The 19th Annual
Indiana University
Undergraduate Research
Conference

IUURC19
RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITY

LEARNING THROUGH RESEARCH

Conference Program

INDIANA UNIVERSITY BLOOMINGTON

INDIANA MEMORIAL UNION - FRIDAY, NOVEMBER 22, 2013
Welcome

The Indiana University Undergraduate Research Conference is dedicated to promoting undergraduate research, scholarship and creative activity, in all fields of study, which is performed in partnership with faculty or other mentors as a vital component of an Indiana University undergraduate education.

A LETTER FROM THE CONFERENCE CHAIR

Dear conference participants,

It is my pleasure to welcome you to the 19th annual Indiana University Undergraduate Research Conference, sponsored and hosted by the Indiana University Graduate School. On behalf of the University Graduate School, we thank today’s student presenters, faculty and project mentors, research and graduate programs here with us today.

We are happy to have received over one hundred-thirty research abstracts and are excited to showcase the scholarly activity of college students from across the nine campus Indiana University system. “Learning through Research”, this year’s theme, celebrates college student research endeavors coupled with faculty mentors who are committed to intellectual discovery. Today’s presenters represent students who have been participating in research that is part of a larger grant - where faculty sponsors have given them substantial levels of responsibility to carry out specific components either individually or collaboratively. Other student presenters initiated their own projects and have been conducting their research independently under faculty guidance. While many students are reporting on completed projects, some are presenting the latest data on research still in progress. All are examples of undergraduate inquiry and analysis taking place at Indiana University. We are pleased to support student researchers as they become part of the IU learning community. This active engagement leads to a deeper understanding of the research process and to the development of skills used by those who add to knowledge. Without our invested faculty who teach, guide, mentor and inspire today’s emerging scholars, these transformative experiences simply would not occur.

I personally wish to extend my sincere thanks to members of this year’s host committee, IUURC liaisons, program partners and volunteers for their support. Each shared expertise, time and resources to make this year’s conference a success.

Finally, congratulations to this year’s student presenters for their accomplishments and hope that this experience helps to launch productive and satisfying academic and professional careers.

Sincerely,

Yolanda Treviño, Assistant Dean of the Indiana University Graduate School
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**SAVE THE DATE FOR ** **IUURC20!**

**FRIDAY NOVEMBER 21, 2014**
The Indiana University Undergraduate Research Conference (IUURC), established in 1994, is dedicated to promoting undergraduate research, scholarship, and creative activity, in all fields of study, which is performed in partnership with faculty or other mentors as a vital component of an Indiana University undergraduate education. This annual meeting for college students represents the nine campuses of Indiana University: IU Bloomington, Indiana University-Purdue University Indianapolis (IUPUI), IU East, Indiana University Purdue University Fort Wayne (IPFW), IU Kokomo, IU Northwest, IU South Bend, IU Southeast, and Indiana University Purdue University Columbus (IUPUC). Each year the IUURC Steering Committee invites a distinguished speaker to focus on a topic that would be of interest to all undergraduate researchers.

This annual statewide conference celebrates undergraduate research and scholarly and creative achievement, in addition to fostering professional development and lifelong learning. Undergraduate researchers deliver oral or poster presentations, and a number of prior IUURC’s engaged undergraduate students in roundtable sessions where they discussed their research procedures and findings. In presenting at IUURC, these budding scholars meet the important challenge of communicating the knowledge that they have created through conducting their research and the insights they have gained in the process. The Indiana University Undergraduate Research Conference would not be possible without the commitment of the faculty members and staff researchers who work tirelessly to mentor novice researchers, undergraduate students learning to explore their disciplines in such professional settings as the laboratory bench, archaeological digs, libraries and museums, and in the studio.
## Conference Schedule

