Ninth Annual
ACC Meeting of the Minds
Undergraduate Research Conference

April 3-5, 2014
University of Pittsburgh
Welcome scholars and faculty advisors to the ninth annual Atlantic Coast Conference Meeting of the Minds. I know that I speak for the entire community at the University of Pittsburgh when I say that we are delighted to host 109 student researchers representing 30 fields over the next three days.

I want to congratulate all of the attendees on your achievements, and for having been chosen by your schools to represent them at this event. The Meeting of the Minds is an opportunity to take the success you have experienced in your research and present it to a broader audience, discuss your thoughts and findings with others, and use these discussions to chart new paths forward. We are confident that your individual motivation and curiosity, combined with the variety of fields represented at this event will create the opportunity for many new ideas and insights, and will plant the seeds for exciting discoveries and collaborations in the future.

I hope that you will enjoy your time at Pitt and in the city of Pittsburgh. As a new ACC member, we look forward to building on the tradition that has been established at this event over the last eight years, and to the new relationships the event will inspire.
Welcome from the ACC

David G. Brown
Coordinator of the ACCIAAC
Former Provost of Wake Forest University

For centuries, worldwide, apprenticeship reinforced by team learning and capped off by “going solo” has been the predominant method of passing knowledge from one generation to the next. And it has provided the primary platform for launching into uncharted territory and new discovery.

All topics from speaking, parenting, car driving, and cooking to all areas of scholarship on the frontiers of science, social science, and the humanities apply.

As premiere undergraduate researchers from many of the world’s best universities, the scholars at this Meeting of the Minds Conference represent the cutting edge and the future of scholarship.

For these reasons, the ACC’s Inter-university Academic Collaborative is pleased to provide $75,000 from funds generated by the athletic conference’s football championship game to support the Meeting of the Minds.

Congratulations. The world is counting on you! We look forward to great things.
Mark A. Nordenberg joined the faculty of the University of Pittsburgh School of Law in 1977. He quickly built a reputation as an outstanding teacher, including being the initial recipient of the School’s Excellence in Teaching Award and one of the first faculty members to receive the University-wide Chancellor's Distinguished Teaching Award. His area of academic specialty is civil litigation, and he has served as a member of both the U.S. Advisory Committee on Civil Rules and the Pennsylvania Supreme Court's Civil Procedural Rules Committee.

Earlier in his career, Chancellor Nordenberg served the University as Dean of School of Law and as Interim Provost. In 1995, he was elected Interim Chancellor by the University’s Board of Trustees, and in 1996, following a national search, he was elected Chancellor.

In June 2013, Chancellor Nordenberg announced that he would step down from that office in the summer of 2014. Under his leadership, the University achieved new levels of quality and impact on virtually every front. Undergraduate applications and academic credentials of enrolled students have soared; faculty and students regularly receive the highest forms of national and international recognition; and Pitt now ranks among the top five U.S. universities in federal science and engineering research and development support.
Pitt Hosts

Juan J. Manfredi, Vice Provost of Undergraduate Studies and Professor of Mathematics, has a distinguished record as a teacher and has been deeply engaged with the undergraduate program throughout his career at the University of Pittsburgh. His innovative teaching of undergraduate calculus was recognized through the Chancellor’s Distinguished Teaching Award in 1994. Dr. Manfredi received his Licenciado degree from the Universidad Complutense in Madrid and his PhD from Washington University in Saint Louis. He studies partial differential equations using the theory of games. Dr. Manfredi is also the advisor for the Panther Amateur Radio Club, W3YI, which was founded in 1915. He explains that ham radio operators share a camaraderie that extends worldwide, and he even carries his radio wherever he travels. Each summer, club members participate in a field day where they practice using non-commercial power sources such as batteries and solar energy in their communications.

Stephen D. Meriney, Professor of Neuroscience and Psychiatry, received his BA in Zoology from the University of New Hampshire where he engaged in undergraduate research focused on marine animal behavior. His mentor at the time was interested in the nervous system control of these marine animals, and this strongly positive undergraduate research experience was the driving force behind the decision to obtain a PhD in Physiology with a concentration in Neuroscience at the University of Connecticut in 1987. Dr. Meriney then engaged in postdoctoral training at the Jerry Lewis Neuromuscular Research Center at UCLA studying motor nerve terminals. In 1993, Dr. Meriney was hired as an assistant professor in the Neuroscience Department at the University of Pittsburgh where he established his research program focused on nerve cell communication. In his current position he studies the function of healthy and diseased neuromuscular synapses.
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Schedule of Activities

Thursday, April 3, 2014

All Day  Visitors’ Registration
          Wyndham Pittsburgh University Center

4:30 pm  Optional Campus Walking Tour
          Conducted by Pitt Pathfinders
          *Departs from the Wyndham-Lobby*

5:30 pm  Opening Reception
          *Frick Fine Arts Building – Cloister*

7:15 pm  Student Group Dinners
          *Oakland Restaurants*

7:15 pm  Faculty Dinner
          *University Club, Gold Room*

Friday, April 4, 2014

8:00 am  Breakfast
          *University Club, Ballroom A*

9:00 am  Oral Student Presentations
          *University Club*

11:30 am Lunch with Pitt Graduate Students
           *University Club, Ballroom A*

12:30 pm Group Photo
           *Ballroom B*

1:00 pm  Oral Student Presentations
           *University Club*
3:15 pm  Poster Set-up  
*O’Hara Student Center, Ballroom, Floor 2*

3:30 pm  Poster Reception  
*O’Hara Student Center, Ballroom, Floor 2*

5:30 pm  Dinner with Plenary Speakers  
*University Club, Ballroom A*

  Dr. Andrew Schwartz  
  *Recent Progress Toward a High-Performance Brain-Controlled Prosthetic Arm*

  Dr. Terry Smith  
  *Andy Warhol: Pittsburgh, New York, the World*

7:30 pm  Warhol Museum and Duquesne Incline  

  *Bus returns to Wyndham*

**Saturday, April 5, 2014**

8:00 am  Breakfast  
*University Club, Ballroom A*

9:00 am  Oral Student Presentations  
*University Club*

11:30 am  Theatre Arts Research Presentation  
*O’Hara Student Center, Ballroom, Floor 2*

12:00 pm  Closing Remarks and Boxed Lunch
Dr. Schwartz received his PhD in Physiology from the University of Minnesota in 1984 with a thesis entitled “Activity in the Deep Cerebellar Nuclei During Normal and Perturbed Locomotion.” He then went on to a postdoctoral fellowship at the Johns Hopkins School of Medicine where he worked with Dr. Apostolos Georgopoulos, who was developing the concept of directional tuning and population-based movement representation in the motor cortex.

In 1988, Dr. Schwartz began his independent research career at the Barrow Neurological Institute in Phoenix. There, he developed a paradigm to explore the continuous cortical signals generated throughout volitional arm movements. After developing the ability to capture a high fidelity representation of movement intention from the motor cortex, Schwartz teamed up with engineering colleagues at Arizona State University to develop cortical neural prosthetics. Schwartz moved from the Barrow Neurological Institute to the Neurosciences Institute in San Diego in 1995 and then to the University of Pittsburgh in 2002.

Recently, the neural prosthesis work has progressed to the point that monkeys can control motorized arm prostheses in a self-feeding task and to orient a prosthetic hand to operate a doorknob with an extension to hand shaping. In collaboration with clinical colleagues at the University of Pittsburgh, this technology is now being used by paralyzed subjects to operate a high-performance prosthetic arm and hand.
Dr. Smith was the 2010 winner of the Mather Award for art criticism conferred by the College Art Association (USA), and recipient of the 2010 Australia Council Visual Arts Award. During 2001-2002 he was a Getty Scholar at the Getty Research Institute, Los Angeles, and in 2007-2008 the GlaxoSmithKline Senior Fellow at the National Humanities Research Centre, Raleigh-Durham. A foundation board member of the Museum of Contemporary Art, Sydney, he is currently a board member of the Andy Warhol Museum, Pittsburgh.

His major research interests are contemporary art of the world, including its institutional and social contexts; the histories of multiple modernities and modernisms; the history and theory of contemporaneity; and the historiography of art history and art criticism. He has special expertise in international contemporary art (practice, theory, institutions, markets), American visual cultures since 1870, and Australia art since settlement, including Aboriginal art.
Ms. Bria Walker is a Pittsburgh-based actress, singer, writer and teaching artist. Her Pittsburgh credits include: *POP!, Marcus; or the Secret of Sweet* (City Theatre); *By the Way, Meet Vera Stark* (The REP at Point Park); *Venus* (University of Pittsburgh Stages); *In the Raw Festival - Ganglia: Instructions for the Symbiogenesis, For the Tree to Drop, Midnight Radio, B.U.S. 7* (Bricolage Production Company); *The Sisters Grey* (August Wilson Center); *Every Tongue Confess, Last of the Line*, The all-female staged reading of *Piano Lesson, & August in August* directed by Mark Clayton Southers and Stephen McKinley Henderson (August Wilson Center); *Anthony & Cleopatra* (Pittsburgh Irish & Classical Theatre); Guest singer with THE SKIVVIES.

New York Theatre credits include: *Behold! The Fig Leaf Apron* - workshop production (Fight or Flight aerial theatre company), *The Doll Confessions* (Lelund Durond Theatre Group - with original writings: *Monk Monk’s Interlude & Tattered Love*); Regional: *Crowns, A Christmas Carol, King Lear, Working, The Elephant Man, 365 Days/365 Plays* (Denver Center Theatre Company); *From the Mississippi Delta* (Triad Stage); *It Ain’t Nothin’ But the Blues* (Theatre Aspen); *Shakespeare on Nature* (Aspen Ideas Festival, written and directed by former Reagan advisor, Kenneth Adelman); *La Dolce Sondheim, Romeo & Juliet, Caucasian Chalk Circle* (National Theatre Conservatory).

Film: *Somewhere Near Here; 1903: The Wings of Dreams* (ThinkTV16); Web Series: *Wallstrip.com* (CBS).

Education: MFA - National Theatre Conservatory in conjunction with the Denver Center for the Performing Arts; BFA - Wright State University.

www.briawalker.com
**Dramaturgy and Sketch Show**

**In The Heights**
Presenter and writer: Esther Terry, PhD student  
Accompanist and music director: Douglas Levine, visiting lecturer  
Undergraduate performers: Erik Blumberg, Chelsea Faber, Arianne Kraiman, Stephen Kromka, Michael Magliocca, Anthony Morrison, Mark Tumblin, Rocky Paterra, and Jenna Simmons

Research dramaturgy for *In the Heights* seeks to situate the characters and the world of the play within relevant contexts to which the play refers, riffs on, repeats, and revises through its characters, dramaturgical structures, music, and rhythm. The historical contexts include, but are not limited to: the creators; Latin @theatre and musical theatre history; immigration politics; rap and hip hop as Atlantic forms; the diasporas, dances, and rhythms of the Caribbean, South America, and Central America; gentrification requiring destruction; and Spanish language variations in the Americas. The theoretical and scholarly contexts include, but are not limited to: performing race and gender; implications of casting choices; gender in rap and hip hop; US encroachments in Latin America; and adverse effects of globalization in the Global South.

**My Doomsday Off**
Presenter and director: Richard Walker, MFA student  
Undergraduate performers: Cassandra Dellacorte, Mallory Fuccella, Melissa Italiano, Shane Jordan, and Claire Sabatine

You can discover more about a person in an hour of play than in a year of conversation. – Plato

*My Doomsday Off* is a sketch show, a format most easily understood as a series of unrelated scenes. The show itself is a kind of research into play. Stuart Brown of the National Institute of Play said, “The State of play is an altered state that allows creatures to explore the possible.” In its development we explored the personal knowledge, experience, and imagination of the actors and writers. Because the creation of this production was largely generated through play, we explored many more ideas and created vastly more material than present in the final draft. In the earliest part of the rehearsal process, play is actually more important than the outcome. Giving over to play allowed this ensemble to create the show.
## Oral Presentation Schedule

Friday, April 4, 9:00 – 11:20 am

### Ballroom B, Floor 2

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<tr>
<th>Time</th>
<th>Event</th>
<th>School</th>
<th>Student</th>
<th>Major/Abstract Page</th>
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</thead>
<tbody>
<tr>
<td>9:00</td>
<td>Florida State University</td>
<td>Kimberly Chewning</td>
<td>Art History, p.25</td>
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<tr>
<td>9:20</td>
<td>Boston College</td>
<td>Steven Jefferson</td>
<td>Sociology, p.51</td>
<td></td>
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<tr>
<td>9:40</td>
<td>University of Virginia</td>
<td>Erica Johnson</td>
<td>Foreign Affairs, p.52</td>
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</tr>
<tr>
<td>10:00</td>
<td>Virginia Tech</td>
<td>Corinne Mayer</td>
<td>Biological Sciences, p.68</td>
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<tr>
<td>10:20</td>
<td>Duke University</td>
<td>Logan Pallin</td>
<td>Environmental Science and Policy, p.81</td>
<td></td>
</tr>
<tr>
<td>10:40</td>
<td>North Carolina State University</td>
<td>Megan Rogers</td>
<td>Psychology, p.93</td>
<td></td>
</tr>
<tr>
<td>11:00</td>
<td>Clemson University</td>
<td>Matthew Wasilewski</td>
<td>Chemistry, p.112</td>
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<tr>
<td>9:00</td>
<td>Florida State University</td>
<td>Lawrence Dunn</td>
<td>Mathematics, p.37</td>
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<tr>
<td>9:20</td>
<td>Wake Forest University</td>
<td>Timothy Lee</td>
<td>Chemistry, p.61</td>
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<tr>
<td>9:40</td>
<td>Boston College</td>
<td>Jonathan Makransky</td>
<td>Islamic Civilization and Societies, p.63</td>
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<tr>
<td>10:00</td>
<td>University of Miami</td>
<td>Emily Minor</td>
<td>Biology and Psychology, p.71</td>
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<tr>
<td>10:20</td>
<td>University of Notre Dame</td>
<td>Megan Reineccius</td>
<td>Architecture, p.90</td>
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<tr>
<td>10:40</td>
<td>University of Pittsburgh</td>
<td>Nicole Somplatsky</td>
<td>Studio Arts, p.102</td>
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<tr>
<td>11:00</td>
<td>Clemson University</td>
<td>Elizabeth Whittaker</td>
<td>Psychology, p.114</td>
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<th>Major/Abstract Page</th>
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<tbody>
<tr>
<td>9:00</td>
<td>University of Louisville</td>
<td>Sean Butterbaugh</td>
<td>French and Biology, p.22</td>
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<tr>
<td>9:20</td>
<td>Clemson University</td>
<td>Grant Davidson</td>
<td>Biological Sciences, p.33</td>
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<tr>
<td>9:40</td>
<td>University of North Carolina</td>
<td>Hanjia (Angela) Guo</td>
<td>Chemistry and Biology, p.44</td>
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<tr>
<td>10:00</td>
<td>Georgia Tech</td>
<td>April Martin</td>
<td>History, Technology, and Society, p.66</td>
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<tr>
<td>10:20</td>
<td>University of Maryland</td>
<td>Stephen Randall</td>
<td>Physics, p.88</td>
<td></td>
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<tr>
<td>10:40</td>
<td>University of Notre Dame</td>
<td>Denise Umubyeyi</td>
<td>Political Science, p.110</td>
<td></td>
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<tr>
<td>11:00</td>
<td>Syracuse University</td>
<td>Kelsey Monteith</td>
<td>Biochemistry, p.72</td>
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## Friday, April 4, 1:00 – 3:20 pm

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<th>Time</th>
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<th>Major/Abstract Page</th>
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<tbody>
<tr>
<td>1:00</td>
<td>Georgia Tech</td>
<td>Priya Bajaj</td>
<td>Electrical and Computer Engineering, p.17</td>
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<tr>
<td>1:20</td>
<td>University of Virginia</td>
<td>Andrew Lankenau</td>
<td>Chemistry, p.59</td>
</tr>
<tr>
<td>1:40</td>
<td>Virginia Tech</td>
<td>Andrea Ledesma</td>
<td>History, p.60</td>
</tr>
<tr>
<td>2:00</td>
<td>Boston College</td>
<td>Marissa Marandola</td>
<td>Political Science, p.64</td>
</tr>
<tr>
<td>2:20</td>
<td>University of Maryland</td>
<td>Michael Natoli</td>
<td>Atmospheric and Oceanic Science, p.77</td>
</tr>
<tr>
<td>2:40</td>
<td>University of North Carolina</td>
<td>Hoang My (Ping) Nguyen</td>
<td>Women’s and Gender Studies, p.78</td>
</tr>
<tr>
<td>3:00</td>
<td>Duke University</td>
<td>Rachel Roberts</td>
<td>Psychology and Biology, p.91</td>
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<tr>
<td>1:00</td>
<td>Wake Forest University</td>
<td>Jesse Konig</td>
<td>English, p.58</td>
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<td>1:20</td>
<td>Boston College</td>
<td>Peter Haskin</td>
<td>History, p.46</td>
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<td>1:40</td>
<td>North Carolina State University</td>
<td>Scott Hefner</td>
<td>Architecture, p.47</td>
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<td>2:00</td>
<td>Florida State University</td>
<td>Lauren Hlubny</td>
<td>Theater and Anthropology, p.49</td>
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<tr>
<td>2:20</td>
<td>Georgia Tech</td>
<td>Mohamad Ali Najia</td>
<td>Biomedical Engineering, p.76</td>
</tr>
<tr>
<td>2:40</td>
<td>Syracuse University</td>
<td>Stephen DeSalvo</td>
<td>Chemical Engineering, p.35</td>
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<th>Time</th>
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<th>Major/Abstract Page</th>
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<tbody>
<tr>
<td>1:00</td>
<td>University of Miami</td>
<td>Jennifer North</td>
<td>Latin American Studies and Spanish, p.79</td>
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<tr>
<td>1:20</td>
<td>Clemson University</td>
<td>Anne Pribonic</td>
<td>Language and International Health, p.85</td>
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<tr>
<td>1:40</td>
<td>North Carolina State University</td>
<td>Shrey Satpathy</td>
<td>Nuclear Engineering, p.98</td>
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<tr>
<td>2:00</td>
<td>University of Louisville</td>
<td>Amber Todd</td>
<td>Human and Health Performance, p.105</td>
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<td>2:20</td>
<td>Georgia Tech</td>
<td>Elizabeth Warden</td>
<td>History, Technology, and Society, p.111</td>
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<tr>
<td>2:40</td>
<td>Duke University</td>
<td>Ian Zhang</td>
<td>History, and Asian and Middle Eastern Studies, p.119</td>
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Saturday, April 5, 9:00 – 11:00 am

