 12:20 pm) *…continued…*

## *Koury Business Center 244 (Moderator: Dr. Victoria Del Gaizo Moore)*

**10:40 am** **Andrew Fischer** (Dr. Kathryn M. Matera)
α- Synuclein Fibril Disaggregation by Dopamine Derivative DL-Norepinephrine

**11:00 am** **Mary Bedard** (Dr. Victoria Del Gaizo Moore)
Analysis of Humic Acid Interference on Estrogenic Activity Using an Estrogen-Sensitive Yeast Assay

**11:20 am** **Jo Anne Crum** (Dr. Victoria Del Gaizo Moore)
Examinating Changes in BCL-2 Family Proteins Using an In Vitro Model of Sepsis

**11:40 am** **Kelsey M. Van Dalfsen** (Dr. Victoria Del Gaizo Moore)
BCL-2 Protein Regulation of Hyperglycemia Induced Cardiomyocyte Apoptosis

**12:00 pm** **Rachel E. Wilson** (Dr. Victoria Del Gaizo Moore)
Investigation of BCL-2 Protein-Protein Interactions in Prostate Cancer Cells

## *Koury Business Center 310 (Moderator: Dr. Sarah Glasco)*

**10:40 am** **Ashton L. Coats** (Dr. Sarah L. Glasco)
Who Am I? A Study of Identity of Second Generation French Immigrants

**11:00 am** **Michael Pappano** (Dr. Sophie R. Adamson)
Globalization and Cultural Shifts: Recent Trends in Wine Production and Consumption in France

**11:20 am** **Amy R. Kenney** (Dr. Sophie R. Adamson)
Views on Immigration in France and the United States: What the Presidential Speeches, Debates and Opinion Surveys Reveal about Cultural Identity

## *Koury Business Center 346 (Moderator: Dr. Amy L. Allocco)*

**10:40 am** **Brett Evans** (Dr. Amy L. Allocco)
Engaged Jain Traditions and Social Nonviolence: Ethnographic Case Studies of Lay Animal Activists and Service-Oriented Nuns

**11:00 am** **Alanna J. Vagianos** (Dr. Amy L. Allocco)
The Cradle of the World: A Feminist Appraisal of Indian Surrogacy

**11:20 am** **Erin E. Palmer** (Dr. Lynn R. Huber)
Imagining Spaces: The Function of Imagined Sacred Space in Ezekiel and Revelation

**11:40 am** **Elizabeth Capel** (Dr. Kirstin Ringelberg)
"Money Alone Was Not Enough": Art Collecting Narratives and the Perpetuation of Difference

**12:00 am** **Rachel L. Zimmermann** (Dr. Kirstin Ringelberg)
(Re)presenting the Body: How Japanese Contemporary Artists Encourage the Intersubjectivity of Nature and Culture Through the Embodiment of Thought

# Session II (12:40 pm - 2:20 pm)

## *LaRose Digital Theater (Moderator: Dr. Allen C. Scott)*

**12:40 pm** **Sarah E. Kowalkowski** (Dr. Christopher R. Leupold)
Identification of Competencies for Lawyer Leaders

**1:00 pm** **Erica Young & Alexandra Romano** (Dr. Mathew H. Gendle)
Effects of Oral 5-HTP Administration on Tower of London Task Performance

**1:20 pm** **Lindsay J. Swenson & Sean M. Walmer** (Dr. Alan C. Scott)
The Effect of Countdown-Only Pedestrian Change Interval Displays on Signal Recognition by Pedestrians with Reduced Visual Acuity

**1:40 pm** **Lauren Clapp** (Dr. Beth E. Warner)
Food Justice: Perceptions of Access, Adequacy, Availability, and Action in Alamance County, North Carolina

**2:00 pm** **Jamie Nicole Albright** (Dr. Cynthia D. Fair)
Patient-Provider Communication about Sexual and Reproductive Health: Perspectives of Adolescents and Young Adults with PHIV and HIV Healthcare Providers

## *Koury Business Center 208 (Moderator: Dr. Tonya Laakko Train)*

**12:40 pm** **Kathryn Allen** (Dr. Matthew W Clark)
Changes in Frog Liver Metabolism Following PBDE Consumption

**1:00 pm** **Allison Nogi** (Dr. Matthew W. Clark)
The Effects of Acrylamide (AA) Ingestion on Liver and Sciatic Nerve Function

**1:20 pm** **Kirsten L. McCormick** (Dr. Tonya Laakko Train)
Cayaponia Tayuya is a Potent Inducer of Cell Death in Immune Cells

**1:40 pm** **Erica L Schenhals** (Dr. Tonya Laakko Train)
Oxytocin regulates signaling in HS578T Breast Cancer Cells

**2:00 pm** **Morgan Gregg** (Dr. Yuko J. Miyamoto)
Examining the Role of mTOR in T Cell Proliferation and Migration Under Immunosuppression by Rapamycin

# Session II (12:40 pm - 2:20 pm) ...*continued...*

## *Koury Business Center 211 (Moderator: Prof. Nicole E. Triche)*

**12:40 pm** **Caitlin O'Donnell** (Dr. David A. Copeland)
The Media of White America: Comparing Press Treatment of 'the Other'

**1:00 pm** **Rachel Southmayd & Kassondra Cloos** (Dr. Glenn Scott)
The Pulitzer Center on Crisis Reporting: Reporting on Organoponico Vivero Alamar during Winter Term 2013

**1:20 pm** **Mary Rouse** (Dr. Harlen E. Makemson)
The Use of Frames in Political Cartoons Depicting Summit Meetings during the Cold War

**1:40 pm** **David Tregde** (Prof. Nicole E. Triche)
Film Authorship: Exploring the Theoretical and Practical Sides to Authorship in Film Production

## *Koury Business Center 242 (Moderator: Dr. Laura J. Roselle)*

**12:40 pm** **Catherine A. Bell** (Dr. Dion Farganis)
The Impact of Partisan and Nonpartisan Election Systems on the NC Supreme Court

**1:00 pm** **Joshua M. McGee** (Dr. Laura J. Roselle)
International Stability in Cyberspace: Addressing Cyber Issues of National Security on the International Stage

**1:20 pm** **Thomas Scott Mills** (Dr. Sean P. Giovanello)
Social Media Use among Georgia State Legislators

**1:40 pm** **Jeffrey Flitter** (Prof. Janna Q. Anderson)
Inventing the Human(e) Network: The Underlying Political Values of the Internet as Expressed by Members of the Inaugural Internet Hall of Fame

## *Koury Business Center 244 (Moderator: Dr. Chad A. Awtrey)*

**12:40 pm** **Alison E. Deatsch** (Dr. Benjamin A. Evans)
Influence of Collective Behavior in Hyperthermia Therapeutics Using Magnetic Nanoparticles

**1:00 pm** **Julie Corbett Ronecker** (Dr. Benjamin A. Evans)
Preferential Binding of Functionalized Magnetic Microspheres to Malignant Cells

**1:20 pm** **Christopher R. Shill** (Dr. Chad A. Awtrey)
Galois 2-adic Fields of Degree 12

**1:40 pm** **Andrew Fischer** (Dr. Karen A. Yokley)
Investigation of the Potassium Leak Parameter in a Mathematical Model of Epileptic Seizures

**2:00 pm** **Ethan Glassman** (Dr. Scott D. Wolter)
A Novel Instrument for Rapid Analysis of Electrochemical Redox Events

# Session II (12:40 pm - 2:20 pm) ...*continued...*

## *Koury Business Center 310 (Moderator: Dr. Vitaliy P. Strohush)*

**12:40 pm** **Kate Easom** (Dr. Jennifer M. Platania)
Gender Equality and Economic Growth

**1:00 pm** **Justin Wanner** (Dr. Vitaliy P. Strohush)
Wage Premiums and Costs of Education

**1:20 pm** **Paige Burke** (Dr. Yilun Shi)
Examining the Relationship between Corporate Governance, Reputation, and Profitability

**1:40 pm** **Alexandra L. Harden** (Dr. Anthony G. Weaver)
The Honeymoon Effect in Major League Baseball: A Case Study of the Colorado Rockies

## *Koury Business Center 346 (Moderator: Dr. Mayte de Lama)*

**12:40 pm** **Genevieve O. D'Cruz** (Dr. Mayte de Lama)
The 'Ideal' Woman in the Context of Spanish Post-Civil War Society in Entre Visillos by Carmen Martin Gaite

**1:00 pm** **Taylor M. Binnix** (Dr. Mayte de Lama)
The Pressure of Society in Spanish Women's Narrative

**1:20 pm** **Margaret Blehar** (Dr. Scott A. Windham)
The Good and Bad of the "Good German" in Albrecht Goes's "Das Brandopfer"

## *Koury Business Center 353 (Moderator: Dr. Hallie C. Hogan)*

**12:40 pm** **Natalie E. Dupuis** (Dr. Hallie C. Hogan)
Brundibar at Theresienstadt: Singing for Survival

**1:00 pm** **Alicia M. Varcoe** (Prof. Jon Metzger)
Beginning a Jazz Musician's Career: A Study in Self-Promotion

**1:20 pm** **Wesley I. Rose** (Dr. Victoria F. Faw)
Franz Liszt and the Devil: Musical Symbolism in the Faust and Dante Symphonies

**1:40 pm** **Lyndsay Burch** (Prof. Fred J. Rubeck)
Elon Women's Theatre Project

**2:00 pm** **Dorothy Noel** (Prof. Michael Q. Smith)
More about Art, Less about Structure: Developing New Business Models for Non-Profit Theatre

# Session III (2:40 pm – 4:20 pm)

## *LaRose Digital Theatre (Moderator: Dr. Katy E. Rouse)*

**2:40 pm** **Celia Rose Eddy** (Dr. Katy E. Rouse)
A Study of the Short-Run and Long-Run Effects of Year-Round Schooling on Student Achievement in Wake County, NC

**3:00 pm** **Kathryn Hjalmarson** (Dr. Stephen DeLoach)
Does an Undervalued Yuan Actually Give China a Trade Advantage?: A Look into China's Exchange Rate and Bilateral Trade

**3:20 pm** **Alex Spitz** (Dr. Thomas K. Tiemann)
Urban Development and Investment in Germany

**3:40 pm** **Bethany Neeb** (Dr. Thomas K. Tiemann)
What Makes World's Fairs Successful in U.S. Cities?

## *Koury Business Center 208 (Moderator: Prof. Elizabeth K. Bailey)*

**2:40 pm** **Kelsey Haines** (Dr. Stephen E. Byrd)
Teaching Single Digit Addition to Students with Autism: A Kinesthetic Intervention

**3:00 pm** **Sandra Weiss** (Prof. Jan P. Mays)
A Case Study on the Experiences of High Achieving Mathematics Students in the Elon Academy: How Has Academic Support Contributed to Their Success?

**3:20 pm** **Dan Eagle, Riese Narcisse, & Thomas Price** (Dr. Shannon L. Duvall)
Clashroom: How Video Games Can Enhance Classroom Education

**3:40 pm** **Kylee Regan Bushway** (Prof. Elizabeth K. Bailey)
Effects of a One on One Mentoring Program for Middle School Girls on Perceptions of Self Esteem, Self-Efficacy, and Sociocultural Attitudes Towards Appearance

## *Koury Business Center 211 (Moderator: Dr. Joel M. Karty)*

**2:40 pm** **Megan A. Martin** (Dr. Eugene B. Grimley)
The Flavonoid Composition of Sourwood (Oxydendrum Arboretum) Honey

**3:00 pm** **Silviano Mastromarino** (Dr. Eugene B. Grimley)
Identification of Flavonoid Markers in Poplar Honey

**3:20 pm** **Anthony Thomas Pratt** (Dr. Eugene B. Grimley)
Guggenheim Method of Kinetic Analysis: A Laboratory Experiment

**3:40 pm** **Kevin Lynch** (Dr. Joel M. Karty)
Why is Sulfuric Acid so Acidic?

**4:00 pm** **Michael Norris** (Dr. Joel M. Karty)
Determining the Contributions by Resonance and Inductive Effects toward the Strengths of Hydrogen Bonds

# Session III (2:40 pm – 4:20 pm) ...*continued...*

## *Koury Business Center 242 (Moderator: Dr. Rebecca J. Pope-Ruark)*

**2:40 pm** **Rob Shapiro** (Dr. Kevin B. Boyle)
Inner Lives on the Page: Studying Craft in Reading and Writing Poetry

**3:00 pm** **Elizabeth Melissa Floyd** (Dr. Megan Isaac)
Staging History through Shakespeare's Henriad

**3:20 pm** **Kelsey O'Connell** (Dr. Rebecca J. Pope-Ruark)
Rhetorical Strategies for Community Building in the Forwards of the DSM

**3:40 pm** **Lucas Randall Walters** (Dr. Ann J. Cahill)
Get Well Soon: The Contextualization and Relationality of Health

## *Koury Business Center 244 (Moderator: Dr. Lucinda L. Austin)*

**2:40 pm** **Keeley Franklin** (Dr. Byung R. Lee)
The Effects of Humor in Advertising

**3:00 pm** **Maria Georgiadis** (Dr. Glenn Scott)
Motivating Behavior Change: A Content Analysis of Public Service Announcements from the Let's Move! Campaign

**3:20 pm** **Baron Smith** (Dr. Lucinda L. Austin)
Organizational Values in Crisis Communication: Exploring the Use of Corporate Codes of Values in Public Responses to Crises

**3:40 pm** **Anna Lee Crenshaw** (Dr. Michael R. Frontani)
Star Images of Loretta Lynn and Taylor Swift: A Comparison of Media Images in Country Music

## *Koury Business Center 310 (Moderator: Dr. Rod C. Clare)*

**2:40 pm** **Claire L. Mayo** (Dr. David M. Crowe)
The Great War and the Roots of Postwar French Pacifism

**3:00 pm** **Christine Swanson** (Dr. David M. Crowe)
Out of Options: The Jewish Experience in Shanghai, China during World War II

**3:20 pm** **Cameron Shirley** (Dr. James S. Bissett)
Scholars vs. Sites: Analyzing Interpretations of Revolutionary America at Historic Sites in Boston and Philadelphia

**3:40 pm** **Hollyn Kae Geibel** (Dr. Rod C. Clare)
" . . . One of the Real Tragedies of Reconstruction": African American Agency and the White Response in North Carolina, 1865-1877

# Session III (2:40 pm – 4:20 pm) …*continued…*

## *Koury Business Center 346 (Moderator: Dr. Michael A. Matthews)*

**2:40 pm** **Sarah George** (Dr. Thomas E. Arcaro)
Perspectives from Students Studying Abroad: Firsthand Accounts of Experiential Transformative Learning

**3:00 pm** **David Carroll** (Dr. Thomas S. Henricks)
The Significance of Jiu-Jitsu in Brazilian Society: An Examination of the Socializing Effects of Brazilian Jiu-Jitsu Practice

**3:20 pm** **Emily Kane** (Dr. Bud D. Warner)
Personal and Community Impacts of the Ghanaian Cocoa Trade

**3:40 pm** **Anna McCracken** (Dr. Heidi Frontani)
Chinese Development Initiatives in Ghana from 1961-2011

**4:00 pm** **Danielle E. Dannenberg** (Dr. Michael A. Matthews)
Drug and Sex Trafficking Across the U.S.-Mexico Border: A Comparative Analysis and U.S. Policy Insights

## *Koury Business Center 353 (Moderator: Dr. Ryan W. Kirk)*

**2:40 pm** **Willem J. Prins** (Dr. Benjamin A. Evans)
Rapid Removal and Recovery of Organic Waste in Waterways Using Novel Magnetic Microspheres

**3:00 pm** **Claire C. Tipton** (Dr. Janet S. MacFall)
Enzyme Activity in the Hyporheic Soils of Piedmont Streams

**3:20 pm** **Lindsay Spiers** (Dr. Michael B. Kingston)
Elevated Temperature Effects on the Growth and Toxicity of Lyngbya Confervoides and Lyngbya Sp.

**3:40 pm** **Kristen M. Conroy** (Dr. Ryan W. Kirk)
Nutrient Retention Monitoring and Modeling of a Suburban Stormwater Detention Basin

## *Yeager Auditorium (Moderator: Prof. Lynne Formato)*

**2:40 pm** **Jennifer McAllister** (Prof. Jennifer G. Metcalf)
Paranoia is a Skill: A Choreographic Study on Mental Illness

**3:10 pm** **Jessi Rexroad** (Prof. Lynne Formato)
Dancing De Mille: Classical Musical Theatre Dance Preserved for the Edification of a New Generation

# *ACTING*

### ELON WOMEN'S THEATRE PROJECT

**Lyndsay H. Burch** (Professor Fred Rubeck) Department of Performing Arts

My research addresses the marginalization of women in theatrical leadership roles; specifically women in the role of the director. The absence of females at the helm of productions is a deep-rooted problem that has been recognized by theatrical artists and scholars throughout the past several decades. In order to research this disparity within the theatrical community, I read previous scholarship completed by women in the field. This portion of my research indicated that while the amount of women in theatrical leadership roles has increased since the late 1980s, female directors still do not receive the same opportunities as their male counterparts. In her article "Broadway Has a Long Way To Go, Baby," Deborah Savadge (2010) reveals that out of the 20 plays and musicals planned for Broadway's 2010-2011 season, only two female directors and one female co-director were slated to work on the upcoming productions. In addition to reading and analyzing scholarly research completed by other theatre artists, I also conducted a survey through the Elon Performing Arts Department. This survey was sent to students of both genders, different ages within the department and encompassed the majors of theatre, musical theatre, technical theatre, dance, and theatre studies. The results of this survey indicated that Elon students are greatly unaware of the gender inequality that female directors face within the professional theatrical community. These findings reinforced my conclusion that the Elon Women's Theatre Project is essential to increase awareness surrounding this issue before these students graduate from Elon. In order to combat gender inequality, the Elon Women's Theatre Project is producing a play entitled "Pending Resolution" which has female students occupying all of the leadership roles. "Pending Resolution" is an original work that was written by a female Elon student and it will also be produced, directed, designed and stage managed entirely by female artists. It is my hope that the Elon Women's Theatre Project will increase awareness surrounding gender inequality in the theatre and begin to make a change in the greater theatrical community.

# *ART HISTORY*

### "MONEY ALONE WAS NOT ENOUGH": ART COLLECTING NARRATIVES AND THE PERPETUATION OF DIFFERENCE

**Elizabeth H. Capel** (Dr. Kirstin Ringelberg) Department of Art and Art History

It is commonly understood that women experienced art collecting differently from men around the turn of the twentieth century in the United States. More specifically, women collectors were faced with obstacles where men were not, such as little approval or social support for their endeavors. Art collecting of quality and depth often required the ability to travel freely and make independent financial decisions, which excluded most women as well as middle- and working-class people and people of color. To understand the complexity of gender's relationship to art collecting I have focused on the collecting narratives of Isabella Stewart Gardner and the Cone

Sisters, Etta and Claribel. These individuals acquired a range of art, with Gardner primarily collecting Renaissance, Asian, and American Modern art and the Cones being collectors of French Modern art. Through a feminist historical lens I have used both archival and contemporary sources, in addition to site visits to the Cone Collection and Isabella Stewart Gardner Museum, to examine and interpret the collections and histories of these individuals. My project analyzes the collecting trajectories of my case studies and also makes use of comparisons between those women and other art collectors, artists, and philanthropists. The guiding question of my research has been whether women have collections or collecting narratives that differ from those of men. I have discovered that while women collectors during my time period of focus do share a genuine commonality in their gendered and comparatively less advantaged collecting narratives, that commonality does not suggest further relatedness or inherency in *what* or *why* they collected. For example, my research dispels notions that women on the whole create domestic or "feminine" collections as some scholars suggest. Furthermore, I have observed that scholarship on women art collectors often compounds the gendered disadvantages seen in their histories by suggesting intrinsically shared qualities among them. I aim to present a new perspective on women collectors' experiences and to critique gendered presentation of those individuals' histories in contemporary scholarship.

## (RE)PRESENTING THE BODY: HOW JAPANESE CONTEMPORARY ARTISTS ENCOURAGE THE INTERSUBJECTIVITY OF NATURE AND CULTURE THROUGH THE EMBODIMENT OF THOUGHT

**Rachel L. Zimmermann** (Dr. Kirstin Ringelberg) Department of Art and Art History

Using a feminist phenomenological approach in which the body is understood as central to the ways in which one experiences the world, I studied three photographic series and various texts related to Japanese culture, philosophy and contemporary art. It is widely understood among philosophers and other academics that "Western" societies generally approach the body from a dualist perspective, giving the mind primacy. However, contemporary artists have challenged this dichotomy by using the body as a site through which cultural norms are performed and reinforced. Japanese contemporary artists Ryoko Suzuki and Noriko Yamaguchi, creating within a culture that does not historically carry the same dualistic valuation of mind over body, do just that. Suzuki, in her representations of idealized bodies, uses a collage technique that inserts her own head in the image, emphasizing the relationship of the viewer to the work and the dichotomy between real and ideal bodies. By incorporating herself in the work, she invites others to move beyond the role of observer and instead encourages them to become active participants, placing themselves within the work as well. She specifically calls on the masculine viewer to question the desire her images might be expected to provoke, thus subversively challenging the dichotomies of female/male and feminine/masculine. Yamaguchi also challenges society's notions of sex, gender, and mind-body dualism but does so by fragmenting the body. Both artists encourage an intersubjective relationship between viewer and image. I argue that is this intersubjectivity, in which the viewer becomes both observer and subject—i.e., separate from *and* part of the work—that allows for the embodiment of thought, a recognition that the mind/body dualism does not exist. In visually challenging societal constructions of gender and sex, the artists whose works I analyze encourage a reassessment of the devaluation of the body, and thereby advocate confrontation of the patriarchal structures that perpetuate such distorted dualisms and social constructions.

# *BIOLOGY*

## ASSESSMENT OF INVASIVE PLANT SPECIES THREAT ON ELON UNIVERSITY FOREST

**Lea S. Abel** (Dr. Vandermast) Department of Biology

In the United States, invasive species are known to reduce biodiversity and affect human health; they also cost the United States billions of dollars per year. Since invasive species are constantly moving into and influencing new environments, more information and research is needed about their spread. Elon University Forest (EUF) was a productive farm until the mid-1960s when the remaining agricultural land was abandoned to return to forest. Like many farms in the Piedmont of North Carolina, EUF contains an old wood lot that was never clearcut and has features consistent with those of old-growth forests. We call these "forests of continuity". We used transects and 8 pre-established Carolina Vegetation Survey (CVS)-style permanent plots, to survey EUF for invasive plant species. Each invasive species was assigned a cover value that corresponds to a cover percentage range. Our surveys identified 24 different invasive plant species in EUF, including many of the common species typically found in Piedmont forests: Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*), and Japanese stiltgrass (*Microstegium vimineum*). Interestingly, the plots within the forest of continuity contained significantly fewer invasive species with a significantly reduced cover compared to invasive species richness and cover in younger forests. Japanese honeysuckle was the most common and widespread invasive species in EUF while Chinese privet and Japanese stiltgrass grew densely in mesic habitats. Our results indicate that forests of continuity throughout the Piedmont region may be less invasible than younger forests, possibly because of the dominance of existing vegetation

## CHANGES IN FROG LIVER METABOLISM FOLLOWING PBDE CONSUMPTION

**Kathryn L. Allen** (Dr. Matthew Clark) Department of Biology

Polybrominated diphenyl ethers (PBDEs) are commonly used as flame retardants in commercial products as they help prevent combustion. PBDEs are prone to bioaccumulation, primarily in the blood, liver tissue, fat tissue, and breast milk. Low doses of PBDEs may also lead to bioaccumulation. Research suggests that excess PBDE bioaccumulation can cause tumors, endocrine disruption, neurodevelopment problems, thyroid hormone imbalance, and poor liver enzyme function (Siddiqi, Laessig & Reed, 2003). This research further investigated the effects of PBDEs on hepatoxicity using Rana pipiens frogs, with an average mass of 21.5g. Frogs were exposed to PBDEs through food in doses of 17.5 µL/2 mL solution, similar to human exposure. One third of the frogs were exercised once per week to determine if exercise plays a role in preventing PBDE accumulation. A set of frogs from each group were periodically sacrificed, and their livers were collected, homogenized, and analyzed using a liver enzyme assay and spectrophotometry. The assay evaluated lactate dehydrogenase (LDH) levels in the liver, which has been shown to be an indicator for liver damage (Dunnick & Nyska, 2009; Hu et al., 2007). Liver viability was tested every two weeks over a period of 3 months. With a p-value=0.0000134, there is a significant difference, at the p=0.05 level, between the LDH levels of control frogs and those frogs exposed to PBDE, indicating that PBDE does significantly influence LDH levels. A p-value=0.00498 indicates that there is also a significant difference

(p=0.05 level) in the LDH levels of control no-exercise frogs and control exercise. However, there is no significant difference (p=0.05 level) in the LDH levels of PBDE no-exercise frogs and PBDE exercise frogs, as indicated by a p-value=0.335. These results indicate that exercise does not play a role in LDH levels following PBDE consumption. Therefore, these data suggest PBDE doses of 17.5 µL/2 mL solution altered the lactate dehydrogenase levels of liver cells in Rana pipiens frogs. In addition, exercise contributed to altered LDH levels.

## TURNING UP THE HEAT ON MITOCHONDRIAL DNA EVOLUTION: COMPARISON OF MUTATION RATES IN TWO LIZARD SPECIES

**Kelly C. Allen** (Dr. Gregory Haenel) Department of Biology

Proteins encoded by the mitochondrial genome contribute to metabolic processes critical to life. Consequently mitochondrial DNA (mtDNA) is said to be under strong balancing selection: the order of nucleotides is highly resistant to change. While most changes are deleterious, some may persist under positive selection to increase the efficiency of certain metabolic processes and reduce the number of DNA mutating byproducts. Two closely related lizard species from Western Arizona are being examined for evidence of selection on mtDNA genomes. One species, *Urosaurus graciosus*, is under greater metabolic stress than its counterpart, *Urosaurus ornatus*, due to the extremely hot environment it inhabits. *U. graciosus* is known to have a higher metabolic rate, but is the mutation rate of mtDNA larger than that of *U. ornatus*? Is there evidence of positive selection on the mutations? An mtDNA sequence is necessary to answer these questions. In order to obtain the sequences, mitochondria were isolated from liver cells and lysed to release the circular mtDNA molecules within. Once extracted and purified, the mtDNA molecules were digested into numerous, small pieces by a restriction enzyme. Small fragments were incorporated into a plasmid. The modified plasmid was then introduced into bacterial cells to create an mtDNA library. From the library, fragments of lizard mtDNA were amplified and sequenced, yielding a previously unknown DNA sequence for analysis. A fragment of cytochrome oxidase C was identified by this technique and comparison of mtDNA mutation rates of the gene between the two species may indicate a potential for positive selection on this gene. A very interesting find, as the protein represents complex IV of the electron transport chain (ETC). Oxidative phosphorylation across the ETC is the principle site of ATP production in eukaryotic cells. Positive selection has been identified within the mitochondrial genomes of mammals living at high altitudes and latitudes. However, past studies have only looked at endothermic organisms. The current project is unique, in that lizards are ectotherms and metabolic stress is induced in a different manner.

## EFFECT OF ENVIRONMENTAL STRESSORS ON MOLECULAR PATHWAYS THAT CONTROL ION HOMEOSTASIS IN *SACCHAROMYCES CEREVISIAE*

**Anthony F. Fata** (Dr. Srikripa Chandrasekaran) Department of Biology

Environmental stressors including oil dispersants have a known negative effect on ion homeostasis in organisms. Oil dispersants and other stressors affect growth, division of cells, and external cellular matrix in the yeast model, *Saccharomyces cerevisiae.* Due to the stressor, specific molecular signaling pathways are activated. This study focuses on Mitogen Activated Protein Kinase (MAPK) pathway and associated downstream processes that are either up or down regulated in order to maintain ionic homeostasis. Testing the expression, localization and activation of proteins and enzymes involved in maintaining ion channels change with a dose-

dependent exposure to stressors. Through the following, determining how MAPK induced control of ion channels may play a role in maintaining key events in the cell cycle, namely growth and division of the cell.

## EXAMINING THE ROLE OF mTOR IN T CELL PROLIFERATION AND MIGRATION UNDER IMMUNOSUPPRESSION BY RAPAMYCIN

**Morgan J. Gregg** (Dr. Yuko J. Miyamoto) Department of Biology

Immunosuppressive agents are used in treatment of autoimmune disorders, organ transplantation, and chemotherapy. As T cells regulate the main function of the human adaptive immune response, T cell signaling is often interrupted by these immunosuppressive agents. Commonly, the PI3K-Akt-mTOR pathway is targeted by immunosuppressants like rapamycin. mTOR (mammalian target of rapamycin) is a protein kinase that has an important role in cell growth and metabolism. mTOR is the core of two functionally distinct protein complexes, mTORC1 and mTORC2. mTORC1 has a prominent role in cell growth and proliferation while mTORC2 has been shown to affect cell proliferation and cytoskeletal organization. However, the role of mTOR signaling in T cell migration is not fully understood. Studies were conducted to determine the effects of rapamycin, an immunosuppressant that targets mTOR, on Jurkat T cell proliferation and migration. Rapamcyin treatment of Jurkat cells was expected to inhibit cell proliferation and migration due to its inhibition of normal mTOR signaling. Jurkat T cells were stimulated with activation agents PMA (50ng/ml) and PHA (5ug/ml) in the presence or absence of rapamcyin (5, 10, 20nM; 12, 24, 48 hour treatment). Viable cell counts at 12, 24, and 48 hours showed a concentration-dependent inhibition of cell proliferation by rapamycin; no significant effects were seen beyond 20nM rapamycin. Cell counts at 48 hours revealed statistically significant concentration-dependent inhibition of cell proliferation at 20nM and 75nM ($p=6.6e^{-3}$, $p=0.046$). Expression of phosphorylated ERK, a protein important in cell proliferation, was also decreased in activated T cells treated with rapamycin as determined by Western blot analysis. Phosphorylated mTOR and FAK397, a protein important in cell movement, expression showed increases in treatment with CXCL12, an immune chemoattractant, in combination with a fibronectin matrix. Rapamycin also inhibited Jurkat T cell migration toward CXCL12; Western blot analysis revealed a 70% decrease in FAKY397 phosphorylation and 75% decrease in phosphorylated mTOR expression in the presence of rapamycin treatment even in response to a migration matrix. Results show that even in combination with activating agents, rapamycin inhibits T cell proliferation and migration, suggesting that mTOR signaling may affect ERK and FAK signaling and T cell migration.

## RESISTANCE AND SUCCESSION OF FUNGAL SPORES AFTER SIMULATED HEAT SHOCK

**Miles W Grunvald & Alexandra Pedicone** (Dr. Antonio Izzo) Department of Biology

Fire is an important disturbance in many ecosystems worldwide. Soils in the forest can be particularly impacted by the heat and drying of a fire disturbance, as well as by the influx of newly released nutrients. Some species are well-adapted to survive and recolonize a system following a disturbance. Spores act as the primary resistant structures of fungi that are loose in the soil and these spores have the potential to remain viable following a disturbance. The goal of this study was to identify potential heat-resistant fungi and to develop an assay to compare their relative sensitivities to heat. Using culture-based approaches an initial screen isolated soil fungi

from the Elon Forest that appeared to have the capacity to resist levels of heat that might be expected from a forest fire. Isolates were identified to species using DNA sequence analysis of the internally transcribed spacer (ITS) regions of the rRNA gene region. A subset of the fungal species that seemed particularly prominent were selected for further testing. These included *Umbelopsis ramanniana*, *Umbelopsis isabellina*, and *Zygorhynchus moelleri*. An assay involving heated liquid spore suspensions and the analysis of spore viability on potato dextrose agar was developed for simulating heat shock on spores. All three fungi showed the ability to persist through a 40 degree C 5 min treatment, however *U. isabellina* spores showed significantly lower percentages of viability and also showed a measurable delay in germination response. *U. ramanniana* was the only species whose spores survived 5 min at 60 degree C, albeit this still represented a >99% reduction in viable spores relative to the control. This finding suggests that heat resistance has the potential to play a role in the recolonization dynamics of soil fungi after a fire.