<table>
<thead>
<tr>
<th>WHEN</th>
<th>WHAT</th>
<th>WHERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 a.m. – 10:00 a.m.</td>
<td>Check-In</td>
<td>Tree Suites Lounge</td>
</tr>
<tr>
<td>9:00 a.m. – 10:00 a.m.</td>
<td>Poster Set Up</td>
<td>Solarium</td>
</tr>
<tr>
<td>9:15 a.m. – 10:15 a.m.</td>
<td>Student Session #1: Leveraging Your Experience for Life After College: Becoming a Competitive Candidate with Patrick Donahue, Director, Career Development Center, IUB; and, Jane Rogan, Director of Engaged Learning, IUB</td>
<td>Oak</td>
</tr>
<tr>
<td>9:15 a.m. – 10:15 a.m.</td>
<td>Student Session #2: Things every undergraduate should know about graduate school with Sabine Justilien; and, April Bell, Katrina Overby and Ren-Jay Shei Emissaries for Graduate Student Diversity</td>
<td>Dogwood</td>
</tr>
<tr>
<td>10:30 a.m. – 11:15 p.m.</td>
<td>Student Poster Session #1</td>
<td>Solarium</td>
</tr>
<tr>
<td>11:00 a.m. – 11:30 a.m.</td>
<td>IUB Graduate Program Expo</td>
<td>Solarium</td>
</tr>
<tr>
<td>11:15 a.m. – 12:00 p.m.</td>
<td>Student Poster Session #2</td>
<td>Solarium</td>
</tr>
<tr>
<td>12:00 pm – 12:15 p.m.</td>
<td>Break (research poster take down)</td>
<td>Alumni Hall</td>
</tr>
<tr>
<td>12:00 p.m. – 1:15 p.m.</td>
<td>Luncheon and Keynote Address by Dennis Groth, Vice Provost for Undergraduate Education, IU Bloomington</td>
<td>Alumni Hall</td>
</tr>
<tr>
<td>1:30 p.m. – 3:30 p.m.</td>
<td>Oral Presentation Concurrent Sessions</td>
<td>Tree Suites</td>
</tr>
<tr>
<td>3:45 p.m.</td>
<td>Adjourn</td>
<td></td>
</tr>
</tbody>
</table>

### Conference Sponsor:

Indiana University Bloomington: Career Development Center, Emissaries for Graduate Student Diversity, Office of the Vice Provost for Undergraduate Education, STEM Initiative
HOTEL ACCOMMODATIONS
Biddle Hotel
Front Desk Lobby, Lobby Level

MEETING ROOMS
Alumni Hall, Mezzanine
Charter Room, Mezzanine
Commemorative Garden, Mezzanine
Distinguished Alumni Room, Mezzanine
Federal Room, Mezzanine
Frangipani Room, Mezzanine
Georgian Room, Mezzanine
Hoosier Room, Mezzanine
K.P. Williams Room, Mezzanine
Memorial Room, Mezzanine
State Room East & West, Mezzanine
The University Club, Mezzanine
Tree Suites Meeting Rooms, Mezzanine
Whittenberger Auditorium, Mezzanine

SHOPPING / SERVICES
900 Hair Design, Mezzanine
Bloomington Shuttle, Mezzanine
Ticket Machine, Lobby Level
Campus Card Services, Mezzanine
Computer Connection, Mezzanine
Computer Lab, Mezzanine
IU Bookstore, Mezzanine & 1
IU Credit Union, Lobby Level
Lactation Room, Mezzanine
The UPS Store®, Lobby Level

DINING AND SNACK SHOPS
Baja Fresh®, Mezzanine
Burger King®, Mezzanine
Dunn Meadow Cafe, Lobby Level
Freshens, Mezzanine
Starbucks®, Mezzanine
Sugar & Spice, Mezzanine
Sycamore Corner, Hotel Lobby
The Market, Mezzanine
Pizza Hut Express®, Charleston Market,
Cyclone Salads, Sakura Sushi & Hot Bowl
Tudor Room, Mezzanine

ACTIVITIES AND ENTERTAINMENT
Activities & Events Office / UNION BOARD, Student Tower 2
IMU Bowling & Billiards, Mezzanine