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<th>Institution</th>
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<tbody>
<tr>
<td>9:00</td>
<td>Duke University</td>
<td>Casey Williams</td>
<td>Literature, p.115</td>
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<tr>
<td>9:20</td>
<td>University of Virginia</td>
<td>Yiqi Cao</td>
<td>Biomedical Engineering, p.23</td>
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<tr>
<td>9:40</td>
<td>University of North Carolina</td>
<td>Dillon David Crockett</td>
<td>Comparative Literature, p.31</td>
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<tr>
<td>10:00</td>
<td>University of Notre Dame</td>
<td>Peter Cummings</td>
<td>Political Science, p.32</td>
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<tr>
<td>10:20</td>
<td>Virginia Tech</td>
<td>Kristen Fread</td>
<td>Biochemistry, p.41</td>
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<td>10:40</td>
<td>Boston College</td>
<td>Marie Pellissier</td>
<td>History, p.82</td>
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<tbody>
<tr>
<td>9:00</td>
<td>University of Maryland</td>
<td>Julie Etheridge</td>
<td>Bioengineering, p.40</td>
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<tr>
<td>9:20</td>
<td>University of Notre Dame</td>
<td>Jingting Kang</td>
<td>Business, p.55</td>
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<tr>
<td>9:40</td>
<td>Wake Forest University</td>
<td>Courtney Abernathy</td>
<td>English, p.13</td>
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<tr>
<td>10:00</td>
<td>Clemson University</td>
<td>Ryan Marosy</td>
<td>Environmental and Natural Resources, p.65</td>
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<tr>
<td>10:20</td>
<td>University of Pittsburgh</td>
<td>Reena Naik</td>
<td>Political Science, p.75</td>
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<tr>
<td>10:40</td>
<td>Georgia Tech</td>
<td>Jae Pyo</td>
<td>Earth and Atmospheric Sciences, p.86</td>
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<tr>
<td>9:00</td>
<td>Wake Forest University</td>
<td>Alex Buchholz</td>
<td>Economics, Politics and International Affairs, p.21</td>
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<tr>
<td>9:20</td>
<td>University of Miami</td>
<td>Alexandra Roe</td>
<td>Anthropology and Art History, p.92</td>
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<tr>
<td>9:40</td>
<td>Florida State University</td>
<td>Sean Tacey</td>
<td>Chemical Engineering, p.103</td>
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<tr>
<td>10:00</td>
<td>Clemson University</td>
<td>Rebecca Thomas</td>
<td>Bioengineering, p.104</td>
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<tr>
<td>10:20</td>
<td>University of Virginia</td>
<td>Scott Tilton</td>
<td>Political and Social Thought, Foreign Affairs, p.106</td>
</tr>
<tr>
<td>10:40</td>
<td>Virginia Tech</td>
<td>Elizabeth (Jade) Womack</td>
<td>International Studies, p.116</td>
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# Poster Presentation Schedule

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<tr>
<td>1</td>
<td>Virginia Tech</td>
<td>Brandon Amos</td>
<td>Computer Science, p.14</td>
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<tr>
<td>2</td>
<td>Boston College</td>
<td>Jean-Claude Asaker</td>
<td>Biology, p.15</td>
</tr>
<tr>
<td>3</td>
<td>Wake Forest University</td>
<td>Abby Bagliani</td>
<td>Health and Exercise Science, p.16</td>
</tr>
<tr>
<td>4</td>
<td>Wake Forest University</td>
<td>Dineth Bandarage and Andy Vuong</td>
<td>Psychology, Math and Biophysics, p.18</td>
</tr>
<tr>
<td>5</td>
<td>University of Pittsburgh</td>
<td>Raissa Berry and Aaron Foglio</td>
<td>Neuroscience, p.19</td>
</tr>
<tr>
<td>6</td>
<td>North Carolina State University</td>
<td>William Borders</td>
<td>Computer and Electrical Engineering, p.20</td>
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Abstracts

Alphabetically, by Student’s Last Name
Courtney Abernathy, *Wake Forest University*
Oral Presentation: April 5, 9:40 am, Gold Room, Floor 2
Major: English
Faculty Mentor: Zak Lancaster

**Definition vs. Reality:**
Organization and Stance in First-year Student Essays

Educators often wonder how college-aged students best define academic writing and whether or not this definition impacts their writing style. In the 2013 Directed-Self Placement survey, incoming Wake Forest first-year students were asked whether they believed academic writing is best represented as “writing that offers a thesis and at least three supporting claims or examples in structured paragraphs” or “writing that expresses a measured stance and, when evaluations are offered, allows room for alternative views and voices.” Although 66% of students indicated the first definition, corpus linguists (computer-aided language analysis) and qualitative (manual, individual text) analysis make it possible to determine if answering the question differently actually plays out in different student writing styles. In order to analyze this, I made two corpora, or databases. One is comprised of students who best describe academic writing as the first answer and wrote in five paragraphs, suggesting they believed the 5 paragraph model is the best definition and wrote in that style. The second is comprised of students who indicated the second response, but nevertheless, wrote in 5 paragraphs, meaning that although they believe expanding outside the 5 paragraph model is best, they still adhered to it when writing. After examination of organization and meta-discourse features, I concluded that students in the first corpus write with more creative organization than those in second, but use similar meta-discourse features, which suggests that there is no difference in how they portray their stance or engage the reader when writing.
A serial Fortran 95 implementation of the QNSTOP algorithm is presented. QNSTOP is a class of quasi-Newton methods for stochastic optimization with variations for deterministic global optimization. This discussion provides results from testing on various deterministic and stochastic optimization functions. QNSTOP is a parameter estimation algorithm developed at Indiana University (Castle) for stochastic optimization. QNSTOP extends prior work on quasi-Newton stochastic optimization (Levy) by combining ideas from numerical optimization (secant updates and trust regions) and response surface methodology (ridge analysis). This discussion provides results from testing on various deterministic and stochastic optimization functions.
Jean-Claude Asaker, Boston College  
Poster Presentation: April 4, 3:30 – 5:30 pm  
Major: Biology  
Faculty Mentor: Alex Coverdill

From Source to Mouth:  
A Study on Water Contamination in Lebanon

In a region where clean water is drastically depleted, this study observes the water quality of the Abraham River of Lebanon, identifies major pollutant sources, and proposes innovative solutions. Through a methodical collection of samples, moving from the mouth (Jbeil) to the sources (Mijdel and Afqa) of the river, water quality was assessed using a HannaTM water quality backpack kit. The parameters tested include acidity, alkalinity, CO2, conductivity, TDS, dissolved oxygen, hardness, phosphates, nitrates, pH, turbidity, and temperature. The cleanliness of each sample was assessed using a variety of techniques including chemical titrations, sense observations, examination of chemical strips, and fieldwork methods. The parameter’s quantitative results for the many samples indicated that the water quality was mostly appropriate to national standards. However, the quality of the water deteriorated quickly as it flowed downstream. By the time the water reached the estuary of the Mediterranean Sea, it had higher levels of nitrates, phosphates, pH, alkalinity, temperature, hardness, CO2, TDS, and lower levels of dissolved oxygen. The results indicated five pollution sources; dumped waste and industrial effluents, untreated sewage, decaying water distribution system, inefficient irrigation techniques, and a lack of structural barriers. Although the Lebanese government is incapable of dealing with such issues, I have proposed innovative solutions to remedy the delicate water situation of Lebanon and the Middle East.
Introduction: Persons born prematurely with very low birth weight (VLBW; <1500g) have increased risk for developing cardiovascular disease (CVD) later in life and also tend to have lower levels of physical activity (PA). Arterial stiffness, as reflected in pulse wave velocity (PWV), is considered a precursor of CVD. Some evidence suggests that PA is inversely related to arterial stiffness. Purpose: To examine the relationship between PA and PWV in a cohort of 18-21 years old young adults born with VLBW. Methods: Participants were recruited from the larger PEPC-2 study. Habitual PA was assessed by questionnaire from which average hours of PA per week (Tot-hrs) and average hours of vigorous PA (>6 METs) per week (Vig-hrs) were determined for the past year. Hours per week spent in sedentary activities (Sed-hrs) were also obtained. Brachial-ankle PWV (baPWV) was measured non-invasively using the Colin VP-1000. Relationships among variables were examined by Spearman correlational analysis. Results: To date, baPWV, PA, and Sed-hrs have been assessed in 20 participants (10 M). In males, baPWV was positively correlated with Tot-hrs and Vig-hrs and negatively correlated with Sed-hrs, while females’ baPWV was negatively correlated with Tot-hrs and Vig-hrs and positively correlated with Sed-hrs. Conclusion: The results suggest that lower PA and higher Sed-hrs were associated with greater arterial stiffness in females while opposite results were found in males. More research is warranted on a larger sample of VLBW young adults to determine if PA and sedentary activity are related to arterial stiffness in this at-risk population.
Object Discovery Services for Cryptographically Curated File System

The goal of this research project is to develop Cryptographically Curated File System (CCFS) to enable secure content distribution without host authorization. The CCFS addresses the challenge that content on the distributed network cannot be retrieved when there is a centralized network disruption, or if retrieved, it cannot be authenticated. My project develops the CCFS architecture that allows for reliable and secure access to files despite intermittent connectivity to the host, especially in the event of network disruptions, such as natural disasters, terrorism or Internet Service Provider disruptions. This model maintains the security, integrity, authenticity and non-repudiation of the content by utilizing a verifiable and arbitration-free content naming system. CCFS uses a combination of public key and hash function model to secure the content. It cryptographically references content object using its hash, and the curator is verified and authenticated using its signature. My work specifically focuses on the retrieval of content objects that have been mapped from their arbitrary names to cryptographic identifiers. This has been achieved by building a query system that sends and receives broadcast requests for the content using hashes and signatures on a local network. This use of the private/public key model of hashes/signature reduces the reliance on central administration, thus satisfying the goal of secure content distribution. Additionally, a potential advantage of this model is cost effectiveness on a large scale because fewer dedicated hosts would be required to distribute the content.
Examining the Combinatorial Effects of Plant-Derived Substances on Lifespan and Tumor Growth of Sarcoma 180 Cells in Mice

Previous literature has found that curcumin from turmeric, epigallocatechin gallate (EGCG) from green tea extracts, and proanthocyanidins from grape seeds all have anticancer effects. Consequently, the purpose of our study is to confirm the claimed anticancer efficacy of these three compounds and to determine whether a combination of the compounds will have improved anticancer efficacy in one of the most aggressive mouse models of cancer. In our study, we tested the anticancer effects of three individual compounds, combinations of any two compounds and a combination of all three compounds with untreated controls. The mouse ascites were induced by intraperitoneal injection of 5x10^6 sarcoma 180 cells, which typically has an average lifespan of fourteen days. One day after inoculation, the mice in each experimental group (n=5) were given daily injections of the designated compounds for up to 42 days. Our results indicated that there was no significant difference from the treatments with individual compounds or combinations of any 2 compounds (p > .05) except a modest prolongation of lifespan in the curcumin treated group (p < .01). Surprisingly, 80% of the mice in the group treated with the combination of all three compounds remained healthy and cancer-free for at least 210 days after inoculation. Moreover, our data suggest that the synergistic anticancer effect of the three natural compounds in one of the most aggressive mouse cancer models may have potential in treating human cancers.
Schizophrenia is associated with altered circuitry in the dorsolateral prefrontal cortex (DLPFC), whose function depends, in part, on interactions between interneurons that express the calcium-binding protein parvalbumin (PV) and pyramidal cells (PCs). Deficits in both PV cells and PCs have been found in schizophrenia subjects. Most PV interneurons and a small number of PCs are surrounded by complex extracellular structures called perineuronal nets (PNNs). PNNs form in an activity-dependent manner, are thought to be protective against oxidative stress and serve as a cation buffer, which may facilitate the fast-spiking nature of these cells. We investigated if there are alterations in PNNs around PV and/or net-associated PCs (naPCs) in schizophrenia subjects. Stereological principles were utilized with quantitative immunohistochemistry to examine naPCs and PV interneurons in layer 3 of the DLPFC in 13 subjects with schizophrenia and paired healthy, comparison subjects. We found a large percentage of PV cells and a minority of PCs to be surrounded by PNNs. No differences in the percentage of naPCs or in labeling of individual PNNs of PCs were found. However, we report a decrease in the percentage of PV-positive cells with PNNs labeled by aggrecan in schizophrenia subjects as well as a decrease in aggrecan labeling of individual PNNs. The decrease in aggrecan, in addition to altered WFA labeling in PV neurons, suggests a cell-type specific disruption in the DLPFC. This decrease may be a cause or result of aberrant activity in the DLPFC and potentially affect working memory and cause other cognitive dysfunctions.
William Borders, North Carolina State University
Poster Presentation: April 4, 3:30 – 5:30 pm
Major: Computer and Electrical Engineering
Faculty Mentor: Leda Lunardi

Understanding Commercial Circuit Simulators and Experimental Transistor Modeling: An Undergraduate Student Perspective

Today in the microelectronic industry, engineers design and rely on computer software to predict the performance of large circuits. The purpose of this project is to describe the process and implementation of a compact model into a commercial circuit simulation platform. The first step is to translate the physical equations of transistors still in the research phase in order to construct a device library model. After simulations with necessary modifications, the results mirror the performance of the experimental devices.
Geopolitics of Energy: Conflict and Cooperation in Caspian Sea States

Following the collapse of the Soviet Union in 1991, a multi-faceted regional struggle erupted over the control of the substantial hydrocarbon reserves of the Caspian Sea basin. On paper, oil and natural gas revenues had the potential to transform Azerbaijan, Kazakhstan, Turkmenistan, and to some extent Georgia from economically poor dependences into major energy exporters. In this sense, the states surrounding and adjacent to the Caspian Sea provide an interesting case study into how hydrocarbons can dramatically shift a region’s geopolitical dynamic. At an international, regional, and domestic level major oil and gas deposits have influenced sociopolitical outcomes. In some cases, these deposits have been a source of tension and conflict between internal and extra regional actors. Yet, in other instances, hydrocarbons have brought tremendous economic development and a certain level of political stability. Going forward, energy will continue to provide the basis of regional interactions and structuring. However, the recent surge in US domestic production and the continued integration of gas markets will create new realities within the Caspian economic and political spheres.
A Microgenomic Approach to Identify Clinically Relevant Gene Signatures that Discriminate Between Invasive Lobular and Ductal Breast Carcinomas

In an effort to distinguish between the two most common invasive breast carcinomas, lobular (ILC) and ductal (IDC), we searched for a genomic marker that discriminates these histologic types when conventional tests are conflicting. A specific genomic marker would be useful to distinguish IDC from ILC, due to the varied responses of luminal A-like-IDC and ILC to the aromatase inhibitor letrozole in post-menopausal women [Metzger et al. Cancer Res 2012]. Although CGH analysis shows that ILC is closely related to low grade IDC (luminal A-like) and genetically unrelated to intermediate and high grade IDC [Pathol Res Pract 2005; 201:713], ILC response to letrozole is more like luminal-B-like IDC (intermediate or high grade). To identify candidate genes, microarray analysis of expression levels were evaluated in laser capture microdissected carcinoma cells of biopsies that were positive for estrogen (ER). In low grade IDC and ILC, 299 probes were differentially expressed (p<0.01), and 99 of these probes were not differentially expressed (p>0.01) between high grade IDC and ILC. These 99 genes serve as candidates for a genomic marker differentiating these two histologic types. Microarray results showed varying expression levels of BRWD1, CAPSL, CHRNA, CMTM7, CRMP1, GSKIP, HBEGF, PAPPA, and LRBA among the different cancer pathologies. By using quantitative polymerase chain reaction (qPCR), we determined expression levels relative to beta-actin for the gene candidates in order to validate those from the microarray array results. qPCR analyses are used to validate and refine the gene subset distinguishing ILC from low grade IDC. Our novel approach is revealing microgenomic features that discriminate these carcinomas which exhibit different clinical behaviors.