## CONTROL OF KUDZU (PUERARIA MONTANA) IN THE ELON UNIVERSITY FOREST WITH SEASONAL SHADING TECHNIQUE

**Chelsea C. Jacobs** (Dr. David B. Vandermast) Department of Biology

Kudzu (Pueraria montana) is an invasive plant species that is spreading rapidly throughout the United States. Currently P. montana occupies approximately 3 million ha in the United States. In the United States $26.4 billion dollars are spent to control and remediate damage caused by introduced weeds. Even more economic damage exists with the attempts in eliminating Kudzu from residential locations. There is such a need for a means to successfully eliminate Kudzu. Even more so is the need for a nonchemical way to eradicate the perennial, climbing vine. Although there are chemical means of reducing Kudzu, these methods can cause damage to surrounding plants and cause further biological damage. These damages could be avoided by refraining from using chemical means to eradicate and reduce Kudzu. To determine if shading of Pueraria montana crowns would hinder growth, plants were covered or uncovered and the effect on the growth of the Kudzu population in EUF in the Town of Elon College, North Carolina was recorded. Plants were shaded all or none of the length of the experiment. It was hypothesized that covered plants would have a decreased growth amount (cm) and decreased accumulation of growth rate. The results indicated that the accumulation of regrowth showed to be faster for uncovered plants than that of covered plants ($P<0.05$). Kudzu vines near trees showed to regrow much less than flat area ground plots ($P<0.05$). These results indicate that for small, young populations of Kudzu, shading can reduce the accumulation of regrowth.

## DIVERSE ANTIMICROBIAL ACTIVITY OBSERVED IN ACTINOBACTERIA ISOLATED FROM A PIEDMONT FOREST IN NORTH CAROLINA

**Elaina M. Kalyvas** (Dr. Antonio Izzo) Department of Biology

Soil microbial activity is known to vary across different depths due to factors such as surface exposure and organic matter. These differences create different competitive zones for the bacteria that inhabit these spaces. Actinobacteria commonly produce antibiotics that allow them to compete against other bacteria and fungi for resources in these soils. The goal of this study was to determine if antibiotic production patterns varied across soil depths as a means of assessing differential competitive capabilities. Actinobacteria were isolated across multiple depths from soils obtained from a Piedmont forest located in Elon, NC. Bacterial isolates were

screened for their ability to produce antibiotics against different types of microbes. Out of the 72 actinobacteria isolates obtained, 45 showed antibiotic production in a plate assay. While no clear differences were seen between the different soil depths, the antibiotic production exhibited by these actinobacteria was extremely diverse as isolates differentially affected gram-positive bacteria, gram-negative bacteria, and/or fungi. Isolates that were observed to produce antibiotics of any kind were further screened for the presence of polyketide synthase (PKS-I) and nonribosomal polyketide synthetase (NRPS) genes using PCR-based approaches. Twenty-two of these isolates showed PKS-I gene amplification, with over half containing multiple bands suggesting the presence of multiple forms of PKS-I genes. Thirty-three isolates showed NRPS gene amplification, with a great majority containing multiple bands as well. Based on these results, while there was no clear pattern across soil depth, there was a great diversity of actinobacteria in these soils, each potentially producing unique antibiotics to create a highly competitive environment.

## THE EFFECT OF BEAVER HERBIVORY ON FOREST COMPOSITION ON THE HAW RIVER, CENTRAL NORTH CAROLINA

**Jillian B. Kelly** (Dr. David B. Vandermast) Department of Biology

The American beaver (Castor canadensis) resides in rivers and ponds and is known as an ecosystem engineer because of the way it alters riparian ecosystems through the consumption of the inner bark of some trees and use others for construction material in their dams. It has long been known that beavers discriminate in the trees they consume. The purpose of this study was to determine how this feeding selectivity affects the composition of riverside forests along the Haw River in the Piedmont of North Carolina. We recorded the identity, size and % damage of all trees with signs of beaver herbivory in five locations constituting approximately 6 km of river frontage. We also recorded saplings growing in a 5.6 m radius around each beaver-damaged tree. The 43 damaged trees included seven tree species. Sweetgum (Liquidambar styraciflua) was, by far, the most commonly damaged species (58.1% frequency) and had the greatest average damage (73.5%). Furthermore, our results show that only 6.2% percent of the saplings recorded were sweetgum, while the most abundant saplings were southern sugar maple (Acer barbatum) at 26% frequency and boxelder (Acer negundo) at 20%. Beavers seem not to prefer these species as none were recorded with beaver damage in this study. Our results indicated that beaver feeding selectivity has the potential to create forests of different compositions than would occur in the absence of beaver herbivory.

## ANALYZING THE INTERACTIONS BETWEEN THE MOTHER AND DAUGTHER RAMET OF *JUSTICIA AMERICANA* IN VARIED DROUGHT CONDITIONS

**Stephanie A Lindeman** (Dr. Brant Touchette) Department of Biology

Wetland plants play a crucial role in maintaining water quality, high biological productivity, and species diversity. They are situated along interface between land and water forming areas such as swamps, marshes, and peatlands. Due to their proximity to upland systems, they are often subjected to varying water availability, which can be exacerbated by human disturbances such as urban development and climate change. Indeed, recent climate change models (Hadley Centre in the United Kingdom and the Canadian Centre for Climate Modeling and Analysis) suggest that further warming will result in substantial decrease in precipitation during active growing seasons. One wetland plant that may be susceptible to decreased soil water is the American water

willow (*Justicia americana*), which grows along the margins of lakes, rivers and swamps. The water willow consists of a mother ramet connected to an identical, yet smaller, daughter ramet via a rhizome. The rhizome is capable of transferring resources between ramets and is hypothesized to transport Abscisic acid (ABA), which is a plant hormone that is produced in roots and transported to leaves. The purpose of this study was to determine if mother ramets were reallocating water to daughter plants in response to ABA signals produced from the daughter. This study also included other plant-water relation parameters including leaf-water potential ($\Psi_{leaf}$), relative water content (RWC), transpiration and leaf area. The experimental design involved experimental microcosms (12L) for four weeks with simulated varied water-tables. The three simulations were: a) both ramets were flooded, b) both ramets receiving drought, and c) the mother ramet flooded, daughter ramet receiving drought. The results suggest that there are significant physiological differences between these hydrological conditions. Moreover, there may be some signaling between the ramets, but it cannot be determined to what degree these signals enhance survival under different water availabilities.

## *CAYAPONIA TAYUYA* IS A POTENT INDUCER OF CELL DEATH IN IMMUNE CELLS

**Kirsten L. McCormick** (Dr. Tonya Laakko Train) Department of Biology

A malfunctioning immune system contributes to a number of autoimmune disorders and dysregulated immune cell growth can result in diseases such as leukemia. Treatments for autoimmune disorders and leukemia often include agents that suppress the immune system by reducing populations of immune cells. Current immunosuppressive treatments can, sometimes, have limited effectiveness or serious side effects, resulting in the need for new treatment options. *Cayaponia tayuya* (tayuya) is a plant found in South America and has been shown to possess anti-inflammatory properties. This plant is used in traditional rituals for the treatment of inflammatory diseases, such as rheumatoid arthritis. Understanding the underlying mechanism of this effect could result in additional therapies for immune disorders. This study aims to investigate the reported anti-inflammatory activity of tayuya by determining the effects of tayuya on immune cell function and survival. To determine whether tayuya modulates T cell growth and survival, Jurkat T cells, a human leukemic cell line, were incubated with or without various concentrations of tayuya extract over time. Culturing Jurkat cells with the tayuya extract for 24 hours resulted in a 43% decrease in viable cell numbers as compared to controls. Additionally, Western blot analysis showed a dramatic increase in treated cells for the presence of the pro-apoptotic proteins, cleaved caspases 7, 9 and PARP, indicating that tayuya reduces Jurkat cell concentrations by inducing apoptotic cell death. Therefore, this study has shown that tayuya significantly reduces immune cell viability and survival by inducing apoptosis; supporting the claim that tayuya does possess anti-inflammatory activity. These results indicate that tayuya warrants further investigation as a possible therapy in the treatment of immune cell disorders.

## EVALUATION OF THREE TRANSFECTION AGENTS TO INCORPORATE GREEN FLUORESCENT PROTEIN (GFP) INTO T CELLS

**Janelle K. McNeil (**Dr. Miyamoto) Department of Biology

Jurkat cells are a line of T leukemic cells that are typically used to study T cell function. These T cells are useful to study cell signaling and to determine the mechanism of how cancers interact with drugs and radiation. A transfection agent is used to help DNA successfully enter into a cell.

The evaluation of three different transfections agents, (TKO, 20-20 and Jurkat) were conducted to see which agent was the most effective, causing the least amount of cell death in Jurkat T cells. The experiments further analyzed how well the green fluorescent plasmid (GFP) DNA was incorporated into the T cells. GFP is protein that glows green under the fluorescent microscope, and is often used to reveal where a target protein, gene, or feature is expressed within a cell. Results showed that after averaging cell death rates between the three transfection agents, TKO was 13%, Jurkat was 20% and 20-20 was 24%. In addition results from using the fluorescent microscope showed that the GFP DNA was successfully taken up using each transfection agent. After assessment of cell death and analyzing the fluorescent microscope images both of these tools indicated that the TKO was most proficient transfection agent, being the least harmful to the Jurkat T cells and able to incorporate the most GFP plasmid. From the findings the TKO agent will be used to deliver chemicals that will eliminate a cytoskeletal protein in Jurkat T cells to determine effects on cell shape and cell signaling of these cells.

## GEOGRAPHIC VARIATION IN THE ALLELOPATHIC POTENTIAL OF AMERICAN BEECH (*FAGUS GRANDIFOLIA)*

**Emily A. Neidhardt** (Dr. David B. Vandermast) Department of Biology

In the Great Smoky Mountains National Park, relatively small monodominant stands of American beech (*Fagus grandifolia*) trees called "beech gaps" exist in a larger, high-elevation forest matrix dominated by spruce and fir *(Picea rubens-Abies fraseri*). This phenomenon has been explained in part by previous research that has identified American beech as having allelopathic qualities against spruce and fir. The purpose of this research is to determine if red beech (a race found in the Piedmont region of North Carolina whose range does not overlap with red spruce or Fraser fir) is as allelopathic as the high-elevation gray beech. This is one of the few studies that seek to determine whether allelopathy is a species-wide trait or whether it varies geographically. Abscised beech leaf litter and beech forest soils were collected from beech forests near Elon, North Carolina. Six treatment combinations (d-H2O and two leachate concentrations X beech soil and topsoil) were used to germinate red spruce, Fraser fir, and lettuce (*Lactuca sativa)* seeds. Our dependent variables were germination rate and aboveground biomass (AGB). Our results indicate that, in combination with beech forest soils, beech leaf leachate can lower AGB and reduce germination significantly ($p<0.05$) in red spruce and lettuce seedlings, yet no significant effects were observed on Fraser fir. In our study, the inhibitory affect of red beech was less than that of gray beech, suggesting that variations in competition intensity may lead to greater production of allelopathogens in geographically distinct populations.

## THE EFFECTS OF ACRYLAMIDE (AA) INGESTION ON LIVER AND SCIATIC NERVE FUNCTION

**Allison Nogi** (Dr. Matthew Clark) Department of Biology

Acrylamide (AA), a common food carcinogen, has recently been found to impair cellular function through increased oxidative stress; however, habitual exercise might attenuate its effects. In this study, cellular function post acrylamide intake and exercise was analyzed through lactate dehydrogenase (LDH) levels in the liver and total lipid peroxidation in the sciatic nerve. An animal model was created that consisted of four groups of eight (48 total) *Rana pipiens*, a species of frog. The groups consisted of AA consumption only, AA consumption with exercise,

no known AA exposure, and no known exposure with exercise. The frogs in the AA consumption groups ingested one cricket per week that were coated with 0.0025g of AA. Exercise consisted of frogs swimming back and forth in a large tank for seven minutes. Exercise difficulty was determined by analyzing respiration rates (breaths per minute) before and after exercise sessions. Frogs in the exercise groups went through this treatment once a week. Post exercise, respiration rates averaged 84.82 bpm, signifying a significant ($p=0.05$) average increase of 67.44 bpm. LDH and lipid peroxidation levels were analyzed every two weeks following dissection. The liver was removed and analyzed using a Max Discovery LDH Color Cytotoxicity Assay Kit to determine LDH levels in the liver cells. Through this assay, AA ingestion demonstrated a significant increase ($p=0.05$), averaging an increase of 0.10858 per week. Exercise diminished the concentration of LDH overtime, creating a difference of 0.35273. The sciatic nerve was also dissected and used in a BCA assay kit to determine overall lipid peroxidation. Frogs that had ingested AA had significantly more lipid peroxidation ($p=0.05$), averaging a 0.441 difference between the control and AA ingestion groups. Exercise significantly ($p=0.05$) reduced lipid peroxidation between the AA and AA Exercise groups, creating a 0.356 average reduction. These data suggest that increased LDH and total lipid peroxidation are correlated with abated liver and sciatic nerve function. The effects of AA and the levels of LDH and lipid peroxidation were minimized through weekly exercise.

## LIFE HISTORY AND THE AGE TO SIZE RELATIONSHIP IN TURTLES AT ELON HOMES POND

**Ian P. Rosen** (Dr. Gregory Haenel) Department of Biology

We set out to learn more about the current ecology of the turtle population of Elon Homes Pond located on Elon University's campus. Our goal was to begin to understand the population size, age structure, and sex structure of the local population. We also investigated the relationship between air temperature and the capture rates of these turtles. We predicted that, if air temperature had a large effect on turtle activity, we would catch many more turtles in basking traps than in hoop traps. Turtles were caught from September through mid-October, using two basking traps and two hoop traps. We recorded whether the turtle was caught in a hoop or a basking trap, as well as the location of the trap within the pond. After the sex and species were determined, we measured carapace width and length, and plastron length, as well as the turtle's mass. We also determined the high temperature for each day throughout the sampling period. The results showed a correlation between temperature and male capture rate, but not necessarily that of females. The majority of turtles captured were of sexually mature sizes. Females were generally larger than males. We also captured more turtles in hoop traps than in basking traps. Our predictions on temperature and trap type capture were supported. We also found strong correlations between size and sex of turtles of each species. Over the past two years of occasional sampling, 27 painted, 19 slider, and 6 snapping turtles have been captured at Elon Homes Pond. This suggests that, despite the recent extensive development of houses, and the draining of wetlands near the pond, there is still a thriving population of turtles.

## OXYTOCIN REGULATES SIGNALING IN HS578T BREAST CANCER CELLS

**Erica L Schenhals** (Dr. Tonya Laakko Train) Department of Biology

Oxytocin (OT) is a peptide hormone best known for its roles in breastfeeding and childbirth. It has been hypothesized that OT production in the breast may be protective against developing

breast cancer, as women who breastfeed tend to have a lower incidence of post-menopausal breast cancer. OT and OT receptors (OTR) have been demonstrated in a number of human breast tumor cell lines, including MCF7 and Hs578T. However, the effect of OT on cellular signaling in breast tumor cells is not yet fully understood. Present studies were conducted to determine the role of the OT system in Hs578T breast tumor cells. Hs578T cells were treated with 50 nM OT and 100 nM OT for 5, 10, 30, or 60 minutes. After treatment the cellular proteins were analyzed to determine whether OT activated certain proteins known to be involved in OTR signaling. Results showed activation of two proteins involved in cell growth (ERK) and cell stress signaling (p38). Results also showed increased activation of protein kinase C (PKC), a family of enzymes responsible for controlling the activation of other proteins. ERK and p38 can be activated by a number of signaling pathways and further studies will investigate whether this activation is mediated by PKC and whether this transient increase in signaling modulates cellular responses such as growth, death, or migration.

## THE EFFECTS OF AN ALL LIQUID DIET ON THE GUT MICROBIOTIA

**Jillian A Somero** (Dr. Jennifer Uno) Department of Biology

Inflammatory Bowel Disease (IBD) causes chronic inflammation of the gastrointestinal (GI) tract associated with abdominal pain, weight loss, diarrhea and ulcers. Current treatments for IBD patients suppress the immune system and cause patients to become more susceptible to other, more life-threatening conditions, including viral infections and cancer. It has been found that placing children on an all-liquid diet for a period of 6-12 weeks can both reduced inflammation and induce mucosal healing, however it remains unclear how this dietary change leads to intestinal healing. Recent work also indicates the importance of bacterial communities in the onset and propagation of intestinal inflammation. The aim of this study was to examine the mechanisms by which a liquid diet promotes intestinal healing. We hypothesize that an all-liquid diet will alter the composition of bacterial communities residing in the gut such that they favor anti-inflammatory communities. In order to test this hypothesis, bacterial DNA was isolated from mouse models of IBD. Normal (wild-type) mice were placed on an all-liquid diet for four weeks. At the end of the time period tissue and stool was collected and DNA extracted. PCR was used to quantify the relative amounts of bacteria within the gut. It was found that after four weeks, mice given an all-liquid diet showed modest decreases in total bacteria and *Bifidobacerium* (n= 8). Conversely, increases were observed in *Lactobacillus*, *F. prausnitzii*, and *E. coli*. Interestingly the most significant changes were observed with the pro-inflammatory *E. coli* (n=8, p = .05). These findings confirm that bacterial communities in the gut change in response to a liquid diet, but how these changes influence inflammation remains unclear. Further experiments are underway in which IBD susceptible mice have been placed on an all-liquid diet for four weeks and tissue and stool were collected. Future studies will be aimed at demonstrating whether changes in bacteria have occurred and if these changes decrease inflammation.

## ELEVATED TEMPERATURE EFFECTS ON THE GROWTH AND TOXICITY OF *LYNGBYA CONFERVOIDES* AND *LYNGBYA* SP.

**Lindsay J Spiers** (Dr. Michael Kingston) Department of Biology

Environmental conditions associated with climate change, including rising $CO_2$ levels and increasing seawater temperatures, are negatively impacting many coral reef organisms. These environmental changes are predicted to be either advantageous or have no effect on cyanobacteria

relative to other coral reef organisms. However, few studies have directly tested the effects of these changes on benthic marine cyanobacteria. Cyanobacteria play many roles in their ecosystem. They act as a food source for some herbivores, although many contain secondary metabolites that limit their palatability, as well as a source of nitrogen in an environment that is often nitrogen limited. They can also form harmful cyanobacterial blooms under environmental conditions that favor their proliferation. This study examined the effects of increasing seawater temperature on two species of benthic cyanobacteria collected off the coast of Ft. Lauderdale, FL: *Lyngbya confervoides* and *Lyngbya* sp. They were grown at 28°C and 32°C to measure how temperature effected growth over a three-week period. *L. confervoides* demonstrated a positive correlation between elevated temperature and growth. Conversely, there was a negative correlation between elevated temperature and growth of *Lyngbya* sp. Changes in cytotoxicity of extracts of *L. confervoides* and *Lyngbya* sp. exposed to increased seawater temperature were also examined. We concluded that elevated temperatures lessened the toxicity of extracts of *Lyngbya* sp. Alternatively, there was a positive correlation between increased temperature and toxicity in *L. confervoides*. These studies indicate that not all cyanobacteria species respond similarly to changes in seawater temperature that may occur due to climate change.

### THE MICROFLORA AND NEUROENDOCRINE REGULATION IN ZEBRAFISH

**Alexander R. Zito-Wolf** (Dr. Jennifer Uno) Department of Biology

The vertebrate gastrointestinal system houses a vast array of bacterial communities, or microbiota, that live symbiotically within the host. Current research indicates the presence of a bidirectional communication system between the gut and the brain by which the microbiota may influence both brain development and host behavior. While this axis is well studied in mice, it has yet to be established in the zebrafish. Zebrafish have emerged as a valuable tool for studying gastrointestinal biology including the microbiota. The aim of this study was to establish the presence of the gut-brain axis in zebrafish. We hypothesize that zebrafish colonized with *lactobacillus*, a bacteria know to influence behavior, will elicit a change in the zebrafish stress response and neurochemistry. In order to test this hypothesis, we began by diminishing the presence of intestinal bacterial using antibiotics (5 days of antibiotics at a concentration of 22.5mg/L) and recolonizing the fish intestines using lactobacillus (*Lactobacillus Plantarum* for 7 days). Bacterial DNA was isolated from zebrafish intestines and quantitative PCR was used to quantitate both total bacteria as well as genus specific bacterial communities. PCR analysis indicated a dramatic decrease in total bacterial DNA in the gut ($n = 4$, $p=0.052$.), furthermore, there was an increased presence of *Lactobacillus* following recolonization with bacteria. These results indicate the microbiotia in zebrafish can be modulated; future studies will focus on determining if these changes coincide with changes in behavior and or development.

## *CHEMISTRY*

### ANALYSIS OF HUMIC ACID INTERFERENCE ON ESTROGENIC ACTIVITY USING AN ESTROGEN-SENSITIVE YEAST ASSAY

**Mary C. Bedard** (Dr. Victoria Del Gaizo Moore & Dr. Karl Sienerth) Department of Chemistry
The presence of estrogens in soil and water has gained recognition as a significant health risk due to their ability to cause endocrine disruption. As such, it is critical that measurement of estrogen

concentrations in environmental samples be accurate. Humic acid (HA), a primary component of humic substances, has been implicated in binding with estrogens. Thus, current analytical techniques that seek to identify the concentration of estrogens present in environmental samples face the challenge of achieving accurate measurements in samples inherently contaminated by humic substances. In this study we characterize binding between HA and two natural estrogens,17β-estradiol (E2) and estriol (E3), using nuclear magnetic resonance spectroscopy (NMR) and via ELISA assays. Additionally, the effect of this binding on estrogenic activity in a biological yeast assay was assessed. We provide definitive evidence that HA and estrogens do bind and that this interaction impacts the amount of detectable, as well as biologically active, estrogen present. This data suggests that standard measurements of estrogens in water samples contaminated with humic substances do not accurately reflect the total estrogen concentration present, but also that the presence of humic substances is advantageous in decreasing estrogen's impact on surrounding biological organisms.

## DETERMINING THE MECHANISM LEADING TO PERIODIC PRECIPITATION (LIESEGANG) REACTIONS

**Alexander W. Bruch** (Dr. Joel M. Karty) Department of Chemistry

Life abounds in water. Salts, such as table salt (NaCl), are composed of positive and negative components that are separated when dissolved in water. However, not all salts dissolve in water; if a salt remains as a solid in solution, it is considered insoluble. When two water-soluble salts combine, they may form an insoluble salt, which falls, or "precipitates," out of solution. This process is relatively simple in water, but is more complex in a gel, such as the gelatin in Jell-O®. When such a reaction is performed in a gel, solid forms in these pores and is deposited in a series of bands. Coined as a Liesegang reaction after its discoverer, Raphael Liesegang, this effect has been known to occur in various natural systems such as geologic structures and cancer cells. Two theories attempt to explain this phenomenon. Autocatalytic growth theory proposes that large particles are growing at the expense of smaller particles. Alternatively, coagulation theory describes that particles grow by clumping together. To date, there is no direct, experimental evidence in support of either theory. Particular to this study, salts composed of heavy metals, such as copper, manganese, or mercury combined with sulfur are insoluble and are known to exhibit the Liesegang phenomenon. Additionally, these particles absorb different colors of light depending on their size. This study proposes to investigate the validity of autocatalytic growth versus coagulation theories by measuring the light absorbed against time. If autocatalytic growth theory holds true, then particles would be observed to both grow and shrink over time, while coagulation theory predicts particles growing continuously.

## BINDING AFFINITY OF ESTROGENIC HORMONES AND LACTOPEROXIDASE

**Natalie M. Clark** (Dr. Kathryn Matera) Department of Chemistry

Lactoperoxidase (LPO) is a mammalian enzyme that has been implicated in breast cancer through its ability to oxidize hormones to form free radicals, which may then attack other biomolecules. Initially, binding affinity between LPO and estrogenic hormones was measured spectroscopically. The primary focus during this process was to determine if there are certain hormones that are more likely to bind to LPO, and therefore are more susceptible to oxidation. Estrone, estradiol, and estriol, were tested. The dissociation constant, $K_D$, of multiple LPO-hormone complexes was measured using an ultraviolet- visible (UV-Vis) spectrophotometer.

Estriol had the lowest $K_D$, 0.0125 mM, thus demonstrating the best binding affinity. Estradiol had the second lowest $K_D$ value,0.0181 mM, and estrone did not demonstrate any binding activity. These results indicate that structural difference between these three hormones could contribute to their varying binding affinities to LPO. Estriol has three hydroxyl groups located at various locations; however, estradiol had only two hydroxyl groups while estrone has only one. The different $K_D$ values among these three hormones can most easily be attributed to the availability for the hydroxyl group to hydrogen bond with the nitrogen atoms within the heme group of LPO.

## EXAMINATING CHANGES IN BCL-2 FAMILY PROTEINS USING AN *IN VITRO* MODEL OF SEPSIS

**Jo A. Crum** (Dr. Victoria Del Gaizo Moore) Department of Chemistry

Bcl-2 family proteins regulate mitochondrial apoptosis and have been shown to be involved in a variety of diseases ranging from cancer to immune disorders. During sepsis, systemic inflammatory response to pathogens including gram positive and gram negative bacteria as well as fungi, apoptosis is triggered in immune cells as a result of the inflammatory cytokine storm induced by the body's response to infection. Immune cell death is not the only damage caused by sepsis and the mechanism of cellular injury on end organs is unknown despite advances in modern medicine. Much of the mortality associated with sepsis is a result of end organ failure, particularly the kidneys. Research has shown that a small amount of apoptotic cell death is characteristic in acute renal injury associated with sepsis, thus it is hypothesized that Bcl-2 family proteins are involved in renal cell death as a result of septic shock. Using a two-step cell culture model of sepsis we have examined cell death induced in kidney cells during cytokine exposure. The first step of this model stresses immune cells to stimulate cytokine release, comparable to the cytokine storm found in sepsis. Those cytokines are then harvested and used to treat cultured kidney cells. Kidney cells were found to have decreased cell viability suggesting that cytokines do indeed cause cell damage. Analysis of total protein expression and co-immunoprecipitation reactions revealed an increase of BH3 only, pro-apoptotic proteins. Furthermore, a decrease in anti-apoptotic Bcl-2 was found, both of these results confirming that Bcl-2 proteins are involved in the cell death observed. Through elucidation of the mechanism of cellular injury and subsequent tissue death, new therapeutic options can be tested in hopes of developing intervention strategies for a leading cause of emergency room death in the United States.

## ALZHEIMER'S DISEASE: ANALYSIS OF AMYLOID-BETA AGGREGATION

**Mark H. Dalgetty (**Dr. Kathy Matera) Department of Chemistry

Alzheimer's disease (AD), the most common neurodegenerative disorder, is most easily recognized by the accumulation of insoluble plaque in the brain made from amyloid-beta peptides. Recent studies have shown that amyloid-beta aggregation plays a central role in Alzheimer's disease. This had led to the idea that breaking apart amyloid-beta aggregates can help alleviate symptoms of Alzheimer's disease. In order to efficiently analyze how to break apart amyloid-beta aggregates a new assay was developed that tested the ability of different molecules to disrupt the amyloid-beta aggregates. First, amyloid-beta was attached to synthetic latex beads. After that an amyloid-beta solution was added to the isolated amyloid-beta beads, so that aggregation would occur. Finally, different chemicals were added to the beads to break apart

the amyloid-beta aggregates. Both gallic acid and ellagic acid were able to effectively break apart amyloid-beta aggregates.

## SYNTHESIS OF A SERIES OF BIS-BPCA METAL COMPLEXES AS POTENTIAL $CO_2$ REDUCTION CATALYSTS

**Russell B. Davidson** (Dr. Karl Sienerth) Department of Chemistry

As recognition of anthropogenic climate change gains support within the scientific community, it becomes ever more important to discover methods through which $CO_2$ can be converted back into useful substances (e.g., fuels) in order to involve it in a reasonable sustainability cycle. However, such conversion of $CO_2$ requires immense amounts of energy, and so much research has focused on developing catalysts which could make $CO_2$ reduction more energetically viable. In our group, we recently showed that the rhodium complex $[Rh(bpca)_2][PF_6]$ (bpca = bis(2-pyridylcarbonyl) amide) demonstrated clear indication of the catalytic electroreduction of $CO_2$, with research currently continuing on identifying the products formed. In the last 18 months, following standard procedures from the literature, we have synthesized and begun studies of a group of similar complexes with the common structure of $[M(bpca)_2]^{(n-2)+}$ (M= Ni(II), Co(II), Pd(IV), and Pt(IV); n=charge of metal center). This presentation will include the results of electrochemical studies on the $Rh(bpca)_2^+$ and $Co(bpca)_2$ complexes, showing that these two substances behave as potential $CO_2$ reduction catalysts. Synthetic and electrochemical research on the other compounds mentioned above will be presented as well.

## α-SYNUCLEIN FIBRIL DISAGGREGATION BY DOPAMINE DERIVATIVE DL-NOREPINEPHRINE

**Andrew F. Fischer** (Dr. Kathryn Matera) Department of Chemistry

Aggregation of α-synuclein has been critically identified in the pathogenesis of Parkinson's disease and is initiated by the folding of the natively unstructured α-synuclein monomer into a pathogenic fibril form. Several small polyphenol molecules such as dopamine have been shown to inhibit the formation of fibrils and break apart existing fibrils into oligomers. The mechanism of this potentially toxic fibril inhibition and oligomer stabilization is unknown. The present study seeks to elucidate the mechanism of fibril disaggregation by observing how this property varies between dopamine derivatives. Using insulin as a model amyloid protein, a thioflavin T assay has demonstrated the disaggregation properties of autoxidized dopamine and DL-norepinephrine. Further thioflavin T assays with α-synuclein have confirmed fibril reduction by DL-norepinephrine and suggest that dopamine that is not oxidized is not a disaggregating agent. Future experiments, including the repetition of these results and analysis of the disaggregation products by SDS-PAGE, will provide more information about the mechanism of fibril disaggregation. This mechanism could be a key target in future neurodegenerative disease therapies.

## LIPID ANCHOR INFLUENCE ON THE ORGANIZATION OF THE CELL MEMBRANE

**Jessica W. Harris** (Dr. Sara Triffo) Department of Chemistry

Cells function depends on the ability of cells to communicate with surrounding cells. This communication is key to biological processes and vital for daily activities. Cells communicate

through membrane signaling; one cell releases chemicals, then surrounding cells detect the chemicals and react. The membrane, which receives these signals, is comprised of many different lipids and proteins. The membrane proteins that send and receive cell signals appear to be sitting on the membrane. However, some of these proteins are held in place by lipid anchors or long carbon chains that insert themselves within the membrane. These anchors, the role they play in membrane organization, and how that affects cell communication is the central focus of this research. Certain lipids within the membrane are able to organize together and form clusters, which are referred to as sterol rich domains. Some lipids and proteins will localize with these sterol rich domains, which directly impacts communication. However, it is unknown what governs this localization. Some theorize that the identity of the protein and specific protein-protein interactions control where it is organized within the membrane. However, others hypothesize the type and combination of lipid anchors dictate membrane organization. This project aims to explore one of these theories by discovering if lipid anchors play a direct role in the organization of the membrane. Previous research has demonstrated that fission yeast have sterol rich domains that are comparable to those found in human membranes. For this reason, S. *pombe*, fission yeast, will be used as a model organism. Using fluorescent microscopy techniques, fluorescent markers will be attached to lipid anchors allowing for the detection of these anchors relative to other membrane components, specifically sterol rich domains. After studying different lipid anchors, insight will be gained to determine if lipid anchor structure and identity contributes to cell membrane organization.

## WHY IS SULFURIC ACID SO ACIDIC?

**Kevin T. Lynch** (Dr. Joel M. Karty) Department of Chemsitry

Sulfuric acid ($H_2SO_4$) is one of the most important chemicals in the world, finding diverse applications in industry, research and synthesis. It is so ubiquitous because it is cheap to manufacture and is among the strongest acids known, making it a very popular catalyst for a variety of chemical reactions. Despite $H_2SO_4$'s significance, the reasons why it is such a strong acid are still very poorly understood. We have therefore investigated $H_2SO_4$'s acid strength by using the Gaussian 03 software package to carry out an ethylogue extrapolation methodology, which quantifies the various factors that contribute to $H_2SO_4$'s acidity. Those factors include: (1) negative hyperconjugation, (2) inductive effects, and (3) polarization. Our results indicate that negative hyperconjugation accounts for roughly 42% of $H_2SO_4$'s enhanced acid strength, while inductive effects and polarization contribute the remaining 58%. To support our results, we have also used Gaussian 03 to carry out a qualitative natural bond orbital (NBO) analysis, and our collaborator at Western Michigan University has provided block localized wavefunction (BLW) calculations. These findings have implications into the nature of the chemical bonding and acidic strengths of other very strong and very important acids, such as perchloric acid ($HClO_4$) and phosphoric acid ($H_3PO_4$).