WI-FI LOUNGES & PUBLIC SPACES
Computer Lab, Mezzanine
East Lounge, Mezzanine
IMUG, Mezzanine
South Lounge, Mezzanine
Tree Suite Lounge, Mezzanine

ADMINISTRATIVE OFFICES
Administrative Services, Lobby
Business Office / Payroll / HR, Lobby
Director's Office, Mezzanine
Dining and Catering Services, Mezzanine
Dean of Students, Mezzanine
IMU Marketing, Lobby Level
IU Trustees Office, Mezzanine
Meeting Room
Reservations & Services, Mezzanine
Student Activities Office
& IUSA, Student Tower & 3
Veteran Support Services, Mezzanine

EMERGENCY
Tornado
In the event of a tornado or severe weather warning, move to interior areas without windows, such as restrooms, stairwells, or hallways and close any doors.

Fire
In the event of a fire, exit the building through the nearest exit door or stairwell. Do not use the elevator.

Legend
Handicap accessible
Escalator
Men's restroom
Women's restroom
Elevator
ATM
E-mail station
**April Bell** is a doctoral candidate in the Department of Epidemiology and Biostatistics in the IU School of Public Health in Bloomington (SPH-B). Prior to returning to graduate school, she was the Program Manager for the Academic Model Providing Access to Healthcare (AMPATH) Research Network, which is jointly operated by the Indiana University School of Medicine (IUSM) and the Moi University School of Medicine in Eldoret, Kenya. April received her B.A. in Human Biology from Stanford University and her M.P.H from the IUSM. Before returning to Indiana, she spent 10 years at the U.S. Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia during which she participated in various infectious disease epidemic investigations, managed US-based pediatric and adolescent HIV studies, and served as a co-investigator on multiple collaborative clinical research projects in Kenya and Madagascar. Her current research interests include HIV, sexually transmitted infections, reproductive and sexual health, and pregnancy in domestic and international settings. April is active on campus and currently serves as a Graduate Emissary and as Secretary for Raising and Enhancing Awareness of Culture in Health (REACH) in the SPH-B.

**Patrick “Pat” Donahue** is the Director of both the Career Development Center and Arts & Sciences Career Services at Indiana University in Bloomington. He has been in that position since August, 2003. Pat also serves as the Vice-President of the Hire Big Ten Plus Career Consortium. His previous positions in higher education included Director of Career Services at Rollins College in Winter Park, Florida from 1999-2003 and Assistant Director of Career Services at Rhodes College in Memphis, Tennessee from 1993-1998. In 2012, Pat received the Distinguished Career Award from the Career Development Professionals of Indiana.

Pat has a Master’s in College Student Personnel Administration and a Bachelor’s in Communications from James Madison University in Virginia. Before pursuing a career in higher education, Pat was a journalist for the Virginian-Pilot, a production assistant on Mister Rogers’ Neighborhood, and the executive producer’s assistant on the TV show Coach. Pat has been married to his wife, Shelley, for 20 years and they have two daughters, Lilly, 15, and Grace, 13.

**Yusuf El** is the marketing and publicity coordinator for IUURC19. Yusuf Ali El II is a second-generation college student out of Hammond, Indiana. He did his undergraduate studies at IU-Bloomington with a focus in Sports management through the school of Public Health. During his years on campus, he served as a residence hall assistant for two years while becoming a member of Kappa Alpha Psi fraternity. His campus activities included: NPHC marketing chairman, KAPSI vice president, Greek council chairman of IU, and Boys & Girls Club intern. Yusuf has always had a love for campus involvement and is currently an intern at Butler University in Indianapolis Indiana. Yusuf is finishing his second year of his masters degree with a focus in Recreational Sports Administration. For IUURC19, he addressed faculty and undergraduate students encouraging their participation in the pre-conference webinars and research conference.
**BIOGRAPHIES CONTINUED**