Supported in part by a grant from NIH/NCI R25-CA134283 and Phi Beta Psi Charity Trust.
The Effect of Collagenase Pretreatment on Adipose Tissue Viability

There exists a tremendous clinical need in reconstructive surgery for repairing soft tissue loss resulting from congenital and pathological conditions, trauma, and cancer resections. Autologous fat is regarded as the ideal implant because of its biocompatibility and minimal donor site morbidity. However, graft survival and retention is variable and unpredictable. Collagenase pretreatment is a technique for tissue dissociation and for the release of the stromal vascular fraction, in order to improve graft take and survival. However, its success is anecdotal in current literature, and there is high variation in clinical practices and digestion time. Furthermore, there is little scientific data characterizing effect of collagenase on the tissue. This study investigates the effect of collagenase digestion time on tissue viability. Adipose tissue samples from human and murine samples are treated with collagenase for durations between 30-60 minutes, sampled at 5 minute intervals. Samples were stained with BODIPY to visualize intact adipocytes and with LIVE/DEAD kit to quantify interstitial cell viability. Images were acquired using confocal microscopy. The data show that with increasing collagenase digestion time, the percent of nonviable interstitial cells initially drops, but subsequently increases. The total number of interstitial cells and intact adipocytes both decrease as digestion time increases. The results show that while collagenase digestion can decrease the percentage of nonviable cells in tissue grafts to an extent, it can also adversely impact tissue health by lysing adipocytes. These findings may contribute to identifying the optimal collagenase digestion time for improving tissue graft survival in reconstructive surgery.
Demand Response (DR) is defined by Federal Energy Regulatory Commission as “changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time.” From the perspective of utilities or power system operators, DR can be used as virtual generation resource, which is dispatched when the system demand level is high to relieve system stress. Under the FERC direction, DR aggregators who have a large portfolio of DR resources can directly participate in the electricity markets. Operational cost and system reliability are improved from committing DR resources for power reduction. In this research, we will investigate methods of managing demand response portfolio from a DR aggregator’s perspective. In particular, we will propose new optimization models for capturing uncertainties in DR resources by applying robust optimization technique to improve the overall performance of power reduction scheduling.
Kimberly Chewning, Florida State University
Oral Presentation: April 4, 9:00 am, Ballroom B, Floor 2
Major: Art History
Faculty Mentor: Lauren Weingarden

Deconstructing Space and Reconstructing (I)dentity in Ryan Trecartin’s I-BE Area

“I’m allowed to feel like a digital girl is my world.” The line spoken by the character I-BE Area 2 in Ryan Trecartin’s 2007 video installation I-BE Area addresses an identity crisis as digital and physical worlds become increasingly indistinguishable. The film is marked by the characters’ exaggerated performances and incessant chatter, which leads to a self-manifestation that becomes unstable as they occupy both digital and physical spaces. This unstable identity can be seen in characters’ repeated exchanges of identity, easily maneuvering between male and female genders, ultimately settling in a realm of queerness that easily eschews both. My paper argues that Ryan Trecartin presents a breakdown of hierarchal spatial organization in favor of a more rhizomatic spatial distinction allowing for existence in multiplicity. Trecartin explores the after effects of substantializing multiplicity. Gilles Deleuze and Félix Guattari state in A Thousand Plateaus, “it is a multiplicity—but we don’t know yet what the multiple entails when it is no longer attributed, that is, after it has been elevated to the status of a substantive.” Within this new spatial organization, meaning breaks down and the multiplied substantive body becomes uniquely abject, whose natural existence is neither subject nor object, but an “other” that addresses the boundaries of existing when an original or a “one” is erased. Trecartin’s exploration becomes a self-reflexive one, as the viewer begins to ponder whether the film is in fact a mirror, reflecting a new truth about societal relationships and identity formation.
Chelsea Chobany, *University of Pittsburgh*
Poster Presentation: April 4, 3:30 – 5:30 pm
Major: Psychology
Faculty Mentor: Steven Stern

**Employability Bias against Disabled Synthetic Speech Users over Natural Speech Users**

Over the last 15 years, we have found that human speech is more persuasive and viewed more favorably than computer-synthesized speech (CSS) (Stern, Mullennix, Dyson, & Wilson, 1999) but, numerous factors moderate this effect. Participants are less likely to denigrate persons who are speech-disabled when they use this technology (Stern, Mullennix, & Wilson, 2002), but, on the other hand, denigrate users who are disabled when it is used for an undesirable task such as a telephone campaign (Stern, Dumont, Mullennix, & Winters, 2007). Most recently, we found that people prefer when individuals who are disabled use synthetic speech than when they use their own natural albeit dysarthric speech (Stern, Chobany, Patel, Tressler, in submission). Insofar as recent findings suggest that people prefer synthetic speech to the natural speech of individuals who are disabled, we designed an experiment that would specifically examine whether or not participants would rate them as more qualified for a variety of jobs. In this experiment, participants viewed two videos of two different disabled actors delivering persuasive appeals. The actors used either CSS or their own dysarthric speech. Actor order and speech type were counter-balanced. Participants rated the speaker more positively when synthetic speech was used in comparison to natural dysarthric speech.

Nevertheless, the speaker who used synthetic speech was viewed as less employable for highly skilled jobs (i.e. accountant and medical technician). It was only for low-skilled jobs (i.e. drive-thru window and greeter) that synthetic speech users were rated more hirable than natural speech users.
Kevin Claybren, University of North Carolina  
Poster Presentation: April 4, 3:30 – 5:30 pm  
Major: Women and Gender Studies  
Faculty Mentors: Anne Hastings and Terri Phoenix

Aspiring for More: A Study of the Effects of Bullying on Self-identified LGBTQ

Two Spirit and Same Gender Loving Youth’s Educational Outcomes Bullying and harassment within the K-12 school setting, based on research studies continues to be a problem with great consequences for the victims such as depression, suicidal thoughts, lower grade point averages, high truancy and high drop-out rates. There has been research exploring the bullying and harassment of students based on social identities such as race/ethnicity, ability status, gender/sex assigned at birth, gender identity and/or gender expression, and sexual orientation. While there has been some examination of the frequency of harassment and the impact of bullying and harassment on disparate aspects of identity in isolation, the reality is that people who hold multiple marginalized identities often experience harassment based on multiple identities. Far less research exists on the academic impacts of harassment based upon multiple intersecting identities simultaneously. This study attempts to address this gap in the literature by assessing the frequency and severity of harassment based on race/ethnicity, ability status, gender/sex assigned at birth, gender identity and/or gender expression, and sexual orientation and the role it plays on aspirations for pursuing higher education. This voluntary, non-compensated online survey allows students to provide input on changes to schools, which will fosters an inclusive and safe environment that promotes academic success.
Variation in the Foraging Behavior of Juvenile Spadefoot Toads, *Spea Bombifrons*

The relatively new field of animal personality has gained a vast increase in interest in recent years. Despite the wealth of research we still know relatively little about developmental factors influencing personality, particularly maternal effects. One potential component of personality is differences in foraging efficiency. We conducted preliminary assays of foraging behavior in juvenile spadefoot toads, *Spea bombifrons* and found that individuals from different families significantly differed in the number of strikes it took them to capture a novel prey item. We also measured egg size to determine whether differences in foraging behavior are associated with differences in maternal investment. Our results showed that while maternal investment, measured by breeding female mass and SVL and egg size, was not a predictor of foraging behavior individual mass and early rearing density were predictors. There was no interaction affect between these two factors, however, we do see sequential effects of rearing density predicting mass and mass predicting foraging behavior.
Multiple Sclerosis (MS) is a debilitating illness characterized by destruction of the myelin sheath surrounding neurons in the central nervous system. Promising therapies focus on promoting remyelination of damaged axons by oligodendrocyte progenitor cells (OPCs) which differentiate to mature oligodendrocytes. OPCs are largely inhibited from differentiation by myelin debris. A current MS treatment, Glatiramer Acetate (GA), is promoted as a myelin analog acted on by the immune system, but the mechanism is poorly understood. An OPC cell line, the CG4 line, suggests that GA treatment increases MBP expression—indicating increased differentiation and thus myelinating capabilities. This proposal aims to demonstrate an interaction between GA and OPCs, which would suggest an immune cell independent mechanism, promoting GA as a remyelination therapeutic. The next experiments hope to add myelin to the sample, which acts as an inhibitor of remyelination. It is expected to see an increase in MBP expression in GA treated OPCs, even in the presence of myelin. This potential interaction could provide a new pharmacological target to promote remyelination, important not only to help manage symptoms, but to address the underlying cause of MS, the destruction of myelin and neuronal death.
Window to Discovery: Intravital Visualization of HER2 Tumor Evolution in its Native Microenvironment

The molecular mechanisms of metastasis are one of the greatest unsolved mysteries of cancer research. Much attention of recent interdisciplinary cancer research efforts has shifted to focus on elucidating the nature of this “black box” of cancer. Little is known concerning the tumor microenvironment’s (TME) role in inducing acquired drug resistance to Herceptin (trastuzumab) when treating HER2-positive breast cancers at primary and secondary metastatic sites. Despite the prevalence of new breakthroughs, few methodologies existed to effectively study the dynamic nature of the TME in vivo. To meet this need, a novel minimally-invasive imaging modality was developed using a modified mammary imaging window (MIW) and two-photon microscopy to study the metastatic niche of HER2 tumors and the surrounding TME in transgenic mice. A combination of rapid-prototyping and additive manufacturing techniques were utilized to effectively manufacture an accurate MIW system used to enable long-term observation of intact mammary tissue in vivo. Various advanced imaging modalities (multiphoton spectroscopy, CT/SPECT, MRI) and software packages (Fluoview, Volview, Imaris, and PMOD) were evaluated to gain qualitative and quantitative insights into the tumor microenvironment. The result of this study suggest that the rapid-prototyping and imaging modalities developed are feasible, reproducible, and scientifically relevant for studying the spatial/temporal dynamics of HER2 tumor growth. These advancements ultimately establish a “window to discovery” through which to study the elusive nature of cancer metastasis, providing biomedical researchers with a novel toolset that can be exploited to gain necessary insights into the TME’s effect on promoting therapeutic drug resistance to Herceptin.
Friendship, Readership, and Citizenship: Petrarch’s Cosmopolitan Literacy in the Epistolae Familiaris

Petrarch, a fourteenth century Italian writer, traveler, and friend, is credited with discovering the previously-lost letters of Cicero, whose Roman political and philosophical ideas then become part of the intellectual impetus for the dawning Renaissance in Europe. Although much of Petrarch’s understanding of cosmopolitanism is rooted in his patriotic appreciation for classical and patristic Roman literature, he is also challenged by his medieval Catholic faith to reconcile secular and religious models of intellectualism and friendship. Although recent political theory has treated cosmopolitanism and patriotism as mutually exclusive, Petrarch’s writings provide a basis for the seemingly-contradictory juxtaposition of the two political impulses. Petrarch’s cosmopolitanism, which is based in his literary experiences, becomes the lens through which Petrarch navigates and critiques contemporary society, both as a political exile and as a freelance traveler. While traveling, Petrarch resuscitates the classical genre of the personal epistle and the classical prose style of Latin, which both Cicero and Augustine are notable for practicing, in order to convey his travel itinerary and intercultural interactions to his correspondents. Throughout his writings, Petrarch draws on the personal and political philosophy of Cicero, such as his theories of friendship presented in his De Amicitia, so that his own Epistolae Familiaris become a space where he simultaneously reflects on his writing, on his travels, and on his friends. Through his literary imagination of cosmopolitanism, Petrarch anticipates the ideals of the humanities in the modern era, that the study of literature can foster friendships across geopolitical and linguistic divides.
The Rises and Falls of the Chilean Student Movement since 1990

In 2011, Chilean students demanded reforms to their country’s education system through a powerful wave of political protests. Characterized by mass marches that drew hundreds of thousands of university and high school students to the streets, these were the largest protests to take place in Chile since the country’s return to democracy in 1990. The rise of these protests provides a stimulating intellectual puzzle because leading up to 2011: Chilean democracy was thriving by most objective indicators, GDP was steadily growing, and quality of life was improving for Chileans. Thus, the Chilean case can offer insight into the causes of the underlying subjective discontent within the fabric of an objectively successful society. Favoring a long-term approach to understanding political protests, this study seeks to explain the rises and falls of the Chilean student protests in the entire post-authoritarian era with 2011 as well as 2006 (a year during which high school students lead major protests) being the two periods of high mobilization. To provide a comprehensive understanding of the high mobilization periods and the relatively tranquil years in between, this study combines theory (influential political protest theories are applied) with original empirical discoveries (I conducted over 40 face-to-face interviews with Chilean student leaders/participants and other important protest actors). The results show that the protests are explained by rising expectations, the arrival of a new generation that did not experience the trauma of the Pinochet dictatorship first-hand, and the decisions and strategies taken by both student and government actors.
The Effect of Social Groups on the Development of Sailfin Mollies (P. Latipinna)

Life history traits such as time to and size at sexual maturity are influenced by both genetic and environmental factors. Variability in the expression of these life history traits among males has important consequences to their lifetime reproductive success. Early maturity confers natural selection benefits through earlier reproduction, but later maturity may confer sexual selection benefits if females prefer to mate with larger males as a result of a longer growth period. My study investigated the role of an important environmental factor, the social environment in which a juvenile male is reared, on the time to and size at sexual maturity. Specifically, I measured the expression of life history traits of sailfin molly fishes (Poecilia latipinna) that were reared in varying social environments: (1) in isolation, (2) in sibling groups without an adult male present, and (3) in sibling groups with an adult male present. Because females prefer larger males, I predicted that males reared in the presence of an adult male (a perceived competitor) should delay maturation, and therefore, mature at larger sizes in order to better compete for mates. My results provide support for this hypothesis, as male offspring reared in the presence of an adult male competitor took nearly three times longer to reach maturity and were twice as large as male offspring reared alone, or in sibling groups in the absence of an adult male. Thus, social environment during rearing appears to have important effects on traits that influence lifetime fitness in male sailfin mollies.
Caroline Davis, Florida State University  
Poster Presentation: April 4, 3:30 – 5:30 pm  
Major: Biological Sciences  
Faculty Mentor: David Gilbert

Determining By Use of Nested Deletions What Maintains Proper Replication Timing

Many diseases such as DiGeorge and Velocardofacial syndromes and likely all cancers display abnormal replication timing, the temporal order in which segments of chromosomes are replicated. However, the elements that maintain normal replication timing are not yet fully understood. Replication timing is associated with large-scale chromosome structure and is highly conserved among cell types. Early and late replicating domains represent regions of synchronously replicating DNA and frequently change their replication timing during cell differentiation. To continue progressing within the field, the DNA sequences and associated elements that maintain proper replication timing must be identified. Uncovering these elements will allow a greater understanding of large-scale chromosome structure and organization as well as the relationship between abnormal replication timing and disease states. The objective of my research is to determine these elements. Preliminary data has shown that chromosomal structural properties and regions with high levels of CTCF, a transcriptional regulator, punctuate areas of abrupt changes in replication timing, suggesting that maintenance elements reside around those areas. Deletions of CTCF regions will likely cause massive changes in replication timing allowing the identification of the sequence or region that sequesters the elements that maintain proper replication timing. I will use mouse embryonic stem cells as a model to engineer deletions of varying sizes. Homologous recombination and CRISPRs will be used to create the deletions and a Cre-LoxP system will be used to identify cells positive for deletions.
Probing Cell Membrane and Biofilm Extracellular Matrix Interactions with Signaling Factors Through Molecular Dynamics Simulations

Bacterial biofilms are a major cause of persistent infections and diseases with known antibiotic and host immune defense resistances. The interaction of signaling factors, namely small cytokines, with the biofilm and host cell is considered vital to the survival of bacterial biofilms. In this study, molecular dynamics (MD) simulations are performed using coarse-grained biomolecular systems to provide significant insight into medical therapeutic advancements in treating persistent and chronic infections. Specifically, MD simulations of the interaction between signaling factors tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6) with a model biofilm matrix with detailed description were performed. Additional simulations were used to study TNF-α interaction with dextran polymer chains of varying monomer length. In each study, resultant potential of mean force curves were analyzed to quantify the energy associated with translocation of the signaling factors through the extracellular polymeric substances, as well as to highlight the effect of chain degradation on this translocation process. The translocation of TNF-α across a lipid bilayer was also performed using MD simulation techniques, and the resultant potential of mean force curve highlights the energy barrier associated with this process. Qualitative and quantitative assessment of membrane damage was also performed.
Dallas Ducar, *University of Virginia*
Poster Presentation: April 4, 3:30 – 5:30 pm
Major: Cognitive Science and Philosophy
Faculty Mentor: Alev Erisir

**Studying Sensory Neuronal Pathways in the Brain: Development of Glutamatergic Terminals and Receptors in Rostrolateral and Rostrocentral NTS**

Delivery of sensory information depends on individual neurons to transmit electrical activity via chemical signals, that is, neurotransmitters to wide networks of additional cells to incorporate sensation. We examined the localization of taste input into the brain, specifically in the rostrocentral and rostrolateral subdivisions of the nucleus of solitary tract (NTS). This area receives high amounts of excitatory axons releasing glutamate from oral afferents (facial, glossopharyngeal and trigeminal), as well as excitatory feedback from other brainstem areas. We examined localization of two vesicular glutamate transporters and glutamate receptor proteins in orosensory subdivisions in rat NTS at ages P8, P14, P35 and P90 (n=25). About 3000μm² of brain area at each age was imaged at the electron microscope; each brain yielded about 250 labeled and 400 unlabeled terminals. There were no quantitative differences in parameters of terminal maturation between young and old ages, suggesting that developmental maturation of glutamatergic terminals is attained by 14 days. Similarly, ratio of connections (synapses) that contain NMDA type glutamate receptors did not appear different between young and old populations. In addition, different vesicular transporters may be utilized in discrete inputs to the rostral NTS based on the larger size of excitatory inputs to the brain. Morphological evidence we identified indicated differences between subdivisions in the NTS, supporting previous findings that synaptic circuitries were discrete, both in terms of their inputs and development. Studying these features provides evidence that various molecular properties play discrete functional roles in sensation and developmental plasticity.
An Overview of Homotopy Theory and Univalent Foundations of Mathematics

“...it is clear that some dramatic breakthrough right at the heart of mathematics has occurred.” These were the words of string theorist Urs Schreiber in May 2012. What is this “dramatic breakthrough,” and what does it mean for mathematics? These are the sorts of questions answered in my honors thesis, an exposition which surveys an exotic new kind of math known as “univalent foundations.” The predominant motivation for the theory is to merge the power of computers with the abstractions of modern mathematics. As cutting-edge mathematics becomes increasingly complicated, one may wonder whether computers can be of assistance in the pursuit and verification of new theorems. A TI-89 calculator, for instance, can solve very complex calculus problems, but can it do a proof? It cannot, because the standard approach to mathematics does not lend itself well to building such a device. For this reason, the field of computer formalization of mathematics has historically seen little enthusiasm. The new approach of univalent foundations is based on the incredible discovery that type theory (a branch of theoretical computer science) and homotopy theory (roughly an abstraction of geometry) are (in a certain sense) the same idea. This dual interpretation makes it immensely more feasible to encode mathematics into computers. The goal of my research is to condense hundreds of pages of specialized mathematical theory into an accessible paper for mathematicians looking to explore this brand new idea, which its founders hope will one day become the standard theory of mathematics.
Self-esteem and Depression in Relation to Bulimic Symptoms in African-American and Caucasian College Women

The current study was designed to assess the roles of depression and self-esteem, both independently and in interaction, in identifying levels of bulimic symptoms in African American and Caucasian undergraduate females. The study sample consisted of 97 African American and 179 Caucasian female participants who completed various surveys. The researcher hypothesized that self-esteem and depression would interact to identify levels of bulimic symptoms, with women high in depression and low in self-esteem experiencing the highest levels of bulimic pathology. The interaction between self-esteem and depression was significant for bulimic symptoms, using all of the bulimic symptom measures (BULIT-R, EDI-Bulimia, binge eating frequency from the EDE-Q4) in the African American sample. In contrast, the interaction between self-esteem and depression was only significant for binge eating frequency. Possible implications include identifying points of intervention.
Eating in China