## FLAVONOID COMPOSITION OF SOURWOOD (*OXYDENDRUM ARBORETUM)* HONEY

**Megan A. Martin** (Dr. Eugene B. Grimley) Department of Chemistry

A chemotaxonomic study was performed to confirm the botanical origin[1] of sourwood (*Oxydendrum arboretum*) honey by establishing a "chemical fingerprint" of its flavonoidic constituents. Flavonoids are a class of over 8,000 phenolic organic molecules that have a wide

range of biochemical and pharmacological effects due to their highly reactive antioxidant and radical scavenging properties. They play a role in anti-inflammation, anti-platelet, anti-thrombotic action, and anti-allergic effects. They also inhibit enzymes that are closely related to tumorgenesis and induce detoxifying enzyme systems. The flavonoid composition of sourwood honey was determined in a two step process. The first step consisted of separating the flavonoids from constituent sugars and the rest of the honey components[2] by bulk column separation using Amberlite XAD-2 ion exchange resin[3]. The second step was a separation of the flavonoids from each other by injecting the samples into a Varian ProStar high performance liquid chromatograph (HPLC) equipped with a 250nm, 5 um Zorbax reverse phase column. As the solvents flowed through the column employing a methanol and 5% aqueous formic acid gradient, the flavonoids were chromatographically detected at 290 nm and 340 nm. The retention times of the peaks were analyzed to determine the partial identity of the flavonoid compound, along with retention ratios which compared compound peaks with the solvent peak. Initial chromatographic analyses showed the presence of ca. twenty different flavonoid peaks for Sourwood honey. The retention time and UV-Visible spectra of chrysin has been identified in the honey. The presence of other flavonoids, including quercetin, kaempferol, irisolidone, zapotitin, and daidzin, were indicated based upon UV-Visible analysis. Complete identification of constituent flavonoids is accomplished by comparison of retention times, retention ratios, and published UV-Visible spectra with known standard flavonoid, and by co-chromatography. A corresponding project included the melissopalynological identification of the pollen in the sourwood honey samples in comparison with pure plant pollen[4]. The nectar of these pure plant samples were then hydrolyzed and compared with sourwood honey samples to test honey purity. The work performed was a part of a comprehensive analysis of the flavonoids within sourwood honey.

## IDENTIFICATION OF FLAVONOID MARKERS IN POPLAR HONEY

**Silviano J Mastromarino** (Dr. Eugene Grimley) Department of Chemistry

Flavonoids are a collection of over 5,000 similar polyphenolic compounds that can be naturally found in the nectar of flowering plants. When honeybees collect plant nectar to convert to honey, the flavonoids are also collected. Because different flavonoids are expressed by different plants, the flavonoid content of the honey is directly and uniquely determined by the composition of the botanical nectar source available to the foraging honey bee. The objective of this research is to identify the flavonoid compounds associated with honey produced from the nectar of the poplar tree (*Liriodendron tulipifera*) in order to advance the effectiveness of flavonoid analysis as a viable method of floral origin determination for honey. Flavonoids were extracted and concentrated from unifloral poplar honey via separation on a column of Amberlite XAD-2 resin. Once separated, flavonoid samples were analyzed using high-performance liquid chromatography using a Varian ProStar HPLC with a diode-array detector. Run times and UV-Vis spectra of unknown flavonoids were then compared to those of known standards. To confirm unknown compound identities, samples were spiked with known standards of suspected flavonoids. Thus far, quercetin, luteolin, apegenin, kaempferol, chrysin, and galagnin have been identified as flavonoids that can serve as chemotaxonomic indicators of poplar honey.

## DETERMINING THE CONTRIBUTIONS BY RESONANCE AND INDUCTIVE EFFECTS TOWARD THE STRENGTHS OF HYDROGEN BONDS

**Michael J. Norris** (Dr. Joel Karty) Department of Chemistry

Hydrogen bonds play significant roles in many important physical and chemical processes, including a molecule's water solubility, boiling point, and biological activity[1]. A hydrogen bond is a physical attraction that is responsible for many distinct and important physical properties. It is an interaction between molecules that is responsible for water's high boiling point, the structure and function of proteins, as well as facilitation of vital processes in the body. There is a specific hydrogen bond that is one of the strongest known between a of two formic acid molecules that forms a complex. In order to assess the different contributions to the stability of this hydrogen bond, computational chemistry methods were employed. Quantifying what contributes to such a strong interaction using computational chemistry methods. Using Gaussview software on a computer, molecules were built virtually and energy calculations were carried out on these and related molecules with imposed orientations. These imposed molecular geometries allowed the separation of resonance and inductive effects. Once the calculations were computed and analyzed, we used that data to extrapolate back to the parent molecule and hydrogen bond of interest. While doing this we effectively isolated certain contributions of resonance and inductive effects quantitatively. After calculating these different contributions we found that in this specific hydrogen bond of interest, the resonance effects contributed 7 times more than inductive effects in the stability of the bond. These finding will be important in the continuing process of explaining this bond's unique stability.

## MASS SPECTRA FRAGMENTATION PATTERNS OF TRIPHENYL PHOSPHINES, ARSINES AND AMINES.

**Hannah R. Peel** (Dr. Eugene B. Grimley) Department of Chemistry

The goal of this study is to explore the formation and stability of intermediate chemical species that are formed as a result of the fragmentation process in Mass Spectrometry. Mass Spectrometry is a method of analysis that bombards injected chemical species in the gas phase with electrons to break the species into ionic fragments. The masses of this fragments are then detected by the instrument and can be used as 'jig-saw pieces' to determine the overall formula and structure of the original chemical species. The computer software, Mass Spec Calculator Pro, was used to aid in the interpretation of the recorded fragment's mass. This research focuses primarily on mono-substituted triphenyl ammine ($NPh_3$) triphenyl phosphine ($PPh_3$) and triphenyl arsenic ($AsPh_3$) derivatives with substituents fluorine, chlorine, bromine, idodine, methyl and methoxy on one of the benzene rings. Mass spectra was used to determine the composition of the ions and intermediate species that are formed inside the special conditions of the instrument, a high vacuum that allows high energy species to exist, which would otherwise react too quickly to be detected under normal conditions. This study also builds on work by a previous student, Kelsey Van Dalfsen, who performed a similar study only with ortho-substituted triphenyl phosphines. The fragmentation patterns of the compounds were found to be largely analogous to previously recorded spectra. The finding that iodine preferentially dissociated from the parent molecule in the previous test with the phosphine compounds was found to hold true for both the arsine and the amine compounds.

## GUGGENHEIM METHOD OF KINETIC ANALYSIS: A LABORATORY EXPERIMENT

**Anthony T. Pratt** (Dr. Eugene Grimley and Dr. Dan Wright) Department of Chemistry

A multifaceted kinetic experiment for physical chemistry laboratory which demonstrates the use of the Guggenheim method (1926) in pseudo-first-order reactions where absorbance at infinity is not known and which demonstrates reactant reaction order determinations has been developed. The reaction between chlorine dioxide and phenol in aqueous acidic solution was chosen because the rate of reaction is amenable to the laboratory time frame at ambient temperatures. The change in chlorine dioxide is easily followed by spectrophotometry and the reagents needed are inexpensive, stable, and easily prepared. Chlorine dioxide reacts with phenol in aqueous solution below pH 2 as a multistep oxidation-reduction reaction, as described by Gordon and Grimley (1973). The reactions were conducted with phenol concentrations in large excess of chlorine dioxide concentrations so that kinetic data would be pseudo-first-order in chlorine dioxide. Reactions were followed by measuring the disappearance of absorbance due to chlorine dioxide at 400nm. Chlorine dioxide obeys Beer's law while in the range of 0.00-0.80 absorbance units. In addition to the concentrations of chlorine dioxide and phenol, the concentration of perchloric acid and ionic strength also impact reaction conditions. The absorbance of the reaction between chlorine dioxide and phenol is unknown at infinity due to the small but significant absorbance of reactive products. Thus, this reaction may be used to demonstrate the analysis of kinetic data where final absorbance is not known. The attractiveness of this experiment lies in the ability for the grouping of class data to map out an experimental, multi-termed rate law which, in turn, provides clues as to the composition of multiple activated complexes that are explained by multiple pathways for the reaction. Initial results of experimental trials have confirmed that the Guggenheim method yields a more accurate kinetic analysis of the reaction between chlorine dioxide and phenol, and that the experimental conditions can be duplicated with standard rectangular spectrophotometric cells and pipets for quickly mixing reagents without requiring the use of expensive apparatuses.

## STUDY OF LIPID-ANCHORED PROTEIN ORGANIZATION IN YEAST CELL MEMBRANES BY FLUORESCENCE MICROSCOPY

**Tadas K. Rimkus** (Dr. Sara B. Triffo) Department of Chemistry

Improper cell signaling has been found to be the underlying cause of many major diseases, including a wide array of cancers and autoimmune diseases. Cell-signaling protein complexes are extensively organized within the cell membrane so they may effectively coordinate their functions. Lipid-anchored proteins have been studied as major factors within these cell-signaling complexes. These proteins are linked to the cell membrane by a diverse array of lipid anchors that can be made up of different motifs, including myristoylation, isoprenylation, and s-acylation. Different combinations of the three motifs make up the lipid anchors, creating a great diversity of lipid anchors. Research has shown lipid-anchored proteins are organized in the same manner as other proteins in the membrane, adjusting their positions in order to most effectively function. The same research also indicated a relationship between the lipid anchors and sterol concentration in the cell membrane (Radhakrishnan, 2010). It is not known whether the organization of lipid-anchored proteins is attributed to the identity of the protein due to protein-protein interactions, as with other membrane proteins, or to the identity of the lipid anchor. The co-localization of lipid anchors with sterols in the membrane would provide evidence that the lipid-lipid interactions between the lipid anchor and the

sterols are responsible for protein organization. This will be tested by inserting lipid-anchors genetically fused to GFP and mCherry fluorescent proteins into the membrane, retaining the lipid anchors they are attached to. This would isolate the effects of organization to only lipid-lipid interactions between the lipid anchor and the sterols in the cell membrane. By fluorescently tagging the sterols in the cell membrane, the co-localization of fluorescent proteins and sterols in the cell membrane can be studied with fluorescence microscopy, showing whether lipid-anchored protein organization is directly attributed to the identity of the lipid anchor.

## ELECTROCHEMILUMINESCENCE QUENCHING FOR DETERMINATION OF NITRATE EXPLOSIVES

**Cecilia L. Smith** (Karl D. Sienerth) Department of Chemistry

Recent research in our laboratory provides evidence that electrochemiluminescence (ECL) quenching is a viable alternative to similar methods based on fluorescence quenching for determination of trinitrotoluene (TNT) and other nitrate explosives. This presentation will describe recent research into a method that quantifies the ECL signals observed from two different luminescent substances: (a) tris(bipyridine) ruthenium(II), $[Ru(bpy)_3]^{2+}$, in the presence of the helper compound tripropylamine (TPA) at a pH of 7.5; and (b) luminol at a pH of 10.5. In the case of each luminescing substance, the expected inverse mathematical relationships were observed between concentration of added TNT and measured ECL signal. Our studies continued using luminol as the luminescor, and we will demonstrate the linear response between quenching factor and amount of nitrate quencher (TNT, DNP, RDX and DMDNB) in aqueous solution at concentrations at or below those that can be measured with competing methods.

## BCL-2 PROTEIN REGULATION OF HYPERGLYCEMIA INDUCED CARDIOMYOCYTE APOPTOSIS

**Kelsey M. Van Dalfsen** (Dr. Victoria Del Gaizo Moore) Department of Chemistry

A complication of diabetes that affects heart function, known as diabetic cardiomyopathy (DCM), contributes to the mortality of over 80% of the diabetic population. High blood sugar (hyperglycemia) has been identified as a major contributor to DCM's development and previous studies have found that apoptosis (cell death) is involved in hyperglycemia-induced heart cell damage. However, the specific cellular mechanisms regulating hyperglycemia-induced damage remain unclear. Apoptosis is coordinated by a number of different proteins and factors at the cellular and mitochondrial levels, including the BCL-2 family of proteins that control changes to mitochondria during apoptosis. This family of proteins contains distinct pro- and anti-apoptotic members and has been implicated in both survival as well as apoptotic events in cardiomyocytes. Several studies have demonstrated biochemical markers of apoptosis in *in vitro* and *in vivo* hyperglycemia cardiomyocyte models. However, the role of BCL-2 proteins in cardiomyocyte apoptosis due to hyperglycemia has not been thoroughly examined. To test the hypothesis that hyperglycemia induces changes to BCL-2 proteins leading to apoptosis, HL-1 cells, a well-characterized cardiomyocyte cell line derived from mouse atrial cardiac muscle, were studied under normoglycemic and hyperglycemic conditions. Protein expression and quantification via Western Blotting was assessed, and induction of apoptosis was evaluated using standard methods such as caspase-3 activation and MTT assays. In addition to looking at direct hyperglycemia-induced death, the ability of high glucose levels to "prime" HL-1 cells for death is currently

being evaluated. Further characterization of these changes may provide important insight regarding the specific pathways leading to the development of diabetic cardiomyopathy.

### INVESTIGATION OF BCL-2 PROTEIN-PROTEIN INTERACTIONS IN PROSTATE CANCER CELLS

**Rachel E Wilson** (Dr. Victoria Del Gaizo Moore) Department of Chemistry

Apoptosis, also known as programmed cell death, occurs both during normal physiological processes as well as when the cell becomes damaged beyond repair to allow removal of infected or injured cells. The Bcl-2 family of proteins plays a crucial role in apoptosis; once the cell receives a stimulus for apoptosis, Bcl-2 proteins interact at mitochondria causing changes within the cell itself eventually leading to cell death. There are two categories of proteins in the Bcl-2 family, pro-apoptotic (promote cell death) and anti-apoptotic (oppose cell death). In cancer cells, anti-apoptotic Bcl-2 proteins are often upregulated allowing the cells to survive under conditions in which they would normally undergo apoptosis. We are evaluating protein-protein interactions of Bcl-2 family proteins during apoptosis sin prostate cancer cells in response to chemotherapy treatments. Prostate cancer is the second most frequently diagnosed cancer in men worldwide, and overexpression of Bcl-2 anti-apoptotic proteins in prostate cancer cells has been associated with chemotherapy resistance. However, the specific Bcl-2 protein-protein interactions of chemo-insensitive cells are poorly understood. By comparing protein-protein interactions of a chemo-sensitive and chemo-insensitive prostate cancer line before and after treatment, the biochemical mechanisms resistance will be further understood, and therefore, better targeted treatments can be developed. Using the PC3 and C4-2 cell lines as models of chemo-insensitive and chemo-sensitive prostate cancer, respectively, we have assessed protein changes, the apoptotic response, and downstream mitochondrial signaling of each to the chemotherapeutic, etoposide. An overexpression of baseline anti-apoptotic protein levels have been found in PC3 cells. Furthermore, treated C4-2 cells show an increase in pro-apoptotic protein expression (Bim and Bid), while these same pro-apoptotic protein levels decrease in treated PC3 cells. Our results demonstrate the importance of Bcl-2 proteins in drug response of prostate cancer cells as well as begin to uncover the apoptotic block in chemo-insensitive prostate cancer cells.

## *COMMUNICATIONS/JOURNALISM*

### STAR IMAGES OF LORETTA LYNN AND TAYLOR SWIFT: A COMPARISON OF MEDIA IMAGES IN COUNTRY MUSIC

**Anna L. Crenshaw** (Dr. Michael Frontani) School of Communications

The entertainment industry and the stars it produces are significant parts of U.S. culture. This research examines two female stars' images created via the mass media and the historical, social, and cultural context of their images' creation and evolution. The image of Loretta Lynn, from 1960 to 1980, a period when country music was transcending its regional audience for a national mass audience, and that of Taylor Swift, who has dominated the country and global music scene since 2005, were analyzed. Rhetorical analysis of mass media documents helped determine the most important elements of each artist's image and how their images developed over time. Analysis included: 20 newspaper articles from *The New York Times* and other major papers, 15

magazine articles from *People* and other periodicals, and 17 videos, including music lyrics and interviews. Newspaper articles and lyrics were readily available for both stars. More magazine articles and videos existed for Swift, but Lynn's biographical film *Coal Miner's Daughter* was also analyzed. This research expands upon previously published scholarship, including key works by Richard Dyer (*Stars*, 1980) and Christine Gledhill (*Stardom: Industry of Desire*, 1991), which focused on star theory and analyzing film stars, by focusing upon two female music stars. Other works such as biographies and analyses of lyrics have been published, but little comparative analysis of stars' images across time exists. Key findings of this project included that Lynn's image differs from Swift's because of the changing status of both women and the country music industry. Lynn's image arose when country music was transitioning from a regional to a national genre and adapted to the feminist movement and women's changing status, representing an evolution of the female country singer. In contrast, Swift has become popular with a teen idol, apolitical image during a time when country music is part of the mainstream, representing a major transformation in country music. A star's image is polysemic, with numerous media types creating it. Technology has changed how images are created and maintained, but it is a stars' image, more than her music that keeps her at the forefront of the industry.

## INVENTING THE HUMAN(E) NETWORK: THE UNDERLYING POLITICAL VALUES OF THE INTERNET AS EXPRESSED BY MEMBERS OF THE INAUGURAL INTERNET HALL OF FAME

**Jeffrey A. Flitter** (Professor Janna Anderson) School of Communications

In a private ceremony in Geneva, Switzerland, April 23, 2012, thirty-three pioneering men and women - engineers and communications innovators - were the first people to be inducted to the Internet Hall of Fame by the Internet Society, the pre-eminent organization responsible for the invention and continuing evolution of the architecture of the Internet. This study gathered and analyzed the formal statements of the Hall of Fame inductees, illuminating the common political and social values held to be of foremost concern by these Internet pioneers as they first designed the global network from the late 1960s to the 1990s and as they see it today. Their values are designed into the hardware, software, and standards that constitute this global resource. Ours was one of two video cameras allowed to gather ethnographic data at the induction ceremony in Geneva at the Internet Society¹s 20th Anniversary conference; a team from the Imagining the Internet Center at Elon University was invited to document the event in video, still photographs, and written reports. This content analysis of Internet pioneers' videotaped and print remarks at the time of their induction indicates that they share a common belief in: open-source systems that encourage edge intelligence and discourage formal legal hierarchies; equal access for all to create and share knowledge; and the ability for free expression and "permissionless" innovation with as few governmental or nongovernmental restrictions as possible. A significant majority of the inaugural Internet Hall of Fame inductees who spoke at the Hall of Fame events say these founding principles were instrumental in the rapid adoption and diffusion of the Internet, and they say the extension of these values into the future is particularly crucial to its continued success.

## THE EFFECTS OF HUMOR IN ADVERTISING

**Keeley A. Franklin** (Dr. Byung Lee) School of Communications

National media spends about $150 billion on advertising annually; 10% to 30% of which is invested in humorous advertisements intended to spark consumer-buying behavior. Advertisers use humor as a marketing strategy to persuade and appeal to consumers through positive stimuli intending to influence purchases of a particular brand, product or service. The believed marketing ideology behind humorous advertising is that if a consumer is exposed to positive stimuli in an ad, in this case humor, than he or she will be more likely to remember the ad and think more favorably of the brand or company behind the advertisement (Spotts, Weinberger, & Parsons, 1997). More recently, humorous advertisements have been used to increase consumer awareness and increase purchases of unsought goods such as car insurance. Geico, Allstate, Nationwide and Progressive are car insurance companies that have turned to humor as a persuasion tactic in their commercials to entice consumers.

Building on studies of the effects of humor of advertising, this research attempted to gain a comprehensive understanding of how a college-aged demographic responds to humorous advertising as it relates to brand recall, humor mechanism/relatedness, product type, brand perception, and intent to purchase.

The research conducted for this survey began with a qualitative focus group. The information gleaned from the results of the focus group was used to create a convenience sampling survey. In appealing to a college-aged demographic, the results of this study found that humor in advertising is an effective tool in enhancing brand cognition and awareness. Brand perception was enhanced through the positive responses to humorous advertising. Although Chattopadhyay and Basu (1990) found that humorous advertisements are more effective when the audience already has lasting positive attitudes about the brand, this is not necessarily true in terms of unsought goods. A positive correlation was seen between the stronger advertisers and favorable brand attitudes. An unexpected outcome of the effects of advertising was the idea that humor advertising expands its realm of reach through buzz marketing and social media as the college-aged demographic is more likely to share an advertisement if they find it humorous.

## MOTIVATING BEHAVIOR CHANGE: A CONTENT ANALYSIS OF PUBLIC SERVICE ANNOUNCEMENTS FROM THE LET'S MOVE! CAMPAIGN

**Maria P. Georgiadis** (Dr. Glenn Scott) School of Communications

Childhood obesity is an important issue facing our country and as a result, public health programs including the Let's Move! campaign have been implemented to prevent this growing epidemic. The Let's Move! campaign released a series of print, TV, radio and outdoor public service advertisements meant to influence publics and motivate behavior change. Through a content analysis of the print and TV PSAs from the Let's Move! campaign, this study found that health messages were strategically communicated with a series of separate but cohesive PSA ads that displayed consistency in messages, logos and themes, ultimately creating a brand for the campaign that was easily recognizable to publics. Furthermore, messages were tactically targeted to parents and kids of different ethnic and socio-economic backgrounds for appeal across a broader audience. PSAs used techniques drawn from the social cognitive theory and health belief model to increase self efficacy by showing rather than telling target audiences how to make the

requested action, influencing attitudes towards childhood obesity, and ultimately motivating behavior change.

## THE MEDIA OF WHITE AMERICA: COMPARING THE PRESS COVERAGE OF 'THE OTHER'

**Caitlin M. O'Donnell** (Dr. David A. Copeland) Communications

Historically, the media have been used to outline the context and dictate the conversation surrounding groups of people outside the traditional understanding of "white America." The media often uses a tactic called framing to quickly categorize topics and construct narratives. This project seeks to compare the press treatment of five key groups in response to a societal catalyst that propelled them into the public and media spotlight: Native Americans during the Indian Wars; women during the suffrage movement; African Americans during the Civil Rights Movement; Japanese Americans following the attacks on Pearl Harbor and during interment; and Muslim Americans following the 9/11 attacks.

This project argues that, in the case of all groups, a tipping point forced them outside the "status quo," and led to pointed and biased coverage, usually in conjunction with dominant prejudices of the era, both complementing and supplementing the public's view of the topic and often manifesting in direct action. In all the studied cases of media framing, this project argues the press had a specific reason for their actions, whether it be to protect the ruling majority or defend the country against those that posed a threat to the American identity. No matter which direction the media frame tilted one commonality remained throughout all five groups: When in the crosshairs of the media, the people group was not the norm and was, rather, categorized as "the other." While media treatment of each group has been studied individually, this project is groundbreaking in that it explores the commonalities between them, arguing that the influence of prejudice on the 20$^{th}$ century press has been constant.

Methodology used in this study includes analysis of print reports from multiple media outlets, including both text and visuals, to identify framing techniques (such as language, structure, and themes) as well as study of secondary sources to provide historical context. To gauge public reaction, close attention was given to firsthand accounts from those within each group, as well as published accounts of treatment against them.

## THE USE OF FRAMES IN POLITICAL CARTOONS DEPICTING SUMMIT MEETINGS DURING THE COLD WAR

**Mary A. Rouse** (Dr. Harlen Makemson and Dr. Laura Roselle) School of Communications and Department of Political Science

Political cartoons are a uniquely visual medium, capturing a moment in national discourse regarding a salient issue or event. During the Cold War, cartoonists sought to give meaning to momentous and important events such as summit meetings between the United States and the Soviet Union. This study examines whether summit meetings between the two superpowers were portrayed more as an arena for international cooperation or as examples of the danger and selfishness of the enemy. Published scholarship has examined the role of political cartoons in reflecting national discourse, and this research builds on that idea by analyzing supposedly peaceful events in a tenuous time period to determine which of the competing messages of peace

or aggression was highlighted by cartoonists. Using a frame analysis developed from the previous research of Gamson and Stuart (1992), cartoons from the *Washington Post* published surrounding the time period of three summit meetings spread throughout the conflict (1959, 1972, and 1987) were examined for their prevailing message. The frame of Common Security, meaning peace and unity, was found to be more prevalent across the period of the Cold War, while the frame of Soviet Expansionist, meaning the emphasis of the Soviet Union as an enemy and their use of weapons or force, was slightly less common. However, the frames shifted in their popularity, with the Soviet Expansionist frame seeing less use as the conflict continued and the Common Security frame seeing greater use. These results might be seen as a reflection of the lessening of tensions between the two superpowers as the Cold War came to an end and as the reality of mutually assured destruction set in. Thus, political cartoons are further found to reflect national discourse, cementing their place as an important media element for study.

## ORGANIZATIONAL VALUES IN CRISIS COMMUNICATION: EXPLORING THE USE OF CORPORATE CODES OF VALUES IN PUBLIC RESPONSES TO CRISES

**Baron A. Smith** (Dr. Lucinda Austin) School of Communications

Over the past decade corporations have become more accessible to publics, due in part to the advent of social media and increased interaction between corporations and publics. However, this increased accessibility comes with a heightened degree of scrutiny. Corporations' actions, donations, or associations with other entities can be politicized and rapidly turn into a crisis. These crises often place corporations in situations where they are asked to take values-based positions on issues. Corporations are increasingly humanized, as seen in the Supreme Court's ruling in *Citizens United v. Federal Election Commission*, and expected, more than ever, to act and communicate with sincere and consistent values. Although many corporations have published codes of values, questions remain as to how organizations use these values. What role, if any, do these values play in how corporations communicate? Little research has analyzed how corporations adhere to these values in practice, specifically in handling crises. To examine the use of corporate codes of values in times of crisis, this study explores corporations' public responses to crises and how these responses align (or not) with organizational codes of values.

This study utilizes a qualitative content analysis method to examine the relationship between corporations' codes of values and their public responses during crises. Communication issued through press releases and social media pages of five high-profile crisis communications cases are examined, in conjunction with corresponding codes of corporate values. Using a constant-comparative approach, each corporation's codes of values are compared with their public communication about the crisis to query whether corporate responses in crises follow published values or if they deviate.

Preliminary findings suggest that some corporations act with regard to their values in public communications during a crisis, particularly as a way to justify their position and reasoning when faced with scrutiny. However, some corporate codes of values are not clearly highlighted on company pages, and many are vague in their wording, rather than taking concrete positions. By doing this, perhaps corporations are still trying to remain largely neutral on their positions.

## THE PULITZER CENTER ON CRISIS REPORTING: REPORTING ON ORGANOPONICO VIVERO ALAMAR DURING WINTER TERM 2013

**Rachel E. Southmayd & Kassondra L. Cloos** (Dr. Glenn Scott) School of Communications

In 2012, Elon University joined the Campus Consortium of the Pulitzer Center on Crisis Reporting, a Washington, D.C.-based organization that exists to encourage high-caliber, ambitious journalism projects with a focus on underreported stories and areas of the globe. ("About Us," n.d.) This campus collaboration selects a "fellow" each year to complete an independent reporting project. This year, Elon selected two journalism majors to be "fellows" and travel to Cuba to research, report and prepare a project on Organoponico Vivero Alamar (OVA), an ultrasustainable and organic urban farm outside Havana, Cuba.

This reporting experience provides the case study for this research project's essential question, which is, "How does firsthand experience in developing countries alter the reporting experience?" This question is important because it impacts the way journalists report on issues and people from countries outside their own.

We sought to answer this question through standard journalism methods: research, interviewing, photography, filming and basic observation, which was compiled into the project visible here: http://pulitzercenter.org/projects/cuba-agricultural-sustainability-government-economy-organoponico-vivero-alamar. This was combined with the study of previous research about reporting in developing countries (Dorman, 1986), the ethics involved in this type of reporting (Wasserman, 2009) and the concept of hybridity, or the distortion and melding of messages in the media when they cross cultural boundaries (Kraidy, 2005).

Our findings reflect those of Dorman, Wasserman and Kraidy. Within the scope of creating this project, it was necessary to recognize that as American journalists, we were incapable of giving a true unbiased account of Cuba (Dorman, 1986). We needed to negotiate our ethical sphere in our approach to reporting (Wasserman, 2009). And finally, we needed to monitor the way we used hybridity and avoid altering the message while still placing it in a contextual sphere our audience could comprehend. The largest conclusions from our research and project development is that reporting and journalism are necessary in today's society to confront peoples' expectations about Cuba and that the most basic role of journalism (to inform) is still relevant even in today's constantly connected world.

## FILM AUTHORSHIP: EXPLORING THE THEORETICAL AND PRACTICAL SIDES TO AUTHORSHIP IN FILM PRODUCTION

**David M. Tregde** (Prof. Nicole Triche) School of Communications

Film authorship has been a topic of debate in film theory since the *Cahiers du Cinema* critics first birthed auteur theory. These film enthusiasts in France studied American films and found a connection between a film director and his body of work: a sort of personal thumbprint that connects the films and identifies those films with that director. American critic Andrew Sarris penned the term auteur theory and categorized directors based on their level of artistic authorship, basically solidifying the idea that a director is the sole author of a film. While the auteur theory is easy to grasp and allows moviegoers to appreciate a director for his or her style, it leaves out the contributions by other artists on a production. In his book *The Schreiber*

*Theory*, David Kipen argues that a writer is responsible for creating the world of the movie and should be looked to as the main author of a film. Nonetheless, this theory also neglects the input of the visual artists like production designers and camera operators. This is why collaborative theories proposed by theorists like Paul Sellors provide a more realistic framework for studying film authorship. However, rarely are any film authorship theories compared with specific examples. Rather, film authorship analysis has been limited to looking at a film after release and guessing as to its artistic origins. To compare theory to practice, this research took a two-fold approach. First, theory is compared and contrasted with examples from behind the scenes featurettes and full-length documentaries about fictional feature films. Second, this research documents the production of a short film as a case study in collaborative film authorship. By observing this microcosm of a production in the context of film authorship, we are able to observe theory in practice during the process rather than as an afterthought.

# *COMPUTING SCIENCE*

### CLASHROOM: HOW VIDEO GAMES CAN ENHANCE CLASSROOM EDUCATION

**Dan R. Eagle, Riese P. Narcisse & Thomas W. Price** (Dr. Shannon Duvall) Department of Computing Sciences

Video games and education have a lot in common. Both games and education require doing some kind of work while receiving feedback and rewards. The major difference is that games are voluntary; you only play games when you want to play them. On the other hand, class is more or less mandatory. There are very real consequences for not participating in the educational system. So, we would like to study whether or not a game can get players to volunteer their time to do academic work by making it intrinsically enjoyable. How do you make traditional/formal education engaging like a video game?

Our project will use a classroom metagame layer as a tool to analyze how or if games can further our engagement in education. We will present a game we created that offers optional content to further engage students with everyday class. The game is web based and connects the students in a class with each other in multiplayer RPG-style gameplay. The professor of the class is the orchestrator for all of the quests and rewards obtained. We will present a user interface that allows the professor to easily tailor the game to enhance the learning objectives for students in any particular class.

Further, we will draw conclusions about important open game design questions given our experience. In particular, we will show how to vaguely define a game and still guarantee the game will be engaging. We are also investigating what kind of intrinsic and extrinsic rewards are needed to get players to play serious educational games.

# *DANCE*

## COMPARING THE ACTIVATION OF FOUR DIFFERENT MUSCLES DURING A PASSE RELVE AT AND AWAY FROM THE BARRE

**Colette M. Dong** (Professor Lauren Kearns) Department of Dance and Department of Dance Science

The purpose of this research is to explore dimensions of muscle tension during a dance movement commonly seen in ballet. To the general public, ballerinas appear to move effortlessly. However, those involved in the dance world know that this is not the case. There is an extreme amount of muscular strength involved in ballet technique and although it may not appear that way to the public eye, many ballerinas grip and tense their muscles to obtain a certain aesthetic goal. It is important to find out whether muscular tension contributes or detracts from a dancers true range of motion. This specific study focuses on the activation of the right and left rectus abdominins as well as the right and left erector spinae during a ballet balance in the position known as passé releve. Three measurements were obtained using EMG surface electrodes. First a maximum effort was recorded by having the participants hold a Pilates teaser. This exercise exerts the abdominal and back muscles immensely. Participants were then asked to go to the barre. The barre is a rod mounted to the wall used in the beginning of each ballet class to support the dancer before the transition into the center of the room. The balance was performed with the barre for support and then in the center without it. Muscle activity was recorded and moments of instability and falling were noted. Data is still being analyzed from this collection, but when a pilot study was performed it was suggested that the participants were activating their abdominals more at the barre than in the center.