**Dennis Groth** is currently Interim Vice Provost for Undergraduate Education at Indiana University Bloomington. In this role, his responsibility includes initiatives aimed at enhancing student success, faculty excellence in teaching, and programs in academic advising, undergraduate student support, engaged learning, general education assessment, and academic student support. He is Associate Professor of Informatics, with a research focus on the development of new database access and data mining techniques in support of data visualization activities, as well as understanding models of exploration in digital environments. He was the Associate Dean for Undergraduate Studies for the School of Informatics from 2008 to 2013, where he was responsible for curricular programs, student services, advising, academic operations, and career services. Prior to entering the academy, Dennis had almost 15 years of professional experience in commercial software development, primarily in the healthcare arena.

**Jorge V. José**, Dr. Sc. Vice President for Research and James H. Rudy Professor of Physics at Indiana University. Jorge José joined Indiana University as vice president for research in August 2010. Prior to his appointment at IU, he served five years as vice president for research at the University at Buffalo, the flagship campus in the 64-member State University of New York (SUNY) system, and the largest public university in the Northeast. As IU’s vice president for research, José is responsible for research development, research compliance, and research administration. Working with various university offices, campus leaders, and deans, he works to increase and diversify research and creative activities at IU, attract external funding for these activities, and develop public-private partnerships, technology transfer, graduate education, and intercampus research opportunities.

**Terri Lee** comes from Gary, Indiana. She attended Butler University where she received her B.A. in science, technology, and society in 2011. She is currently completing her master of public health degree at the Indiana University School of Public Health in Bloomington. Her research topics of interest include domestic violence in rural communities, the influence of religion on health, and the use of social media in health communication. Ultimately, she hopes to work in health policy and health advocacy and aspires to be a program officer at a national foundation.
Katrina Overby is an Indianapolis, Indiana native who received her Bachelor of Arts in Mass Communications and Broadcast Journalism from Rust College in Holly Springs, Mississippi in 2009, and shortly after in 2011, received her Master of Science in Media Management from Oklahoma State University. She has presented research at several institutions and conferences including the University of Mississippi, the University of New Mexico, AEJMC, the Media and Civil Rights History Symposium in South Carolina, and the Fifth Summit on Communication and Sports. Katrina is a third year doctoral student at IU in the School of Journalism and an adjunct instructor. Katrina has taught J200 Reporting, Reporting, Writing, and Editing from 2011-2012 and J375 Race, Gender, and the Media during the 2013 spring semester, and taught J160 The Media Village this semester. Her research interests broadly include race, gender, and sexuality in the media. More specifically, the history of representations of African American women in television and film, history black film promotion and advertising, and race and gender in sports media.

Jane Rogan is Director Engaged Learning for the Office of the Vice Provost for Undergraduate Education which is charged with ensuring the success, retention and engagement of Indiana University’s undergraduate student population. Jane earned her undergraduate degree from Birmingham City University, England, and holds a masters in higher education from Indiana University, Bloomington. With over 16 years experience in higher education administration and academic programming, and teaching in career development and critical thinking, Jane is currently working to expand IU’s undergraduate research opportunities to allow more students to connect to their scholarly pursuits outside the classroom.