This presentation provides a glimpse of food availability, pricing, purchasing, production, and service in China. China is the fastest growing economy on the planet. A major portion of that economy is devoted to food. The objective of this research is to reveal a link between the socioeconomic standing of an area and the variety and pricing of the foods available there, as well as to demonstrate the effects of these prices and selection on a Chinese consumer. Data was gathered using five weeks of purchasing data in Hangzhou, Beijing, Shanghai, and Xianju, as well as through interviews of students, hostel guests, and a family business, and this data was supplemented with outside research. Food prices were found to be rising rapidly, causing purchasers to seek out cheaper brands of their desired foods, but these consumers are loath to give up purchasing different food items, even in the face of rising prices. The socioeconomic index of an area does affect the food prices and availability. A prime example is that Shanghai is highly developed and has higher prices and a wider variety available than Xianju. Before a certain point, it’s the other way around; the foods available affect the socioeconomics of the area. Before an area is more developed, the foods that grow well there determine the local economy, providing jobs such as planting, harvesting, processing, and maintenance. After the area develops, those who live and work there are more financially secure and have the incomes to support markets which bring in foods from outside the area.
Providing an adequate supply of blood to tissue grafts is currently one of the major issues facing the field of tissue engineering as a whole. Current in vivo implantation of large engineered tissue grafts leads to cell death at the center of the construct, due to the lack of penetrating vasculature that cannot provide sufficient oxygen and nutrient flow to the cells. To overcome this problem and promote vasculogenesis, platelet derived growth factor subunit B (PDGF-BB) was immobilized onto collagen scaffolds. PDGF-BB has been shown to support the formation of more stable, complex vascular networks. Sulfo-SMCC covalent chemistry was used to modify the surface of type I collagen gels and an enzyme-linked immunosorbent assay (ELISA) was performed to confirm that PDGF-BB was successfully bound to the scaffold surface. In addition, preliminary studies have shown that PDGF-BB upregulates common angiogenic markers, such as platelet endothelial cell adhesion molecule (PECAM), as well as stimulates the formation of vascular sprouts in human umbilical vein endothelial cells (HUVECs) in vitro. PDGF-BB treated cells show a 3-fold increase in PECAM mRNA expression compared to non-treated control cells. These results were confirmed using mRNA gene expression, brightfield imaging, and immunohistochemical staining of proteins. Additional work is being done to optimize the collagen modification for use with HUVEC encapsulation studies in static and dynamic culture utilizing a tubular perfusion system (TPS) bioreactor. The controlled delivery of PDGF-BB to endothelial cells is a potential method to promote vascularization and make engineered tissue grafts more clinically relevant.
Adaptor proteins are often committed to cellular processes that involve cargo internalization from the plasma membrane. Ubiquitinated cargo is internalized by endocytosis and delivered to early endosomes via intracellular vesicles. There are many adaptor proteins involved in the intricate pathway of cargo trafficking within the cell. Tollip and Tom1 are just two of these proteins. Tollip can bind to phosphatidylinositol 3-phosphate (PI3P), allowing it to associate to endosomal membranes. In addition, Tollip can also bind to Tom1, and it has been suggested that this association is critical for the involvement of these proteins in endosomal protein trafficking. Using solution NMR spectroscopy, we demonstrate that the Tollip Tom1-binding domain binds to the Tom1 GAT domain by a mechanism called folding and coupling. By using the protein-lipid overlay assay, we show that the presence of Tom1 inhibits Tollip’s binding to PI3P. These results suggest that binding of Tom1 to Tollip is followed by a conformational change in Tollip, which in turn, reduces the affinity of the protein for PI3P. Consequently, we propose that association of Tom1 to Tollip helps to release Tollip from endosomal membranes, allowing Tollip to commit to endosomal ubiquitinated cargo trafficking.
Although racial differences among NBA player salary have been studied extensively prior to 2000, the NBA has become more diverse in the last 15 years with an influx of international players. Many advanced performance statistics have also been introduced in the last decade. Therefore, exploring the influence that these new factors have on player salary will be useful to understand the important determinants of player salary. This study aims to extend existing literature by using player performance data from the 2012-13 season. The factors that influence salary are investigated by building upon existing econometric models with additional explanatory variables. In my research, the economic model being used to estimate salary is a function of a vector of explanatory variables. These include an indicator for race, performance statistics, and local market variables such as per capita income and population in metropolitan statistical areas. The dataset consisted of 468 observations, which encompassed all players in the NBA during the 2012-13 season. A Tobit regression was performed to estimate the salary model because the dependent variable is non-negative and truncated at the NBA’s minimum player salary. As such, 62 observations were left censored. The results indicated that significantly positive influences on salary include race, age, position, and minutes played. Significantly negative influences on salary are personal fouls and population in a metropolitan statistical area.
Alisha Giri, *Wake Forest University*
Poster Presentation: April 4, 3:30 – 5:30 pm
Major: Anthropology
Faculty Mentor: Steven Folmar

The Manifestation of Gender Differentiation in Tibetan Buddhism

The past few decades have shown a noteworthy increase in female leaders and the gender gap has significantly decreased as women shed their traditional roles in the domestic environment and compete with men for jobs and leadership positions. However, there are still societies in which women are considered inferior to men and don’t have equal access to the educational facilities, positions, and various other opportunities offered to men. Therefore it is important to study gender differences in various cultures of the world today, and find ways to empower those women living in male-dominant societies. In Buddhism, the relationship between a man and a woman has been very obscure throughout its history, and although Buddha is said to have objected to gender differentiation, his followers overlooked his disapproval. The primary focus of this project was to investigate how gender differentiation manifests itself in the daily lives of Buddhist devotees, and discover whether or not gender inequalities exist in Buddhism. I did this through participant-observation of the daily lives, rituals, and living facilities of male versus female ordained monks at four different monasteries and nunneries in parts of Nepal. At each monastery, I also interviewed at least ten devotees, focusing on their perception of gender differences. In conclusion, gender inequality in Buddhism does exist. Additionally, these gender inequalities are disregarded by the Tibetan nuns although Buddhism has seen a general decrease in the gender gap the past two decades due to the rising interest in Buddhism by westerners.
Discovery and Characterization of a Novel Interaction between Lysine Demethylase JMJD2a and Tumor Suppressor p53

Histone post-translational modifications (PTMs) are critical to many essential biological processes, including gene transcription and DNA repair, by altering the physical structure of chromatin and serving as docking sites for reader proteins. JMJD2a is a unique protein with the ability to both erase and read histone PTMs. It has been shown that as a histone demethylase, JMJD2a removes di- and tri-methylation from lysines 9 and 36 on the histone H3 tail (H3K9me2/3 and H3K36me2/3). As a reader, JMJD2a binds tri-methylated lysine 4 on the histone H3 tail (H3K4me3) and di- and tri-methylated lysine 20 on the histone H4 tail (H4K20me2/3) through its double Tudor domain (dTd). In this presentation, I will show the tumor suppressor p53 as the first non-histone target of JMJD2a. When cellular processes malfunction, p53 levels within the cell increase exponentially and initiate a multitude of regulatory pathways, including apoptosis. In 50 percent of all cancers, p53 is either mutated or deleted. Peptide micro-array, in-solution peptide pulldown, and protein-peptide immunoprecipitation all suggest that the JMJD2a, via its dTd, binds p53 at di-methylated lysine 382 (p53K382me2), a mark that increases upon DNA damage. This novel interaction implicates the demethylase JMJD2a in p53 biology.
Runaway

Technology has influenced human’s perception of reality to such an extent that it has altered what reality is being perceived. New social forums, new ways of thinking, the reprocess of personal perception, and the consumption and digestion of post-modern ideologies are all aiming to produce a reality that hasn’t existed until the assistance of these technological advancements. We, as humans, are no longer running away from our “homes,” to which we use to threaten, and no longer are we tempted to distance ourselves from our daily routines, to which we had become accustomed to. Rather, we are standing ground and satisfying our current needs within every given moment. Within a Third Place, we are vacating from the comforting ways of thinking. We are finding ourselves in realms where questions and curiosity are appraised. We are discovering a world where man takes ownership of his/her reality and attempts to rebuild their perception smarter, better, and stronger.
El Cid Campeador in the Monuments of Burgos, Spain

El Cid Campeador was an 11th-century mercenary in Reconquista Spain. Known to many Americans as the Charlton-Heston-played protagonist of a romanticized, eponymous 1961 epic film, El Cid has been the subject of numerous works of commemorative art. In Spain, his historical legacy is bound to a literary one: El Cantar de Mio Cid is the earliest epic poem written in the Castilian vernacular available to us. Thanks to these and various other works of art, El Cid has taken on in Spanish cultural memory the status of legendary national hero — one that sometimes diverges from historical data. This project investigates how successive Spanish regimes of the 20th and 21st centuries have warped retellings of the Cidian myth to suit their diverse political ends. The monuments to El Cid in his home city, Burgos, offer an abundance of evidence for this phenomenon.
The Global and the Local: Framing Cultural Identity in Western Turkey

Every culture throughout history builds an environment that is self-descriptive. Dozens of empires have uniquely shaped the built environment of the Republic of Turkey. For a nation that holds so much culture of the past, new development is surprisingly insensitive to this context. Global markets have championed over local traditions, and are reshaping the built environment. Historic villages along Turkey’s west coast are being restored for commercial tourism, thereby displacing villagers. Sleepy island towns, once a melting pot of poor Greeks and Turks, have slowly become a refuge for the elite. Rows and rows of lonely apartment towers sit on empty land next to cities, rather than addressing the urban core.

In order to properly address these growing concerns, designers must seek to understand the context in which they build. This research seeks to identify and question some of the driving cultural factors in nine locations along the Aegean coast. When and by whom was a community built, and what does the future hold? Which symbols in the built environment signal change in culture or time? How do residents identify with a local subculture as well as the larger global culture? These questions begin to help us understand the cultural identity of individuals and the places they live. This research acts as a case study to help designers ask the right questions about their own environment so they can respond with thoughtful solutions.
The Development of Nicaraguan Sign Language

During the 1980’s, Nicaragua witnessed the birth of the world’s newest language, Nicaraguan Sign Language (ISN). In a world where the death of languages has become a serious and increasing problem, the birth of one has been exciting. ISN is one of the first languages linguists have used to study and track how languages are born and developed. With ISN, the growth of deaf education started as well, but currently still leaves much to be desired. Systemic problems in the Nicaraguan educational system affect deaf education as teachers have extremely low salaries, they lack basic funding and supplies, and schools frequently close for various reasons, causing students to fall behind. Furthermore, many teachers within deaf classrooms have no training or exposure to sign language, leaving them wholly unprepared to communicate with, much less teach, their deaf students. Even if a training program for teachers of deaf students were to be implemented, the turnover rate nearly makes such a training program inefficient. Other problems include a lack of deaf role models in the classroom, the issue of effectively teaching in multi-grade classrooms, and insufficient use and knowledge of deaf services. However, for all of the struggles that Nicaragua deaf education faces, there are some positives to be found. ISN is recognized as the language of instruction in the classroom. Additionally, while many teachers are not versed in the different theories of deaf education, such as oralism, total communication, or bilingualism, most teachers do seem to employ a bilingual method of teaching deaf students. Thus, while ISN has spurred the creation of Nicaragua’s deaf community, associations and the beginning of deaf education, current practice demonstrates the great need to improve these services to better serve deaf individuals.
Lauren Hlubny, Florida State University
Oral Presentation: April 4, 2:00 pm, Library, Floor 1
Major: Theater and Anthropology
Faculty Mentor: Kris Salata

Live Encounters: Performance in Museums

In recent decades, museum curators have shown a growing interest in live performance events that would alter the often austere and intimidating atmosphere of the exhibits. Major museums, including the Smithsonian's National Museum of the American Indian in Washington, D.C. and the Museum of Modern Art in New York City, have begun to incorporate regular performance programming, including live interactions between performers and audience members, ranging from reenactments to live human installations. This project had a research and a creative component. It addressed the question of performance in the museum, treating the museum venue as a site of societal ritual. I approached the subject with an interdisciplinary focus, employing practical and theoretical knowledge from the fields of theatre and anthropology. The first phase involved the completion of a hands-on internship at the Spanish-Apalachee Living History Museum Mission San Luis in Tallahassee, Florida, where performance is an accepted and necessary part of everyday museum operation. In the second phase of the project, I led a small ensemble of performers in creating and testing out various modes of performance for five different museums throughout the state of Florida ranging from "invisible theatre" to personally driven monologue pieces within the framework of the museum as a ritual site. Summer research culminated in the semester long development of a 40 minute dance theatre performance in January at the Dali Museum. I gathered insightful information through participant observation and interviews, and drew innovative conclusions about the role of performers in museums.
Peer Social Interactions between Preschoolers with a Language Match and Preschoolers with a Language Mismatch

Our study examined the peer social interactions of approximately 300 preschoolers from Miami-Dade County Head Start classrooms. These children are predominantly African-American and Hispanic, from low socioeconomic backgrounds that face high risks to school success. The purpose of this study is to analyze the classroom language makeup of Head Start Centers in Miami-Dade County and determine if students in each classroom are experiencing a classroom match (i.e. their home language is being spoken in the classroom) or a mismatch (i.e. the home language is not being spoken in the classroom), in order to determine whether for individual children a classroom match or mismatch is associated with higher or lower levels of peer interactions. For this study, we will create a match variable for children based on observed peer and teacher language use in the classroom. Findings indicate that about 69% of English speakers experienced an overall match, while about 85% of Spanish speakers experienced an overall language match in the classroom. From these findings I predict that a language match will be associated with positive peer interactions and a language mismatch will be associated with negative peer interactions. These hypotheses will be tested using teacher-reported data, from the Penn Interactive Peer Play Scale, and observational data, from The Individualized Classroom Assessment Scoring System and Supports for English Language Learners Classroom. Correlational analysis and a multiple regression analyses will be conducted to analyze the collected data.
Performing Whiteness, Negotiating Blackness: Identity, Achievement, and The Invisible Burden of Institutional Racism

Education has become increasingly important for upward socioeconomic mobility, but Black Americans have not been able to compete at the same level as their white counterparts. In investigating the achievement gap, structural and cultural arguments dominate much of the literature on explanations for racial disparities in education. However, there is a dearth of studies that consider institutional racism as the major explanatory factor for racial difference in educational outcomes. Through semi-structured interviews with Black collegians, this qualitative study explores the ways in which racism manifests itself in higher education institutions and impacts black students’ academic experiences. Study participants express an awareness of the necessity of acquiring “white dominant cultural capital” to succeed, but attribute these behaviors in the context of “redefining blackness.” This project employs a critical race theory (CRT) analysis of emotional labor theory to provide insight into connections between black identity, conforming to whiteness, and impression management. The ways in which these are implicated in the reproduction of academic inequality is also explored. My study offers that the “invisible burden” of racism creates a racialized form of emotional and physical “work” that black and white students experience unequally, which consequently impacts their educational outcomes.
This thesis seeks to quantify the relationship between Sinn Féin and the Irish Republican Army in Northern Ireland by correlating Sinn Féin’s electoral results with the number of terror attacks claimed by the IRA. I consider the significance of terrorism in determining voter preferences, and predict that voter support for Sinn Féin, the perceived political wing of the IRA, will rise with increasing terrorist activity. To test this hypothesis, I conduct a time series analysis of data obtained from the “Conflict Archive on the Internet,”[1] and “ARK Northern Ireland”[2] with observations spanning from 1969 to 1998. In conducting this statistical analysis, we can better observe the impact of terrorism on voter preferences. Building from literature that assess voter choice toward parties that adopt a clear stance against terrorists, I claim that there is a significant positive relationship between voters’ preferences directed toward political parties with perceptibly close ties to terrorist organizations.
Production Rate of Phi Mesons in Electron-Positron Annihilation near $\sqrt{s} \approx 10$ GeV

In high energy particle collisions the processes that occur between the initial collision and the production of hadrons and leptons are still not fully understood. One way to bring us closer to finding out what occurs during these processes is to study the end products of the reactions and the rate at which collisions involving different particles at varying energies produce different end particles. Our work was to determine the production rate of the phi meson in electron-positron annihilation reactions with a center of mass energy of approximately 10.54 GeV. We used data from the BABAR experiment at the Stanford Linear Accelerator Laboratory to determine the total number of phi mesons produced per collision and the momentum dependence of their production. We find $0.026 \pm 0.00053$ phi mesons produced per event on average, an improvement on existing measurements in the same energy range.
Analysis of NMDA Receptor Subunit Ligand Binding Domain Interactions in Multiple Conformations by Molecular Dynamics Simulations

The N-methyl-D-aspartate (NMDA) glutamate receptors are widely expressed in the central nervous system, and play a crucial role in normal brain function and pathogenesis of several neurological and psychiatric disorders. In the present study, we have done molecular dynamics simulations (MDS) of ligand binding sites (LBDs) for GluN1/2A and GluN1/2D subunits in different conformations including apo (unbound), agonist (glutamate bound) and antagonist (PPDA bound) for 5nS, and analyzed the trajectories. The distances between four pairs of amino acids located in close proximity of GluN1/N2 interface demonstrate the subunit specific dynamic changes that occur during the course of MDS. These findings were re-confirmed by manually measuring the distance between the Cα atoms. In order to further understand the functional properties of crucial amino acids, we extended our focus on L538 GluN2A and L537 GluN2D side chain rotations using g_gyrate, an inbuilt program in GROMCAS 4.0.5. The results indicate that L538/537 (GluN2A/2D) undergo significantly different rotational freedom in each conformation we studied. Finally, this study demonstrates the distinct intersubunit interactions of GluN1/2A and GluN1/2D at the LBD level. These findings will be valuable to design GluN2 subunit specific drugs for the treatment of diseases associated with NMDA receptor dysfunction (epilepsy, schizophrenia, Alzheimer’s, Parkinson’s).
International volunteering has become a growing industry in many Western countries. However, many volunteers are posing serve problems at developing countries through their unconscious acts that result in a neglect of local desires, disruption of local economies, and a hindering of work process. The current practice of international volunteering also fosters moral imperialism that hinders the understanding of root problems and thus prevents the implementation of sustainable solutions. Good intentions and big-heartedness are simply not enough. It is crucial for people to recognize the deep impact of their service and to be educated first so that they can serve responsively and effectively in developing countries. A case study in Cambodia this winter break will allow me to collect both quantitative and qualitative data from NGOs engaged in community development. Cambodia boasts a great number of non-profit international organizations combating developmental issues using comprehensive and sustainable approaches. My research examines the impact of leading international volunteering organizations in Cambodia and suggests solutions to strengthen the volunteering industry in the United States. Empowerment, sustainability, and entrepreneurship are the key elements shaping effective long-term tactics solving developmental issues. My research will be revolved around these factors to produce practical solutions.
Caitlin Kilcullen, *University of Pittsburgh*
Poster Presentation: April 4, 3:30 – 5:30 pm
Major: Nursing
Faculty Mentors: Judith Erlen and Jennifer Lingler

Optimism, Self-efficacy, and Discrepancies in Medication Reconciliation in a Sample of Caregivers of Community Dwelling Individuals with Memory Loss

Medication reconciliation, a comparison of the reported medication regimen against medical records, is a fundamental aspect of ensuring safe and accurate medication taking. Reconciliation is especially important when a family caregiver is assuming responsibility for medication management. Given that self-efficacy and optimism are positively associated with medication adherence, an outcome of medication management, in multiple patient populations. Therefore this study explored whether there are also associations between optimism, self-efficacy, and discrepancies in medication reconciliation among caregivers of community-dwelling patients with memory loss. We examined baseline data from 66 family caregivers participating in a larger randomized controlled trial implementing a tailored intervention to improve medication management. Participants completed self-report assessments of optimism (Life Orientation Test-Revised), self-efficacy (Chronic Disease Self-Efficacy Scale), and demographics. In addition, we collected data on the patients’ medication regimens. These regimens were compared to medical records by the patients’ primary health care providers and the total number of discrepancies was recorded. Discrepancies included dosing errors, unreported medications, discontinued medications, and regimen changes not recorded into medical records.