## PARANOIA IS A SKILL: A CHOREOGRAPHIC STUDY ON MENTAL ILLNESS

**Jennifer A McAllister** (Professor Jen Guy Metcalf) Department of Performing Arts

My research is unique because it does not seek to answer a specific question, but rather hopes to serve as an instigator for further discussion on the tabooed topic of mental illness. My formal research on this topic has inspired an original, contemporary dance work, “Paranoia is a Skill”, which will be performed at the American College Dance Festival (ACDFA) in Tampa, Florida during the week of March 12$^{th}$ through March 16$^{th}$. The American public downplays the fact that individuals with severe mental illnesses are not granted the treatment they need, either because of the lack of awareness, as there is a stigma against mental illness as opposed to a physical one, or the lack of proper resources. Many Americans do not realize that their friend or even a member of their own family may be struggling with a mental illness, as many affected individuals are experts in hiding their illnesses from the surrounding environment. My research project seeks to raise awareness about the lack of resources available for people with a mental illness, including things such as lack of health insurance, counselors, and proper medication, and to prompt people to have further discussions on how we may improve our mental healthcare system. Along with this, since much of my evaluation process will result from the feedback I receive by dance experts at ACDFA, this project also serves as an opportunity to learn more about the art of choreography. By receiving feedback on the structure, musicality, and overall choreographic skill of the work, I will be able to both refine and expand its message so as to make it clearer to the audience. This research is about engagement, prompting discussion and

raising awareness on the social stigmas surrounding mental illness. Along with this, this research also demonstrates that the arts can be used as a vehicle to shed light on difficult topics in both an abstract and emotionally engaging way. At this time, my research and evaluation process has a further to go, and is contingent on the informal feedback I receive at the American College Dance Festival Association.

## DANCING DE MILLE: CLASSIC MUSICAL THEATRE DANCE PRESERVED FOR THE EDIFICATION OF A NEW GENERATION

**Jessi N. Rexroad** (Professor Lynne Formato) Department of Performing Arts, Dance Performance & Choreography

Art is often about being new, innovative, different. Why then should an artist such as myself care so much about preserving the work of a choreographer whose greatest contribution to the dance world occurred almost seventy years ago?

Agnes de Mille's choreographic works have changed the very definition of what it means to be a dancer, both on the concert and Broadway stage. With ground-breaking musicals like *Oklahoma (1943),* Agnes de Mille brought ballet to Broadway, character to choreography, and depth to the cliché chorus girl. De Mille turned the rigid structure of classical technique on its head by integrating movements from the emerging modern field, trivial folk dances and other colloquial steps amidst the elegance and structure that ballet had long since taken for granted.

Agnes de Mille brings a certain flair to her dancing and choreography that no other artist has been able to fully master, ―her ability to define and convey character through the use of gesture; her skill in blending an eclectic variety of dance styles and genres; her sense of timing, especially in detailing a broadly comic or subtly humorous moment; and her unerring sense of theatricality are all distinct elements of de Mille's style, and today's art would not be the same without them. Even beneath the bright lights and glamour of Broadway, de Mille's work rings with honesty. Dance is an art form uniquely preserved inside the bodies of the artists who practice it. As the years pass, dancers who have de Mille's legacy in their bodies grow older and the danger of her contributions being lost increases.

*Is there a way to teach today's dancers to understand the classic de Mille style in order to inspire a new generation of artists to appreciate and embody her work?* As a dancer, my research methods primarily involved what I know best—movement, action, dancing. Through developing my own curriculum and teaching classes to a variety of dance students as well as through learning and notating pieces of de Mille's original work, I have attempted to answer this question.

# *ECONOMICS*

## GENDER INEQUALITY AND ECONOMIC GROWTH

**Katherine L. Easom** (Dr. Jennifer Platania) Department of Economics

Throughout the world, in both developed and developing countries, there is evidence of gender inequality and discrimination. In the poorest countries, only five percent of adult women have any secondary level education and throughout the world the average number of females in managerial positions is less than thirty percent. Although gender inequality is typically thought of as a social justice issue, there is evidence that it also affects the economy. When women are paid less than men for doing comparable work, women make on average two-thirds what men make, there are consequences that affect the economy as a whole. This paper looks at how gender inequality affects the growth of a country by using a two-stage model to control for endogenous effects. The paper finds strong that increased gender inequality leads to lower economic growth.

## A STUDY OF THE SHORT-RUN AND LONG-RUN EFFECTS OF YEAR-ROUND SCHOOLING ON STUDENT ACHIEVEMENT IN WAKE COUNTY, NC

**Celia Rose Eddy** (Dr. Katy E. Rouse) Department of Economics

The majority of states' budgets for primary school education have been cut in the past five years, with 35 states now operating at lower budgets than they did in 2008. Wake County, NC, the largest school system in the state, has been faced with both budget cuts and increased student population. In the face of such changes, the school district enacted a policy that changed dozens of primary schools to a multi-track year-round (MTYR) calendar, as well as mandated that new schools be opened on the MTYR calendar. This policy created an interesting case study regarding differences in achievement between traditional and year-round student populations. The potential achievement gap between these two groups has been studied in the past, with evidence that points to both benefits and drawbacks to the use of the year-round calendar. Two papers in particular studied Wake County. This paper seeks to add to that research by adding two more years of data to the study. Using school and grade-level data, this paper uses a fixed-effects model to study to potential effects of year-round schooling on achievement. Furthermore, a variable is added to the model that captures the number of years each school has been on the year-round calendar. In adding this variable, this model evaluates whether the impact of YRS on achievement changes based on an "adjustment period" by teachers, students, and families. Descriptive results show that year-round schooling seems to have a positive impact on end-of-year math standardized test scores, and no significant effect on reading scores. However, in the fixed-effects model, which controls for both observed and unobserved school characteristics across models, neither math nor reading is significantly affected by year-round schooling. Even with the addition of the variable for number of years, reading and math are not significantly affected. The findings of this paper are different from similar papers published in the past, which could be due to the used of school-level data instead of student-level data. In future studies, more years and more specific data could be helpful.

## DOES AN UNDERVALUED YUAN ACTUALLY GIVE CHINA A TRADE ADVANTAGE?: A LOOK INTO CHINA'S EXCHANGE RATE AND BILATERAL TRADE

**Kathryn O. Hjalmarson** (Dr. Stephen DeLoach) Department of Economics

The ever increasing U.S.-China trade imbalance and complaints from U.S. manufacturing firms and workers over the competition brought on by Chinese imports have led many policymakers to call for a more aggressive U.S. stance against certain Chinese trade policies concerning its fixed exchange rate to keep the Yuan undervalued. While many policymakers stress the importance of exchange rates on the bilateral balance of trade, conclusive evidence does not exist to prove that an undervalued Yuan significantly improves China's bilateral balance of trade with not only the United States, but also with all of its trading partners. Using data collected from the world databank, global insight, and the IFS, I explored the relationship between China's exchange rate fluctuations on its bilateral balance of trade with 190 trading partners from 1960 to 2011 using the gravity model of trade. Specifically, I hypothesized that an appreciation of the Yuan, in actuality, would not significantly decrease Chinese exports altering its bilateral balance of trade. After controlling for a variety of factors such as distance and GDP, I found no evidence to support that a depreciation of the Yuan significantly affects China's number of exports and imports. By understanding that fluctuations in China's exchange rate do not affect its balance of trade, U.S. policymakers can better grasp that regardless of what happens with the Yuan, there is no evidence that depreciation is helping their trade balance.

## SAVINGS, DEPENDENCY, AND CREDIT CONSTRAINTS

**Gregory M. Nantz** (Dr. Steve DeLoach) Department of Economics

The relationship between savings rates and proportion of dependents to non-dependents in a country population has been a major focus of the economic development literature. As countries continue to age, economists and policy-makers have become interested in how other variables might mitigate increases in the proportion of dependents to non-dependents (also know as dependency ratios). Using panel data from 214 countries collected over a fifty-one year period, three FEGLS econometric models are created to test the relationship between savings rates and population dependency ratios, controlling for the effects of credit constraints. While youth dependency is insignificant, old age dependency and life expectancy are shown to have significant, negative effects on savings, even after controlling for credit constraints. In addition, as credit becomes more available, savings rates decline. These results highlight the importance of understanding how other variables might inform the relationship between savings and population dependency.

## WHAT MAKES WORLD'S FAIRS SUCCESSFUL IN U.S. CITIES?

**Bethany P. Neeb** (Dr. Thomas Tiemann) Love School of Business: Department of Economics

This paper uses data from the 27 major World's Fairs that have been held in U.S. cities since the original fair in 1851 to answer the research question of what makes World's Fairs successful in U.S. cities. This is a beneficial empirical addition to existing research because cities that have hosted a successful World's Fair experience the long-term economic benefits that come from increased visitors and spending. The data included in the study were the average number of

visitors per day at each fair, the number of countries represented at the fairs, the number of U.S. states represented at the fairs, the number of acres that each fair spanned, monetary profit or loss of the fairs, ticket cost, number of fairs held prior in each city, and how many years have passed since the first fair in 1851 (to account for increasing popularity of fairs over the years). Success of the fairs was measured by the average number of visitors per day. Monetary profit or loss was not used to measure success because a fair could technically experience a monetary loss but still be considered successful due to the economic boost the city sees from increased spending and visitors. Furthermore, monetary profit or loss and ticket cost were not calculated because they were not controlled for inflation over the years. A regression reflected the variables representing the number of countries represented at each fair, the size of the fair in acres, and the years that had passed since the original fair in 1851 each had a statistically significant, positive effect on the success of the fair. On the other hand, the number of U.S. states represented at each fair and the number of fairs held in the respective city prior were not found to have a significant impact on success of the fair.

## URBAN DEVELOPMENT AND INVESTMENT IN GERMANY

**Alexander D Spitz** Dr. Thomas Tiemann (Department of Economics)

The European Commission created the European Regional Development Fund in hopes to fund for projects and initiatives across Europe. The main idea as to why they would do this is to promote sustainable growth and cohesion within the European Union. Past literature has tested whether regions and cities across Europe are converging on these goals. This paper takes another direction, rather than looking at Europe, I look at Germany and how investment decisions for urban growth have fared there. I find that regional investment is helping growth, in German regions, however there are some regional indicators that have yet to converge. Given this knowledge it would be advisable to promote investment in areas that still seem to be weak for future investment programs.

## WAGE PREMIUMS & COSTS OF EDUCATION

**Justin L. Wanner** (Dr. Vitaliy Strohush) Department of Economics

The question addressed in this research is whether or not higher education is fundamentally valued. That is, is it worth it to pursue higher education or is there a bubble? This is important for potential students, academic institutions, banks/lenders, and the entire economy. We employ data from the National Longitudinal Survey of Youth 1979 (NLSY79) to estimate wage premiums of college graduates over high school graduates for the period 1979-2007. We used these wage premiums to construct fundamental values for costs of higher education and compare them to the actual average costs of higher education. We find that the actual prices of higher education are not justified by their fundamental values, suggesting the possibility of an asset bubble in the U.S. higher education sector.

# *EDUCATION*

## TEACHING SINGLE DIGIT ADDITION TO STUDENTS WITH AUTISM: A KINESTHETIC INTERVENTION

**Kelsey D. Haines** (Dr. Stephen Byrd) Department of Education

Autism is a growing disability that now affects 1 in 88 people according to the US Center for Disease Control and Prevention. Though it is common belief that all students with autism are gifted in mathematics, this is not the case. Many students struggle with simple arithmetic and require intensive interventions in this area through special education services. However mathematic interventions for students with autism are not well researched and often focus on using concrete manipulatives such as colored chips or links. This study was conducted to determine whether a kinesthetic (defined as moving one's whole body through space) mathematics intervention could improve students with autism achievement in single digit addition.

The study employed a single-subject multiple baseline design in which two elementary students with autism who struggle with single-digit addition were provided with an original kinesthetic intervention. The intervention included an original carpet with the numbers 1-10 vertically represented. During their individual sessions, the student jumped on carpet to represent and determine answers to simple addition such as 2+5. The researcher worked with each student using the formulized kinesthetic intervention 2-3 times per week over a three-month period in a local school. Data was collected using both a pre and posttest as well as quizzes before and after each intervention session.

The researcher found that both students exhibited improved single-digit achievement. However, the student with higher cognitive abilities showed a greater achievement following the intervention than the student with lower cognitive abilities. These findings seem to support the fact that some students with autism struggle with mathematics and benefit from specific kinesthetic interventions. Furthermore, it can be hypothesized that in addition to autism, the students' cognitive abilities play a direct role in their rate of mathematical achievement for single-digit addition. Most importantly though, the study results demonstrate slight but positive academic growth for students' mathematical achievement from the kinesthetic intervention as demonstrated through multiple data sets. Further research can expand these findings to determine the extent of the positive outcomes for kinesthetic approaches for students with autism who also have mathematical difficulties.

## A CASE STUDY ON THE EXPERIENCES OF HIGH ACHIEVING MATHEMATICS STUDENTS IN THE ELON ACADEMY: HOW HAS ACADEMIC SUPPORT CONTRIBUTED TO THEIR SUCCESS?

**Sandra J. Weiss** (Professor Jan Mays) Department of Mathematics and Statistics

This research aims to answer what kinds of academic support have shaped and supported the mathematics achievement among successful students in the Elon Academy. The Elon Academy is an Elon University community outreach program that works with the local school district, Alamance-Burlington School System, to give low-income high school students opportunities for

advanced levels of success in high school and access to post-secondary education. Looking at successful mathematics students in a selective program in order to identify factors that have contributed to their success through a case study approach contributes to how the Elon Academy can most effectively support the enrolled scholars in mathematics.

Because of the great disparity in mathematics achievement between diverse populations, it is important to recognize success and reflect on the academic support that influences it. There have been a large number of studies pertaining to achievement gaps and reasons behind failure. As attention shifts towards factors that influence successful students, individual experiences lead to the construction of models for high achievement. Research with the Elon Academy adds to the discussion that focuses on success rather than failure. The findings reflect the specific elements of our particular case study, while also adding understanding to the broader discipline. For these reasons, our research is a relevant and valuable contribution to the discipline and Elon Academy.

Data collection for this case study was done through participant observation, interviewing, and various sources of written and non-written data. Transcribing, coding, and analyzing revealed that the importance of each type of support lay in how it fostered mathematics persistence and effort. Expectations, encouragement, and accountability from external sources impacted the achievement of the participants by increasing their motivation to persist. Additionally, knowledge of and access to resources contributed to the success of the four students in this case study by providing them with outlets for increasing their understanding. Further research and questioning should follow the findings from these in-depth interviews in order to uncover how high achieving math students are best supported.

# *ENGLISH*

### CLEANLINESS IS NEXT TO IMPOSSIBLE: A STUDY OF HEALTH AND CLEANLINESS IN MY ANTONIA

**Jacqueline D. Alnes** (Dr. Jean Schwind) Department of English

Willa Cather, the author of My Antonía, is largely applauded for her interpretation of early American life on the plains of Nebraska within her work. Because many of her novels are largely historical and place-centered, it is important to analyze her work alongside contemporaneous texts and events. In this research paper, I use new historicism as a critical lens. New historicism is a type of literary theory that compares texts in order to reach conclusions about society, literature, and the relationship between the two at any point in history. I used new historicism to compare a resource entitled "Health and Cleanliness" (published in 1915) to the representation of health and cleanliness efforts on the Nebraska plains as depicted in Cather's 1918 novel, My Antonia. Within the novel, there are two families who live within close distance of one another, but employ divergent methods of personal and household hygiene. These two families are the Burden family, and the Shimerda family, contrasted by their status as "white settlers", and Bohemian immigrants, respectively. As a product of studying these co-texts, I propose the idea that through Book 1 of My Antonia, Jim Burden (as a white male) embodies the hegemonic societal values of cleanliness as presented in the contemporaneous instructional text, "Health and Cleanliness". Additionally, I argue that the areas of household upkeep and stature, and food

storage and preparation are specific instances Cather utilizes Jim as a character to demonstrate the 'proper' methods of health and cleanliness as advised by society, and speak out against the poor practices of immigrants during the time period.

## STAGING HISTORY THROUGH SHAKESPEARE'S HENRIAD

**Elizabeth M. Floyd,** (Dr. Megan Isaac), English

In 1598, William Shakespeare penned the play *Henry V* under the political influence of the Elizabethan Era. Shakespeare reinterpreted and embellished the historical figures and events surrounding the Battle of Agincourt for the purpose of creating a political message that was relevant to his Renaissance audience. In turn, the major English productions of *Henry V* that follow from the first post-Renaissance performance and span the years from 1723-2012 have reinterpreted Shakespeare's texts in order to create a production to play towards their own political agendas. Throughout this era, *Henry V* went in and out of vogue: it was considered irrelevant when England was stable, but the moment the country was threatened by an outside force, *Henry V* became essential to the British theatre season. This presentation will primarily explore how different political climates are this is reflected in three major productions of *Henry V*: Charles Calvert's 1872 production during the Franco-Prussian War, Laurence Olivier's 1944 film during WWII, and Nicholas Hytner's 2003 production during the Invasion of Iraq.

## "HALF AGONY, HALF HOPE:" (Austen, 1817/1995, p. 158) LETTERS OF COURTSHIP IN *PERSUASION*

**Sarah R Lentz** (Dr. Janet Myers) Department of English

This paper is part of a larger project that uses a new historical lens to examine the following question: In what ways do Jane Austen's male characters adhere to or resist 18th-century letter writing conventions, and what motivations associated with 18th-century masculinity influence the content and import of their letters? I juxtapose *Persuasion* and the letters within the novel with non-literary texts such as conduct books written in epistolary form and 18th-century letter writing manuals, which contain sample letters that serve as models for correspondence. Although this presentation focuses primarily on Captain Wentworth's letter, I also explore other instances of male letter writing in the novel, particularly Mr. Elliot's letter, which reveals his questionable character and serves as a powerful contrast to Captain Wentworth's.

I argue that Wentworth's letter to Anne, which is delivered at the novel's climax, addresses and resolves two of the novel's greatest concerns: the problem of "in-betweenness" (Tanner, 1986/1995, p. 232) and the problem of communication between the lovers. The first problem refers to the historical context. England was in a transitional period with respect to perceptions of masculinity during the Napoleonic Wars. Consequently, Wentworth is caught between two different masculine ideals: the rigid and controlled, and the natural and sincere. I examine the ways in which Wentworth's letter manifests this tension. The second problem addresses Wentworth's inner battle to confront his repressed feelings for Anne, and subsequently to express them to her. Prior to the letter, Wentworth and Anne resort to other nonverbal communications such as looks and gestures, which prove insufficient in clarifying their understanding of one another.

I conclude that the historical context of "in-betweenness" creates a problem of communication in the novel, which Captain Wentworth's letter resolves by allowing him to follow rules and conventions while also expressing his feelings. Other standards of propriety and conduct, such as the pressures of social decorum and propriety, don't necessarily allow for that degree of freedom of expression.

## RHETORICAL STRATEGIES FOR COMMUNITY BUILDING IN THE FORWARDS OF THE DSM

**Kelsey M. O'Connell** (Dr. Rebecca Pope-Ruark) Department of English

My overall research examines the rhetorical strategies at work in the community discussions surrounding the development of the new Diagnostic and Statistical Manual of Mental Disorders (DSM), especially as related to Generalized Anxiety Disorder (GAD). Presently, I am exploring how the forwards of the DSMs reflect community building in the mental health community.

Professional Writing and Rhetoric (PWR), my concentration area in the English major, has a long history of exploring complex communities like social work and engineering, and I have had the amazing opportunity to combine my interests in psychiatry and rhetoric by examining the psychiatric community and its impact on the forwards of the DSM. The forwards are texts at the beginning of each manual that tell the story of the DSM. It is important to study these texts because it is so crucial to understand how communities talk about themselves and continue their knowledge in order to understand the impact of the texts themselves on the community.

To examine the forwards, I used a neo-Aristotelian analysis with Cluster analysis looking for evidence of how the forwards might be used to legitimize the text in the idea of the community and also to shape the community. The major conclusions I will present at SURF pertain to how the forwards can be seen as community creation myths with a purpose of text legitimization.

## INNER LIVES ON THE PAGE: STUDYING CRAFT IN READING AND WRITING POETRY

**Rob J. Shapiro** (Dr. Kevin Boyle) Department of English

This project asks the following: what makes successful contemporary American poetry successful, and how can we integrate these attributes and techniques into our own poetry? This project is important, because poetry is a medium that has been a cornerstone of art communities for centuries, and continues to be influential today. In our minds the most important work is the creation of art, for art creates a "permanent" record of what a lived life feels like, how the depths of human emotion can be revealed. This is the goal of our project.

For this project, we began a cycle of reading, writing, and revising—the process that is used in every level of creative writing workshop. During the SURE period, however, the process was greatly intensified. We read two collections of poetry each week, I would write one original poem each week with integrated structural aspects from the collections, and I would revise the poem from the previous week. Through this process, we exposed ourselves to several authors with diverse styles and backgrounds, and tinkered with our own new material to produce more successful works.

In the fall, I continued writing new material and using the techniques I picked up with Dr. Boyle in my creative writing senior seminar. In January, I read and critiqued Dr. Boyle's new manuscript of poems, allowing us to continue the dialogue we had over the summer, yet exploring new creative territory regarding how we explore poetry together.

I am very proud of the results. Over the summer, I wrote eight new poems and read fifteen collections of poetry by authors whose works have come to influence my own writing in exciting ways. Since the project, I have won Elon's poetry competition judged by the visiting poet, A. Van Jordan, and I feel my work has improved.

It would be a pleasure to talk more about our process, the poets I read, my plans for after this project and after Elon, and read some poems.

**SHERMAN ALEXIE AND MODERN NATIVE AMERICAN NOSTALGIA**

**Jane Siegel** (Dr. Jean Schwind) Department of English

Abstract: The contemporary Native American writer Sherman Alexie both celebrates nostalgia as a desire to conserve what's valuable in the past and ridicules it as an attempt to live backward instead of forward. His celebration of nostalgia is most evident in his *War Dances* series of odes and in stories about Indians who unsuccessfully try to make it in the world off the reservation in *The Lone Ranger and Tonto Fist-Fight in Heaven*. Alexie's critique of nostalgia is most vividly captured in a memorable image in *Smoke Signals*: the reservation car only operates in reverse. Alexie's film *Smoke Signals*, collection of short stories *The Lone Ranger and Tonto Fist-Fight in Heaven*, and ode poems from the collection *War Dances* make up the primary texts that this analysis evaluates. This paper critically argues that Alexie is promoting a hybrid postcolonial Indian identity that encompasses a blend of a progressive modern American orientation with nostalgia for what is of value from their history and past. Using a postcolonial critical lens and Homi K. Bhabha's theory of unhomliness, I explain how and why Alexie alternately rants against nostalgia as a terminal "Indian disease" and flaunts his own mild case of infection.

**THE QUEST FOR WALDEN POND: THE ARTHURIAN MOTIF IN THOREAU'S *WALDEN***

**Christopher R Sonzogni** (Dr. Cassie Kircher) Department of English

Some critics argue that the lack of a clear narrative structure in Henry David Thoreau's *Walden* makes the text inaccessible to many readers. *Walden* does follow a loose seasonal chronology that suggests a progression of time, organization, and narrative: a chronology that is countered by the explicit organization of the book into thematic topics, such as the flora and fauna that Thoreau reflected on during his two-year stay at Walden Pond. This implicit seasonal chronology, my paper argues, is relied on too heavily by readers and critics alike. I argue that the Arthurian quest narrative consists of integral pieces: a specific hero (in this case, Thoreau himself), an object or reason for a quest (to "simplify"), and a desire for adventure (as told in Thoreau's own voice). This narrative is submerged under Thoreau's non-narrative plot. However, by bringing the Arthurian narrative to the surface and casting Thoreau as an Arthurian hero instead of a transcendentalist philosopher, I offer a new lens through which to read *Walden*, one that helps to illuminate and clarify the overall themes and motifs in Thoreau's masterpiece.

# *ENVIRONMENTAL STUDIES*

## NUTRIENT RETENTION MONITORING AND MODELING OF A SUBURBAN STORMWATER DETENTION BASIN

**Kristen M. Conroy** (Dr. Ryan Kirk) Department of Environmental Studies

Increased nutrient pollution associated with development is a concern for stormwater managers throughout the country. As urban populations increase and more development occurs, waterways can become impaired through increased nutrient loads that can lead to algal blooms, causing fish kills and closing of recreational facilities. New forms of federal and state legislation have mandated the reduction of nutrient levels entering waterways from surrounding watersheds. A popular mechanism to reduce nutrient pollution is to construct "wet ponds", which are water retention basins that hold water for extended periods in order to let nutrients settle into the soil or be taken up by vegetation or the atmosphere. Several models have been developed to predict nutrient loads within watersheds and the reduction that can be achieved through use of wet ponds and other Best Management Practices (BMPs) and understanding the practical capabilities of these models is important to the future of stormwater management. This study aimed to monitor hydrologic patterns and nutrient dynamics in a single wet-pond located in a 12 acre, suburban development in Alamance County, North Carolina, and to validate a recently-developed management tool, called the Jordan Lake Stormwater Load Accounting Tool (JLSLAT), that was designed to estimate nutrient reduction in new developments in the Jordan Lake watershed. Rainfall and storm flow were measured continuously for one calendar year, and grab samples were collected periodically from inflow and outflow of the pond. Samples were taken during or immediately following rain events and were tested for nitrogen and phosphorous content. Watershed characteristics were estimated using a Geographic Information System (GIS) and reservoir routing modeling software. Results show that the model is sensitive to change in land cover categorization and is also affected by watershed size. Loads predicted by JLSLAT are consistently higher than those based on empirical data. Total percent reduction was calculated as 28% for nitrogen and 41% percent for phosphorous, though these results should be interpreted cautiously given a small sample size (n=13).

## COMPARING THE PRODUCTIVITY, NUTRITIONAL VALUE, AND PROFITABILITY OF A MONOCROPPED SYSTEM TO AN INTERCROPPED SYSTEM USING INTENSIVE PRACTICES

**Kyle P Meredith** (Professor Steve Moore), Department of Environmental Studies

The Green Revolution created a modern agricultural system that is highly mechanized and heavily reliant on fossil fuels. After years of increased crop yields, the rate has slowly been decreasing, while the rate of energy input and the amount of other resources used has rapidly increased. Continuing population growth and dwindling land and resources will require more efficient methods to produce the maximum amount of crops in the least amount of space. Large mechanized farms may have to give way to small-scale intensive farms that will be able to produce more food in a smaller amount of space while increasing agricultural energy efficiency and reducing the overall amount of resources used. This study is designed to determine whether an intercropped system of pak choi and lettuce is of greater benefit than a monocropped lettuce system. . Using 100 square foot (25' x 4') garden beds, three intercropped and three monocropped

plots were planted. The intercropped plots were planted with even 12" spacing, resulting in even rows of four heads of lettuce. The monocropped plots were planted using a varied 12" offset spacing design, resulting in alternating rows of four and three heads of lettuce. This study found that the average amount of calories in monocropped plots (1760.4 cals) was higher than the average amount of calories in the intercropped plots (1527.4 cals). One reason for this was the great difference in weight of the lettuce heads. Monocropped lettuce heads had an average weight of 523.9 grams compared to 349.6 grams for the intercropped lettuce. Nutritional value results were mixed, however, indicating that intercropping was more advantageous in terms of total fat, calcium and potassium but disadvantageous with regards to protein, calories and carbohydrates. In terms of economics, the intercropped plots had greater plot profitability than monocropped plots.

## ENZYME ACTIVITY IN THE HYPORHEIC SOILS OF PIEDMONT STREAMS

**Claire C. Tipton** (Dr. Janet MacFall), Department of Environmental Studies

Streams and rivers are the source of our drinking water, scenic beauty, recreational opportunities and wildlife habitat. Land use practices such as agriculture, urbanization and development have caused erosion and habitat loss to some Piedmont streams, with about 10% of NC streams considered impaired. The goal of this research was to establish biochemical and microbial baseline measurements that could be used as assessment tools in the evaluation of stream restoration initiatives. Hyporheic soils are ecologically important as zones of active exchange between ground and surface water and terrestrial and aquatic ecosystems. Five major soil enzymes involved in nutrient cycling within soil were examined using methods modified for hyporheic soils. All assays were done on freshly collected soil cores. Enzymes studied included phenol oxidase, protease, acid phosphatase, β-glucosidase, and β-galactosidase. There was a correlation between degree of erosion—determined by bank height—and enzyme activity for phenol oxidase, acid phosphatase, β-glucosidase, and β-galactosidase (R values ranged from 0.3 to 0.6). Bank height ranging from 15 to 244 cm was used as a measure of erosion. There was a significant effect for depth of soil cores for β -galactosidase, protease, β -glucosidase, and acid phosphatase but not for phenol oxidase. Higher activity was measured in surface soils than at 20 cm. These results suggest the possibility of significant roles for the microbial community in nutrient cycling within hyporheic soils which may be related to degree of erosion. Furthermore, preliminary observations indicate a relationship between soil organic carbon and enzyme activity.

## EFFECT OF *CASTOR CANADENSIS* HERBIVORY ON INVASIVE PLANT SPECIES FREQUENCY AND GROUND COVER

**William F Wollman** (Dr. David Vandermast) Department of Environmental Studies

Beavers (*Castor canadensis*) play in important role in shaping the composition and structure of an ecosystem. Beavers are ecosystem engineers that play an important role in creating and modifying the habitat that they live in. However, there is little data that examines the preferred tree species of beavers or the relationship between beaver herbivory and invasive species presence. Given the abundance of invasive species in riparian forests of eastern North America, it is important to understand beaver tree selectivity and assess the correlation between beaver activity and invasive species cover. Our research surveyed invasive plant species richness and cover in $100m^2$ areas around beaver-damaged 'focal' trees along the Haw River North Carolina.

Beaver damage data were collected by recording whether the tree was dead or alive and estimating the percent of the damaged stem that had been fed on by beavers. Our results indicate that there is a significant negative correlation between beaver damage and the number of invasive species; however the reduction in invasive species richness was not due to greater cover of any individual invasive species. It may instead be due to increased cover of one or more native species. Additionally, our research showed that average cover of Japanese honeysuckle (*Lonicera japonica*) and Silverberry (*Elaeagnus umbellata*) were significantly greater when the focal tree had damage exceeding 60% percent of the stem area. Our results indicate that beaver herbivory on riparian trees can affect invasive species richness and cover, at least temporarily.

# *EXERCISE SCIENCE*

### THE EFFECT OF A FACEBOOK BASED NUTRITION EDUCATION PROGRAM ON KNOWLEDGE, BEHAVIORS, AND WEIGHT OF FIRST YEAR COLLEGE STUDENTS

**Annie R Chan** (Professor Elizabeth Bailey) Department of Health and Human Performance.

Purpose: The purpose of this study is to determine the effect that a semester long nutrition education program using Facebook has on the behavior, knowledge, and weight of first year students.

Methods: First year students were recruited from core courses. Informed consent and baseline demographic information (height and weight) were collected prior to participation. Participants completed the International Physical Activity Questionnaire (IPAQ) to evaluate level of physical activity, the Diet Pattern Review (DPR) questionnaire to measure eating habits, and nutritional knowledge/interest were assessed using a novel quiz and a rating ruler for interest level before the education program was initiated. Participants were randomly assigned to either the experimental (N=10, 6 females/4 males) or control group (N=6, 5 females/1male). Those in the experimental group were linked to a Facebook page that provided unique nutrition education modules weekly for 8 weeks corresponding to a specific nutritional theme. Participants were asked to provide weekly feedback. The control group did not have access to the Facebook page and received no intervention. At the end of the 8 weeks, participants in both groups recompleted the DPR, IPAQ, quiz, and had their height and weight retaken.

Results: A high attrition rate for post-data collection was experienced. From pre-post testing, DPR scores improved 18%, and body weight decreased 3%. Level of physical activity did not change across the intervention period (for both groups). Experimental group participants could "comment" below each Facebook module, and those who contributed the most received a Target gift card. There were always at least 2-4 comments (by separate participants) for each module every week whose feedback was commonly in regards to, expression of learning novel information, expression towards the expansion of their prior knowledge, and/or an expression of interest in the given topic. It is evident that participation in the actual intervention itself was well received and no further motivation is required; post-test data collection is where limitations occur.