Results: Caregivers were on average 66.8 years of age (SD=12.6; range = 42 to 93), 72.7% female, 90.9% Caucasian, with an average of 14.9 years of formal education (SD=2.9; range= 10 to 25). Average caregiver optimism score was 15.2 (SD=5.2), average self-efficacy was 6.9 (SD=2.1), and caregivers averaged 1.5 medication reconciliation discrepancies (SD=2.1, range 0-9). Optimism was correlated with self-efficacy (r=.313, p=.010). There was also a trend for optimism to be associated with discrepancies (r=-.233, p=.059); however, there was no statistically significant correlation between self-efficacy and discrepancies (r=.154, p=.177). Multiple regression analysis indicated optimism (b=-.130, p=.012) and self-efficacy (b=.281, p=.029) were independently associated with medication reconciliation discrepancies, explaining about 12% of the variance (F(2,63) = 4.458, p=.015; R2=.124).
The Influence of Audience: Analyzing the Relationship between Post-Sandy Hook Newspaper Coverage and Readers’ Positions on Gun Policy

The Sandy Hook Elementary School shooting in Newtown, Connecticut took place on December 14, 2012. Sandy Hook prompted President Barack Obama to issue 23 executive orders related to gun policy in early 2013. Newspapers throughout the country covered the policy changes and the Sandy Hook shooting in various ways. In the 90 days after Sandy Hook, 30 randomly selected newspapers published 1,017 articles mentioning guns in the context of the shooting. Fifteen newspapers were more likely to use gun control to characterize the shooting, fourteen were more likely to use gun rights, and one newspaper was evenly split in its use of gun control and gun rights. Newspapers also varied in the percentage of their total articles that mentioned guns in the context of Sandy Hook. Newspapers that published a larger percentage of their overall articles that mentioned guns in the context of Sandy Hook were more likely to frame the event with gun control. These newspaper articles were also examined using audience demand theory, which posits that demand may shape the way newspapers cover issues. This project suggests that audience demand theory can be applied to newspaper coverage of guns.
Self-Perception as a Differentiator in Student Writing

As students from diverse academic backgrounds enter the university, educators wonder how well a student’s perception of their own preparedness for college writing compares to the quality of the work they produce. Using survey results and student essays from the 2013 Directed Self-Placement (DSP) process, I worked to begin a dialogue about students’ self-perception of their writing ability and how it reflects their actual preparedness vis-à-vis other students of similar writing ability. I selected students from the DSP survey that reflected the highest level of preparedness for college writing. Then, using a metric I developed, what I call a Self-Perception Indicator Score (SPIS), I was able to separate these students into two corpora, or collections of student essays, which I labeled as the “High Self-Perception” and “Cautious Self-Perception” groups. With two separate corpora, I applied corpus linguistics (computer-aided language analysis) and qualitative (manual reading of the text) analysis to examine their organization, attention to the DSP writing prompt, and the meta-discursive features in the corpora. Though I was able to conclude that the “Cautious Self-Perception” corpus showed slightly better results than the “High Self-Perception” group in categories such as producing what the DSP team determines as academic writing, “writing that expresses a measured stance and, when evaluations are offered, allows room for alternative views and voices,” and responding explicitly to the prompt, the findings are just the beginning of an interesting discussion about self-perception in first-year student writing.
Andrew Lankenau, *University of Virginia*
Oral Presentation: April 4, 1:20 pm, Ballroom B, Floor 2
Major: Chemistry
Faculty Mentor: W. Dean Harman

**Chiral Resolution of a Dearomatizing Tungsten Agent**

In the past several years, η2-dearomatization has been used to modify arenes and produce novel organic compounds. The \{TpW(NO)(PMe3)\} fragment has proven to be a viable synthetic tool as it is scalable, non-toxic, and cost-effective; however there has been limited success in obtaining enantiomerically enriched forms of this metal center. A new methodology for resolution of the racemic dearomatizing agent \{TpW(NO)(PMe3)\} is currently being developed. In this approach, 1,3-dimethoxybenzene is bound to \{TpW(NO)(PMe3)\} and protonated via chiral acid, producing two diastereomeric salts. Accordingly, separation via crystallization, precipitation, and chromatography is being tested. When separation is achieved, the two diastereomers may be deprotonated and exchanged with other aromatic ligands. These systems, which include η2-dearomatized arenes, may be used to facilitate electrophilic addition and cycloaddition reactions on the ring. Finally, the enriched organic product may be removed from the metal via oxidation. Example chiral acids that have demonstrated clean protonation of the TpW(NO)(PMe3)(5,6-η2-1,3-dimethoxybenzene) complex include (S)-camphor sulfonic acid, L-tartaric acid, L-dibenzoyl tartaric acid, and L-di-p-toluoyl tartaric acid. Oftentimes, the product diastereomers may be distinguished from each other in a 1H-NMR spectrum, with near baseline splitting occurring for certain Tp and ring protons. Integration of these “split” peaks provides a measurement of the enantiomeric excess of the mixture. Evidently, this spectroscopic technique proves to be a facile alternative to other methods, such as chiral HPLC, when determining the degree of resolution. With these techniques and spectroscopic methods in hand, unique enantio-enriched products derived from the \{TpW(NO)(PMe3)\} dearomatizing system may soon be obtained.
Interwar period feminists stood at a crossroads. The ratification of the 19th Amendment promised a flowering of women’s social and political ambitions, yet the cultural backlash of the 1920s paired with economic instability in the 1930s interrupted this pursuit. The once outspoken women’s movement found itself without a voice. Many women were the “first orphans in the storm” that drove them out of politics and work and back into the home. Those who continued to lobby for female independence and power attracted harsh criticism. Feminism was no longer a movement of sociopolitical progress, but the radical agenda of troublesome, unkempt women. Yet some feminists, like Eudora Ramsay Richardson—a popular writer and activist of the interwar years—escaped these constructs and constraints to forge their own path. In this thesis, I will explore how Eudora Ramsay Richardson’s political and literary work created and promoted a style of feminism that was fitting of the sociopolitical landscape of the interwar period and ultimately the bridge between the political themes of the suffrage movement and the cultural theories championed by flappers and “new-style” feminists. The 1930s was not a lull or absence in American feminism, but actually a formative period for it.
The Medical Implications of Robotics with Painting

Within the past few years, the preference for robotic surgery has increased due to promising radiological and urologic outcomes and to safer and more dexterous surgical procedures than traditional surgical procedures. Using painting as an analogy for performing surgical procedures, I proposed to study the movements and precision of a robotic painting arm to explore new possibilities for enhancing robotic surgical applications like the development of an autonomous system that would increase precision and accuracy while reducing human intervention during the surgical process. My research conveys the importance of future robotic surgical processes in relations to potential lives and money saved in hospitals. Likewise, this research conveys the idea that painting is a way for us to understand how Science depends on the creativity, inspiration, and ideas of the Arts for new discoveries.
The Clemson Veterans Project exist to preserve and honor the stories of all American combat veterans from all conflicts throughout our country's history and do so in a professional manner expected from a university with such a rich military heritage. The project has to date collected a total of 70 interviews of combat veterans totaling 62 hours of HD video. All videos have been uploaded to Youtube for the public to view online. The project was started to assist the Library of Congress with its own Veterans History Project of the American Folklife Center. With their limited resources, they are only able to digitize 11% of the interviews. To assist the LoC, Clemson University students conduct interviews and collect other materials accepted by the project then facilitates their digitization for Clemson University records before sending the original materials to the Library of Congress. Before interviewing each student must take an exam on the digital file preparation process, and interview courtesy, and then conduct a practice interview where they behave exactly as if it was a real interview. The unedited videos are put onto DVDs along with accompanying documentation and then shipped in bulk. Going above the requirements for the LoC, each shipment contains a flash drive with every video and document in a digital format. Special interviews are selected for post-production editing including a custom made introduction segment. Not only does this project provide a valuable public service, but it honors the sacrifices of all our armed forces.
Religion is among the most powerful forces present in the realm of popular culture. As major world faiths encounter diverse ethnicities and nationalities, they tend to adapt to local traditions and beliefs, incorporating a variety of practices previously unassociated with the followers of the religion. Islam is among the most prominent examples of such adaptability; a faith that embodies ideals of purity and particular legal conceptions of justice, it has proven remarkably able to assimilate the customs of the localities it dominates, particularly in North Africa. The myriad of practices that resulted has frequently come into conflict with more official, orthodox interpretations of the Islamic tradition, however, particularly under regimes in which the state adopts a high degree of control over religious practice. In Morocco in particular, narratives of popular and official Islam maintain unique identities, frequently clashing with each other on the basis of these persistent differences. The two Islams are not necessarily mutually exclusive, however. The Moroccan state has adapted popular Islam on a number of occasions in order to bolster its own initiatives, and expressions of popular Islam have survived state repression and appropriation and remain a vehicle for millions of Moroccans to find a spiritual outlet.
Marissa Marandola, *Boston College*
Oral Presentation: April 4, 2:00 pm, Ballroom B, Floor 2
Major: Political Science
Faculty Mentor: Dennis Hale

**Ahlquist v. Cranston:**
The Establishment Clause and Public School Prayer

Throughout American history, society has debated the proper links and boundaries between church and state. At different times, largely contingent on demography, the prevailing understanding of church and state has permitted various degrees of religious presence and influence in government institutions. Modern questions of religious establishment ask whether it is appropriate for religion to have any presence, beyond the historical, in state-sponsored bodies, such as public schools. The 2012 US District Court case Ahlquist v. Cranston contested the presence of an explicitly Christian prayer banner in a Rhode Island high school on establishment grounds. This project examines various interpretations of the First Amendment’s Establishment Clause, and particularly its relationship to the presence of religion in public schools, through analysis of scholarly theories and Supreme Court precedents and doctrines. It then applies historical examples to the present day through a case study of Ahlquist v. Cranston, including scrupulous examination of primary documents and interviews with key participants in the case.
Ryan Marosy, *Clemson University*
Oral Presentation: April 5, 10:00 am, Gold Room, Floor 2
Major: Environmental and Natural Resources
Faculty Mentor: Molly Epsey

Land and Water Conservation Fund Study

This research project investigates the influence of various economic, social, and political factors on Congressional appropriations from the federal Land and Water Conservation Fund (LWCF) from 1965 to 2012. The Land and Water Conservation Fund Act was passed in 1964 to protect existing outdoor recreational areas, with conservation and citizens’ health serving as the primary motives for the law’s enactment. The majority of funding for the LWCF comes from offshore oil and gas drilling lease revenues. Increases in these receipts and federal surpluses or smaller federal deficits are found to be positively correlated with higher levels of annual LWCF appropriations. Appropriations as a percent of available funds are found to be positively correlated with Democrat control of Congress, holding other factors constant, and also positively correlated with charitable contributions to environmental organizations, a proxy for pro-environmental public attitudes. In 1977, an amendment increased total available funding from $300 million to $900 million annually. Prior to this time, total receipts appeared to act as a constraint on appropriations. When limiting the analysis to only the years after this amendment, the net federal government budget, charitable contributions to environmental organizations, and the control of both Congress and the Presidency by the same party (unified government) were all found to positively influence the appropriation of LWCF funds. With the Land and Water Conservation Fund set to expire in September 2015, this project may provide information useful to those debating reauthorization of this program.
Too Big a Storm: 
The Complicated Atmosphere Around Women’s Sexual Problems

The medicalization of women’s sexual bodies is a contested subject in the United States. Although there are blockbuster drugs to treat Erectile Dysfunction, a male sexual disorder, the Food and Drug Administration (FDA) has not approved any drugs for the treatment of women’s sexual disorders. In order to investigate the social and cultural factors that are attributing to the medicalization of women’s sexuality, this paper investigates how women’s sexual problems are being framed in the media. Based on a content analysis of newspaper articles discussing Female Sexual Dysfunction and Hypoactive Sexual Desire Disorder in the New York Times, the Washington Post, and USA Today from 1998 to 2013, this paper identifies which factors are being attributed to women’s sexual problems compared to men’s sexual problems. Overall, the study found that newspaper articles are presenting a complex and contradictory view of women’s sexual problems. I argue that the media’s presentation of the issue has resulted in a resistance to medicalization by the public and FDA. These findings suggest that an FDA-approved drug for women’s sexual problems may not be imminent and that many of the same issues addressed in sociological research also appear in the media.
Environmental Enrichment as a Preclinical Model of Neurorehabilitation

Environmental enrichment (EE) consists of increased living space, complex stimuli, and social interaction that promotes exploration and confers improvements in behavioral outcome and histopathology after experimental traumatic brain injury (TBI) vs. standard (STD) housing. However, as a model of rehabilitation, continuous EE is not clinically relevant due to the timing parameters of the typical EE and thus translatability could be limited. Specifically, TBI patients typically receive rehabilitation only after critical care has been provided and then only for 3-6 hours per day. Thus, to mimic the clinic, the goal of this study was to determine whether delaying EE by three days and providing only six hours per day would provide benefits similar to continuous EE. It was hypothesized that no significant differences would be revealed between the two EE approaches. To address this rehabilitation relevant issue, isoflurane-anesthetized male rats were subjected to a controlled cortical impact (2.8 mm depth at 4 m/s) or sham injury and randomly assigned to TBI+EE (continuous), TBI+EE (3 day delayed, 6 hr day), and respective sham controls. Motor function (beam-balance/beam-walk) was assessed on post-operative days 1-5. Spatial learning/memory (Morris water maze) was evaluated on days 14-19. The data showed that EE, regardless of timing, improved motor and cognitive function compared to STD housing (p < 0.0001). Moreover, there were no differences between the TBI+EE (continuous) and TBI+EE (3 day delayed, 6 hr day), p > 0.05. These data demonstrate that delayed and abbreviated EE produces motor and cognitive benefits similar to continuous EE after TBI and thus further supports EE as a preclinical model of neurorehabilitation. Ongoing studies are evaluating the effects of longer delays in implementing EE after TBI.
Contraction of Mycoplasma Gallisepticum Negatively Affects Anti-Predator Behavior in House Finches (Haemorhous Mexicanus)

While some infectious diseases do not directly kill their hosts, they can still have significant effects on individual behaviors that increase the risk of mortality. We investigated the effects of an infectious disease seen in house finches—Mycoplasma gallisepticum (MG)—on a crucial source of mortality in this species: predation. MG has been a driving factor behind declining house finch populations since its emergence in the mid-1990s, yet in most laboratory tests MG does not cause mortality; this indicates that while not a fatal disease itself, MG likely represents an indirect threat to house finch mortality. Because MG infection has been shown to induce lethargy and a reduced field of vision, we predict that finches with MG would display a lesser response to predators and diminished anti-predator behavior. We measured the responses of both sick and healthy finches to three different simulated predator threats: the appearance of a stuffed natural predator, a predator call, and the approach of a human. We found that finches with MG were significantly less responsive than their healthy counterparts to the appearance of the simulated predator and to playback of that predator’s call. All healthy birds spent the majority of their time on the side of the cage where they could not see the stuffed predator, while sick birds showed no preference for either side of the cage. These results suggest that MG does have a negative effect on the birds’ ability to respond to threats.
Alicia McKean, *Boston College*
Poster Presentation: April 4, 3:30 – 5:30 pm
Major: Applied Psychology and Human Development
Faculty Mentor: Lauri Johnson

Perceptions of the Racial Achievement Gap and Efforts to Address It

This research explored how educational professionals working in racially diverse schools in Massachusetts cities view the racial achievement gap and efforts to address it. Using data from interviews with six teachers and administrators, the findings revealed that teachers and administrators acknowledge how racism shapes students’ academic experience in a variety of ways including course selection, disciplinary actions, and relationships with faculty. Findings also indicated that cultural competency training for teachers and community partnerships are two practices that are thought to have the potential to reduce the racial achievement gap in schools.
How Fast are Neurons Dying in Alzheimer’s Disease?

A significant portion of post-mitotic neurons in Alzheimer’s Disease (AD), re-enter the cell cycle, which leads to their degeneration and subsequent death. Cell cycle re-entry requires soluble Aβ and tau, the building components of the insoluble plaques and tangles that accumulate in the AD brain. While the commonly used synthetic amyloid protein to model amyloid toxicity in AD is useful, it is not as potent as Aβ derived from other neurons. Measurements of the secretion of Aβ in Alzheimer’s Disease have been established using in vivo models, and other labs have measured rates of Aβ secretion in vitro, from cultures of primary neurons and other cell types. In this study, cultured neurons from CVN mice, which display increased insoluble Aβ plaques that are biochemical hallmarks of Alzheimer’s Disease, were used. The rate of secretion at which cultured neurons from CVN mice are compared to Tau KO and Wild Type mice. In vitro Aβ levels are measured using the Dot blot assay. It is hypothesized that the neurons secreting higher levels of Aβ drive neurons to re-enter the cell cycle. Cell cycle re-entry in primary cultures of mouse cortical neurons were measured with bromodeoxyuridine (BrdU), which detects DNA replication.
Ascorbate Induces Ten-Eleven Translocation (Tet) Methylcytosine Dioxygenase-mediated Generation of 5-Hydroxymethyl-Cytosine

Ascorbate (vitamin C) is best known for its role in scurvy, in which the hydroxylation of collagen catalyzed by dioxygenases is incomplete due to ascorbate deficiency. Here, we report a novel function of ascorbate in the hydroxylation of 5-methylcytosine (5-mC) to 5-hydroxymethylcytosine (5-hmC) in DNA catalyzed by Tet (ten-eleven translocation) methylcytosine dioxygenase. The content of 5-hmC is extremely low in mouse embryonic fibroblasts cultured in ascorbate-free medium. Additions of ascorbate dose- and time-dependently enhance the generation of 5-hmC, without any effects on the expression of Tet genes. Treatment with another reducer glutathione (GSH) does not change the level of 5-hmC. Further, blocking ascorbate entry into cells by phloretin and knocking down Tet (Tet1, Tet2, and Tet3) expression by short interference RNAs (siRNA) significantly inhibit the effect of ascorbate on 5-hmC. These results suggest that ascorbate enhances 5-hmC generation, most likely by acting as a co-factor for Tet methylcytosine dioxygenase to hydroxylate 5-mC. Thus, we have uncovered a novel role for ascorbate in modulating the epigenetic control of genome activity.
The Purification and Characterization of the Drosophila Melanogaster Trithorax Protein and its Implications in the Studies of the SET Domain Family of Proteins

Methylation at histone H3 lysine 4 (H3K4) is a post-translational modification often associated with transcriptional regulation through altering the structural state of chromatin or by acting as a marker for transcription factor recruitment. The human mixed lineage leukemia protein-1 protein (MLL1) is a known histone methyltransferase that catalyzes the transfer of methyl groups to H3K4 and while in complex with other essential components, proteins WDR5, RbBP5, Ash2L, DPY-30 (WRAD), performs characteristic dimethylation. Alterations of the MLL1 gene or misregulation of the MLL1 protein are known to be associated with Acute Myelogenic and Acute Lymphocytic leukemias. The Trithorax (TRX) protein is the Drosophila melanogaster ortholog to human MLL1, and although structurally similar, in complex with the human components TRX is unable to perform dimethylation. In this study, we have systematically chosen a series of residues in MLL1 that may be critical for dimethylation activity. To examine each residue, we mutated the chosen amino acid in TRX to the equivalent amino acid in human MLL1 to test for a gain of dimethylation activity. If the residue sites in TRX were identified to gain dimethylation activity, then we would gain a greater understanding of protein-structural features that are required for H3K4 dimethylation, an epigenetic mark required for transcriptional activity in eukaryotes. A greater understanding of MLL1 enzymatic activity could lead to innovative strategies to manipulate gene expression patterns in leukemic cells.
Dispersion Trading Profitability

My research is conducted under the direction of Dr. Alexander Dvorsky, Associate Professor, University of Miami Mathematics Department. As an Honors Program Summer Research Grant recipient my research focused on an option trading strategy known as Dispersion Trading. Dispersion trading utilizes options to make bets on the volatility of individual stocks within different business sectors and their indices. In short, dispersion trading is a bet that the stocks within an index are either more or less correlated than the market believes them to be and is done by selling short index options while buying options on the individual stocks composing the index or vice versa. For each simulation, I began with a control test in which I would determine the original stock and index option prices, subsequently weighting the individual stock options so that we were spending the same amount buying the individual stock options as we were making from selling the index options (or vice versa). I then changed the individual volatilities of the stock as well as the time to expiration, representing a real life change in volatilities over time. Using the weights determined in the control test and the new prices based off the updated volatilities, I concluded whether a profit or loss was made. Therefore, it was deduced that dispersion trading could be a profitable trading strategy. Future research will include transaction costs, will add put options and will adjust the model for the costs of hedging all to make the model less theoretical and more realistic.
Reading Marian Halcombe: The Heroine as Physiognomical Text in Wilkie Collins’ *The Woman in White*

Reading Marian Halcombe addresses the extent to which the Victorian author Wilkie Collins uses physiognomy to illustrate his female characters throughout his distinguished novel *The Woman in White*. The paper focuses particular attention on Marian Halcombe, the heroine of the story, and her relationship with the protagonist Walter Hartwright. My research questioned how Marian’s sexually ambiguous appearance affected her heroism and set her apart from her seemingly helpless sister, Laura Fairlie. In order to further explore the topic, I related several physionomical texts (including feminist, scientific, and socio-cultural books pertaining to the Victorian era) back to *The Woman in White*. I then analyzed Marian’s actions and personality characteristics based on the principles of physiognomy. This paper shows how the strong, masculine features of Marian allow her to act as the novel’s heroine and save the beautiful, feminine Laura from her fiendish husband.
Legal arbitration is a dispute resolution mechanism. It is used to solve legal disputes between two parties through a mediator. International arbitration has recently gained popularity due to increased globalization of markets. Arbitration provides countries with an efficient alternative to filing court cases.

My project attempts to analyze the expansive networks of international arbitration specifically in the case of Brazil. This is done by creating spreadsheets that profile international mediators and popular cases. The spreadsheets contain information about individual mediators such as their linkages to international arbitration centers and their law specializations. The increasing connections among mediators with these centers provide evidence for the expansion of international arbitration. This information can also be used to explain the increasing amount of foreign direct investment within Brazil. This is important because it gives rise to Brazil as a world actor.

The outcome of my project has proven significant connections between the use of arbitration in Brazil and economic development. This is illustrated by the increasingly important role of Brazilian arbitration centers such as Camara de Mediacao e Arbitragem (ARBITAC) and Camara de Arbitragem Empresarial Brazil (CAMARB). The spreadsheets confirm that the mediators at these centers have strong connections to arbitration centers in the United Kingdom, the United States, and Canada. This proves the theory that arbitration has facilitated increased economic activity within Brazil. The Brackenridge Research Fellowship through the Honors University College has provided me with the opportunity to pursue this project and prove my theory.
Mohamad Ali Najia, Georgia Tech
Oral Presentation: April 4, 2:20 pm, Library, Floor 1
Major: Biomedical Engineering
Faculty Mentor: Todd McDevitt

Allele-Specific DNA Methylation and Monoallelically Expressed Genes

The generation of functionally diverse cells from common progenitors is one of the most fundamental processes in metazoan biology. Autosomal monoallelic expression (MAE) is the least understood epigenetic mechanism involved in the generation of mitotically stable cell subpopulations through the separate regulation of each allele. Several lines of evidence imply that MAE establishment and maintenance are controlled by a variety of genetic elements. Here, we show evidence of allele-specific DNA methylation among MAE genes using padlock probe technology in clonal lymphoblast cell lines. Allele-specific DNA methylation is significantly enriched, particularly upstream of MAE genes’ transcriptional start site. This finding is the first evidence of epigenetic associations with MAE genes along autosomes.
This study examines the responses in temperature and precipitation over South America due to variations in the Madden-Julian Oscillation (MJO), an eastward propagating area of enhanced convection near the equator. The data analyzed was acquired from NCEP’s Climate Forecast System Reanalysis (CFSR) from 1979-2010. Global composites were created for each of the eight MJO phases as the oscillation progresses eastward across the planet. Focusing on North and South America, anomalies in temperature and precipitation are studied for two seasons, May-September and November-March. Two extended seasons are included in order to highlight responses that may only occur during one season in each hemisphere. These temperature and precipitation responses were tracked through relationships to upper level wind anomalies and velocity potential anomalies associated with the MJO enhanced convection.
On May 8th, 2012, North Carolina Amendment One (NC-1) was passed. NC 1 defines marriage as solely between a man and woman and denies legal recognition for any type of domestic union. This qualitative content analysis attempts to examine how localized mass media, specifically North Carolina county newspapers, framed the issue of same-sex marriage in news coverage. This research asks: how did three politically diverse North Carolina newspapers frame the issue of same-sex marriage in the period leading up to passage of Amendment One. This study of news coverage of same-sex marriage finds that there are two dominant and competing frames: morality and equality. Additionally, this study also finds that the news frames of same-sex marriage have been more nuanced, existing alongside the morality and equality frames. This research argues that the framing of the same-sex marriage debate invoked more nuanced themes such as the support of children, competing claims of harm, and separation of government power. Furthermore, same-sex marriage was also presented as "threat" and "in jeopardy" frames in news coverage of the same-sex marriage debate; that is, same-sex marriage is framed as a "threat" to the heterosexual marriage institution, while at the same time the institution of marriage is also "in jeopardy" or on the verge of collapse. This study seeks to deepen our understandings of the complex relationship between public opinion, political policy, and news media.
Entertainment-Education Telenovelas in the Promotion of Gender Equality: The Case of Por Ella Soy Eva

Recent communications research has focused on the effects of television on its viewers, frequently linking negative content such as violence to societal woes. This analysis challenges that tendency by examining Por Ella Soy Eva (For her, I'm Eva), a Mexican soap opera released in 2012 in Mexico and later in twelve countries, including the United States. Over the eight-month period during which the telenovela broadcasted daily, viewers watched women and men navigate the sexist world of contemporary Mexico. During its 165 episodes, a theme developed: the need for cultural as well as legal equality between men and women. Unlike most educational programming, which is pedantic and dull, this telenovela was a commercial success, following in the legacy of a genre that has developed in Latin America: entertainment-education telenovelas. This essay traces the history and methodology behind the construction of socially influential and empowering television. It then deconstructs Por Ella Soy Eva, assessing the educational potential of the telenovela based on criteria assembled through research of past productions and their measurable societal effects. Por Ella Soy Eva effectively conveys the social message of gender equality through conscientious pre-production research, ambivalent characters who gradually reject sexist behavior, and its own popularity, but it fails in the crucial step of informing viewers of established institutions to help them denounce workplace discrimination and domestic violence. Even so, the implications of better understanding television that both amuses and informs transcend the genre of telenovelas and expand beyond Latin America.
Killing of Intracellular Pathogenic Bacteria by Pore-Forming Protein: A New Paradigm of Innate Immunity

Clearance of intracellular bacteria is an essential function of natural immunity. Host cells are equipped with several mechanisms for eliminating pathogens including autophagy and secretion of antimicrobial compounds. In phagocytic cells, the elimination of bacteria is thought to be mediated by phagocytosis combined with oxidative mechanisms (ROS/NO) within the phagolysosome and by lysosomal hydrolases. In this project the gentamicin protection assay was utilized to quantitate bacterial survival and replication within the intracellular environment. siRNA knock down was used to analyze the impact of a novel pore forming protein on bactericidal activity. In vivo models were used to examine the effect of the Perforin-2 protein in mice exposed to pathogens like methicillin-resistant Staphylococcus aureus. To analyze mRNA and protein levels, qRT-PCR and western blot analyses were carried out. We show that a pore-forming protein is required for killing of intracellular bacteria in all cells including epithelia, endothelia, fibroblasts, myoblasts, astrocytes, and phagocytes. siRNA knock down of the protein enables intracellular bacteria to replicate, while complementation is able to restore intracellular bacterial killing. In vitro findings are confirmed with the in vivo model. Pathogenic methicillin-resistant Staphylococcus aureus, Mycobacteria and Salmonella are killed by physical attack of the outer bacterial cell wall via generation of pores visible through electron microscopy. In analogy to C9 and Perforin-1, pores assemble by polymerization of the protein Perforin-2, the third pore former of the mammalian immune system. The data establish a new paradigm for clearance of intracellular bacteria in all cells by natural immunity.
Logan Pallin, Duke University
Oral Presentation: April 4, 10:20 am, Ballroom B, Floor 2
Major: Environmental Science and Policy
Faculty Mentor: Andy Read

Seasonal Variation in the Sex Ratio of Humpback Whales on Feeding Grounds along the Western Antarctic Peninsula

As populations of baleen whales recover from past over-exploitation they re-occupy ecological roles from which they may have been functionally absent for many decades. For example, in many areas of the Southern Ocean humpback whale (Megaptera novaeangliae) populations are growing rapidly and recolonizing feeding grounds in the Antarctic. In some of these areas, whales are encountering environmental conditions that are very different from those that existed prior to exploitation. Awareness of the sex of individuals in a population greatly facilitates the study of these animals. We collected skin biopsy samples from 122 humpback whales throughout the Western Antarctic Peninsula (WAP) using remote biopsy techniques. We determined the sex of individual whales by analysis of nuclear DNA extracted from the skin biopsy samples using multiplexed PCRs. The sex ratio of the entire sample was close to unity (1.08), supporting observations made from commercial whaling records that the sexes mix randomly on the feeding grounds. We demonstrate a seasonal shift in the sex ratio of humpback whales feeding along the WAP, such that females are disproportionately represented in the autumn. We believe that this represents a tendency for pregnant female whales to depart later from the feeding grounds, prior to undertaking a long migration to low latitude breeding grounds off the coasts of central and South America. The extraordinary energetic demands of reproduction in female baleen whales may require a longer feeding period for pregnant females.
Eighteenth-century cookbooks presume that readers already know how to cook. They don’t give instructions, they simply remind the cook what to do. They show a strong French influence and can be difficult nuts for a modern historian to crack. The Elizabeth Capell cookbook manuscript in Boston College’s Burns Library is one such cookbook; written in English, many of its recipes are French-influenced. Very few of them provide descriptions of techniques or quantities of ingredients, but merely lists of ingredients and vague directions. Eighteenth-century women learned to cook through practice. In order to understand the Capell manuscript in the broader context of eighteenth-century food history, I studied the French language as well as cooking in Paris. These skills helped me to contextualize the importance of the Capell manuscript as a personal kitchen aid, as well as part of a broader historical study of culinary history, women’s history, and social history.
Diabetic Peripheral Neuropathy (DPN) is a disease characterized by the degeneration of sensory fibers in people with diabetes. A lack of Insulin-like growth factor 1 (IGF-I) plays a role in the development of nerve dysfunction and organic and structural nerve damage. In our experiment, we are investigating the amount of IGF-1 secreted from two different Periodontal Ligament (PDL) stem cell lines (F-18 and M-19). The F-18 stem cells are a heterogeneous population that are treated with growth factors (BFGF and EGF) to differentiate into neural progenitors. The M-19 cells are a homogenous, connexin 43 positive population that will remain undifferentiated. After culturing the cells, counting the cells, and collecting the media, we did a total protein assay to normalize protein concentrations and then an ELISA to measure IGF-1. Using this information we can dose DPN infected rats with the proper amount of stem cells to relieve nerve degradation.
The BET Family of Bromodomains in the Epigenetic Mechanisms of Addiction

Epigenetic processes play key roles in cocaine-induced neuroadaptations and behaviors. Among the common epigenetic mechanisms, histone acetylation has been particularly implicated in cocaine-induced neuroplasticity and seeking behaviors. Epigenetic ‘reader’ proteins, such as bromodomain containing proteins, are mediators of histone acetylation. These proteins bind acetylated histones and recruit histone acetyltransferases, histone deacetylases and other protein complexes leading to chromatin remodeling and transcriptional activation or repression, yet the role of bromodomain proteins in addiction has not been investigated. Given that histone acetylation mechanisms play an essential role in cocaine-related behaviors and adaptations, we hypothesized that bromodomain proteins (specifically the bromodomain with extraterminal (BETs) that include: Brd2, Brd3, Brd4 and Brdt) are integrally involved in epigenetic responses to cocaine. Here, using behavioral and molecular techniques, we reveal a novel role for specific BET bromodomain proteins in cocaine reward. Results from these experiments shed light on the new epigenetic targets that are potentially important in addiction-related behaviors.
A Dose of Prose

Numerous alternative therapies - such as art, music, and pet therapies - have been researched and proven to aid in positive health outcomes for patients. Reading therapy, however, has not been extensively researched. Studies point to the beneficial effects of positive communication in healthcare and the need for providers to empathetically interact with patients. Reading therapy encourages meaningful patient interactions that are often lacking in today’s healthcare system, and could assist in the healing process. Volunteer students attended a three-hour training session on proper techniques for reading to patients, including training on selection of reading material for each patient. Readings were selected from a research team-created anthology- “A Dose of Prose”- a compilation of various literature forms appropriate for health care settings. Post-training, volunteers conducted reading therapy (alternatively, “bibliotherapy”) sessions with patients of approximately 30 minutes with a focus on positive communication. Sessions were conducted in various healthcare settings, including hospices, hospitals, and assisted care facilities. Patients completed pre- and post-session surveys ranking their mood, calmness, and alertness. Analysis of over two hundred sessions found statistically significant improvements in mood and calmness after the bibliotherapy session.
Development of a Scanning Flow Thermal Denuder for Air Quality and Climate Applications

Atmospheric aerosols are known to have a significant impact on the radiative forcing due to their ability to act as cloud condensation nuclei (CCN) which uptake water to form cloud droplets. An increase in CCN concentration results in smaller cloud droplets and an increase in cloud albedo. While atmospheric aerosols composed of inorganic salts may be known to be the most effective in forming CCN, organic aerosols (OA) are also known to influence CCN activity, especially Secondary Organic Aerosols (SOA), which are the result of gas-to-particle conversion of oxidized gas-phase precursors and constitute a large portion of organic aerosols. As the impacts of organic aerosols on cloud droplet formation are uncertain, it is important to investigate the impacts of organics on droplet growth kinetics and their link with aerosol volatility. In doing so, there would be clarity on how organic aerosols indirectly affect climate by altering the albedo and lifetime of clouds. The utilization of a thermodenuder (TD) or a laminar flow reactor is the focus of the project. The TD consists of both a heating section, which allows semi-volatile components in the aerosol to evaporate, and a cooling section, which allows for the evaporated gas components to be adsorbed onto activated carbon such that the vapor does not condense back onto the aerosol. A bypass tube allows for the comparison of aerosols with those that have passed through the TD. The TD is used to expose particles to specific temperatures in order to characterize their volatility through measurement of changes in particle size.
The Effects of Step Training On Polyuria in Spinal Cord Injured Rats

Individuals with spinal cord injuries (SCI) experience various deficits, including bladder dysfunction. Bladder management after SCI requires intermittent catheterization throughout the day and multiple awakenings throughout the nighttime, negatively impacting quality of life. Polyuria is a significant problem, particularly at night. Overproduction of urine produces bladder overdistension, impacting management of the upper and lower urinary tract and potentially triggering autonomic dysreflexia. A recent study from our lab using a male rat spinal contusion model indicated that even mild injuries where weight-bearing locomotion is retained exhibit severe polyuria and 30 minutes of daily step training failed to reduce polyuria. In the present study, we examined the effects of daily step training for 60 minutes, which we have recently shown improves bladder function after SCI. SCI rats were divided into three groups: quadrupedal-trained, forelimb-trained, and non-trained controls. Metabolic cages were used once per week for 24 hours to measure the rats’ fluid intake and urine output. Each animal was assessed weekly on the Basso, Beattie, Bresnahan (BBB) locomotor scale to evaluate mobility. Data was recorded throughout the course of nine weeks of training. Both quadrupedal and forelimb training for 60 minutes per day returned toward pre-injury levels of mean urine volume collected over a 24-hour period, suggesting that physical therapy including step training reduces SCI-induced persistent polyuria. Thus, therapies for SCI patients can be designed such that bladder function can be improved through step training, reducing nightly catheterizations, decreasing the risk of autonomic dysreflexia due to overdistention, and improving quality of life.
High-Energy Searches for Supersymmetry at CMS