## THE EFFECTS OF CHOCOLATE SOYMILK ON RECOVERY IN RECREATIONALLY ACTIVE WOMEN

**Kaylie E. Chrismon** (Dr. Paul C. Miller & Dr. Svetlana Nepocatych) Department of Exercise Science

Recently it has been suggested that consuming chocolate milk (CHOC) post-exercise may improve glycogen replenishment and protein re-synthesis thus aiding recovery. CHOC has been suggested to be an appropriate recovery beverage due to its combination of carbohydrates and protein (Karp et al., 2006). While this is a benefit to some exercisers, vegan and lactose intolerant exercisers will not consume CHOC. Therefore, chocolate soymilk (SOY) which contains similar content of protein and carbohydrate to CHOC and is lactose-free, could serve as vegan alternative. PURPOSE: To examine the effects of SOY on recovery in recreationally active women. METHODS: A double-blind, repeated measures design was used in this study. Participants (n = 17) completed one familiarization session and two exercise sessions separated by one week. Sessions 2 & 3 consisted of a 20-km time trial (TT), followed by the ingestion of a recovery drink, a two hour recovery period, and then a second 20-km TT. TT performance was measured and recorded. Sessions 2 & 3 were identical with an exception of the consumption of CHOC or SOY as a recovery treatment in randomized and counterbalanced order. The content of protein and carbohydrate were similar for both recovery treatments. RESULTS: A repeated measures GLM revealed no statistical differences ($p = 0.20$) in TT performance between CHOC (T1: 43.2 ± 1.2 m; T2: 43.5 ± 1.3 m) and SOY (T1: 42.7 ± 1.3 m; T2: 43.2 ± 1.2 m). CONCLUSION: These data indicate that drinking SOY following exercise may be as effective for recovery as CHOC. This may prove to be beneficial for exercisers with dietary concerns or restrictions.

## DIETARY INTAKE, BODY COMPOSITION AND FITNESS AMONG COLLEGE FEMALE ATHLETES DURING IN- AND OFF-SEASON

**Cristina DiCostanzo, Mollie Hughes, Katherine Szabo,** (Dr. Gytis Balilionis & Dr. Svetlana Nepocatych). Department of Exercise Science

The purpose of the present study was to examine dietary intake of essential macro- and micro-nutrients, the use of dietary supplements in the past 30 days, body composition and physical fitness in NCAA Division I female athletes during in- and off-season training. Twenty six female athletes, aged 20.5 ± 0.64 from basketball, tennis, softball and soccer teams completed 3-day food records, dietary supplements survey, body composition assessment using Dual- energy X-ray absorptiometry DXA and modified Bruce treadmill test (VO2peak). Mean body mass 72.16 ± 15.56 kg with body fat 29.56 ± 6.35% and VO2peak 41.10 ± 6.39 ml/kg/min. Mean energy intake was 2136.51 ± 1014.46 kcal/day. The energy obtained from carbohydrate (CHO), protein (PRO), total fat and saturated fat were 255.24 ± 1.2758 g, 86.10 ± 42.29 g, 89.52 ± 57.00 g and 27.52 ± 25.26 g, respectively. CHO and PRO intakes were well above recommendations. Cholesterol and fiber intakes were 361.72 ± 335.96 mg and 18.15 ± 11.21 g respectively. Total fat and saturated fat intake exceeded recommendations of the Acceptable Macronutrient Distribution Range (AMDR). Recommended Dietary Allowances (RDA) were not met for Vitamin A, Vitamin E, Calcium, Magnesium, Iron, Zinc, and Potassium by 16%, 72%, 25%, 30%, 17%, 2%, and 52%, respectively. Sodium intake was 3.54 ± 2.05 g which excedes the RDA by 236%. In addition, 81% of athletes reported taking dietary supplements and in the past 30 days. In conclusion, 24-hour dietary recall for athletes indicate inadequate intake of many crucial micronutrients, especially iron, calcium and vitamin A which are critical for energy metabolism

and bone health in young athletes. Higher fat and protein intake replace nutrient rich meals hindering the nutrient supply in the body. The lack of these nutrients could potentially be affecting athletic performance; therefore, nutritional counseling specific to these micronutrients for female athletes is warranted.

## PHYSICAL ACTIVITY, NUTRITION, AND SELF-CONCEPT INTERVENTION AT A WEEK-LONG GIRL SCOUT CAMP

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BACKGROUND: Childhood obesity is becoming an increasingly prominent concern in the field of health. It has been shown that lifestyle habits developed in childhood often carry over into adulthood and that developing healthy habits at a young age can help prevent weight-related health problems later in life. PURPOSE: To develop and implement an intervention curriculum based around fitness, nutrition, and self-concept in adolescent girls to promote the development of healthy lifestyle habits. METHODS: Ten girls (11- to 14-years-old) were recruited to participate in a five-day Girl Scout camp during which this research took place. Baseline measures of body composition, cardiac fitness/endurance, muscular strength/ endurance, flexibility, and coordination/balance were taken and each participant filled out a questionnaire regarding eating habits, nutritional knowledge, self-concept, and physical activity. Educational curriculum surrounding nutrition, physical activity, and self-concept was incorporated each day in addition to activities including learning to correlate heart rates with physical activity, a grocery store scavenger hunt, and cooking with healthier substitutes. Participants were guided in setting goals for healthy lifestyle changes over the coming months and provided with journals to track their progress. RESULTS: It was found that 60% of participants had a BMI percentile above the 85th percentile. A majority ate sweets multiple times per day and ate at fast food restaurants at least 2-3 times per week. A significant negative correlation was found between baseline strength measures and BMI ($r = -0.746$, $p < 0.05$). All participants scored high on a subset of the Physical Self-Description Questionnaire. Participants were enthusiastic and responsive during the 5-day intervention, but post-data could not be collected. CONCLUSIONS: The participants represented a high-risk population for obesity. Associations between strength, flexibility, coordination/ balance, and cardiovascular health were found. The intervention was impactful during the camp week, but a lack of post-data prevents the ability to validate these observations. Further revision of the curriculum and follow-up plan would be beneficial in widening the body of literature in this area

## RELATIONSHIP BETWEEN INFORMATION PROCESSING AND POSTURAL STABILITY IN COLLEGIATE AND HIGH SCHOOL ATHLETES

**Kelsey M. Evans** (Dr. Caroline Ketcham) Department of Exercise Science

Concussions have been associated with deficits in balance and postural stability (Catena et al., 2011; Guskiewicz et al., 2001; Slobounov et al., 2007). Subjects sustaining mild to moderate head injuries showed an increase in inhibition of the primary motor cortex, which has been associated with sensorimotor organization and movement execution (Beaumont et al., 2011; Toxopeus et al., 2011). Research has recently shown that reaction time along with dynamic balance control is impaired in those with traumatic brain injuries (Catena et al., 2011, Beaumont et al., 2011). The purpose of this study was to examine the relationship between postural stability

and reaction time composite of the ImPACT test in 119 collegiate and 104 high school athletes. A Biodex Balance System SD$^{tm}$ was used to measure postural sway under four conditions: eyes open firm surface, eyes closed firm surface, eyes open foam surface, eyes closed foam surface. Reaction time data came from a composite of the ImPACT neurocognitive assessment tool. These tests were part of a battery of baseline tests performed by athletes. Participants were analyzed across age and history of concussions. Composite reaction time scores were significantly correlated with postural sway in the eyes open [$r=0.26$, $p<0.001$] and eyes closed [$r=0.19$, $p<0.005$] on the foam surface condition. In addition, there was a significant group effect between concussed and nonconcussed athletes across the four balance conditions[$F=3.99_{(1, 218)}$, $p<.05$]with the concussed group having lower sway index scores across conditions. While increases in reaction time are correlated with higher postural sway scores, participants with a history of concussions seem to perform with overall more postural stability. The mechanism of increased stability is unclear, but if participants are giving more attentional resources or cocontracting muscles to create a more rigid body, they may be less able to adapt or respond to postural disturbances. This has far reaching implications for athletes in contact sports with a history of concussions.

## EXERCISE AND COGNITION: EFFECT OF LOW VOLUME EXERCISE ON EXECUTIVE FUNCTION IN OLDER ADULTS

**Kristen M. Grater** (Dr. Joyce A. Davis) Department of Exercise Science

PURPOSE: To study the effect of a low volume of aerobic exercise on executive cognitive function in older adults. It is unknown as to the effects of low volume and intensity aerobic exercise on cognitive function. (Berchtold, Castello, & Cotman, 2010). METHODS: Twenty seven adults (23 females, 4 males) ages 50-65 (*M*=58) volunteered to participate in an eight week low volume exercise (LVE) program consisting of preferred mode of aerobic exercise among treadmill, stationary bicycle, or elliptical. Prior to exercise, participants were screened for cognitive impairment and high cardiovascular risk before completing the Trail Making Test as a measure of executive function. Exercise intensity was monitored using heart rate and BORG ratings of perceived exertion. Values of 85% maximum heart rate and 6 on the 10-point exertion scale were established as ceilings for moderate intensity. Participants exercised three times per week for 30 min at or below moderate intensity for a total of 90 min per week. The minimum volume of aerobic exercise recommended by the American College of Sports Medicine is 150 min per week at moderate intensity making the exercise intervention low in both volume and intensity. RESULTS: Trail Making A and B scores significantly improved following the LVE program ($p=0.03$, $p=0.01$). Mean times (sec) for Trail Making A ($30.66\pm11.21$) and B ($58.77\pm17.28$) decreased following eight weeks of LVE ($26.38\pm7.62$, $50.93\pm16.17$). CONCLUSIONS: These results suggest that even at low volume and intensity, aerobic exercise can improve executive function in older adults.

## DOES GATORADE G3 FACILITATE RECOVERY IN MALE COLLEGIATE ATHLETES?

**Andrea G. Gross** (Dr. Paul C. Miller) Department of Exercise Science

Athletes have been commonly advised to consume fluid to facilitate recovery from exercise. However, recent research has shown that drinks containing a carbohydrate-protein solution may facilitate recovery more effectively than simply rehydrating. A review by Burke (2010)

demonstrated that male athletes who consumed a carbohydrate-protein solution immediately after exercise experienced faster muscle glycogen restoration and enhanced muscle recovery. It has been suggested that consuming a carbohydrate-protein solution after exercise could lead to increased insulin secretion resulting in the restoration of muscle glycogen. Recently, Gatorade has manufactured a recovery beverage (G3) containing both carbohydrates and protein. However, there is little research on the effectiveness of G3's impact on recovery from exercise. **PURPOSE:** To examine the effectiveness of Gatorade G3 on the facilitation of recovery from vigorous exercise in male collegiate athletes. **METHODS:** A double-blind, repeated measures protocol was designed for this study. Participants (n=14; age = 20.2 ± 1.1 years; BMI = 22.6 ± 3.1; $VO_2$max = 44.0 ± 9.1 ml/kg/min) completed three trials, one familiarization and two experimental trials. The experimental trial consisted of a 20-km time trial (TT), ingestion of the recovery drink immediately after, a two-hour recovery period, and then a second 20-km TT. These trials were separated by a week, and performance for each TT was recorded. The recovery beverage was either Gatorade G3 recovery or flavor-matched placebo. The administration of the beverage was randomized and counterbalanced. The supplement volume was identical for each condition. **RESULTS:** A repeated measures GLM revealed no statistical differences (p = 0.17) in TT performance between G3 (T1: 36.9 ± 0.9 min; T2: 37.5 ± 0.8 min) and placebo (T1: 36.9 ± 1.0 min; T2: 37.8 ± 0.9 min). **CONCLUSION:** These data indicate that drinking G3 following exercise may be no more effective for recovery than water when applied to this exercise protocol. Therefore, athletes may be able to focus simply on rehydration rather than the content of the fluid following this type of exercise.

## THE EFFECTS OF PERFLUOROOCTANOIC ACID (PFOA) ON BRANCHING MORPHOGENESIS

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Perfluorooctanoic Acid (PFOA) is an industrial surfactant most commonly used in the production of materials like non-stick cook ware, carpet, and food packaging. It is found in the blood of all Americans. Previous research has indicated the chemical's ability to cause developmental abnormalities in lab animals. PFOA has been shown to directly affect the development of the mammary gland, an organ regulated by branching morphogenesis, in prenatally exposed mice. While it is understood that PFOA can affect mammary gland branching morphogenesis, the specific genes in the mammary-specific pathway, and in other potential target tissues, i.e. the kidney, lungs, and liver, have not been identified. The focus of this study was to discern the specific genes involved in branching morphogenesis that are impacted by exposure to PFOA. Mammary gland, kidney, liver, and lung tissue samples were obtained from CD-1 mice which had been exposed *in utero* to either 0 or 1 mg PFOA/kg. RNA was isolated from tissues collected at postnatal day 7 (PND 7) and was processed for RNA using the "TRIZOL Total RNA Extraction" method. The resulting RNA for each tissue was then assessed for quality and quantity. Six genes were chosen based on their expression in all four tissues as well as their roles in morphogenesis regulation: PTEN; FGF10; TGF-B1; Wnt-10b; MMP-2; and Tbx3. Gene expression was normalized to tata box binding gene (TBP) or glyceraldehyde 3-phosphate dehydrogenase (GAPDH). Forward and reverse primers were created for each gene. All tissue samples were DNAsed and then used to make cDNA. There was no expression of TBP, which limited the correlations that could be made in the data. For the liver and the kidney, there was no expression of any genes in the control samples. In the mice treated with 1

mg/kg/day, for those tissues, there was expression at varying levels, except for TGF-B1. In the lung tissues, using GAPDH as the reference gene, there were no differences in any branching morphogenesis genes analyzed. This data suggests that a 1.0 mg/kg gestational dose of PFOA caused no significant changes in expression in lung tissue and only one significant change in expression for one mammary gland tissue for several genes involved in branching morphogenesis.

## EFFECTS OF ACUTE EXERCISE ON RETENTION AND LEARNING

**Marissa R. Mastrocola** (Dr. Walter Bixby) Department of Exercise Science

Reading while exercising is a very prominent occurrence on college campuses, yet little research has been done to examine the relationship between reading while exercising and learning. Although past research has shown a correlation between exercise and improvements in cognition, the majority of this research has not focused on learning while exercising. **PURPOSE:** To examine how reading during exercise affects retention and learning. **METHODS:** 11 female college students (mean age 20.0 +/- .78, BMI 23.01) read a chapter from a nutrition textbook during 2 separate 30 minutes sessions of elliptical exercise or sitting. Participants were asked to exercise at an intensity that corresponded to a 12-14 (moderate to hard) on a perceived exertion scale. After the session, participants completed a short exam on the reading and then returned 24 hours later to take a second exam on the material. Each exam consisted of 15 multiple choice and true/false questions. The order of exercise and sitting were counterbalanced and participants were randomly assigned one of three possible chapters for each session. **RESULTS:** A 2 (Day; exercise and sitting) x 2 (Time; post, 24 hours post) repeated measures ANOVA revealed a significant Day x Time interaction, $F(1, 10) = 6.54$, $p = 0.03$. Post hoc analysis revealed that participants did better immediately following the quiet rest (10.36) when compared to exercise (9.18); however, this difference dissipated 24 hours after exercise for sitting (9.0) and exercise (9.6). **DISCUSSION:** In this sample, it appears that reading while sitting quietly is superior to reading while exercising for performance immediately after the session. However, no difference exists between the two conditions 24 hours after the session. Thus, to improve performance on an exam that will be taken within the next hour, it appears that reading while sitting is superior to reading while exercising but if the exam is 24 hours later, there is no difference.

## CHARACTERISTICS OF METABOLIC SYNDROME IN MALE COLLEGIATE ATHLETES

**Christine E. Pacewicz and Sarah P. Basiliere** (Dr. Barry Beedle) Department of Exercise Science

This research looks to address the health of male collegiate athletes. Specifically, this study focuses on the prevalence of the risk factors of the metabolic syndrome. The metabolic syndrome is a group of risk factors that occur together which increase an individual's risk for developing coronary heart disease, type II diabetes, and stroke. In collegiate athletics, male athletes tend to increase their size throughout their collegiate athletic careers. The purpose of this study is to determine if collegiate male athletes are at risk of developing the metabolic syndrome or experiencing negative health effects later in life.

In order to test for the risk factors of the metabolic syndrome in male collegiate athletes, participants from Elon University's Division I Men's Basketball, Baseball, and Football teams, along with the Club Men's Rugby team, were tested. Measurements of height and weight were taken along with blood pressure tests using an aneroid BP cuff. Percent body fat was calculated by taking skinfolds at three sites on the body with a Lange skinfold caliper. Finally, levels of glucose, triglycerides, cholesterol, HDL, and LDL were measured using finger sticks and CardioChek PA to test the blood samples.

Twenty four participants have been tested ($M$ = 20.1, $SD$ = 1.21). Mean blood pressure was 124/81 (*Systolic SD* = 9.13; *Diastolic SD* = 9.59); total cholesterol had a mean of 131.16 ($SD$ = 21.69); mean value of triglycerides was 87.5 ($SD$ = 63.85); HDL had a mean of 43.39 ($SD$ = 12.74) while LDL had a mean of 64.33 ($SD$ = 18.59); mean fasting glucose was 64.42 ($SD$ = 10.97). Percent body fat was calculated using three skinfold sites (pectoral, abdominal, and thigh). Mean body fat was 17.38 ($SD$ = 10.34). Results suggest the absence of risk factors of the metabolic syndrome in these athletes. This may be due to the sports the participants played. Strength and leanness may be more important than size in these athletic sports teams.

## EVALUATING MOTIVATIONAL CLIMATE IN YOUTH SPORT ATMOSPHERES: ARE AGGRESSIVE TENDENCIES IN YOUTH SOCCER INTRINSICALLY OR EXTRINSICALLY MOTIVATED?

**Elizabeth A Perdue** (Dr. Eric Hall) Department of Exercise Science

In the United States, it is estimated that approximately 52 million youth have joined after-school sport programs (Duda & Ntoumanis, 2005). Aggression has become an increasingly significant issue in sport, where incidents affect all levels of play and are only strengthening in severity and frequency (Shields, Bredemeier, LaVoi, & Power, 2005). Researchers are interested in the source of this aggression in regards to motivational climate. The motivational climate can consist of parent, peer, and coach influences in addition to the individual's views of themselves. Researchers have targeted the high school population due to the significant transitional period of adolescence – individuals are beginning to think for themselves but the external environment is greatly impacting their decisions and behavior as well (Steinberg, Bornstein, Vandell, & Rook, 201). The dominant question that drives this research is whether aggressive tendencies correlate to motivational climates for youth soccer participants. Our sample for this study consists of male and female high school soccer athletes. Participants will complete self-report scales based on their soccer experience. The questionnaires evaluate several facets of the individual. Motivational climate is analyzed via The Sport Motivation Scale (Pelletier et al., 1995) and Perceived Motivational Climate in Sport Questionnaire-2 (Newton, Duda, & Yin, 2000). Aggression is analyzed via Bredemeier Athletic Aggression Inventory (Bredemeier, 1975) and Buss-Perry Scale (Buss & Perry, 1992). Finally, parental influence is analyzed via Parenting Style: Appendix A & B (Buri, 1991). We have collected data from a sample in Texas, and have plans to collect data from a sample in North Carolina. These results will be analyzed for potential correlations between motivational climate variables and aggression. By further understanding the motivation associated with aggression, more expansive knowledge will be provided to coaches, sport psychologists and, most importantly, parents. A greater understanding of this association will hopefully curtail what may be a dangerous, violent future of youth sport.

## THE INFLUENCE OF EXERCISE AND CAFFEINE ON COGNITIVE FUNCTION IN COLLEGE STUDENTS

**Rachel J. Shulder** (Dr. Eric Hall & Dr. Paul Miller) Department of Exercise Science

Exercise has widely been shown to improve cognition, potentially by making individuals more receptive to sensory stimulation or inhibiting irrelevant information. Caffeine, one of the world's most widely used stimulants, seems to have similar effects. It seems that both exercise and caffeine improve cognitive function separately, but little research has been done examining their combined effects. **PURPOSE:** The purpose of this study was to examine the impact of caffeine and exercise, independently and combined, on cognitive function. **METHODS:** 20 college students completed the study. These participants were recreationally active and low caffeine consumers. Each participant came to the lab 5 times. During the first session, they completed a graded exercise test on a cycle ergometer to determine ventilatory threshold (VT). The following four sessions were test sessions involving supplementation and exercise. During these, each participant engaged in 30 minutes of cycling (at 90% VT) or 30 minutes of quiet reading after consuming either caffeine (at 4 mg/kg body weight) or a placebo. The Contingent Continuous Performance Task (CPT) and Wisconsin Card Sorting Task were used to measure cognitive function and were completed 5 minutes and 20 minutes after exercise or quiet reading. **RESULTS:** There were no significant differences between false alarms in the CPT between conditions ($p>.05$) or total number of errors in the Wisconsin Card Sort ($p>.05$). **CONCLUSION:** This shows that the effects of caffeine and exercise are cumulative and may improve cognitive function more together than either does separately. Future research may include looking at exercise at different intensities, different dosages of caffeine, or looking at the long-term cognitive effects.

## MOTOR PLANNING AND END STATE COMFORT IN CHILDREN WITH AUTISM SPECTRUM DISORDERS

**Jessica L Simermeyer** (Dr. Caroline Ketcham) Department of Exercise Science

Autism Spectrum Disorders are a cluster of disorders that effect communication, behavior, and social ability. The Centers for Disease Control and Prevention (CDC) recently released that Autism affects 1 in 88 U.S. children (2012). The increasing prevalence of Autism has led to an increase in the body of research regarding Autism, however, there has not been extensive investigation into how movement and motor skills may play a role in this population. Those that have looked into movement and Autism have found that children with Autism Spectrum Disorders may show impairments in motor planning and coordination (Hughes, 1996; Smyth & Mason, 1997; Van Sweiten et al., 2010). This study investigates motor planning and ability in children with Autism Spectrum Disorders through a battery of fine and gross motor tasks, as well as postural components through alteration of sensory input, in order to determine if their abilities to plan and complete motor tasks differs from their typically developing peers. The study includes children with a diagnosis of an Autism Spectrum Disorder, as well as typically developing children, between the ages of 5 and 13. The battery of tasks consisted of a dial-turning task, "Simon-Says" imitation task, drawing task, and beading task. Preliminary findings have shown that children with Autism Spectrum Disorders show greater variability in hand selection during the dial turning task and a tendency to plan movements that are not in accordance with end state comfort. In addition, those that indicated a diagnosis of Autism or

general Autism Spectrum Disorder showed the lowest confidence on the drawing task. Further analysis is underway to investigate additional relationships.

### DOES PERSONALITY INFLUENCE PHYSICAL ACTIVITY AND NUTRITION BEHAVIORS IN COLLEGE STUDENTS?

**Suzanne K. Stranzl** (Dr. Eric Hall) Department of Exercise Science

The importance of regular exercise and eating right for a healthy lifestyle has always been encouraged. The physiological and psychological benefits of exercising and eating right are often expressed, while the personal characteristics that led to and promote these behaviors are far less discussed. Ingledew, Markland & Sheppard (2004) compared individual's personality traits to exercise habits and found a relationship. Additionally, emotional states, which in part characterize personality, and extreme emotional behaviors, have been found to influence eating behavior (Terracciano et al., 2009). The purpose of this study is to assess the relationship between personality, physical activity and nutrition behaviors. The goal is to identity any commonalities in personality traits that may relate to a either positive or negative exercise and eating habits. 108 (17 males) college students participated in this study by completing a series of questionnaires. Elon University students were contacted through email and social media sites to participate in the study. Personality was measured via the Goldberg 50-item Five Factor Personality Questionnaire (International Personality Item Pool, 1999) and the Barratt Impulsiveness Scale (Patton, Stanford, & Barratt, 1995). Physical activity behavior was measured with the Godin Leisure Time Physical Activity Questionnaire (Godin, 1985). Nutrition behavior was assed via the Fat, Fruit and Vegetable Screener (Block et al., 2000). None of the personality variables was found to have a significant relationship with physical activity behavior. Emotional stability was the closest ($p = .063$). Extraversion was found to be significantly correlated with Total fat intake ($p = .029$). Number of fruit and vegetable servings was positively correlated with emotional stability ($p = .039$) and intellect ($p = .031$). The results from this study suggest that personality variables may be related to nutritional behaviors, but maybe not physical activity behavior.

## *FINANCE*

### EXAMINING THE RELATIONSHIP BETWEEN CORPORATE GOVERNANCE, REPUTATION, AND PROFITABILITY

**Paige B. Burke** (Dr. Yilun Shi) Department of Finance

The economic crisis of 2008 has changed the face of industry forever. The woe of the aftermath still cripples the United States economic system while many corporations continue to struggle to keep their businesses afloat. In the wake of the recent economic collapse, it is important to reflect and examine those companies that have survived and learn from their valiant efforts. I evaluate various companies and examine what makes some more competitive, valuable and/or profitable than others. Specifically, in this paper I study the relationship between two intangible assets, namely corporate governance and reputation, and the firm performance measured by financial performance and stock returns.

Corporate governance is a system which administers the relationships among the board of directors, shareholders, and the executive management team. I use the duality variable (whether the CEO is also the chair of the board) as the proxy for corporate governance. I evaluate a company's reputation by using *Fortune*'s List of Most Reputable Companies' scoring system. Stock returns are calculated using monthly compounding return adjusted by market index, and I measure financial performance by using operation income scaled by total sales.
I examined a variety of different companies in different industries to determine the relationship between corporate reputation/governance and profitability, as well as their relationships with regard to stock performance and financial performance. Empirically, I use multi-variable regression to determine the relationships between the intangible assets and the performance indicators.

The preliminary findings of this research on a sample basis (a selection of 20 companies, which will expand to at least 50 before publication) are as follows: 1) financial performance and stock performance have no impact on the firm performance; 2) poor corporate governance negatively impacts financial performance but reputation scores have no impact on financial performance; 3) corporate governance scores have no impact on stock performance but positive reputation is positively correlated with stock returns.

# *FOREIGN LANGUAGES*

### THE PRESSURE OF SOCIETY IN SPANISH WOMEN'S NARRATIVE

**Taylor M. Binnix** (Dr. Mayte de Lama) Department of Foreign Languages

A prevalent theme in writing by Spanish women authors is exploration of female domesticity. Maternity falls within this category, which masculine authors often neglect to address. Literary interest regarding motherhood has encouraged female writers to explore how the patriarchal society of Spain influences the characteristics of a prototypical mother. The objective of this presentation is to identify the reach of societal norms as they contribute to normally private relationships between mothers and daughters, reflected in three short stories: "Primer amor (First Love)" by Cristina Peri Rossi (1996), "La buena hija (The Good Daughter)" and "Amor de madre (A Mother's Love)", both written by Almudena Grandes (1996). I argue that the weight of expectation on each mother-daughter relationship is specific, yet such distinct specificity varies by context because every relationship is as unique as the two people in it. This research highlights the impact of societal norms and informal education during the development of modern Spain (following the death of Spanish dictator, Francisco Franco, in 1975) on three different styles of motherhood: caring mothers, cold mothers, and obsessive mothers. From there, I apply psychological theories to the characters of these works, revealing which underlying factors actually permit society's influence in each relationship.

To conduct this research, I referred to analyses that examined Spanish women authors, especially Cristina Peri Rossi and Almudena Grandes. I investigated several theories in psychology to analyze the behaviors of the fictional daughters. I apply Sigmund Freud's psychosexual stages and the Oedipus complex to the romance from daughter to mother in "Primer amor," the mother-archetype of Carl Jung as resisted by the daughter in "La buena hija," and the extremity of the mother-daughter connection defined by Nancy Chodorow, represented in "Amor de madre."

The impact of this research shows how Spanish women writers have effectively captured the changing nature of mother-daughter relationships throughout time. Spanish society and family relations have slowly diversified, breaking away from the rigid expectations that were in place during Franco's regime.

This presentation will be in Spanish.

## THE GOOD AND BAD OF THE "GOOD GERMAN" IN ALBRECHT GOES'S "DAS BRANDOPFER"

**Margaret E. Blehar** (Dr. Scott Windham) Department of Foreign Languages

"*Das Brandopfer*," (The Burnt Offering) written by Albrecht Goes in 1954, is a story that takes place shortly after the end of WWII in Germany. The story is narrated by Dr. S., who is retelling his landlady's story. During the war, Frau Walker is given the task of being the "Jews' butcher," and she is required to open her shop to the Jews so that they can receive their weekly rations. She tells Dr. S. about the events she witnessed in her shop and how she decided it was her duty to aid them as much as she possibly could.

The essential question my research addresses is whether or not *Das Brandopfer* is a legitimate representation of the "good German" theme. This theme can be found throughout German literature and depicts a German who risked his/her life in order to help the Jews or other minority groups escape the horrors of Nazi Germany.

This book has not been well-studied, even though it offers insight into the way that some Germans wanted to represent their own past. The lack of research on this book is the main factor I chose to investigate this topic. My research and findings will add knowledge to the subject of the "good German" found within German literature.

I sought to answer this research question in a multitude of ways. I read primary and secondary sources that dealt with the theme of the "good German." I then focused on the aspects of *Das Brandopfer* that address this theme in positive and negative lights in order to come to my own conclusion about whether or not this book is an accurate portrayal of the theme.

After in-depth research and analysis, my thesis claims that though there are many controversial aspects of the "good German" theme (which are discussed), *Das Brandopfer* illustrates this theme honestly, making the story one worth reading and analyzing. The novel does this through the use of its heroine, Frau Walker, whose specific actions and self-critical thought processes allow the theme of the "good German" to be represented as realistically as possible.

## WHO AM I? A STUDY OF IDENTITY OF SECOND GENERATION FRENCH IMMIGRANTS

**Ashton L. Coats** (Dr. Sarah Glasco) Department of Foreign Languages

This presentation explores the struggles of second-generation immigrants to France from North Africa. It is the dream of many North Africans to immigrate to Europe. The hope of a better life, full of healthcare, job opportunities, and education attract many. There are many barriers for these hopeful immigrants on their journey- money, a place to live, and finding a community to fit

in with. Yet, there is an intriguing challenge that was unforeseen by these immigrants that affects their children. Children, who are born in France, enjoy the right of French citizenship, a French education, and who speak and understand French culture better than their parents still struggle to identify as French. Racism is rampant, affecting job opportunities and a way of life. Yet, unlike their parents who have their own identity and a home in their country of origin, these second generation immigrants cannot go back to "where they came from," because ultimately, they are from France. They don't always understand Arabic or understand their parents' culture. They are stuck in a limbo, unable to fully identify with either the France in which they live or the "home" to which they may have never been. I explore this phenomenon in order to decipher what it is that the second-generation Maghrebi immigrants in France identify with. I explore this through the literature of Azouz Begag, a French author, politician, and activist who writes about his childhood struggles of balancing his Algerian heritage and his new French identity. How does/will this phenomenon affect France at large? Ultimately my research exposes that while *some* of these second- generation immigrants create their own identity, some feeling that they are truly French, others neither identify with the French or the North-African identity of their parents. The presentation will highlight examples from Begag's sociological and literary texts that demonstrate these diverse cases in order to expose the political and social shifts in France over the past fifty years.

This presentation will be in French.

**"LA MUJER 'IDEAL' SEGUN LA SOCIEDAD DE POSGUERRA EN *ENTRE VISILLOS* DE CARMEN MARTIN GAITE"**

**"THE 'IDEAL' WOMAN IN THE CONTEXT OF SPANISH POST-CIVIL WAR SOCIETY IN *ENTRE VISILLOS* BY CARMEN MARTIN GAITE"**

**Genevieve O. D'Cruz** (Dr. Mayte de Lama) Department of Foreign Languages

The primary question for my research project is the following: "What characterizes the ideal woman during the Spanish post-Civil War era and how does her experience compare to women who do not conform to these ideal characteristics?" This question is important and relevant to the academic sphere because, in addition to increasing the studies on post-Civil War Spain, it focuses specifically on women's experiences and adds to the field of gender studies as it relates to Francisco Franco's regime as the Spanish dictator during this era. Because literature is a lens through which history is remembered, I chose to read the novel *Entre Visillos* (1957) by Carmen Martín Gaite to research this idea.

Along with *Entre Visillos*, my research encompassed the analysis of eighteen sources about the Spanish post-Civil War era and selections from the extensive essay *Usos amorosos de la posguerra española* (1987), also by Martín Gaite. I identify and examine the women in *Entre Visillos* that embody the characteristics of the ideal woman during the Spanish post-Civil War era. I also research and analyze the women in the novel that are considered "strange" (that do not submit to the role of the ideal woman during this time period) and the qualities that cause them to be labeled and characterized as "strange."

My thesis is the following: "The women of the Spanish post-Civil War era that submit to the roles imposed on them by Francisco Franco's society are submissive, exercise extreme self-control, and aspire to marry, but those who do not submit to these norms are considered 'strange'

women and are constantly confronted with challenges and frustrations for venturing outside the norm." My conclusion is that, although there were women who submitted to societal norms, they did not live fulfilling lives. The "strange" women, despite the mandates, challenges and difficulties constantly imposed on them by Spanish society, lived more satisfactory and complete lives than those who fell within the prototype of the ideal woman imposed by a society that constrained them.