Supersymmetry (SUSY) is a proposed extension of the Standard Model in which all known particles are given “super-partners” with opposite spin-statistics. In addition to offering a mechanism for grand unification, SUSY presents possible dark matter candidates and a solution to the hierarchy problem. To date, no experimental evidence for SUSY has ever been observed. In this presentation we give an overview of high-energy searches for SUSY at the Large Hadron Collider, a calculation of a particular misreconstruction rate relevant to same-sign dilepton signals, and some new results from searches for R-parity violating SUSY. The data used was collected by the CMS collaboration in 2012 at $\sqrt{s} = 8$ TeV.
Relative Expression Analysis of Secretory Lipases in Microbotryum Violaceum

Microbotryum violaceum is a fungal species complex that includes related smut species primarily infecting members of the Caryophyllaceae (pinks). Individual species of this group are limited to successful infection and reproduction on a specific host species. A draft sequence of the genome at 18x coverage was generated for a haploid strain derived from meiosis of teliospores isolated from the host Silene latifolia. The draft sequence is currently in the process of annotation and is publicly available through a website at the Broad Institute. Through the analysis we have performed so far, we were able to identify a suite of secreted proteins (SPs) that are potentially involved in host-pathogen interactions. Some of these include plant cell degradation enzymes like pectinesterase, laccase, subtilase and glycoside hydrolase. Analysis also identified a group of lipid degrading enzymes know as secretory lipases; these were selected for further study due to their apparent enrichment in M. violaceum relative to the other fungi examined. Since such enzymes are associated with pathogenicity in some fungi, this was additional rationale for examination of their expression in M. violaceum. Inspection of the genome sequence identified seven secretory lipases, likely participants in fungal development and pathogenicity. In this study, we used qPCR to validate preliminary predictions of expression levels for these genes and to investigate expression levels under growth conditions not previously examined.
Understanding the Role of the Built Environment in Tanzania:
As Defined by the Communities which Live in Them

The spaces one lives, works, and plays in are essential to one’s overall sense of self, community, and well-being. In East Africa, there is little research to date on the role of the built environment, largely because of the idea that great architecture and architectural innovation originates in the developed world. Underdeveloped nations are actually key places to practice and learn about the inseparable relationship between man and nature, or nature and the man-made due to critical financial, environmental, and health challenges which make resources scarce. The presentation exhibits the author’s research into the role of the built environment in Tanzania through two case studies: the first an urban setting of Stone Town, a UNESCO World Heritage site on the island of Zanzibar, and the second a rural setting of Musa a village in the foothills of Mt. Kilimanjaro. Through a series of interviews, quantitative comparative analysis of building materials and firsthand experience living in these settings, the author looks at the way people interact with and perceive their built environment beyond the date of construction completion in order to explore issues of maintenance, social stigma, health impacts, and comfort. If architecture can communicate ideas and certain lifestyles to the people it supports, architects need to accept the responsibility of design with care, especially in foreign developing nations. Assessing the built environment’s impact and history through a variety of lenses at once including ecological, social, and economical gives a better perspective on the current condition and future direction of East African architecture.
Doing Math with Dot Arrays: 
Behavioral Implications and Neural Explanations

The approximate number system (ANS) allows quick estimation of number without the use of language or symbols. Because knowledge of symbols is not required, the ANS allows the study of math understanding in young children and primates. It has recently been discovered that training approximate arithmetic, the addition and subtraction of large dot arrays, improves symbolic math performance in adults. A question arises: can we train young children to improve their math skills before they understand symbols or number words? I will discuss an ongoing iPad intervention project which trains North Carolina state-funded preschoolers to add and subtract dot arrays. I will also discuss my thesis research, which uses functional magnetic resonance imaging (fMRI) to explore functional connectivity that exists during these approximate arithmetic tasks but not during a similar matching task. We find increased parieto-frontal connectivity during approximate arithmetic when compared to matching, which may indicate shared machinery between approximate and symbolic arithmetic.
Modern Modes of Communication in Museum Education

This thesis examines current modes of communication between museums and the public through the analysis of past and present reflections of cultural adaptations in exhibitions. In the decades following World War Two, rapid advancements have led many societies to evolve into high-tech cultures where originality through hybridity rules popular forms of communication including music remixes, video clip television shows, and smart devices. The institutional response to this era of multitasking and immediate gratification has resulted in innovative exhibitions that engage the public and act themselves as a product of our high-tech, remix culture. In this thesis examples of exhibitions that make use of modern communication techniques are discussed and related to established social theory in order to understand the difficulties and triumphs of modern public education. Patterns such as on-the-go learning through smartphones and tablets as well as interactive installations and experiences have redefined the roles of the teacher and the student. Consequently, the role of the museum is also left in a state of flux. This thesis supports the idea that cultural trends are a necessary component to effective museum education because they foster excitement through popular forms of media and engage the audience through interactive and immersive projects.
Effective emotion regulation plays an essential role in successfully managing stressors in everyday life. In contrast, poor emotion regulation is associated with more stress and depressive symptoms (Martin & Dahlen, 2005). Less is known, however, about the effectiveness of different forms of emotion regulation. Two forms, antecedent-focused and response-focused emotion regulation, are typically differentiated (Gross, 1998). In general, we expected that antecedent-focused emotion regulation, occurring earlier in the emotion generative process, leads to more positive outcomes than response-focused emotion regulation, occurring later in the process. In the present study, we investigated the impact of these two forms of emotion regulation on indicators of subjective well-being (life satisfaction, positive and negative affect), stress, and self-reported physical health in a sample of 857 persons between the ages of 18 and 75 (mean age of 35.6 years, 471 females). Consistent with our expectations, the findings suggested that the use of antecedent-focused, but not response-focused, emotion regulation strategies were consistently predictive of less perceived stress, less negative affect, more positive affect, better self-reported health, and greater life satisfaction. These findings indicate that regulating one’s emotions earlier in the process is better when it comes to living a more healthy and satisfying life, whereas regulating one’s emotions later in the process has little effect on measures of well-being, stress, and physical health. Interestingly, participants' age had little influence on these associations.
Characterizing the Roles of Two S1 Subsite Cap Residues in Determining the Substrate Specificity of a Malarial M1-Family Aminopeptidase

PfA-M1 is an M1-family aminopeptidase in the malaria parasite Plasmodium falciparum that participates in the catabolism of host proteins and has been identified as an essential enzyme for parasite growth. PfA-M1 residues Glu572 and Met1034 serve to cap a cylindrical S1 “subsite”, which is a well-defined pocket that interacts with the sidechain of the first residue of peptide substrates and is the dominant determinant of enzyme specificity. As PfA-M1 is of interest as a potential drug target, further characterization of the roles played by these two residues in defining substrate and inhibitor specificities is desirable. We have used the peptidic aminopeptidase inhibitor bestatin to characterize the effects of the two cap residues on the potency of a model inhibitor. These results indicate that both cap residues contribute to the binding of bestatin to PfA-M1. Experiments with X-Ala dipeptide substrates are currently in progress to assess the effects of the PfA-M1 cap residues on substrate specificity.
African cichlid fish species have incredible diversity in pigmentation phenotypes, including different color morphs for males and females. Most Lake Malawi species with yellow and blue color morphs have yellow females and blue males. This is reversed only in Metriaclima lombardoi. All juveniles express a blue pigmentation with black bars, but as they age the males begin to change to yellow while the females retain blue pigmentation. We examined this transition throughout development using an epinephrine treatment to contract chromatophores. The caudal fin was then photographed using a camera-mounted compound microscope. These images are analyzed using Image J to obtain melanophore counts throughout development. The emergence of xanthophores, which are responsible for yellow pigmentation, is also tracked under the microscope using field color values. Chromatophore differentiation and migration was also examined through tissue regeneration, following amputation of a small piece of tail fin. We are also interested in a closely related species, Metriaclima phaeos, which has yellow females and blue males. We are currently comparing gene expression in tail fin of blue and yellow morphs in both species, using a high-throughput sequencing approach from a cDNA template. Overall we hope to identify the genes responsible for pigmentation and their expression levels as they relate to chromatophore amounts and patterning in development.
Experimental and Computational Studies of the Activity of the Native Substrate for the Two Isoforms of Dehaloperoxidase

Dehaloperoxidase (DHP) naturally occurs in two isoforms of A and B in the marine organism Amphitrite ornata. DHP is both a hemoglobin and a peroxidase, with a native substrate of 2,4,6-tribromophenol (TBP). The recent discovery of DHP B has been investigated, although the relationship between the enzyme and the substrate is still unknown. There has been a recent observation of an internal substrate binding site in DHP A. It is still not known whether DHP B has the same binding site as DHP A. The details of DHP B enzyme kinetics have not yet been investigated. We have studied these aspects based on the principles of Michaelis-Menten kinetics and using molecular dynamics simulations. Using experimental and computational methods, the binding and chemistry of the DHP B and its binding site will be explored using TBP as the substrate in comparison to DHPA.
Imaging Autoimmune Medicated Destruction of Tumors

Cancers can be difficult to kill but one line of defense are immunomodulatory agents, which signifies the notion that autoimmunity can be an effective tool to eradicate cancer. To further explore this interplay, the behavior of autoimmune cells at the target tissue of the tumor was examined. The anterior chamber of the mice eye model was used to study the motility behavior of immune cells, and the T-cells used were from a line of cells; the utilization of these methods allowed for the most controlled setting to run the experiment. Splenocytes from a diabetic mouse are efficient at clearing an islet derived tumor (NIT-1) and CD4+ restricted TCR, specific for beta-cells, are alone capable of destroying the tumor. A step further was taken to look specifically at the role of the receptor CTLA4, and the central question developed as the following: How will the reduction in the expression of CTLA4 affect the destruction of the tumor mass? Through the examination of the data, CTLA4 modulates the anti-tumor response, which is correlated with specific changes in cellular motility. By modestly reducing its expression, there is a greater efficiency in the killing of the tumor mass. The presence of antigen affects motility in the control mice, however in CTLA4 RNAi T-cells their movement is independent of whether or not it’s in the tumor, which indicates a critical role for intrinsic behavior of CTLA4 on T-cell motility.
Portable neutron generation systems that can be turned on and off are of significant interest to many areas of industry and science including medicine, security, and materials analysis; inertial electrostatically confined (IEC) systems can provide neutron production rates at par with existing radioisotope and accelerator based systems that either lack portability or the ability to switch on and off, making them an attractive solution for scientific and engineering endeavors that require neutron production. A prototype IEC was fabricated at NC State. Our research strives to develop and optimize the device, laying down the theoretical framework for optimization and experimentally validating these calculations by constructing a prototype IEC device based on this study. The operating parameters for this IEC system, including pressure, voltage, current, and purveyance will be optimized for confined plasma neutron production. Deuterium-Deuterium fusion in an inertial electrostatic confinement device is possible due to the formation of virtual potential wells that only exist within a range of electrical purveyance (this purveyance can be varied by changing operating parameters of the IEC). Trapping the deuterium nuclei in this potential well helps us achieve the three basic conditions required for nuclear fusion, which are: high temperature to overcome the Coulomb barrier, high ion density, and confinement for enough time to avoid plasma cooling. We will present a theoretical model for device optimization and experimental measurement of purveyance curves for a prototype IEC designed and constructed by our group.
An important question in psychology and philosophy is how we understand the minds of others. In order to function normally in a social world, we need to be able to recognize other peoples’ intentions quickly to help us understand their actions so we can respond appropriately. However, lingering questions remain regarding how we interpret the intentions behind various types of actions and the influence of actions that only involve one person in comparison to more social acts involving exchanges between two people. Research into the mirror neuron system (MNS) may answer these questions. Mirror neurons have been found in macaque monkeys and fire when the monkeys observe and execute goal-directed actions. A similar system is believed to exist in humans and to be involved in social development. My research attempts to answer these lingering questions by using EEG to investigate how the intentionality and social context of various short actions modulates mu rhythm (an EEG rhythm in the 8-13 Hz frequency range) activity in adults. A decrease in mu rhythm power is believed to be a marker of mirror neuron activity in humans. Last semester I used EEG to record the brain responses of 40 undergraduates at the University of Maryland when they viewed short videos of 28 different actions that were either intentional or unintentional and involved one or two people. I am currently analyzing the EEG data to look at mu rhythm activity and will also analyze behavioral data.
Stimulated Brillouin scattering (SBS) is a nonlinear interaction between optical and acoustical waves that can severely limit the power transmitted through fiber optic systems. Here, we explore both experimentally and theoretically the possibility of using chaotic phase modulation to suppress SBS, and we compare the results to conventional non-chaotic modulation. We also present a theoretical model to simulate the output of a fiber optic system in the presence of such phase modulation, and we compare the simulation results to experimental data. Finally, we explore ways to exploit chaotic synchronization to recover the un-modulated carrier at the receiver.
Han (Eddie) Shin, University of Pittsburgh
Poster Presentation: April 4, 3:30 – 5:30 pm
Major: Biology
Faculty Mentor: Doug Potoka

Defective Vasoactive Intestinal Peptide Expression in Experimental Congenital Diaphragmatic Hernia: Effects on Airway Branching

Congenital diaphragmatic hernia (CDH) is associated with high mortality and morbidity due to lung hypoplasia and pulmonary hypertension. CDH lungs exhibit deceased airway branching and a truncated pulmonary arterial tree with increased arterial muscularization. Our lab has previously shown defective pulmonary innervation in CDH with a relative decrease in parasympathetic innervation during development of the lung. Vasoactive Intestinal Peptide (VIP) is a parasympathetic mediator and neuropeptide expressed within pulmonary nerves and the pulmonary epithelium. The role of VIP in normal processes of lung branching morphogenesis and pulmonary vascular development and abnormal lung development in CDH remain to be fully defined. Neuropeptides such as bombesin and CGRP have been shown to have direct effects on lung airway branching. In addition, VIP promotes vasodilation and inhibits vascular smooth muscle cell proliferation. Thus, VIP deficiency has been shown to be associated with pulmonary arterial hypertension and may result in decreased embryonic pulmonary blood flow. We hypothesize that VIP plays a role in normal airway branching morphogenesis during lung development and that defective VIP expression in CDH contributes to lung hypoplasia either through a direct effect on airway branching or via modulation of embryonic pulmonary blood flow.

Materials and Methods: We utilized the nitrofen model of CDH. Timed-pregnant CD-1 mice were gavage-fed 25mg of nitrofen dissolved in 0.5 mL of olive oil (nitrofen group) or 0.5 mL of olive oil alone (control) on E8.5 and sacrificed at various time points (E11.5 through E16.5) for embryonic lung harvest. Embryonic lungs were fixed and sectioned for immunohistochemistry for E-cadherin, CD-31, VIP, and the VIP receptors, VPAC 1 and VPAC 2. Protein extracted from whole embryonic lungs was used for western blot analysis of VIP protein expression. For lung explant cultures, E11.5 control or nitrofen-treated whole lungs were cultured in serum-free DMEM media with or without the addition of endogenous VIP protein for up to 72 hours. Airway branching was quantified by counting terminal buds.
The Art of Movement

As a dancer and an artist I began to consider the contrasting longevity of both art forms. My project investigates the intersection of the ephemeral art of dance and the permanent art of painting. My goal was to document the energy of movement by dancing on canvas with paint covered feet. Initially, I embraced the ideas associated with action painting and performed improvised movements to random music. As a result, I began to let go of the control I often desire to attain as an artist. These early paintings were chaotic and dense in composition. From here, I began planning two paintings utilizing the same choreography but changing the movements via different music and the elements of dance (pace, scale, and the quality of movement). By evolving this set piece of choreography, the approach demonstrated how vastly different the imagery of each painting could be. My purpose for creating each painting changed as I allowed the anxieties of my viewer’s approval to dissipate and began exploring my own repressed memories. From a color inventory based off of a seashell and lucid movements to the sounds of ocean waves, I wanted to entice the viewer to investigate my process of painting. I soon abandoned this purpose and created a painting based off of my heritage and memories. For this piece, I folded the canvas after each layer of paint was applied to create a faded, symmetrical imprint. This evanescent imagery was meant to reflect my grandmother’s memories fading away due to Alzheimer’s disease. My last piece comments on rape culture, the gray areas of consent, and the loss of privacy while nearing adulthood which is very prevalent in college communities.
Enzymatic Hydrolysis Kinetics:
The Study of the Effects of Glucose and Pre-treatment Solution on the Conversion of Cellulose to Glucose

Throughout the world, continuous sources of energy have become highly sought after; thus, the development of an environmentally safe energy source is of great importance. As a result, the production of biofuels from cellulosic materials (e.g., sugarcane bagasse) has garnered particular interest. In this process, a crucial step is the conversion of cellulose to glucose through the use of commercial enzymes; therefore, an understanding of the enzyme kinetics with respect to the overall rate and extent of reaction is desirable. To obtain this understanding, a quartz crystal microbalance (QCM) can be used. This device employs gold sensors that can detect changes in mass (nanogram quantities) through frequency readings from the sensors. Moreover, the process of developing thin-films of cellulose on the gold sensor surfaces has been studied in great detail, allowing for the production of reproducible and reliable films. These sensors can then be placed in the QCM, through which an enzyme solution will flow over the sensor surface, causing the hydrolysis reaction to take place. Further, by altering the concentration of enzyme in the enzyme solution employed, information regarding the effect of enzyme concentration can be obtained. As well, the effects of outside factors can be studied, as it is believed that both the solution used to pre-treat the cellulose and the glucose product have inhibitory effects on the enzymes. By understanding the effects of enzyme concentration and these outside factors, the overall process of biofuels production can be appropriately modified to make it both economically feasible and efficient.
Rebecca Thomas, *Clemson University*
Oral Presentation: April 5, 10:00 am, Conference Room A, Floor 3
Major: Bioengineering
Faculty Mentor: Delphine Dean

Designing a Medical Training Simulator: Central Venous Catheterization

The 2010 Affordable Care Act set many financial incentives for increasing quality of care as well as major disincentives for medical errors. Medicare has also eliminated hospital reimbursement for hospital-acquired conditions. Approximately 1 in 6 of the 800,000 central venous catheterization (CVC) procedures performed in the U.S. will result in complications that cost patients, hospitals, insurance providers, and the US government as much as $2.17 billion annually. These complications arise due to the susceptibility of the insertion site to disease and the close proximity of the jugular and subclavian veins to the heart, lungs, and large arteries. We are currently designing a new CVC simulator with the hopes of reducing these complications. Now, medical residents train for this procedure on live patients because CVC simulators are scarce and often anatomically inaccurate. Our low-cost, patent-pending simulator is ultrasoundable and has a fully rotatable head, accurate anatomical structures, and vasculature that pulsates and expands under fluid pressure changes. We are working closely with business professionals to determine the most feasible option for manufacturing our product. In preparation of marketing, we are conducting usability tests in which both medical residents and experienced physicians conduct CVC to evaluate the accuracy, ease of use, and training effectiveness of our simulator as compared to other simulators on the market. By developing an affordable, accurate, and economically feasible simulator for CVC training, we hope to reduce injuries, leading to a lower financial cost and an increased quality of care.
A Review of Youth Physical Activity Behavior and Community Coalition Outcomes in a Rural Population

In the fall of 2008, community members of Meade County, Kentucky assembled to discuss the lack of a public swimming facility for their children. From this conversation they determined that a broad range of community needs existed, and a primary goal of increasing access to recreational facilities and health-related programming was established. The Meade Activity Center, Inc. (MAC) non-profit organization was thus formed and by 2010, MAC began offering children’s sports and physical activities, community events, and summer camps.

The current review focuses on MAC’s ability to create physical activity opportunities and places that address the gaps in availability of access to services within the community, including those due to income disparity. This is important as rural residency is linked to health inequity due to a lack of access to healthcare services and physicians. Engaging in disease preventing and health promoting behaviors are then crucial. The purposes were to answer the following:

1. What programming opportunities have MAC provided?
2. To what extent are children in the community participating in MAC programming?
3. What are the demographic, health behavior, and health access characteristics of MAC participants?
4. Do differences in physical activity participation exist among children with different SES backgrounds?

Program attendance sheets were used to determine the reach of programming for each session, including the name of the session activity, dates for the activities, and total enrollment per date. Children who were previously or currently enrolled in any MAC programming (N = 766, ages 5-18 years) since the MAC’s inception were invited to participate in a health survey which included demographic data and health behavior evaluation.
Creole Opposition in Plessy v. Ferguson

The landmark case of Plessy v. Ferguson (1896) validated legal segregation in America built on a racial binary between blacks and whites and facilitated the political and cultural collapse of the Creole community in New Orleans. Originally, the Creoles were French and Spanish settlers in Louisiana who settled prior to the Louisiana Purchase (1803). The definition of Creole expanded as distinct slave laws, called Le Code Noir, and an accepted social custom of concubinage, called plaçage, molded a Francophone identity among “free people of color” who became known as black Creoles. The Creoles constructed a tripartite racial hierarchy that categorized white Creoles, black Creoles, and slaves. In this tripartite racial system, black Creoles established an economic, cultural, and political space that was exceptional in the American South. The Civil War threatened this system. Anglo-American political elites employed the Creoles’ diminished political and economic position to advance a racial binary enforced through racial violence. The black Creoles challenged their classification as black under the racial binary to avoid losing their legal and economic rights. In response, leaders from the black Creoles formed the Comité des Citoyens (Citizens’ Committee) and used Homer Plessy’s appearance as a white male to mount the most significant legal challenge to racial segregation. The decision rendered in Plessy v. Ferguson not only defined racial segregation in America until the 1950s but also marked the termination of Creole influence in New Orleans.
The Burden of Malnutrition, Anemia, Malaria, and Helminthic Infection in Pregnant Women & Children in Central Uganda

According to the WHO, pregnant women and children are populations more vulnerable to malnutrition, anemia, malaria, and helminths in sub-Saharan Africa. Co-infection with these diseases can have detrimental effects on education, pregnancy, and general health outcomes. As a nuanced understanding of disease burden can contribute to targeted intervention strategies, this project examined the disease prevalence and risk factors in a rural parish of Central Uganda. This study involved in-depth interviews, clinical testing, and/or anthropometric measurements of 118 school-aged children and 71 pregnant women. Children ages 5-16 were recruited from four grade levels of three primary schools. Pregnant women were enrolled through home-visits, a health fair, and a local health center. Data were collected on demographics, disease history, net usage, footwear practices, and other risk factors. Anemia, malaria, and helminthic infection were diagnosed through hemoglobin levels, thick blood film microscopy, and examination of stool samples, respectively. Of the pregnant women, 43% were anemic, 20% exhibited malaria parasitemia, and 37% had helminthic infection. Of the children, 12% were anemic, 20% exhibited malaria parasitemia, 28% had helminthic infection, and 23% were stunted, with higher prevalence in males and younger children 5-10 years. Approximately 61% of children reported not sleeping under a malaria net regularly. Children who reported never wearing shoes had nearly double the rate of helminthic infection (50%) compared to those who reported always wearing shoes (23%). Discrepancies across age groups and gender suggest the need for interventions targeting high-risk groups, addressing factors such as footwear usage and malaria net ownership.
The Effects of Tumor Growth on Lymph Node Mechanics

Tumor growth affects a body in innumerable ways. Some of the more interesting effects resulting from tumor growth are found when asking questions about how a tumor may affect certain tissue structures in the body. Knowledge about how tumors affect tissue mechanics opens gateways to cancer detection, prevention, treatment, drug delivery, to name a few. One of the first symptoms of the presence of a malignant tumor is the stiffening of tissues, which presents an opportunity for early diagnosis. Changes in tissue structure and fluid pressure may also inhibit metastatic cells to spread to other lymph nodes and throughout the body. Our research sought to further understand how changes in the mechanical properties of lymph nodes relates to tumor growth and immune response. In this research experiment, melanoma tumors were implanted in mice and tested using various methods of indentation testing. The elastic moduli of each type of node at different stages of tumor development were compared. Findings show the complex changes that occur in the microenvironment of a tumor draining lymph node. Better understanding of how and why these changes occur help complete the puzzle of how a tumor effects its environment, is able to spread and grow, and how the body reacts in response to and enables tumor growth.
Targeting the Akt Pathway in Glioblastoma Multiforme Stem Cells

Glioblastoma Multiforme (GBM) is the most prevalent and most aggressive form of malignant primary brain tumor. A subset of glioblastoma cells, known as glioblastoma stem-like cells (GSCs), display stem cell properties and are hypothesized to be responsible for tumor formation, maintenance, and recurrence. Conventional GBM treatments such as radiotherapy and chemotherapy often fail to eliminate GSCs completely, and the remaining GSCs are able to repopulate the tumor. Thus drugs that specifically target the GSCs are necessary for successful treatment of GBM. Large-scale genomic studies revealed that the serine/threonine kinase AKT signaling pathway is hyperactive in GBM. Amplification or mutation in growth factor receptors, loss of tumor suppressors such as PTEN and oncogenic mutations all contribute to increased activity of this pathway. Therefore we sought to determine the efficacy of drugs targeting the AKT pathway in patient-derived GSC lines. We are evaluating the effect on cell viability using MTS assay of drugs that target different nodes of this pathway from the level of growth factor receptors to downstream targets of AKT. For drugs that show a potent cytotoxic effect, we are using Western blots to determine how we can further increase the cytotoxicity of the drug. The enhanced AKT pathway activation in GSCs may confer chemoresistance, and drug therapies that target the AKT pathway specifically in GSCs may be a promising treatment for GBM in the future.
Partnerships in International Development: Implications for the Development of Rwandan Healthcare

In 2012, in partnership with the Clinton Health Access Initiative, Rwanda launched the Human Resources for Health Program, which was designed to alleviate the physician density problem in Rwanda. This research investigates the nature of the partnership consisting of 23 U.S universities, the United States Agency for International Development (USAID) and other funding organizations in collaboration with the Rwandan Ministry of Health. This research adds to scholarship surrounding the donor recipient relationship and how this has important implications for project success, but also and more importantly sustainability. A new and evolving concept of accompaniment articulates how partnerships in development should aim to strategically partner with national public and private institutions to increase their capacities. Such an approach recognizes that the reason countries are incapable is because they do not have the resources they need and bypassing them further undermines their ability to fulfill their capacities and create long-term solutions. The research uses observation, document analysis and semi-structured interviews. The results show that the partnership adhered to the concept of partnership and accompaniment. However, I discovered evidence of issues that appear to limit the implementation success. These include: 1. The direction of the relationship and where the partnerships are concentrated 2. Social and cultural barriers, 3. Communication objectives, 4. Basic equipment needs 4. Language barriers 5. Economic incentives. This research adds an important dimension to discussions regarding the role accompaniment plays in the evolving nature of partnership and will be of interest to anyone interested in effective and successful partnerships.
“The Power to Keep Them Apart”:
The Reinforcement of Gender Stereotypes in Prescription Direct-To-Consumer Advertising

The media influences what gender norms people internalize. When prescription direct-to-consumer advertisements go about convincing consumers using gender stereotypes, traditional gender notions of what is appropriate are reinforced. This study is based on a content analysis from December 2010 to November 2012 of 68 prescription product advertisements in Cosmopolitan and Popular Mechanics, two magazines whose readership is highly gendered. Based on this primary data, this project examines the types of prescription products being advertised to women as compared to men and how gender stereotypes are portrayed in these advertisements. The findings indicate that prescriptions directed at women were predominately for preventing pregnancy while prescription products directed at men were for a diverse range of prescription products. Direct-to-consumer prescription marketing reinforced traditional gender roles through choices in characters, settings, masculine and feminine color schemes, word choice, and character activities.
Matthew Wasilewski, *Clemson University*
Oral Presentation: April 4, 11:00 am, Ballroom B, Floor 2
Major: Chemistry
Faculty Mentor: Modi Wetzler

**Novel, Greener, Safer Synthetic Routes to Nitrogen Macrocycles:**
TACN, Cyclen and Beyond

Nitrogen containing macrocycles (azamacrocycles) such as 1,4,7-triazacyclononane (TACN) and its larger cousin 1,4,7,10-tetrazacyclododecane (cyclen) are useful metal-binding chemicals with broad applications ranging from catalysts to medical imaging. However, existing methods of synthesizing them rely on out-dated protection group chemistry. As a consequence, azamacrocycles are difficult, dangerous to produce, and generate environmentally harmful byproducts. To circumvent the difficult protecting group used, p-toluenesulfonyl (Ts), we investigated alternative protecting group strategies. An ideal choice was tert-butoxy carbonyl (Boc), which sees extensive use in peptide synthesis and has mild enough chemistry that reactions using it can be performed by machine. Installing and removing Boc produces no hazardous products; only carbon dioxide gas (CO2) and t-butyl alcohol, both of which can be removed and recovered safely. Use of this method dramatically reduces the danger and waste of the deprotection step when Ts is used. Additionally, Ts based methods only yield single-functional rings, which must then be painstakingly functionalized post-cyclization. This frustration was greatly alleviated by the incorporation of trifluoroacetyl (TFA) protecting groups, which can be removed by conditions under which Boc is stable. By varying conditions, these resultant rings can be much more easily functionalized; opening new routes to derivatives that previously would have been too difficult to produce. By replacing the environmental and economic burden of outdated techniques with safer, greener, more sustainable alternatives, the application of azamacrocycles can be better realized for the benefit of mankind.
"But Where Is His Voice?": The Debate of Pope Pius XII's Silence During the Holocaust

For the past sixty years the question of whether or not Pope Pius XII did all that he could to help the victims of the Holocaust has plagued the reputation and memory of his papacy. As the Vatican and Pope Francis continue proceedings towards the canonization of Pius, the question of what judgment can be placed against the pope becomes ever more pressing. My project examines the path that the debate has taken over the past six decades through the work of both the critics and defenders of His Holiness. While this thesis does not deliver a verdict against Pius, it does address the important question of how the contemporary reader can understand what has been written and the evolution of the charges that have been placed against him. In this paper Rolf Hochhuth serves as the leading example for the critics and Father Robert Graham S.J. serves as his defense counterpart. Beginning with these two men and their arguments, I examine the charges and responses of both the defenders and the critics during the controversial years of the 1960s and 1990s. Through this study I have found that though the Vatican’s records remain sealed limiting the pool of information for researchers, the debate has continued to thrive because of the difference in perception of the two sides. The critics place their emphasis on the moral responsibility of the pope and the defenders focus their arguments on the political responsibility and implications of the pope’s actions during this uncertain time.
Cyberbullying Via Social Media

Cyberbullying is a topic that has been increasingly discussed as of late, both by the media and researchers. However, there is still much in the field of cyberbullying research to explore, as cyberbullying has mostly been examined with regard to frequency, and as it relates to students. This work aims to explore the venues through which cyberbullying occurs (e.g., text messages, social networking sites, e-mail, etc.) as well as the types of relationships that exist among victims and perpetrators. To examine this, two surveys were developed, one exploring the relationship between victim and perpetrator, as well as venue, the other examining how cyberbullying directed toward different types of targets is viewed by observers. In addition, Clemson’s Social Media Listening Center was used to gather real-world data from Facebook, website comments, and forums. A total of 3,000 posts were categorized based on whether they constituted cyber aggression, where they occurred, if they are direct or indirect, and who they are directed toward. As the ways in which people use social media sites to communicate continue to change, it is important to examine how these changes affect the nature of cyberbullying, so that we can have a clearer picture of what exactly cyberbullying is. It is also important to investigate the relationships that exist among victims and perpetrators, as ever changing social media allows people to communicate with others on an unprecedented scale, potentially changing who is involved in cyberbullying. This research seeks to begin scrutinizing these questions.
Casey Williams, *Duke University*
Oral Presentation: April 5, 9:00 am, Ballroom B, Floor 2
Major: Literature
Faculty Mentor: Michael Hardt

Nature and Politics

In the age of global climate change, are natural disasters really “natural”? If we insist on calling disruptive weather events “acts of nature,” what human actions and social costs might we be obscuring? My research seeks to answer these and related questions. It attempts to tease out human contributions to ostensibly “natural” events and examine the rhetorical strategies used to make sense of socio-natural disasters, their causes, and who or what is responsible for their effects. This project includes textual analyses of maps produced after Katrina and undertakes theoretical evaluations of the “Anthropocene,” the “Posthuman,” and Spinozan naturalism. It identifies the conceptual division between nature and society as one of the primary analytical engines driving contemporary discourses of natural disasters. It also explores alternatives to this conceptual frame, using the work of Baruch Spinoza, in particular, to seek concepts that begin to dissolve the categorical barriers separating nature and society. The project is, ultimately, concerned with justice – specifically, how responsibility for socio-natural disasters is assigned – and the rhetorical strategies and conceptual tools that secure or undermine it.
Breast is Best:  
A Case Study of Advertising Techniques  
of Infant Formula Post-Nestlé Boycott (1984-)

In the 1970s the multinational corporation Nestlé received harsh criticism for its advertising policies of infant formula in developing countries. As a result, the United Nations Children’s Fund and the World Health Organization published an International Code of Marketing of Breast-milk Substitutes. The author examined the implications of the code and to what extent its national adoption has been able to uphold its accordance through the examination of journals articles, and reports from both infant formula companies and third parties. Even with the code being passed, the infrastructure and the emerging role of doctors as middleman conclude the code as a failure in forming change. The findings pose a question to the ethical responsibility of multinational corporations such as infant formula in developing countries.
Haoxiang Yang, Georgia Tech
Poster Presentation: April 4, 3:30 – 5:30 pm
Major: Industrial and Systems Engineering
Faculty Mentor: Joel Sokol

A Bayesian Methodology of NCAA Basketball Bracket Prediction Improvement

In this research project, a model of predicting NCAA Basketball match outcomes based on a Bayesian methodology which was initially used to pinpoint the psychometric threshold will be presented. The match difficulty will be modeled as a psychometric function, which has a closed form and will be found to optimize the forecast result based on the previous data. The connection between the new methodology and the LRMC (Logistic Regression Markov Chain) model will also be explained. The deliverable of this research project will be a practical prediction tool with the input of past match results and the teams which are selected in the championship round and the output of the predicted bracket.
Role of Peroxisomes in Antibacterial Immunity

Peroxisomes are known to play central roles in regulating various metabolic activities in mammalian cells, and have recently been shown to play a crucial role in eliciting antiviral immunity. However, the role of peroxisomes in antibacterial immunity has not been examined. We hypothesized that peroxisomes also play an important role in antibacterial immunity because they are closely associated with antiviral signaling proteins that also induce immunity against intestinal commensal bacteria. In this pilot study we monitored the association of peroxisomes with the intravacuolar bacterial pathogen Legionella pneumophila. Through time-course infections of murine macrophages, we found that peroxisomes localized frequently in close proximity to Legionella-containing vacuoles (LCVs). This association was enhanced in macrophages primed with the proinflammatory cytokine Interferon-gamma (IFNγ), with over 50% colocalization at 4 hours post-infection (hpi). At 4hpi under IFNγ activation, virulent L. pneumophila with functional secretion systems induced approximately 30% more peroxisome colocalization than avirulent mutant strains lacking complete secretion systems. We also only observed significant increases in peroxisome colocalization from 0.5 to 4 hpi in IFNγ-primed macrophages, which suggests that peroxisomes are involved in IFNγ-induced host cell signaling and trafficking pathways that help resist infection and ultimately eliminate the pathogen. Ultimately, dissecting the role of peroxisomes in immunity to L. pneumophila will help us better understand the roles and mechanisms of peroxisome-dependent host defense pathways active against a broad array of intravacuolar bacterial pathogens.
Seeing Red: Microhistory in China’s 20th Century

The People’s Republic of China has carefully guarded the narration of its history. Novels, interviews, movies, or articles that reflect an opinion contrary to the Chinese Communist’s Party’s take on a given issue are often banned and censored. The result is that as individuals who lived through these tumultuous times age and die, there is a very real concern that accurately documenting them will become difficult. This presents myriad issues, foremost that a government-controlled narrative will replace the actual history of a country and the experiences of its people. Enter my grandmother, currently living in Shanghai. She was born in the late 1920s, and has lived through decades in a country affected by internal and external forces outside of her control. Where she lived, how she worked, and the situations she was born in to shaped her life—and her descendants—in profound ways. By recording her story, it is my hope to create a narrative that not only tackles China’s tumultuous 20th century from a unique standpoint, but to craft a story that operates outside of the master narrative. I hope to provide a body of work that is both relatable and widely applicable in analyzing China’s 20th century and its impact on contemporary society.
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