## VIEWS ON IMMIGRATION IN FRANCE AND THE UNITED STATES: WHAT THE PRESIDENTIAL SPEECHES, DEBATES AND OPINION SURVEYS REVEAL ABOUT CULTURAL IDENTITY

**Amy R. Kenney** (Dr. Sophie Adamson) Department of World Languages and Culture

Immigration remains a complex and divisive issue in both American and French politics. While the two countries have different historical narratives of immigration, anti-immigrant sentiment persists in both. Presidential campaigns present the opportunity to address and discuss matters such as immigration; it is from these conversations and speeches that base opinions and attitudes towards immigrant populations can be exposed and analyzed. Thus, what would an examination of political rhetoric within the two countries and their different political parties reveal? This research looked primarily at the themes used by major party candidates in France and the United States to treat the immigration issue during public debates and press interviews during the 2012 presidential elections. The discourse of the sitting presidents, Sarkozy and Obama, was more closely studied to find parallels between claims they made and the progress (or lack thereof) that was made for immigration rights during their presidency. The second part of this research turned to national polls and surveys to see if presidential candidates were reflecting the same priorities and attitudes as their constituents. How receptive are French and American citizens to new immigrants in their country? Would immigration play a large role in determining their vote in the 2012 presidential elections?

My findings highlight different approaches to the subject of immigration by French and American politicians. For example, the French candidates were more likely to be direct and more detailed in their seemingly inhospitable views of immigrants, whereas their American counterparts represented a vague, sensitive viewpoint which valorized the country's immigrants and referred often to the history of immigration of the country. Polls and surveys revealed differing attitudes between party lines, and showed that there is as much, if not more, anti-immigrant sentiment in the United States. These disparities can be attributed to cultural differences between France and the United States; the importance of national identity and the culture of debate in France are clearly contrasted with Americans' desire to preserve the politically-correct "American dream" and remember our roots as a country of immigrants.

## GLOBALIZATION AND CULTURAL SHIFTS: RECENT TRENDS IN WINE PRODUCTION AND CONSUMPTION IN FRANCE

**Michael J. Pappano** (Dr. Sophie Adamson) Department of Foreign Languages

French wine is considered to be among the best in the world. In recent years, however, globalization has significantly affected trends in wine production. France has seen more competition in the international market from other nations exporting wine, as well as a decline in domestic consumption of wine. In fact, research indicates that France's average wine

consumption has fallen from 160 liters per adult, per year in 1965, to merely 57 liters in 2010. These declining figures suggest increasing French reliance on international consumption of wine to maintain productivity.
How are we to make sense of this downward trend? This study in French focuses on the recent trajectory of the wine industry and explores the impact of globalization as well as considerable cultural shifts in consumers. It is informed by current research and literature as well as invaluable perspectives from a personal interview in Paris, France with sommelier and best-selling author, Olivier Magny.

# *HEALTH AND HUMAN PERFORMANCE*

### EFFECTS OF A ONE ON ONE MENTORING PROGRAM FOR MIDDLE SCHOOL GIRLS ON PERCEPTIONS OF SELF ESTEEM, SELF-EFFICACY, AND SOCIOCULTURAL ATTITUDES TOWARDS APPEARANCE

**Kylee R Bushway** (Professor Elizabeth Bailey) Department of Health and Human Performance

The Girls to Empowered Teens (GET) program was designed to empower middle school girls to make healthy choices through education, the use of college women as mentors, and skill building in fitness and communication in order to enhance self esteem, build social support and self efficacy and improve overall health. While based on the Alamance Girls in Motion (AGIM) and Coaching Health and Mentoring Positive Students (CHAMPS) programs, this new program was designed to cater to the unique interests and needs of middle school girls, who are generally underserved. Data collected from $4^{th}$ and $5^{th}$ grade participants in both AGIM and CHAMPS has consistently suggested that the combination of mentorship, health education programming, and physical activity results in increases in self esteem, body satisfaction, feelings of competence and physical activity. It is our belief that participation in GET can have similar results. The purpose of this study was to examine changes in measures of self-esteem, attitudes towards appearance, and self-efficacy following participation in the GET program. Twenty $6^{th}$ and $7^{th}$ grade girls were enrolled in the program. Prior to and following completion of the program, participants completed the Rosenberg Self Esteem Scale (RSE), the Self-Efficacy Questionnaire (SEQ) and the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ), with its 2 subscales of Internalization (IN) and Awareness (AN). No significant differences were found on any measure following participation in the program. However, improvements were noted for IN (Mean $_{pre}$ $=13.54 \pm 1.475$; Mean $_{post}$ $=11.23 \pm 1.612$; $p=0.07$), suggesting a positive outcome of less internalization of social expectations for an ideal body. Evaluation of this pilot program is necessary to increase its efficacy; however, research limitations are noted. Girls in middle school have more extracurricular opportunities than younger girls, and 2 sessions occurred on days the girls were on holiday, negatively affecting attendance. The program schedule will need to be revised to accommodate this in the future. In addition, girls reported that they wanted more one on one mentor time to discuss program topics, which in itself could enhance the program's effectiveness, given the importance of mentors in shaping behaviors at this age.

## HEALTHY MOUTHS PROMOTE HEALTHY BODIES

**Anson G. Fisher** (Professor Amanda Tapler) Department of Health and Human Performance

It is widely understood that poor oral health leads to increased risks of heart disease and other potentially deadly illnesses. Through the Bruns Scholarship, the researcher had the opportunity to participate in service and research in a disadvantaged population in the underdeveloped region of Burundi, Africa. The research entailed an investigation of 2nd graders (n=30), evaluating the students' understanding of dental health and willingness to comply with a simple hygiene protocol. A pretest was administered to assess the students' oral hygiene practices and their basic oral health knowledge. Following the pretest, a dental health education 'mini-intervention' was implemented which also demonstrated proper brushing and flossing techniques. In developing countries, it is imperative that nonprofessionals be empowered to provide appropriate dental health instruction to uneducated, inexperienced and often unskilled communities. Thus, with professional oversight, this program was designed in such a way that it could be replicated by nonprofessionals. A posttest, administered 1 week following the intervention, closely paralleled the pretest and concluded the project.

An analysis of the data indicated that the 'mini-intervention' was successful. Following the intervention, 8 participants tooth brushing frequency remained the same and 15 increased their tooth brushing practices. Further statistical analysis of a 1-proportion Z-interval, revealed with 95% confidence, that the true proportion of participants brushing habits would remain the same or increase between 61.532% and 91.802% respectively, if the 'mini-intervention' was implemented in a larger, comparable population. Additionally, 100% of participants flossed the same or more than they did prior to the 'mini-intervention.' A paired t-test analysis yielded a significant p-value of $5.09x10^{-11}$, indicating increased oral health knowledge.

While much more research needs to be conducted regarding dental health interventions for disadvantage populations, the results of this study clearly indicate that through a simple dental health education intervention, good dental health practices can be adopted leading to better overall health outcomes. Hopefully the results of this study will encourage others, both in practice and in research, to raise awareness of the mouth-body connection, provide skill based dental health education, and create opportunities for successful behavior change.

## CHANGES IN PERCEIVED BODY IMAGE, SELF ESTEEM AND COMPETENCE IN YOUNG GIRLS FOLLOWING PARTICIPATION IN A HEALTH EDUCATION PROGRAM FROM THE PERSPECTIVE OF THE PARTICIPANT AND THEIR PARENT

**Meredith S. Gwaltney** (Professor Elizabeth K. Bailey) Department of Health and Human Services

Alamance Girls in Motion (AGIM) is a program for girls in 4th and 5th grade that provides mentorship with a college woman, physical activity, and education on health topics including nutrition, physical activity and body image. Participants are recruited from local schools to attend the 8-week program. The purpose of this study is to investigate if participation in AGIM influences participants' perceived body image, social competence and self-esteem, and to examine if there is a relationship between this change and parents' evaluation of behavior and social competence in their daughters. Seventeen young girls volunteered to complete the

Rosenberg Self Esteem scale (SES), a modified version of Harter's Perceived Competence Scale for children (PCS) reflecting social competence, and a unique body image questionnaire developed by the researcher prior to and upon completion of the program. Twenty-two parents also completed the PCS with respect to their daughter and a Child Behavior Questionnaire for Parents (CBQP) describing social behaviors at the same time points. Results suggest that following participation in the program, self-esteem in the young girls was significantly improved (PRE=15.35±0.38 and POST=22.67±1.06, p<.001). Data from the body image questionnaire appear to indicate that while girls perceived themselves to be of normal weight upon the start of the program, they were worried about becoming fat. Following the completion of the program, that worry had subsided, potentially suggesting a better understanding of the concept of body image. Data from parent questionnaires suggest parents saw a positive change in social behaviors in their daughters (PRE=36.32±1.23 and POST=29.89±0.89, p<.001) following completion of the program and an improvement in their perceptions of their children's social competence (PCS- PRE=43.8±0.94 and POST=45.64±1.33, p<.001). The results lend support to the efficacy of AGIM to increase self-esteem and decrease body image concerns in young girls. It can be inferred from the parent questionnaires that these improvements are manifested in the participants' behaviors. Since it falls to parents to support their daughters in maintaining this positive change, the observed behavioral improvement may serve to motivate a more active involvement from parents in encouraging their daughters to maintain a positive body image.

## INFLUENCES ON QUALITY OF LIFE IN OLDER COMMUNITY DWELLERS

**Hannah F. McHugh** (Professor Elizabeth Bailey) Department of Health and Human Performance

By 2030 the population of Americans age 65+ is projected to double to 71 million (Centers for Disease Control and Prevention, 2005). The rapid growth of this demographic has important public health implications, and will place significant demands on services offered, and on the nation's health care system. As life expectancy increases, the goal of improving the additional years requires consideration of the quality of life (QOL) experienced in spite of the cumulative health effects associated with normal aging. It is well accepted that QOL is multidimensional. While the influence of health status has been documented, other influences on QOL are less well studied. The purpose of this study is to identify potential predictors of QOL in older adults living independently. Participants ($\bar{x}$ = 83.3 ± 8.12yrs) were recruited via flyers to attend a one-time 90 min evaluation session. Information on health, social relationships, satisfaction with home environment, and activities/hobbies was collected via questionnaire and interview. Self esteem was evaluated via Rosenberg's Self Esteem Scale (SES), and the Short Form 12 (SF12) and World Health Organization QOL questionnaire (WHOQOL-BREF) were used to assess multiple dimensions of QOL. Physical function was assessed via: 1) an evaluation of upper (via Hand Grip) and lower body (via Keiser Leg Press) strength; 2) the Short Physical Performance Battery (SPPB), which evaluates gait speed and basic functional skills; 3) a 6-minute walk distance (6MWD) and body mass index (BMI) to assess functional capacity; 4) an evaluation of sway index using a Biodex Balance system. At this time 7 participants have been evaluated, with a goal of an additional 25-50 participants. Regression analysis will be used to determine which physical assessment variables (6MWD, SPPB, Gait Speed, Sway Index, Hand Grip, Leg Strength (max force), BMI) are best at describing the variance in perceived QOL (SF12, WHOQOL-BREF, SES). Initial analysis suggests that leg strength is consistently correlated with the Physical Composite Score (PCS) of the SF-12 (r=.86), the WHOQOL Physical Health scale

(r=.76), and Self-Esteem (r=.84). This information could be valuable to determine which interventions would be most effective at improving perceived QOL in older adults.

# *HISTORY AND GEOGRAPHY*

### " . . . ONE OF THE REAL TRAGEDIES OF RECONSTRUCTION": AFRICAN AMERICAN AGENCY AND THE WHITE RESPONSE IN NORTH CAROLINA, 1865-1877

**Hollyn K. Geibel** (Dr. Rod Clare) Department of History

After the Civil War ended in 1865, North Carolina was considered among the most progressive of the former Confederate states, due in part to its degree of Union support during the war and because it was one of the last states to join the Confederacy. Because of this, the federal government held few reservations about North Carolina accepting the recently freedpeople into its society and unifying with the Union's ideals. However, during this time period known as Reconstruction, 1865-1877, this assumption proved false. Over the years, historians have been increasingly interested in how and why this was the case. Because of this development, historians have asked questions to try to understand North Carolina's unique Reconstruction experience: What did the newly freed slaves do to try to assert their new role in North Carolina society? How did white North Carolinians respond to these declarations? Were there sympathetic whites and if so, did any cross-racial solidarity take place? This research project tries to answer these questions using primary sources at the Duke University Archives, the Southern Historical Collection at the University of North Carolina at Chapel Hill, and the State Archives of North Carolina and analytical comparisons of secondary sources. The results indicate that African Americans in North Carolina tried to gain rights through their involvement in politics and social issues aided by their white political allies. The main roadblock to these rights proved to be social and political discrimination and violence by white supremacists, regardless of North Carolina's initial Union sympathies. Through the Ku Klux Klan and other terrorist groups, whites attacked African Americans and their white Republican allies. In response, North Carolina governor started the Kirk-Holden War by building an army to fight against the violence. While this white supremacist discrimination was prevalent all over the south, it ended in the first ever impeachment and conviction of a governor in United States history. Because African Americans were prevented from making significant political advances, they focused on social issues, forming racially segregated churches and schools, so they would not have to remain racially inferior in all aspects of post-Civil War life.

### THE ROOTS OF FRENCH PACIFISM IN THE GREAT WAR

**Claire L. Mayo** (Dr. David Crowe) Department of History

Though almost one hundred years have passed since the outbreak of war in 1914, historians continue to question and revaluate previous interpretations of the Great War. American historians either over-emphasize the United State's contribution to the victory or blame the Treaty of Versailles for the rise of Hitler in an oppressed Germany. This view, however, supports a US-centric perspective and will therefore limit our understanding of the far-reaching effects of the Great War upon Europe and the world. To address this concern, the question posed by this

study evaluates the French interpretation of the Great War and their understanding of its impact upon French politics and society. The research was conducted during my semester abroad in Montpellier, France, where I worked with scholars and French students to answer my question. The bulk of the research comes from the course *Les relations internationals à la première guerre mondiale de la seconde guerre mondiale* (International Relations from the First World War to the Second World War) taught by Monsieur MURACCIOLE. The scholarship reveals that the inferior position of France in Europe after immense personal loses during the war created a strong nationalistic sentiment among French leaders for the preservation of the country. The resulting peace treaties provided for the suppression of Germany's power as well as the regulation of peace in Europe. The hopes generated by these clauses quickly deflated during the 1920s and 1930s when the League of Nations broke apart and the modifications of reparations created an economic crisis throughout Europe. Despite the ineffectiveness of the treaties, France adhered to a policy of demilitarization that Germany no longer followed. The intricate French political environment of pacifists, anti-socialists, defeatists, and communists inhibited this policy from changing in response to German militarization. Against such a backdrop of passivism, it is remarkable to see the persistent courage of General Charles de Gaulle to defy his superiors in order to preserve the nation. The Great War of 1914-1919 greatly impacted the French psyche, and while each leader looked to preserve *l'Hexagone*, some acted to avoid a fight while others labored to prevent a war.

## SCHOLARS VS. SITES: ANALYZING INTERPRETATIONS OF REVOLUTIONARY AMERICA AT HISTORIC SITES IN BOSTON AND PHILADELPHIA

**Cameron M. Shirley** (Dr. Jim Bissett) Department of History

While academic historians like to think that their work shapes the public discourse about America's past, in reality, more Americans' understanding about the past is based on visits to historic sites than on scholarly historical monographs. In light of this fact, it is important to consider how closely the interpretations given at the historic sites Americans visit on family vacations match scholars' interpretations of American history. Furthermore, while scholarly historical interpretations constantly evolve, it seems that historic sites are much more static, portraying the celebratory interpretations of past decades. Through this project, I have explored the differences between public and scholarly historical interpretations for one important event, the American Revolution. This project began with an in-depth study of the scholarship of the American Revolution resulting in a historiographical essay. One key insight of my historiographical study is that scholarly interpretation is heavily influenced by the time period in which it was written. The second phase of my project consisted of traveling to Boston and Philadelphia, visiting the historic sites related to the American Revolution, determining the type of interpretation they present, and analyzing these interpretations in light of my historiographical research. Through my travel experiences and historiographical work, I concluded that historic sites tend to present an interpretation that is less sophisticated than those found in scholarly sources. Thus, I found that 57% of the historic sites I visited fall into the Neo-Whig interpretive theme that originated in the 1950s/60s, presenting a celebratory interpretation focused on the deeds of great white men in history. Even so, several sites demonstrate that it is possible to achieve interpretive sophistication, providing a dynamic and multi-faceted approach and examining the American Revolution from the bottom-up. The interpretations at historic sites are what the majority of Americans experience after high school history, proving the importance of presenting sophisticated interpretations of the American Revolution.

### OUT OF OPTIONS: THE JEWISH EXPERIENCE IN SHANGHAI, CHINA DURING WORLD WAR II

**Christine L. Swanson** (Dr. David Crowe) Department of History

Between 18,000-25,000 Jews fled Europe for Shanghai between 1938-1945 to avoid Nazi persecution after China opened this port city to emigrants. While some were encouraged to leave by the Nazis, once World War II many fled to avoid growing Nazi terror in Eastern Europe and the Soviet Union. While some had visas, others did not, which mattered little to the Chinese, who accepted emigrants with or without official entry documents. Consequently, Shanghai became a haven for those who were running out of other options. However, refugees would not breathe a sigh of relief once they reached the city. Jewish refugees were forced into a small and overcrowded ghetto during the Japanese invasion of China. The ghetto only encompassed one square mile and housed approximately 20,000 refugees, along with thousands of native Shanghainese. Food, shelter, and jobs were scarce. Air raids and fighting on the outskirts of the city exacerbated the abysmal conditions. This project attempts to answer how Jewish refugees persevered through the tumultuous years of civil war and invasion that devastated Shanghai. A Jewish community still exists in the modern economic heartland of China, along with the remains of a Jewish quarter. Using Chinese and English primary and secondary documents to explain the interactions between Jews, Chinese, and Japanese soldiers, this project will thoroughly document the lives of Jewish refugees in Shanghai. Beyond that, the project will connect the legacy of the World War II Shanghai Jewish community to contemporary Jewish interactions in China. In addition, citing Chinese resources, the project will consider how China's accepting attitude towards Jewish refugees during World War II shaped the contemporary Chinese perspective of the Holocaust.

## *HUMAN SERVICES STUDIES*

### FOOD JUSTICE: PERCEPTIONS OF ACCESS, ADEQUACY, AVAILABILITY, AND ACTION IN ALAMANCE COUNTY, NORTH CAROLINA

**Lauren E. Clapp** (Dr. Beth Warner) Department of Human Service Studies

A rights based approach to food, also known as food justice, contends that communities have the basic right not only to sufficient food, but also to food that is nutritional, culturally appropriate and accessible in a sustainable manner (United Nations General Assembly: Human Rights Council, 2010). Traditional discourses about hunger and poverty often ignore the institutionalized denial of access to fresh, healthy food in the United States. This study approaches the issue of access to healthy food in different communities in the United States by proposing that the human right to adequate nutrition is frequently violated in the United States, and as a major social justice concern, is an issue that requires our full attention and understanding. However, before action can be taken to promote change and justice, stakeholders in the issue must have their voices heard, especially when the issue is something as personal as food. This study investigates the attitudes and perceptions that residents of Burlington, North Carolina hold about food, the role food plays in their lives, and about their willingness to organize to promote food justice in their community. Through the use of surveys, informal

interviews, and secondary data analysis, conclusions are drawn about residents' perceptions of the economic and physical access to healthy food, the nutritious adequacy of the food they eat, and the availability of healthy food in the area. Results from the surveys show that those who believe they are less able to afford healthy food are more likely to think of healthy food as a right. Those who report that they are able to afford healthy food are less likely to think of healthy food as a right. In addition, the researcher will describe her experiences as a member of a collaborative group of local leaders who organized a community garden in a food desert in Burlington, North Carolina in order to provide an opportunity for participants to take action to promote food justice.

### PERSONAL AND COMMUNITY IMPACTS OF THE GHANAIAN COCOA TRADE

**Emily M. Kane** (Dr. Bud Warner) Department of Human Services Studies

Cocoa is one of the most heavily traded commodities in the world with Ghana being the second leading producer. As such, cocoa is Ghana's primary export and the country is very reliant on its production. However, very little research has been conducted about the impacts cocoa farming has on the local farming communities. This research study looks at the impact that the Ghanaian cocoa trade has on personal and community life in three different Ghanaian villages in the Brong-Ahafo Region. Qualitative field interviews were conducted with local famers, chiefs and pastors to provide a greater understanding of the impacts that cocoa farming has on community structures. Emerging themes in the data indicate that close-knit family units are more valuable than geographically-based villages. However, additional support networks exist between cocoa farming families that provide inter-family loans and assistance with manual labor. Further, results indicate a lack of cohesiveness around community organizing to solve shared community problems relating to both cocoa farming and other village needs. Future implications of this research may involve a more widespread survey of cocoa farming villages in Ghana and their community structures.

## *INTERNATIONAL STUDIES*

### DRUG AND SEX TRAFFICKING ACROSS THE U.S.-MEXICO BORDER: A COMPARATIVE ANALYSIS AND U.S. POLICY INSIGHTS

**Danielle E. Dannenberg** (Dr. Michael Matthews) Department of International Studies

Drug trafficking and sex trafficking across the U.S.-Mexico border have raised human rights and national security concerns for policymakers. Illicit drug smuggling across the U.S.-Mexico border accounts for the majority of illegal drugs that enter the U.S. Drug trafficking and sex trafficking operations function under similar conditions and important linkages exist between the two industries. Organized criminal groups and drug trafficking organizations often use similar networks, methods, and tactics to facilitate both drug and sex trafficking across the border. Sex trafficking includes the exploitation of persons for the purposes of forced sexual acts, commercial sex, sexual slavery, or other forms of sexual exploitation. The U.S. serves as a primary destination country for victims of transnational sex trafficking. The U.S.-Mexico border operates as a critical entry point for victims of trafficking into the U.S. Existing literature focuses

on drug trafficking in the region and examines U.S. drug policy. Far less literature exists on sex trafficking or policy responses. Previous research has failed to explore the relationship between drug and sex trafficking in the region or how to coordinate policy responses to the two issues. This study attempts to fill in gaps in the literature by seeking to understand how successes and failures of U.S. drug policy can provide policy implications for further developing sex trafficking policy. The study combines a review of current U.S. legislation with a synthesis of previous scholarly work to develop a comparative analysis of U.S. policy responses. This research highlights the need to focus on demand, the importance of educating and training state and local officials, benefits of community engagement, detriments of militarizing the border, and successes of a multidisciplinary approach. The study identifies important lessons stemming from U.S. drug policy for strengthening policy responses to sex trafficking and providing insight to policymakers.

### CHINESE DEVELOPMENT INITIATIVES IN GHANA, 1961-2011

**Anna M. McCracken** (Dr. Heidi Frontani) Department of History and Geography

Beginning in the early 2000s, the Chinese government greatly increased its involvement in Africa, giving large sums of Economic and Technical Cooperation (ETC) and incentivizing investments in many African industries. Many of these projects have been harshly criticized by the Western powers for undermining human rights, good governance, and environmental protection. Has Chinese investment in Ghana had similar results? This paper explores 50 years of Chinese development assistance to determine the extent to which the general criticism of the Chinese in Africa holds true to Ghana's specific case. Chinese ETC is assessed based on the nature of, and overall level provided to Ghana's democratically and non-democratically-elected regimes, and perceptions of it as expressed in scholarly studies, Ghana's and China's state newspapers, and Ghana's independent news sources. Media sources were analyzed based on tone and content to understand the perceptions of ETC in Ghana and China and whether or not it is viewed to undermine human rights, good governance, and environmental protection. Findings indicate that Chinese ETC: 1) varies based on stability at home and in Ghana, 2) is viewed more favorably in Ghana and China than in Western presses, and 3) projects funded after 2003 are the most environmentally unsound and ethically questionable.

## *MATHEMATICS AND STATISTICS*

### INVESTIGATION OF THE POTASSIUM LEAK PARAMETER IN A MATHEMATICAL MODEL OF EPILEPTIC SEIZURES

**Andrew F. Fischer** (Dr. Karen Yokley) Department of Mathematics

An ordinary differential equation model describing the rate of change of membrane potential in groups of cells in the hippocampal portion of the temporal lobe of the brain was investigated. This o.d.e. model is intended to give insight to the propagation of epileptic seizures. Research was conducted into how changes to individual fixed parameters affect model output using the computational software *Mathematica*. A subset of the parameters that have interesting effects on model output was determined. The potassium leak conductance parameter was identified as a key

determinate of model behavior causing chaos upon relatively small changes similar to what would be expected in epileptic seizures. Support for this behavior is confirmed by biological observations in literature.

## GALOIS 2-ADIC FIELDS OF DEGREE 12

**Christopher R. Shill** (Dr. Chad Awtrey) Department of Mathematics and Statistics

Nineteenth century mathematician Evariste Galois put forth ground-breaking ideas, now known as Galois theory, which changed the landscape of mathematics forever. This paved the way for current research in Galois theory, which has become an exciting mathematical area. The discipline boasts researchers from all over the world and regularly inspires international conferences, connecting Galois theory with other areas of mathematics, including cryptology – the making and breaking of codes.

One largely untapped application of Galois theory is to the study of p-adic numbers. These numbers are closely related to the prime numbers we all studied in grade school (i.e., numbers such as 2, 3, 5, 7, 11, ...), and their unique and peculiar properties make them an integral tool in cryptology and its many applications.

An area of research that remains largely mysterious to mathematicians deals with an important collection of p-adic objects known as p-adic polynomial equations. These equations are identified by a numerical property known as their degree (which is necessarily a positive integer). Current research has only produced an understanding of p-adic polynomial equations up to and including degree 11. Consequently, our project focuses on completely classifying degree 12 p-adic polynomial equations. Of particular interest to mathematicians is the special collection of equations, known as Galois 2-adic fields.

During the course of our research, we have employed the following methodology. (1) We have used cutting-edge software to create a collection of algorithms for our work. (2) We used these algorithms to create a vast amount of data for Galois 2-adic polynomial equations, far surpassing anything computed before in this area. (3) Finally, we have used theoretical results of Galois to systematically analyze the data.

Our research has resulted in the following outcomes. We have proved that there are a total of 5493 degree 12 2-adic polynomial equations. Of these, only 27 define Galois 2-adic fields. Additionally, we have shown that our algorithms are transferable to future research in this area. As such, our results have been accepted for publication at a high-quality, peer-reviewed, professional mathematics research journal.

# *MUSIC*

## BRUNDIBAR AT THERESIENSTADT: SINGING FOR SURVIVAL

**Natalie E. Dupuis** (Dr. Hallie Hogan), Department of Music

Theresienstadt, a concentration camp in the Czech Republic, was unique from other Nazi-run concentration camps because of its culture of art and music, as exemplified in performances of Hans Krasa's children's opera Brundibar. As a double major in Music and Communications, and in combination with my study abroad experience (World War II in Europe), I have sought to develop a project that sheds light on how the story of the Brundibar opera ironically aligns itself with the prisoners' experience in Theresienstadt. This research aims to gain a deeper understanding of Theresienstadt as a community, and the ways in which the artistic culture reflects that community. Methods used in the study of Brundibar include musical analysis, historiographical research, rhetorical criticism, and artistic performance. The exhibition will include an oral presentation of the findings, as well as different visual and musical examples of the story of Brundibar in Theresienstadt. It will be the culmination of 18 months of research and an artistic presentation that will take place in early April as part of my expectations as the Elon Music Scholar '13. Research and practice have found that the story in the Brundibar opera aligns with the oppression and horror the prisoners of Theresienstadt had to endure while living in the concentration camp.

## FRANZ LISZT AND THE DEVIL: MUSICAL SYMBOLISM IN THE FAUST AND DANTE SYMPHONIES

**Wesley I. Rose** (Dr. Victoria Fischer Faw), Department of Music

Franz Liszt (1811-1886) was one of the most prolific musicians of the Romantic period in music. Throughout his life his constant companions were three books: his breviary, Dante's *Divina commedia*, and Goethe's *Faust*. The purpose of my research is to trace the role of a specific musical metaphor in Liszt's works – one related to *Faust*, Dante's *Divine Comedy*, and Liszt's own psychological preoccupation with religiosity and death. I intend to explore the metaphor, particularly its manifestations in two of Liszt's most important symphonic compositions, *A Symphony to Dante's Divine Comedy* S. 109 and *A Faust Symphony in Three Character Pictures* S. 108. The Dante and Faust symphonies are both major testaments to a concern with literal and philosophical truths expressed in music, and as such are central to the 19th-century Romantic tradition in music. They are also clear examples of the demoniacal symbolism to be found in Liszt's output. Within a more comprehensive Lumen project focused on this type of symbolism in all of Liszt's music, this research is only a small portion of the whole but is integral to the overall goal of the project.

This work seeks to show that Liszt's Faust and Dante symphonies should be understood and appreciated in terms of programmatic association and musical innovation; that is, Liszt found in the persona of Goethe's Mephistopheles and Dante's depiction of Hell the ideal imagery for depicting the nature of a "music of the future", where new compositions would be freed from conventions of the past. Melodic, harmonic, structural, and motivic devices are analyzed in the Faust and Dante symphonies. Corresponding with these strictly musical materials, a summary of the specific literary symbols is also pertinent to the investigative process. This involves

identifying any direct references to specific texts; including specific plot elements, scenes, or characters. A survey of biographical evidence relevant to this music is also critical (e.g. letters, journals). With this information, an evaluation of what Liszt used to achieve his musical depiction of Goethe and Dante's literary works will help to understand how he crossed the musical boundaries of the Romantic period.

### BEGINNING A JAZZ MUSICIAN'S CAREER

**Alicia M. Varcoe** (Professor Jon Metzger) Department of Music

The purpose of my project is to complete a study of necessary self-promotion as it relates to the business of music, my future goals as a working musician, and the launch of my career. The knowledge gained thereby will help facilitate the beginning, sustainability and self-perpetuation of my solo career. This experiential learning project has included multiple categories, including identifying and documenting my fan, critic and independent label audience; researching print, web and radio markets and grantsmanship; and simultaneously compiling and distributing promotional materials—the largest of which was a full-length jazz vocal album. The album was created over an eleven-month period, and included countless sub-tasks, including developing an overall concept, arranging existing music, composing original music, hiring and rehearsing professional musicians, working with a recording engineer, forming my own publishing company and establishing my business, securing copyright permission and my own copyrights, joining ASCAP (a performing rights protection organization), recording, mixing, mastering, creating graphic art and liner notes, replicating the CD through a disc manufacturer, and organizing and performing CD release concerts. A detailed timeline of events, budget, and personal experiences—including what I learned about myself—will be among the findings presented.

## *NEUROSCIENCE*

### EFFECTS OF ORAL 5-HTP ADMINISTRATION ON TOWER OF LONDON TASK PERFORMANCE

**Erica L. Young** & **Alexandra Romano** (Dr. Mathew Gendle) Department of Psychology

Neurotransmitters are chemicals that convey information between cells in the nervous system. Historically, the neurotransmitters dopamine and serotonin have been assumed to exist in systems that are largely metabolically independent. However, recent work in the field of neuroscience is beginning to challenge this assumption. Several studies have hypothesized that oral administration of the serotonin precursor 5-hydroxytryptophan (5-HTP) can result in the production of serotonin in neurons that normally produce dopamine, and cause a related, functionally relevant reduction in dopamine release from these cells in the mammalian forebrain (Arai, et al., 1995; Jackson and Wightman, 1995; Lynn-Bullock, et al., 2004; Stamford, et al., 1990). This study used the standardized Tower of London (TOL) planning task to test this hypothesis in humans. Several past investigations have shown that TOL performance is sensitive to changes in forebrain dopamine levels, but insensitive to changes in forebrain serotonin levels (Lang, et al., 1992; Mehta, et al., 1999; Murphy, et al., 2002; Park, et al., 1994). The TOL requires that participants replicate patterns of colored beads on a pegboard using as few moves as

possible. A sample of 68 undergraduates participated, and each received either 150 mg (oral) of 5-HTP or a matched placebo (in a double-blind fashion), and completed the TOL after a standard absorption period. 5-HTP significantly increased the average time necessary to complete each of the ten trials of the TOL ($p = 0.02$), but did not affect participant accuracy on this task ($p = 0.32$). Because performance on the TOL is known to be altered by changes in dopamine, but is unaffected by changes in serotonin, this specific pattern of results suggests a disruption of dopamine functioning in the forebrain of participants who received 5-HTP. These results underscore the interconnected (rather than independent) nature of dopamine and serotonin systems in the mammalian forebrain. 5-HTP could prove to be a useful research tool to experimentally manipulate forebrain dopamine activity in humans.

# *PHILOSOPHY*

### GET WELL SOON

**Lucas Walters** (Dr. Cahill) Department of Philosophy

This paper examines the problematic assumptions of the ideal-based, contemporary American view of health and seeks to provide an analysis of health that is more accurate than this view. In order to find the most accurate meaning of "healthy", I explore Maurice Merleau-Ponty's idea of the lived body as it appears in his works, The Structure of Behavior and The Phenomenology of Perception, in order to discover a concept of health that is consistent with Merleau-Ponty's findings. After showing the relational and contingent nature of human beings in the world, I develop a theory of health based on the relations and interactions between humans and things rather than on the forms of the things and people themselves. The paper concludes by explaining how a theory of health that is not based on an ideal, but rather is based on cohesive interaction, implies drastic changes be made in the way science and medicine are understood.

# *PHYSICS*

### BIOMIMETIC CILIA AS A MODEL EPENDYMAL CILIA SYSTEM

**Michael Francis Berg** (Dr. Benjamin A. Evans) Department of Physics

Cilia are ubiquitous throughout the human body and serve a variety of functions. Human lung cilia in particular have been widely studied due to the prevalence of ciliary diseases such as cystic fibrosis. Less-well-studied are ependymal cilia, which are responsible for transporting cerebrospinal fluid throughout the ventricular system; however, their response to increased viscous loading during infection may be critical in understanding the pathology and treatment of meningitis and other inflammatory diseases.

While ependymal cilia and human lung cilia are morphologically homologous, it has been shown in ex vivo studies that they respond very differently to increased viscous loading: lung cilia maintain a constant beat frequency but show decreased beat amplitude, while ependymal cilia

maintain amplitude but decrease frequency. This difference may have dramatic implications in the clearance of viscoelastic fluids. However, the physical mechanisms behind this clearance are not well understood.

We present therefore an artificial, biomimetic system which replicates the features of ependymal cilia as a tool for understanding the biological system. These biomimetic cilia are constructed of a material which is a composite of magnetic nanoparticles and silicone polymer. The composite has a high magnetic content (up to 50% wt.) and is homogenous at length scales below 100 nm, making it ideally suited to the fabrication of micro-scale magnetic actuators. The cilia are templated in a porous polycarbonate track-etched membrane which is subsequently dissolved with chloroform. The resulting cilia are 25 microns tall by 1 micron in diameter and may be actuated with an external magnetic field. A large array of cilia can be implemented in a microfluidic geometry for analysis of tracer particle movement to elucidate the interaction of cilia with a viscoelastic fluid.

## INFLUENCE OF COLLECTIVE BEHAVIOR IN HYPERTHERMIA THERAPEUTICS USING MAGNETIC NANOPARTICLES

**Alison E. Deatsch** (Dr. Ben Evans); Department of Physics

Magnetic hyperthermia offers new potential for treatment of cancerous tumors. In this therapy, a biocompatible magnetic material is localized inside the body, then heated *in vivo* upon exposure to a high-frequency magnetic field. The resulting thermal energy ablates tumor cells with minimal damage to surrounding tissue. The goal of most studies dealing with hyperthermia is to optimize the heating efficiency of an ensemble of magnetic nanoparticles. Heating efficiency is in general very sensitive to many parameters including both the physical and magnetic properties of the particles. However, optimizing the properties of the *individual particles* is not the only consideration for hyperthermia; recently, an emphasis has been placed on the role of *collective behavior*. In particular, when particles become concentrated, inter-particle interactions can have a significant effect on heating efficiency. However, studies which examine the effects of particle concentration often do not control for aggregation of the nanoparticles, so these studies vary widely in their conclusions.

In contrast to most studies, we have the ability to isolate the effect of concentration on heating efficiency. We use a novel magnetic-nanoparticle/silicone composite material which is homogenous at the nanoscale, and can be produced with nanoparticle concentrations varying smoothly from 0-50% wt. (0-17% v.) without any particle aggregation or agglomeration. The small-scale homogeneity of our iron oxide nanocomposite enables us to isolate the effect of concentration from clustering behavior. We calculate heating efficiency for samples of varying concentration using calorimetric techniques and determine heating efficiency as a function of nanoparticle concentration. Our data show that heating efficiency improves dramatically when nanoparticle concentrations are reduced. This data contributes to a fundamental understanding of collective behavior effects on heating efficiency, ultimately leading to better materials for magnetic hyperthermia.

## A NOVEL INSTRUMENT FOR RAPID ANALYSIS OF ELECTROCHEMICAL REDOX EVENTS

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There exists a need for an instrument capable of simultaneous determination of multiple chemicals and chemical processes. Some kinetic reversible oxidation-reduction reactions (redox) show multiple step redox reactions, where the initial solute is electrolyzed to a second solute. We have developed a system to rapidly analyze redox reactions, which we can apply to study reactions of this type. Traditional cyclic voltammetry for assessing redox reactions can take several minutes; we can analyze similar data in seconds using our instrument. Our system can measure data at 100 electrodes using groups of up to ten distinct applied voltages, as compared to the traditional single working electrode technique. We have used a ten-electrode setup in a ferrocyanide solution, which has a well-defined formal potential, as a proof of concept. Our system has been shown to closely match the expected formal potential with only ten seconds of analysis time. With this experimental setup, we are capable of studying redox reaction kinetics in real time, which is difficult using a traditional single electrode experimental setup.

## RAPID REMOVAL AND RECOVERY OF ORGANIC WASTE IN WATERWAYS USING NOVEL MAGNETIC MICROSPHERES

**Willem J. Prins** (Dr. Benjamin Evans) Department of Physics

Spilled oil is a major source of contamination in water bodies totaling over 100 million cubic meters yearly. BTEX compounds (benzene, toluene, ethylbenzene, and xylene) are semi-soluble organic hydrocarbons which make up some of the volatile organic compounds within oil. We propose to remove these contaminants from waterways by using a novel magnetic microspheres created in our lab. These microspheres are derived from a magnetic silicone polymer and can be produced in diameters ranging from 1 – 10 microns. Because of the lipophilic nature of the silicone microspheres, they readily absorb non-polar substances such as BTEX. In addition, because the spheres are magnetic they are very easily recoverable from waterways, improving clean-up speed and reducing costs. In this work we produce these microspheres and use UV-VIS spectroscopy to demonstrate the removal of a BTEX contaminant from a water solution. We quantify an absorption rate by plotting the amount of contaminant remaining in solution as a function of time. In addition, we explore the absorption rate of the microspheres at short time scales to observe the effects of microsphere size on absorption rate. While prior work by other researchers on larger, non-magnetic spheres has shown that absorption rate does not depend on size, these experiments did not probe the time scale in short enough increments to see a measureable effect. We found that rapid absorption (< 5 seconds to clean a saturated solution) is a property of the novel magnetic spheres, providing for rapid removal of contaminants.

## PREFERENTIAL BINDING OF FUNCTIONALIZED MAGNETIC MICROSPHERES TO MALIGNANT CELLS

**Julie C. Ronecker** (Dr. Benjamin Evans) Department of Physics

Ligand-targeted drug delivery is known as an attractive alternative to traditional, non-specific chemotherapy treatments. In ligand-targeted delivery, a carrier particle is conjugated with a ligand known to preferentially bind to receptors over-expressed on certain cancer cell membranes. In this work, we demonstrate the utility of in-house produced magnetic microspheres by functionalizing the sphere surface with folic acid and investigating the preferential binding to cells with folic acid receptor (FR-α). The drug carriers used in this study are between 0.5-2 microns and contain magnetite nanoparticles distributed uniformly throughout an amine-functionalized silicone matrix. The silicone facilitates compatibility with lipophilic drugs, the high magnetic content allows the potential for magnetically stimulated drug release, and an abundance of primary amines within the matrix enables surface functionalization. Microspheres in this study were conjugated with folic acid and a fluorophore using an EDAC reaction, incubated with HeLa and Jurkat T cells, and analyzed for preferential binding by fluorescence microscopy and flow cytometry. We show a five-fold increase in bound spheres per HeLa cell relative to a control sphere, indicating a high degree of specific binding. Flow cytometry results with Jurkat T cells also suggest more binding with functionalized microspheres. This research gives insight into the utility of these magnetic microspheres for future drug delivery studies.

## MAGNETIC SEPARATION OF TARGETED CELL POPULATIONS IN A MICROFLUIDIC CHANNEL

**Anna C. Wilkes** (Dr. Benjamin Evans) Department of Physics

The ability to separate populations of cells is not only useful in research but also in clinical applications. Magnetic cell separation is one method used to obtain a highly selective separation of specific cell populations. In this work, we use a novel magnetic microsphere, developed previously in our lab, to bind and remove certain cells from a solution. The microspheres have a very high magnetization which enables large forces to be exerted on targeted cells, pulling them out of solution. The surface of the magnetic microspheres can also be functionalized so that they can bind to a specified receptor located on the membrane of biological cells. Many malignant cancer cells overexpress folate-binding receptors. By functionalizing the microspheres with folate, this overexpression allows one to specifically target the magnetic microspheres to attach to the malignant cells. The targeted cells can then be separated within a microfluidic channel equipped with a magnetic field. Thus far, I have developed a microfluidic channel for use in cell separation experiments. The channel was fabricated using standard photolithographic techniques: a master is constructed by developing a patterned photoresist; this master is then used to mold a negative from a silicone polymer; once bonded to a glass substrate, the negative forms a completed channel. Solution containing functionalized microspheres and target cells can be pumped through the channel. In transit, cells with bound magnetic microspheres can be removed from the primary population and directed toward a separate outlet, thus isolating two distinct cell populations.

# *POLITICAL SCIENCE AND PUBLIC ADMINISTRATION*

## THE IMPACT OF PARTISAN AND NONPARTISAN ELECTION SYSTEMS ON THE NC SUPREME COURT

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In 2004, North Carolina modified its judicial selection procedure, eliminating partisan elections in favor of a nonpartisan system. According to legislators, this was in response to claims that competitive, partisan elections were politicizing the state's courts, causing the public to lose its faith in the bench, and in turn, jeopardizing the courts' legitimacy and political capital. But did it work? In this paper, I explore the effects of the change from a partisan to a nonpartisan judicial election system on the North Carolina Supreme Court. Specifically, I examine the effect the switch to nonpartisan elections had on voters, the court's institutional arrangements, and its opinions from 1999-2012. My study builds off of existing work in the field of judicial elections, which suggest that changes in selection procedures have a profound impact on state courts – most notably in terms of voter interest and the costs and competition of judicial campaigns. I also include the effects on judicial behavior – i.e., how justices vote – which most previous studies omit.

To explore the effects of the change in North Carolina's judicial selection procedure, I analyzed 423 state supreme court rulings from 1999 to 2012, as well as individual justice's votes, and public opinion surveys. I also conducted interviews with former justices from the state court. The results of this quantitative and qualitative analysis suggest that the adoption of nonpartisan elections has certainly affected the court, but not in the ways legislators predicted. Rather than engaging the public or depoliticizing the court, the evidence suggests that the switch actually muted citizen interest and knowledge and created a more polarized court. Taken together with other research, these results seem to indicate that North Carolina's move to nonpartisan elections should not be considered a solution to the problems legislators claimed were facing the state supreme court.

## INTERNATIONAL STABILITY IN CYBERSPACE: ADDRESSING CYBER ISSUES OF NATIONAL SECURITY ON THE INTERNATIONAL STAGE

**Joshua M. McGee** (Dr. Laura Roselle) Department of Political Science and Public Administration

The US relies heavily on cyberspace (ie. the Internet) in order to maintain national security (both economically and militarily). With its growth, the Internet has become an unsafe and high stake environment. Ultimately, these threats in cyberspace must be addressed as a matter of national security when they affect US vulnerable critical infrastructure (such as power grids and mass transit) (Stewart Baker, Shaun Waterman, & George Ivanov, 2010), the stealing of intellectual property (Office of the National Counterintelligence Executive, 2011), and the protection of government and military networks in order to maintain military readiness and resiliency. As the Internet is a highly global environment, these threats must be addressed not only domestically, but internationally as well.

This project is a prescriptive policy analysis on how the United States addresses cyber threats of national security on the international stage (Patton & Sawicki, 1993). This analysis focuses on the current US international policy towards cyberspace (Executive Office of the President of the US, 2011; United States Department of Defense, 2011), and how the US has executed this policy via a variety of international organizations (such as NATO and the International Telecommunications Union) and norms of action (such as the Law of Armed Conflict) in order to shape cyberspace, cooperate with various state (and non-state) actors, and prepare for impending offensive actions against the US in cyberspace. This analysis draws upon theoretical insight and possible precedent in international relations theory (such as realism and institutionalism) to suggest specific policy and strategic recommendations for the US's international strategy for addressing cyber threats of national security. Specific Recommendations include: 1) Setting "cyber stability" as the ultimate goal for the United States in cyberspace, 2) creating a multi-tiered approach, and 3) translating current international norms (such as the Law of Armed Conflict) into agreed upon norms in cyberspace.

### SOCIAL MEDIA USE AMONG GEORGIA STATE LEGISLATORS

**Thomas S. Mills, Jr.** (Dr. Sean Giovanello) Department of Political Science and Public Administration

This study analyzes the growing use of social media as a tool for political communication in state level politics. The state of Georgia, which embraced social media use before many other states, was selected as a case study for this project. To date, most studies of internet based political communication have focused on actors at the federal level and/or the use of more traditional technologies such as homepages and email. This project fills a void in the literature by analyzing the use of social media use by state legislators. Specifically, this project analyzes to what extent legislator age, tenure, and gender affect the use of and perceptions of the efficacy of Facebook. The study utilizes a mixed method approach which combines a quantitative email survey sent to each legislator and qualitative in person interviews. The results indicate that legislator age significantly influences how often legislators use social media and the extent to which they view Facebook as an effective means of political communication. Interestingly, legislator tenure and gender have little impact on the use and perceptions of Facebook by Georgia state legislators.

## *PSYCHOLOGY*

### LINGUISTIC RELATIVITY: WRITING AND EDITING OF BILINGUAL STUDENTS

**John M. Hollander, Hayley L. D'Antuono, Caitlin J. Tarantiles, & Tara J. Corbett** (Dr. L. Kimberly Epting) Department of Psychology

The linguistic relativity hypothesis is a psycholinguistic theory that states that the language in which we speak influences the way in which we think. Previous research concerning this theory has typically focused on areas such as categorical perception, but surprisingly, there has been virtually no research that has considered linguistic relativity in the context of writing. The goal of this research is to evaluate linguistic relativity as it may pertain to the writing and self-editing process. Self-editing is the outcome of the monitoring stage of speech production and involves cognitive analysis and revision of recently outputted speech. We can quantitatively measure

self-editing in writing by using keystroke-logging programs on computers in order to view revision behaviors such as deletion, insertion, and pausing, among others. In order to test the linguistic relativity hypothesis, we recruited bilingual students (English-Spanish) from the university and had them write two essays on a computer with a keystroke-logging program, though the students were not aware of the program. One essay was instructed, prompted, and written entirely in one language. After completion of the first essay, they then moved on to a second essay that was instructed, prompted, and written entirely in the second language. We are analyzing the differences in their self-editing behaviors, which may indicate differences in cognition when they are engaged in each language. The students also completed a questionnaire in order to assess whether certain demographics (e.g., number of languages spoken, year in school) are related to aspects of the writing and editing processes. We predict that aspects of writing and self-editing will differ between participants' two essays, as a function of the language in which they are thinking and writing, providing evidence for a form of linguistic relativity.

## AN INVESTIGATION OF AUDIOVIOSUAL INTEGRATION IN SPEECH PERCEPTION

**Jessica L. Katschke & Lauren E. Packard** (Dr. Amy Overman) Department of Psychology

The purpose of this study was to determine if neurotypical individuals exhibit a relationship between the presence of autism-associated personality traits and speech perception, when presented with simultaneous visual and auditory stimuli. With a better understanding of the relationship between personality traits and perceptual processing, improved learning techniques can be designed to aid a greater variety of people. A recent study (Stewart & Ota, 2008) found that in normal individuals, a greater presence of autism-associated personality traits negatively correlated with the individual's speech perception, as influenced by lexical information (word knowledge). Participants (n=93) were administered the Autism Quotient survey (AQ), which is designed to place neurotypical individuals on a continuum to quantitatively measure how normal individuals compare to autistic individuals (Baron-Cohen, Wheelwright, Skinner, Martin & Clubley, 2001). In addition to the AQ survey, participants completed a computerized speech perception task. Participants were presented with simultaneous auditory and visual stimuli (which may or may not have matched) and were asked to determine what they perceived. This measured the participant's ability to integrate both stimuli during speech perception. Contrary to prior findings, no evidence of a correlation between AQ scores and information integration of audio-visual speech perception was present ($p > .05$). The results suggest that integration of auditory and visual information integration does not depend on AQ in the same way as integration of auditory and lexical information.

## IDENTIFICATION OF COMPETENCIES FOR LAWYER LEADERS

**Sarah E. Kowalkowski** (Dr. Christopher R. Leupold) Department of Psychology

Historically, legal education curricula have almost exclusively focused on honing students' technical, analytical, and argumentative skills. However, in light of the evolving role of the lawyer in our society, the 2007 Carnegie Foundation Study on legal education called for legal educators to develop in their students more practical and professional skills. In order to address this call for a greater focus on practical skills, law schools must expand their realm of behavioral learning outcomes, then ensure that their students receive the necessary tools and training to be

maximally prepared to thrive in a highly competitive job market. To identify these outcomes and employer expectations, we conducted a qualitative study in which we interviewed 21 practicing attorneys, law school career services professionals, and other experts in legal recruitment to determine the keys to job success for entry-level attorneys. After analyzing and coding interview transcripts using ATLAS TI, themes and trends related to the success of entry-level attorneys were identified. Our findings suggest that strong written, verbal, and nonverbal communication skills, attentiveness to detail, community involvement, and general business knowledge are among the most crucial factors that impact early success in one's legal career. Implications and recommendations regarding these findings will also be discussed.

## THE ROLE OF TEACHERS AND PARENTS IN SUPPORTING PRESCHOOLERS' NATURE EXPERIENCES

**Cara M. McClain** (Dr. Vandermaas-Peeler) Department of Psychology

Children's direct experiences with nature have decreased dramatically, and today's children are growing increasingly isolated from the natural environment and increasingly dependent on technology and time spent indoors (Kahn, 2002; Louv, 2008). Research shows that nature experience is associated with improved cognitive abilities, resistance to depression, strengthened self-confidence and deeper friendships (Louv, 2008). Through nature play experiences, children learn to enjoy time outdoors and prepare for participation in environmental preservation (Chawla & Cushing, 2007). Nature experience is crucial because a sense of belonging to a larger nature community is a key component for environmental protection (Mayer & Frantz, 2004). Despite this, few studies have examined the influences of nature experiences on preschoolers. The present research is part of a one-year longitudinal case study of a preschool that highly values nature experience with eleven mixed-aged preschoolers, their parents, and two teachers participating. Employing a mixed-method approach, we are conducting observations of children's nature play throughout the school year, interviewing children and teachers and surveying parents. At the beginning of the school year, parents rated their own connectedness to nature (CNS) and their children's CNS and also rated frequency of time spent with their preschooler in outdoor activities. Both mothers and fathers rated their own CNS higher than that of their preschooler, possibly because the assessment reflects an abstract understanding of nature. Repeated measures ANOVAs indicated that mothers and fathers rated the frequency of their child's nature interaction (16-18 hours weekly) significantly higher than their own. Both parents strongly encouraged their children to hike, play, and identify plants and animals. In interviews at school, children discussed what they liked and found challenging in outdoor contexts such as the school's garden, creek and a local river. They talked about what nature means and how to take care of it. Additional findings will be presented in the context of parents, teachers, and children's shared values and nature interactions. Together, the findings suggest that children's understanding of nature is based on their direct experiences, supported by adult guidance and encouragement.

## STUDENTS' EMOTIONS IN ACADEMIC SERVICE-LEARNING

**Elise K. Noyes** (Dr. Darby), Department of Psychology

Recent cognitive research has demonstrated the interconnectedness of emotions and learning (Felten, Gilchrist, & Darby, 2006). Contemporary scholarship on academic service-learning (AS-L), has found increasing educational benefits and superior achievement outcomes for AS-L structured

experiential pedagogy compared to traditional classroom settings (Eyler, Giles, & Braxton 1997). Little research has explored and linked emotions and AS-L experiences to better grasp how they impact academic outcomes and cognitive processes associated with AS-L. The lack of research is problematic in that it limits scholars' and professors' understanding of how to make the most of the AS-L experience for personal and intellectual growth. The purpose of the present study was to fill this research gap by exploring students' emotions associated with AS-L experiences. The findings further facilitate an understanding of students' emotional experiences to lay the groundwork for future research connecting them with academic achievement outcomes to improve pedagogical practices. Participants were Elon students enrolled in an AS-L course in the spring of 2012, and the study employed a mixed methods design. The quantitative measure consisted of administering to 205 participants Pekrun et al.'s (2010) Achievement Emotions Questionnaire with Likert scale items relating to achievement emotions in class, during assignments, or while testing, as well as a newly developed section particular to AS-L sites. For the qualitative dimension of the study, individual interviews were conducted with 13 participants. Statistical analyses revealed that students experienced all of the various achievement emotions, with enjoyment being the most frequently experienced and shame the least; similarly, positive emotions (e.g. hope, pride) were positively correlated within and across academic settings, while the same was true for negative emotions (e.g. anxiety, hopelessness). In the interviews, all participants referenced feelings of excitement/joy in their AS-L experience in all settings. Emotional references were most commonly related to on-site experiences, and students' reflections revealed the complexity and significance of their emotional experiences in relation to their AS-L course. From the findings, it is evident that students' emotions are a significant aspect of their AS-L experience that potentially mediate the academic, warranting future investigation and demonstrating the importance of emotions in learning.

## WHEN THE GYM STRESSES YOU OUT: THE MEDIATING ROLE OF FITNESS STRESS ON THE RELATIOHSHIP BETWEEN DEPRESSION AND EMOTION BASED EATING

**Michelle M. Pebole & Benjamin R. Unger** (Dr. Longmire-Avital), Department of Psychology

A main contributor to emotional eating is stress, which can be alleviated by exercise. However, despite engagement in physical activity individuals still experience stress concerning fitness level. Previous research has identified another factor beyond stress, which contributes to emotional eating which is depression. Those who report higher levels of depression are reported to engaging in higher levels of emotional eating. Given the relationships among stress regarding fitness and depression on mood-based eating, the purpose of this study was to see how these factors in combination are predictive of self-reported emotion-based eating. A total of 317 emerging adults between the ages of 18-24 years old currently enrolled in a liberal arts universities completed an anonymous online survey. A series of bivariate analyses revealed that feelings of depression and higher levels of fitness stress were related to emotional eating; females reported more emotional eating. A 2-step hierarchal linear regression analysis was conducted to determine if fitness stress mediated the relationship between depression, gender, and emotional eating. The results determined that whereas gender was not mediated by fitness stress depression was. These results highlight the contributing role that fitness stress has on emotion-based eating, over and above an individual's self-reported depression.

## PARENTAL GUIDANCE OF CHILDREN'S NUMERACY ACROSS CONTEXTS

**Caroline M. Pittard** (Dr. Vandermaas-Peeler) Department of Psychology

The importance of parent-child interactions for young children's numeracy development has seldom been examined (LeFevre et al., 2009; 2010), which is surprising given that early math achievement is predictive of subsequent school achievement (Duncan et al., 2004). Children from low-income families are especially at risk for low mathematical achievement (Starkey & Klein, 2008). The study purpose was to observe low-income parents' numeracy guidance in two activities, a board game and a number concept assessment, and to compare preschoolers' math performance in independent and guided situations. Additionally, parents recorded numeracy activities they performed at home with their child and their beliefs about numeracy. Eighteen parent-child dyads were observed playing a game and completing a math number concept assessment. The amount of total numeracy guidance provided by parents in each activity was the same, but parents supported more advanced numeracy during the assessment activity. Children made few errors and many correct responses during the board game, and parent guidance was focused on counting and number recognition. Very little guidance for more advanced numeracy was observed during the game. During the assessment activity, children engaged in more advanced math and had a higher percentage of correct responses when guided by a parent, compared to independent performance. Parental reports of home numeracy practices were significantly and positively correlated with children's standardized math scores, underscoring the importance of numeracy activities in the home. Examples of home numeracy practices included playing counting games and singing counting songs. Parent beliefs about numeracy, including the importance of certain benchmarks and confidence in their own ability to help their child, were rated significantly lower than parent beliefs about literacy. Overall, the results of the study signify the importance of parent-child numeracy interactions for children's understanding and practice with number concepts prior to formal schooling. Parents could benefit from training to support advanced numeracy through engaging social contexts, such as board games.

## THE INFLUENCE OF CONGRUENT INFORMATION ON ASSOCIATIVE MEMORY IN YOUNG AND OLDER ADULTS

**Ursula G. Saelzler** (Dr. Amy Overman) Department of Psychology

Research has demonstrated that older adults have more difficulty than young adults in linking together pieces of information into one unit, a problem known as the associative deficit (Naveh-Benjamin, 2000). This study investigated whether the associative deficit in older adults can be ameliorated by presenting congruent information that is more easily bound together in memory than incongruent information. The N400 ERP component is said to index novelty, and that the unitization of pairs influences the strength of the N400 difference between intact versus rearranged pairs when viewed again (Rhodes & Donaldson, 2007; Rugg & Curran, 2007). The present study used the N400 component to examine differences in the strength of associations between congruent or incongruent paired items in young and older adults. Unitization was manipulated by presenting pairs of items (faces and names) that were congruent or incongruent in regards to gender. The experiment was composed of 10 study/test phases consisting of a 32 face-name pair study list, immediately followed by a 32 face-name pair test during which participants were asked to identify previously-presented pairings. Study lists consisted of congruent (female face/female name, male face/male name) pairs, and incongruent pairs (female face/male name, male face/female name), while test lists consisted of target pairs (intact pairs

from study list) and lure pairs (items from the previous study list rearranged into new pairs) of all four conditions. Preliminary analysis of behavioral data indicates that young adults (*n = 23*) have more accurate memory than older adults (*n = 18*) overall ($p = .003$), and that congruency of stimuli significantly improves accurate recall for both age groups ($p < .01$). Thus, the results provide additional evidence for the existence of an associative deficit in older adults, and provide the first known evidence that congruency of information can improve memory in older adults. This finding is significant for the healthy older adult community as it indicates that finding a way to make information congruent during encoding will augment associations between items in memory, thus lessening the influence of the associative deficit.

## CHECKING EVERY BOX: THE STRESS ADOLESCENTS FACE IN PURSUIT OF BEING A FIRST GENERATION COLLEGE STUDENT

**Nichole E. Schulz** (Dr. Buffie Longmire-Avital) Department of Psychology

A powerful mediator and contributor to poor health is stress. The relationship between stress and health has been conceptualized in a variety of ways, however Lazarus and Folkman's (1984) cognitive appraisal model suggest that interpretation of stress and cause of stress is critical in determining the strength of the relationship between stress and health outcomes. More specifically, the stress that is appraised to originate from factors that are not controllable or changeable, such as gender or race have more of an impact than non-chronic stressors, such as a busy period at work or school. Sparse research on adolescents has found that those with parents of lower education levels tend to have higher perceived stress and less optimism, and also tend to take on the stresses of their parents and family situations. The current quasi-longitudinal qualitative study explored what types of chronic stressors were the most salient for adolescents who hoped to become the first in their family to enter and graduate college. Ten (6 female and 4 male) students enrolled in a college access program participated in an 8-session participatory research program that focused on mindfulness meditation and stress recognition. Students identified their stressors through journals and group discussions. A dominant theme was stress stemming from conflicting desires to be a *future* provider for their family by becoming a competitive applicant for college scholarships through extracurriculars while simultaneously wanting to give up extracurricular activities in exchange for a job, which could help them provide for their family *now*. The students also struggled with being overextended with advanced classes and/or activities and having limited time for themselves. Students consistently reported that they dealt with stress by themselves or with the help of their peers; not adults. Although, highly stressed from self-imposed academic pressures the students consistently dismissed the stress they experienced because they perceived their academic achievement as a controllable choice. However, ignoring the impact these chronic stressors regardless of origin could have major impacts on their mental well-being and physical health overtime.

## THE INFLUENCE OF MULTIPLE REPETITIONS AND PERCEPTION OF CONTROL OVER MEMORY ON MEMORY PERFORMANCE

**Benjamin P. Schwartz & Garrett B. Tante** (Dr. Amy Overman) Department of Psychology

This study examined the role of perceived memory control and repetition of face-name pair stimuli on the associative memory of younger and older adults. Previous research has shown that older adults have impaired associative memory, repetition may be a useful strategy to improve this deficit (Naveh-Benjamin, 2000; Kilb & Naveh-Benjamin, 2011) and a principal complaint of

older adults is the inability to remember the name of someone that they have seen and met previously (Naveh-Benjamin, Kilb, Reedy, & Guez, 2004). Further, an individual's perception of control over their own memory has been shown to affect performance on some memory tasks (Memory Control Inventory; Lachman, Bandura, Weaver, & Elliot, 1995). Thus, this study used a novel experimental paradigm in which the number of pair repetitions of face-name stimuli varied and neuropsychological assessments were administered in order to determine perception of control over one's own memory. The results showed that older adults have poorer memory overall compared to younger adults ($p$=.035) and benefited less from pair repetition than younger adults ($p$=.024). However, presenting multiple repetitions of pairs was still beneficial to older adults, demonstrating that the associative deficit can be improved under certain conditions. There was no correlation between older adults' perception of control over one's own memory and actual memory performance ($p$=.935) indicating that thinking you have little control over memory does not mean you will actually perform poorly.

## PSYCHOSOCIAL DEVELOPMENT AND WELL-BEING OF COLLEGE STUDENTS

**Kate M. Sidwell & Victoria L. Lipinski** (Dr. Catherine King) Department of Psychology

Elon University is known for Engaged Learning, which Swaney (2007) describes as characteristic of an educational environment that involves students actively and socially participating in increasingly complex and integrative experiences. These experiences occur in and out of the classroom and promote cognitive and psychosocial student development. For over two decades, it has been assumed that student engagement correlates with quality of education: the more students put in to their education, the more they get out of it (Kuh, 2003). As students' engagement increases, their academic achievement and the schools retention rates are said to increase as well (Kuh, 2003). This study was designed to see if there is a point at which student engagement in academics, co-curricular and extra-curricular activities and family relationships negatively affect one's psychological well-being. Specifically, we predicted that reduced psychosocial well-being related to over-commitment might explain the "sophomore slump" phenomenon. Data was collected in two waves. In Fall 2011, 109 students were recruited to participate in this cohort sequential study (a combination of cross-sectional and longitudinal designs). In the Fall of 2012, 38 of the original participants and an additional 11 first year students participated. Participants responded to a series of surveys assessing their level of engagement in multiple domains (The Engagement Form, created for this study) and their psychological well-being, including the Flourishing Scale ( Keyes 2006), the Authentic Happiness Inventory (Peterson, 2005). Across almost all types of activities and class levels, results suggest no statistically significant relationship between amount of time spent on various types of activities and participants' scores for happiness. Results do indicate that for sophomore and junior participants, meaningfulness of schoolwork and happiness scores are statistically significantly positively correlated in wave one (r=.378 and r=.565, respectively) and in wave two (r=.378 and r=.565, respectively). Overall results indicate that there are significant relationships between level of activity engagement and psychological well-being, however, the strength of the relationships vary depending on class. Understanding which aspects of a students' life are most beneficial to their psychological well-being helps foster a positive and engaging environment that does not hinder students' psychological health.

### THE EFFECT OF COUNTDOWN-ONLY PEDESTRIAN CHANGE INTERVAL DISPLAYS ON SIGNAL RECOGNITION BY PEDESTRIANS WITH REDUCED VISUAL ACUITY

**Lindsay J. Swenson & Sean M. Walmer** (Dr. Alan C. Scott) Department of Psychology

Visual pedestrian signals provide information regarding the appropriate time for pedestrians to cross at intersections and are increasingly important for complex intersections. Singer and Lerner (2004) investigated the usability of an experimental pedestrian signal display in which the flashing, upraised hand was removed during the pedestrian change interval; their results suggest that providing the countdown pedestrian timer alone may be sufficient for pedestrians to interpret the symbols displayed as a pedestrian change interval. However, the removal of the flashing, upraised hand may have a negative impact on the ability of visually impaired pedestrians to successfully discriminate the pedestrian change interval.

This study evaluates the effects of Singer and Lerner's (2004) experimental display on the ability of persons with reduced visual acuity to accurately and confidently identify the pedestrian interval. While watching video clips of actual intersections presented on a 42 in. monitor under simulated visual impairment (participants in Experiment 1 experienced simulated acuities of 20/70, 20/100, and 20/200, and participants in Experiment 2 experienced approximate acuities of 20/20, 20/50, and 20/300), participants attempted to determine the pedestrian interval (walk, flashing don't walk (FDW), or steady don't walk (SDW)) and provided confidence ratings for each judgment. A critical comparison was conducted between two methods of signaling the pedestrian change (i.e., FDW) interval; 1.) simultaneous presentation of a countdown and flashing, upraised hand, 2.) a countdown-only display without the flashing, upraised hand.

With the exception of performance in the 20/300 condition, participants' accuracy on the interval discrimination task was overall rather high. However, under simulated visual impairments of 20/70 or worse, participants' success at correctly determining the pedestrian interval was on average 21.5 percentage points lower when the countdown display was presented without the flashing, upraised hand than when the countdown display was presented with the upraised hand. Participants' average reported confidence in their judgments was also lower in the countdown-only condition, and their interval judgment response times showed a negative effect of the countdown-only display as well. The results of this study suggest the potential benefits of this experimental display do not outweigh the potential costs for visually impaired pedestrians.

## *PUBLIC HEALTH STUDIES*

### PATIENT-PROVIDER COMMUNICATION ABOUT SEXUAL AND REPRODUCTIVE HEALTH: PERSPECTIVES OF ADOLESCENTS AND YOUNG ADULTS WITH PHIV AND HIV HEALTHCARE PROVIDERS

**Jamie N. Albright** (Dr. Cynthia D. Fair), Department of Public Health Studies

The aging population of adolescents and young adults with perinatally-acquired HIV (PHIV) engage in developmentally-expected sexual behavior and desire children in the future. As gatekeepers to reproductive care and a reliable source of accurate medical information, HIV

healthcare providers (HHCPs) play a critical role in enhancing their sexual/reproductive health (SRH). This cross-sectional study, focused on AYA with PHIV and HHCPs, explores the nature and content of their discussions about SRH. Thirty-five AYA with PHIV were recruited from two pediatric infectious disease clinics in the southeastern U.S. and participated in semi-structured interviews. The mean age of participants was 20.7 years (range 15-30). The majority were African-American (87.8%) and female (69.7%). Sixty-seven HHCPs (medical: 44.8%, social service: 55.2%) were recruited using snowball sampling to complete an online survey. HHCPs were mostly female (82.1%), white (64.7%), and had an average of 12.0 years of work experience. The most frequently patient-endorsed topics discussed with HHCPs about SRH included STD prevention (75.8%) and condom use (72.7%). Some patients reported discussions about social aspects of SRH such as including a partner in a medical appointment (33.3%) and half had discussed childbearing with an HHCP. More HHCPs discussed condom use (77.3%), STD prevention (73.1%), and STD screening (62.1%) than other social or future-oriented topics such as romantic relationships (50.7%) or strategies to prevent mother-to-child transmission (e.g. C-section: 16.4%). Providers' most commonly reported barriers to providing SRH education included: more pressing health concerns to address (53.0%), lack of time (43.9%), and parent/guardian not receptive (43.9%). Providers and patients both reported discussing the medical, risk prevention aspects of SRH more frequently than psychosocial aspects of SRH. That the majority of AYA had been sexually active (71.4%) yet disclosure to partners was relatively infrequent (47.9%) highlights the importance of communication about such topics. Knowledge of mother-to-child transmission was low (mean estimated risk: 32.5%), yet most wanted to have a child (88.6%), indicating the relevance of future-oriented SRH discussions. In order to support this vulnerable population as entering adulthood, a holistic approach to SRH education is critical, which will in turn support public health efforts to reduce transmission of HIV infection.

## SEXUAL AND REPRODUCTIVE HEALTH INFORMATION OFFERED TO ADOLESCENTS WITH PERINATALLY-ACQUIRED HIV: A QUALITATIVE STUDY OF PROVIDER PERSPECTIVES

**Lauren Culy** (Dr. Cynthia D. Fair) Public Health Studies

Within the U.S., medical advances have greatly enhanced the long-term survival of children with perinatally-acquired HIV (PHIV). Historically, HIV-infected infants were not expected to survive beyond childhood. Today, youth with PHIV are living well into adolescence and young adulthood. They must wrestle with the same issues of sexuality as other teens, made more complex due to issues of possible transmission and requirements to disclose to sex partners. Previous literature has explored the sexual risk behaviors and reproductive outcomes of adolescents with PHIV. However, little research has examined the sexual and reproductive health (SRH) information shared by healthcare providers with their PHIV-infected patients. This study analyzes interviews of pediatric medical (n=6) and social service (n=7) providers regarding their perspectives on the SRH information shared with adolescents living with PHIV. A snowball sample of providers was recruited from members of the NC Children's AIDS Network. Most participants were female (n=11) and white (n=12) and had a mean of 12.1 years of experience in the pediatric HIV field. Interviews were recorded, transcribed, and coded for emerging themes with two independent reviewers. Findings indicated great variability in the kind of SRH education offered to adolescents with PHIV. Very few providers described formal written policies regarding the nature of SRH education. The majority of providers indicated that SRH education began with disclosure of the adolescent's HIV status. Most providers centered

SRH education on legal disclosure laws, risk reduction measures such as the use of condoms, and pregnancy prevention. Only two providers discussed psychosocial aspects of SRH such as relationship development and future childbearing aspirations. Barriers to offering SRH care included parent/guardian resistance and the "adolescent mindset" which included discomfort discussing SRH and a denial of involvement in sexual activity. The majority of providers indicated the importance of individualizing SRH to each patient and resisted the notion that there needed to be a standard SRH curriculum. Findings indicated great variability in the nature of SRH education offered to adolescents with PHIV. Further research is needed to identify SRH education needs of this maturing population.

**Congruence of Transition Preparedness Between Adolescents with PHIV and their Guardians**

**Becca Goldstein** (Dr. Cynthia D. Fair) Department of Public Health Studies

The transition to adult care is an inevitable event in the lives of all adolescents and young adults. However, the transition to adult care is made more challenging for those living with a chronic and stigmatizing illness such as perinatally-acquired HIV (PHIV) due to increased demands of self-management, fewer resources for psychosocial support, and different models of care in the adult clinic. Previous research has examined medical and social service provider perspectives, as well as patient and guardian views on the transition experience. Adolescent and guardian perspectives about the transition to an adult care setting have used independent or side-by-side analyses of perceptions. No research to date explores the ways in which transition perspectives of youth with PHIV converge or diverge from those of their caregivers and what implications this may have for the adolescent's transition. The purpose of this study was to (1) describe the congruence and dissimilarities of guardian and adolescent perspectives of transition preparedness and planning and (2) consider the role of transition expectations in shaping agreement and disagreement in perceptions. Semi-structured interviews were conducted with 18 adolescents with PHIV (mean age 16.3 years; range 15-19 years) and their guardians (mean age 58.1 years; range 37-83 years). Most adolescents were female (61.1%), African American (77.7%), currently enrolled in high school (77.7%). The majority of guardians were biological parents (67.0% ). Responses to questions about transition planning and involvement in transition decisions were coded using standard qualitative methods. Adolescents and guardians were in agreement that the transition process had not started. When prompted to describe guardian and adolescents' involvement in transition decisions, the dyads were likely to agree about the level of involvement. However, when asked broadly who would be involved in transition, few pairs mentioned the same parties and only one dyad suggested that the adolescent would be involved. An analysis of adolescents' and guardians' expectations for transition provided a framework for understanding congruence and incongruence of perceptions. The findings of this study may have important implications for developing transition planning strategies that aim to facilitate communication between adolescents, guardians, and providers.

# *RELIGIOUS STUDIES*

## ENGAGED JAIN TRADITIONS AND SOCIAL NONVIOLENCE: ETHNOGRAPHIC CASE STUDIES OF LAY ANIMAL ACTIVISTS AND SERVICE-ORIENTED NUNS

**Brett Evans** (Dr. Amy Allocco), Department of Religious Studies

This paper focuses on several interrelated lay and monastic Jain interpretations of *ahimsa* (nonviolence) which have, to date, been underrepresented in the scholarly literature. Jainism, an Indian religion that scholars trace to the 9th century BCE, has approximately 5 million followers in the world today. Drawing on case studies of Jain animal activists and service-oriented nuns recorded during the course of ethnographic fieldwork in western India in 2012, it highlights the ways in which many Jains are leveraging *ahimsa* as a rationale for a range of socially engaged actions. These actions, such as maintaining animal homes (*panjrapoles*) and operating free health clinics for humans, are part of a repertoire of practices which are undertaken alongside traditional personal actions (e.g., abstaining from meat). The case studies included in this paper serve as valuable counterpoints to the prevailing scholarly emphasis on orthodox understandings of *ahimsa* that focus almost exclusively on restricting personal violence with the intention of limiting an individual's karmic intake. I argue first that many contemporary lay Jains emphasize *ahimsa*'s social dimensions over its ascetic commitments and that this sort of social *ahimsa* is also present among some monastics, both explicitly and implicitly. Second, I contend that this contemporary, socially engaged Jainism should not be understood as a recent phenomenon produced by the convergence of western and diaspora forces, but rather that these Jains are participating in long-standing indigenous traditions with contested histories.

## IMAGINING SPACES: THE FUNCTION OF IMAGINED SACRED SPACE IN EZEKIEL AND REVELATION

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Representations of spaces and places (i.e. lands, temples, realms, cities) function in various ways within biblical texts, including communicating ideas, arousing feelings and attitudes, and shaping the actions of the community. This project examines the rhetorical function of space in Ezekiel's vision of the Jerusalem Temple and in John's visions of the Throne Room and the New Jerusalem in Revelation. By attending to the historical contexts of these writings, as well as employing the tools of literary and rhetorical analysis, I argue that the Temple and New Jerusalem spaces described in Ezekiel and Revelation respectively are *imagined* spaces. They are not descriptions of existing spaces nor blueprints for places to be constructed, as some scholars suggest; rather, the spatial language and imagery of these texts allow the authors to communicate their political-theological goals to their audience who would understand them better in this way. One of the foci of this presentation will be on the ways that these authors use numerical values rhetorically and symbolically within imagined spaces, which has received little attention in academic discussions. Overall, we will see how these authors utilize aspects of space, architecture, and numerical values to engage and communicate with their audiences in a meaningful way.

### THE CRADLE OF THE WORLD: A FEMINIST APPRAISAL OF INDIAN SURROGACY

**Alanna J. Vagianos** (Dr. Amy L. Allocco) Department of Religious Studies

In an effort to avoid more stringent legal codes and higher costs elsewhere, individuals and couples from so-called First World countries who face obstacles in their paths to parenthood are increasingly seeking Indian surrogates. As India's commercial surrogacy business burgeons, ethical concerns are being raised about this $300 million/year industry. Drawing on secondary literature, media sources, and short-term ethnographic fieldwork in India, I offer an overview of India's commercial surrogacy industry and contextualize the relevant gender expectations and issues. Next I introduce the developing legal issues surrounding surrogacy, exploring them in relation to rapidly advancing reproductive technologies and the incredible growth in India's medical tourism industry. I describe how legislation essential to the surrogacy industry has languished, leaving hundreds of surrogates and biological families without adequate legal protections. After providing this background, I examine four main areas: 1) "automatic" childbearing (the idea that many women are socially conditioned to believe that fulfilling their womanhood necessarily entails motherhood) and the patriarchal ideals that contribute to feelings of inadequacy when a woman cannot achieve biological motherhood; 2) the perspectives and experiences of Indian surrogates; 3) surrogacy as a form of agency, which allows a surrogate the right of self-determination over her own body; and 4) the effect of occupational identity on Indian surrogates in their everyday familial and social contexts. In conclusion, I argue from a context-sensitive feminist perspective that fair compensation, legal protection, and access to necessary medical treatment of all parties is imperative to the ethical success, and consequently global success, of this industry. If and only if these safeguards are put into place, then a surrogate's decision to employ her body in this manner has the potential to empower her within the family as well as in her wider social contexts, particularly in economic terms. I argue that surrogate relationships have a latent capacity to function in positive, reciprocal, and mutually empowering ways, opening up new arenas of possibility for some Indian women.

## *SOCIOLOGY AND ANTHROPOLOGY*

### EXPLORING THE CULTURAL CONSEQUENCES OF OIL DRILLING ON SACRED NATIVE AMERICAN SITES

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Introduction: As the world demand for fossil fuels increases and the United States becomes increasingly reliant on the use of fossil fuels, exploration and drilling within the United States is intensifying. Native American tribes are coming together to protect sacred and historical sites from oil drilling while the Bureau of Land Management grants oil exploration permits. The focal location of this research, Bear Butte State Park, exemplifies a sacred site that is essential to Native tribes' religions and threatened with potential oil drilling prospects. The surrounding land is not federally protected from commercial exploitation and therefore puts the sacred mountain at risk of desecration. Objectives: The objective of this research is to explore the cultural impact of oil drilling on Native American sacred sites from the point of view of Native Americans whose identities, heritage, and history are tied up in these spaces. Secondly, I would like to investigate

potential pathways for Native Americans and oil companies to form partnerships such that both sides benefit. Methods: From March 15-25, 2013 I am traveling to Bear Butte State Park to conduct participant observation as a way to become acquainted with the people in the tribes and visit the sacred areas affected by oil companies. I plan to develop relationships and conduct semi-structured and unstructured interviews. I expect to interview about 20 people during my ten-day ethnographic travel. I hope that my experience as a woman with Native American heritage will help me to build rapport with the local people and enhance my ability to explore these questions. Results: The narratives collected by the research participants will place the voices and concerns of Native American tribes at the front and center of the oil drilling and exploration debate. A thorough understanding of what Native American people have to say about the importance that these lands and their potential loss might have on their communities opens the door for new protection laws, debate, and discussion concerning sacred Native American land.

## THE SIGNIFICANCE OF JIU-JITSU IN BRAZILIAN SOCIETY: AN EXAMINATION OF THE SOCIALIZING EFFECTS OF BRAZILIAN JIU-JITSU PRACTICE

**David K. Carroll** (Dr. Thomas S. Henricks) Department of Sociology

This project explores the functions of Brazilian Jiu-Jitsu, a grappling based martial art, in the context of Brazilian society. In Brazil, an important distinction is made between the sphere of home and family (what is called the "house") and involvement in the wider society, including work relations (what is called the "street") (see Robben, 1988). The researcher seeks to understand the place of Brazilian Jiu-Jitsu schools as possible "mediating" organizations that help young men negotiate their place between these two realms. The general thesis is that these training schools are effectively agencies of socialization in which students develop several qualities: skills in physical combat, qualities of character and self-image, and social support systems that allow them to participate in society in more effective ways.
To examine this thesis, the researcher (himself a practitioner of this martial art for five years) enrolled in a Jiu-Jitsu training academy in Montes Claros, Brazil for ten weeks during summer 2012. During this period, he spent approximately 12 hours a day with 35-40 Brazilian students and conducted participant observation research on both the training procedures and personal lives of the practitioners outside of that setting. Of these, approximately 20 students were chosen for more focused semi-structured interviews, both as individuals and in small groups. The purpose of these interviews was to discover the meanings of Jiu-Jitsu in their lives. Special attention was placed on the perceived ability to defend oneself, body image, family and friendship networks, and the more general philosophy of life promoted by the academy.
As a result of this study, the researcher concludes that Brazilian Jiu-Jitsu is an especially effective socialization agency because of its specialized training procedures, including somewhat counter-intuitive defensive skills, strict control of ego, and almost faith-based trust in professors and their techniques. Focus is less on direct competition than on cooperative learning and on the development of longer-term skills. As a result of this training, important social relationships are developed; and these relationships serve as mediating organizations for young men trying to find their place in Brazilian society.

## MATERIAL CULTURE AND SOCIAL ORGANIZATION: INDICATIONS OF SOCIAL STATUS AT THE ANCIENT MAYA SITE OF DOS HOMBRES, BELIZE

**Margaret M. Frates** (Dr. Rissa Trachman) Department of Anthropology

Recent research in archaeology has begun to challenge early assumptions about the relationship between material culture and social organization. Through the collection and analysis of ceramics and non-tool artifacts from multiple spatial and temporal contexts, the extent to which material culture reflected the complex socioeconomic status of the ancient Maya was tested and inferred. The Maya archaeological site of Dos Hombres served as a case study and source of ancient Maya artifact assemblages from various contexts, including ceremonial site centers and households in the hinterlands. The study will yield a greater understanding of the relationship between socioeconomics and material culture at Dos Hombres that could contribute to greater, holistic understanding of these variables within the archaeological contexts in which they were recovered. LeCount (1999) constructed a model challenging early assumptions that failed to recognize the cultural complexity and context. Rather than assuming social status was proportional to the ownership of vast and various material goods, LeCount's model considers when and how material culture functioned as a means to promote political strategies in state-level societies through the analysis of decorated pottery. Her model was utilized to investigate the complex relationships between wealth, social status, and political strategy at Dos Hombres. The pottery evidence was analyzed utilizing type-variety mode analysis, which entailed categorizing ceramic fragments according to surface treatment, decoration and paste. Temporal differences in the ceramic ware and group frequencies were evident in various contexts and point to economic, social and political changes occurring within Dos Hombres. These changes indicate a shift in supply and demand of both utilitarian goods and prestige goods. According to LeCount, the distribution of prestige goods across households of both elite and commoner contexts was a result of attempts by the centralized authority to maintain power during political instability. However, due to the findings of this study, LeCount's model does not completely explain the complexities of hierarchy as positioned within rural communities. LeCount recognizes the distribution of goods as a direct result of the actions of the state, failing to distinguish between the changing power and authority dynamics among various social classes over time.

## PERSPECTIVES FROM STUDENTS STUDYING ABROAD: FIRSTHAND ACCOUNTS OF EXPERIENTIAL TRANSFORMATIVE LEARNING

**Sarah Karis George** (Dr. Tom Arcaro) Department of Sociology and Anthropology

The purpose of this study was to explore students' experiences while participating in semester-long study abroad programs, focusing on the adjustment processes that they experienced going abroad and upon return. As study abroad experiences allow students to become immersed in new cultures, students are faced with adjusting to new cultural environments while abroad and readjusting to their home environment upon return. The literature refers to these periods of readjustment as "culture shock" and "reverse culture shock." Understanding patterns of students' experiences with these adjustment periods is important so programs can provide support ensuring students' success both abroad and upon return, and find effective pathways to ensure meaningful, lasting impact of the study abroad experience.

This research methodology compared responses from structured interviews and surveys with classroom-based group discussion and blog responses from Coming Home, an upper-level GST

class meant to equip students with the tools to retroactively identify and describe instances in which they had encountered meaningful cultural differences. This methodology combined qualitative and quantitative data to provide a holistic perspective on students' experiences.

The findings of this research very closely support and contribute to prior literature describing and analyzing study abroad experiences, including the presence of cohorts formed by study abroad students, academic and lifestyle differences, and reverse culture shock. The unique aspect of this research is that it did what other studies have not by exploring students' experiences using a structured course to supplement data from interviews. In employing this methodology, one of the main conclusions of this research supports the use of programming for students upon their return from abroad, as the Coming Home course fostered deeper understanding and greater awareness towards the transformative impact of studying abroad.

Though the findings in this study are both rich and immediately useful, this study is not easily replicable, as it would require both a sample of students to participate in a three-tiered interview process, and a group of studies abroad students to voluntarily participate in a three-week, structured course following the design of Coming Home, immediately upon their return from abroad.

## AUTHENTICITY, SEXUAL ORIENTATION, AND MENTAL HEALTH AMONG COLLEGE STUDENTS

**Joshua M. Kaufmann** (Dr. Alexis T. Franzese) Department of Sociology and Anthropology

How do college- aged individuals who identify with a non-majority sexual orientation negotiate authenticity in various settings, and do feelings of authenticity play a role in the mental health of these individuals? The concept of authenticity, a sense of being true to oneself, has been addressed in relation to mental health, but its implications for understanding the sexual orientation/mental health linkage have not been studied. Previous research on youth and sexual orientation demonstrates that because adolescents are undergoing emotional, social and cognitive development, those who identify as bisexual or homosexual often endure a more difficult path of coming to terms with their sexuality and are at greater risk for negative mental health outcomes than their heterosexual peers (Omoto & Kurtzman 2006). These health problems may include but are not limited to alcohol and drug abuse (c.f., McKirnan & Peterson 1989), engaging in greater sexual behavior with the increase of contracting HIV (c.f., Grossman 2001), experiencing bullying and discrimination (c.f., Hall 2007), and suicidal thoughts and actions (c.f., Russell 2003). The current study addresses individual and group differences in the extent to which individuals feel that they can be their 'true selves' with others. Sociologically, this work is important because it explores the influence of social structural position on health outcomes and applies sociological theories such as symbolic interactionism to consider the ways in which identity is negotiated. Psychologically, this work is significant because it examines factors that may be protective of mental health and explores the nature of personal identity. This research has been conducted by extensive literature review on authenticity, on sexual orientation, and of the few studies linking those concepts, and through collection of pilot data on these topics. Though this research is currently ongoing, preliminary findings suggest that there is a complex relationship between sexual orientation and authenticity and that an individual's self-presentation is contextually dependent. The study suggests the importance of non-majority sexual orientation individuals identifying contexts in which they can experience feelings of authenticity and carry implications for programming on college campuses.

## TOURISM AS A FORM OF ECONOMIC GROWTH AND CULTURAL REVITALIZATION: A CASE STUDY OF THE OCCANEECHI BAND OF THE SAPONI NATION

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There has been a significant lack of academic attention paid to smaller, non-federally recognized American Indian tribes. Thus, as one attempt to remedy this lack of attention, this study offers an examination of the relationship between North Carolina's Occaneechi Band of the Saponi Nation (OBSN) and tourism. Many of the issues relevant to the Occaneechi are also applicable to other small, non-federally recognized tribes throughout the United States. This case study therefore provides an important lens though which to consider American Indian tourism in the U.S.

Data was gathered through standard ethnographic methods, including participant-observation and in-depth interviewing. Interviews were transcribed and analyzed using open coding to identify emergent themes. The analysis reveals that tourism serves a number of functions for the Occaneechi community. Most importantly, the internal education of tribal members dominates the tribe's efforts in their public programming. Tourist events also function as a means of constructing a public identity. In particular, they are used as a forum through which to respond to and educate the public about misconceptions surrounding Native Americans generally and the Occaneechi specifically. Lastly, tourist events are used as a means of inter-tribal relations and of connecting with a broader "Indian" identity.

This case study of the Occaneechi also allows for a broader consideration of American Indian tourism as a whole. Indeed, this case study suggests that greater attention needs to be paid to the internal rather than external motivations for tourism. Much of the existing literature suggests that communities are pressured into accepting tourism because of financial distress or existing public demand. For the Occaneechi, however, tourism was actively and independently sought out. Furthermore, this case study suggests a need for a new model of proximity concerning local perceptions of tourism in an unsaturated tourist market. The current model of proximity suggests a correlation between proximity to major tourist attractions and locals' frustration with tourism. Yet, because of the Occaneechi's small size, lack of reservation land, and low tourist demand, tribal members generally hold more positive attitudes towards tourism than current theoretical models would suggest.

## PLAYING POOR: IMAGES OF IRISH TRAVELLERS IN SETTLED PEOPLE'S NARRATIVES.

**Caroline H. Miller** (Dr. Tom Mould) Department of Anthropology

The Irish Travellers are a minority group indigenous to Ireland who share common cultural practices such as self-employment and nomadism. As a marginalized community they experience a great deal of prejudice. Indeed, the European Parliament Committee of Enquiry on Racism and Xenophobia has found Travellers to be one of the most discriminated against groups in Ireland (Danaher et al.). However, significant shifts in economic and social life in Ireland in the past few decades suggest that these prejudices and perceptions may be changing. Understanding what these perceptions are, how they are evolving, and the dynamics that both create and continue to

shape these perceptions is vital to being able to create policies that will construct a climate conducive to mutual understanding and respect between these two groups. Accordingly, this study examines the narratives shared about Travellers by settled Irish Millennials (those born between 1982 and 2004) in order to identify and understand these shifting perceptions. Data gathered using in-depth interviews with college-aged Irish students. Interviews were transcribed and analyzed using open coding to identify emergent themes. The data showed a dramatic increase in the perception of Travellers as being rich but pretending to be poor to get money from settled people and the government. The study also revealed some dissonance between the opinions discussed during discourse in the interviews and those that were apparent through the sharing of narratives. In most cases opinions expressed in discourse were more optimistic about the relationships between Travellers and settled people whereas in narratives, especially those originating from the media or friends of friends, tended to be more negative. Further, it is clear that the mass media is a significant source from which Irish Millennials form their perceptions of Travellers and plays a large role in the shift in perceptions. Therefore, if the mass media continues to be a primary source of information for Millennials, change in perceptions of Travellers will be slow until media depictions are dramatically changed.

## BREASTFEEDING NARRATIVES AMONG WIC PARTICIPANTS IN ALAMANCE COUNTY, NORTH CAROLINA

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Introduction: Though overall breastfeeding initiation rates have progressively increased since 1990, exclusive breastfeeding initiation rates have only increased slightly. Exclusive breastfeeding rates in the first six months of life are especially low among families eligible for WIC assistance. This unequal distribution of breastfeeding rates might be due to a lack of an established, effective, and sustainable means of breastfeeding promotion—a void that could be filled with breastfeeding peer counselors. Breastfeeding, particularly prolonged, exclusive breastfeeding, is important for maternal and infant health as well as long-term disease prevention. Objectives: The objective of this research is to gain an understanding of how mothers who have received WIC peer counseling and services conceptualize and value these service in their everyday lives. The project will examine these issues through exploration of breastfeeding narratives from WIC-eligible mothers and WIC breastfeeding peer counselors in Alamance County, North Carolina. Methods: Semi-structured interviews will be carried out with 10-20 mothers who have received WIC peer counseling services and support in the last 12 months. Additionally, WIC peer counselors will be interviewed to gain their perspective on the special needs and challenges of helping mothers to achieve their breastfeeding goals in this population. Data collection will happen between February 2013 and March 2013. Interviews will be transcribed and coded using AtlasTi. Results: Collectively, the narratives gathered from participants will facilitate analysis of the various factors of participants' everyday lives and experiences that intersect with WIC peer counseling to ultimately influence breastfeeding success or cessation. Stories about how WIC peer counseling has helped, or hindered, participants' efforts will be important in understanding the impact of these services on the experiences and practices of breastfeeding mothers within this population. Ultimately, this research will provide greater insight into the existing challenges to optimal breastfeeding practices within this population in Alamance County.

### FOOTBALL AND IDENTITY: FANTASY FOOTBALL AND FANSHIP IN THE UNITED STATES

**Rosemary L. Towchik** (Dr. Thomas S. Henricks) Department of Anthropology

The purpose of this research is to describe the construction of fan identity with a focus on fantasy football participation and media consumption amongst university students. After an initial description of fantasy football as a unique cultural experience in which fans have the opportunity to become "owners" of professional sports teams, the research focuses on the tensions between traditional football team fanship and the fanship associated with fantasy football teams. It is argued that the formation of a personal fantasy team, comprised of individual players selected by the "owner," may jeopardize traditional fan loyalty to a specific National Football League team, weaken patterns of regional and familial allegiance, and influence the consumption of sports-related materials. The findings of the research are based on individual interviews, email correspondence and observations conducted during a one year period with students at a midsized, private institution in the Southeast. Those interactions with university students investigated their individual life histories, motives for involvement, and methods of fantasy football participation. Identifying the factors that influence participation may assist the efforts of fantasy football leagues to developed more efficient, relevant, and interesting entertainment systems for undergraduate university populations. This research found that while fantasy football is growing in popularity as a supplement to traditional fanship, it will not override fan support of NFL teams. Fantasy football's temporal nature prohibits long-term commitment and a sense of "loyalty" to a team. Rather, fan support of teams based on their regional affiliation or family preferences provides a much stronger connection and the possibility for lifelong allegiance. In this sense, fantasy football will not take precedence in the lives of fans.

## *SPORT AND EVENT MANAGMENT*

### THE HONEYMOON EFFECT IN MAJOR LEAGUE BASEBALL: A CASE STUDY OF THE COLORADO ROCKIES

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The honeymoon effect is the decline in attendance a facility experiences some time after it is built. This phenomenon, which has been researched across all four major league sports (hockey, football, basketball, and baseball), can last anywhere from four to ten years. While research has been conducted on the honeymoon effect in professional sports, little is known about why this phenomenon occurs. The Major League Baseball team the Colorado Rockies is a prime target for this study because from 1996-2005, they saw an unexplained sharp decline in attendance. This decline came after the Rockies set record highs in attendance for Major League Baseball from 1993-1996. Thus, the purpose of this study is to conduct an in-depth examination of the honeymoon effect as it applies to the Colorado Rockies, and determine why the phenomenon occurred. Semi-structured interviews guided by factors identified in the research to be potential reasons for the occurrence of the honeymoon effect (team success, acquisition or performance of star players, economic factors, marketing strategies, individual facilities) were conducted with 16 Rockies ticket holders and employees. Additionally, document analysis of popular media and participant observations of game day events have been conducted. Content analysis of

interviews, documents, and observations have been analyzed to uncover interviewees' perceptions on why Colorado experienced the honeymoon effect. Themes indicate that people attend Rockies games because they simply enjoy the baseball environment; there is a problem with the Rockies' lack of success; attendance and purchasing of season tickets have a lot to do with the talent on the field and team management; attendance is affected by the ticket holders' lifestyles; and the idea that Coors Field is still an attraction. Findings provide some understanding as to why fans may or may not attend a particular sporting event. Although the honeymoon effect will have an impact on new stadiums, findings may also provide insight into how sport managers could reduce the drop of attendance in new facilities.

### THE EXPLORATION OF DIVERSITY AMONG DIVISION I SOFTBALL COACHING STAFFS

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The purpose of this exploratory study was to examine if the diversity, defined by gender, of Division I softball coaching staffs impacts a team's performance. According to Cortini (2009), the most important factor to winning for collegiate athletic teams is a strong, high quality, coach-athlete relationship; however this relationship takes considerable time due to the numerous barriers that exist. One barrier to developing a strong coach-athlete relationship and thus having athletic success is the attitude of athletes toward the gender of the coach (Cortini, 2009). This study helped to determine which diversity combinations of coaching staffs, in terms of genders, lead to greater athletic success in Division I softball. Data was collected in two phases using each university's website and media guide, National Collegiate Athletic Association (NCAA) records, and other college athletics media. The first phase identified the top 25 Division I softball programs each season from 1995 to 2012 and the gender of head coach. The second phase assessed the relationship between coaching diversity, defined by gender, of all coaching staffs for all Division I programs (N=289) during the 2011 and 2012 seasons and team success. The data was analyzed using descriptive analysis, one-way ANOVAS, cross-tabulation, and chi-squares. The results showed that for data collected during phase 1, there was a significant difference between overall winning percentage based on head coach gender with co-head coaches having the highest winning percentages, then males, and then females. The results also showed that for data collected during phase 2, there was a significant difference between gender of head coach and overall winning percentage with male head coaches having a higher winning percentage than females. Therefore, Division I softball teams with a male head coach and a gender diverse staff are more likely to have a higher winning percentage. Based on this study, it appears that coaching staff diversity, in terms of gender, does impact winning percentages of Division I softball teams.

## *THEATRICAL DESIGN AND PRODUCTION*

### MORE ABOUT ART, LESS ABOUT STRUCTURE: DEVELOPING NEW BUSINESS MODELS FOR NONPROFIT THEATRE

**Dorothy E. Noel** (Professor Michael Smith) Department of Performing Arts

The current economic environment has not been a positive one. The 2008 recession and continued economic hardship has led to decreased funding for the arts across the board. In response to this trend, theatres have begun to search for new ways to provide performance without compromising their artistic merit. One method employs cutting down on administrative overhead and rethinking how the theatre operates day-to-day. Working in theatre administration involves finding the balance between running a business and producing good theatre. In order to do both, it is important to remain focused on the art, and that all other tasks serve it. One method of doing so is using the Business Model Canvas designed by Alex Osterwalder and Yves Pigneur. By using one model to compare theatres, it is possible to see their strengths and weaknesses and begin to develop some standards for successful business models for new or redeveloped theatres.

Doing case studies of three theatres based on a phone interview with an administrative leader and extensive review of their website, publicity, and review materials provided a picture of each theatre that was laid out on the business model canvas for ease of comparison. The Commonweal theatre in Lanesboro MN, the Space performing arts and Community center in London, UK, and 13Playwrites in NY, NY all which provide traditional theatrical performance but within different settings and serving different populations.

These case studies showed that while there is no one way to best structure a theatre, there are some commonalties to consider. In all theatre settings, having a specific, measurable serviceable mission statement helps direct the theatre's resources in the most efficient way. This mission defines who the theatre serves and why, which leads to their success in all other areas. Traditionally, the audience and community are considered the only theatrical customers, but in some cases the artists are as well. Each theatre must understand its own unique business model if it is to provide its most rewarding theatrical experience.