Ren-Jay Shei is a doctoral student in the Indiana University School of Public Health-Bloomington studying exercise physiology. He is a native of Bloomington, IN and completed his undergraduate and Master’s degrees at IU. During his undergraduate studies, Ren-Jay participated in the Little 500 and IU Cycling Club, competing in two Collegiate National Championships. Ren-Jay's research interests include mechanisms of fatigue development during exercise and respiratory physiology. In particular, he has studied the effects of deceptive feedback on exercise performance as well as the effects of nutritional supplementation on lung function in asthmatics and elite athletes. Ren-Jay is active on campus as an Emissary for Graduate Student Diversity, Officer in the SPH-B Student Government, Student Ambassador for the SPH-B, and Little 500 coach for both a men's and a women's team. In his spare time, Ren-Jay enjoys cycling, hiking, swimming, and cooking.
James C. Wimbush, Ph.D., Vice President for Diversity, Equity, and Multicultural Affairs, Dean, The University Graduate School. As the Vice President for Diversity, Equity, and Multicultural Affairs, Dr. James C. Wimbush works to create a learning environment that promotes cultural, ethnic, and gender diversity. He also seeks to find meaningful ways to improve the performance of all campuses in retaining, educating, and graduating students, especially those from underrepresented and diverse populations. As Dean of the University Graduate School—which oversees academic master’s and doctoral programs on Indiana University’s eight campuses—Wimbush advocates for the enhancement of graduate education and improvement of the overall quality of graduate student life, and works to increase funding for programs promoting educational equality in science, technology, engineering, and math. Currently a member of the President’s Cabinet, he is active in service and advisory roles at IU. Wimbush earned a doctorate in management and a master’s degree in human resources management and industrial and labor relations from Virginia Polytechnic Institute and State University in Blacksburg, Virginia.

Maxine Watson is a plant population biologist who looks at the interaction between development and physiology in determining the flowering behavior of plants. Throughout her career Prof. Watson has been active in issues relating to graduate education, academic freedom and due process. She has served as chair of the BFC Faculty Mediation Committee and was on the executive board of AARP. Professor Watson served as the director of graduate studies in Biology and Associate Dean for Graduate Education in the College of Arts and Sciences. She currently is an associate dean in the University Graduate School where she is responsible for diversity building initiatives and graduate student life. She is founding director of the Office of Postdoctoral Affairs and directs the McNair Scholars Program; a federally funded program that prepares first generation, low income and underrepresented minority undergraduates to attend and succeed in PhD programs.
MODERATORS

Dr. Polly Boruff-Jones, Indiana University Kokomo
Polly Boruff-Jones recently returned to Indiana to accept the position of Dean of the Library at Indiana University Kokomo. **Room: Dogwood.**

Dr. Suranga Hettiarachchi, Indiana University Southeast
Suranga Hettiarachchi is an assistant professor in Computer Science. **Room: Persimmon.**

Dr. Allison Howland, Indiana University-Purdue University Columbus
Allison is an assistant professor of Special Education. **Room: Maple.**

Dr. Kasem Kasem, Indiana University Kokomo
Kasem Kasem is a professor of Chemistry in the Department of Natural, Information and Mathematical Sciences at Indiana. **Room: Sassafras.**

Dr. Dennis Rodriguez, Indiana University South Bend
Dennis is an associate professor and chair of the Department of Psychology at Indiana University South Bend. **Room: Walnut.**

Dr. Maxine Watson, Indiana University Bloomington
Maxine is a professor of Biology in the program of Evolution, Ecology and Behavior. **Room: Oak.**

EXPO EXHIBITORS

<table>
<thead>
<tr>
<th>Table</th>
<th>Program/Department/School</th>
<th>Contact</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>African American and African</td>
<td>Yunika Jackson</td>
<td>Graduate Admissions</td>
<td><a href="mailto:ytjackso@indiana.edu">ytjackso@indiana.edu</a></td>
</tr>
<tr>
<td>2</td>
<td>Anthropology</td>
<td>Stacie King</td>
<td>Associate Professor/Director of Graduate Studies</td>
<td><a href="mailto:kingsm@indiana.edu">kingsm@indiana.edu</a></td>
</tr>
<tr>
<td>3</td>
<td>Institute for European Studies</td>
<td>Kallan Picha</td>
<td>Assistant Director</td>
<td><a href="mailto:euroinst@indiana.edu">euroinst@indiana.edu</a></td>
</tr>
<tr>
<td>4</td>
<td>Mathematics</td>
<td>Matthias Weber</td>
<td>DGS</td>
<td><a href="mailto:gradmath@indiana.edu">gradmath@indiana.edu</a></td>
</tr>
<tr>
<td>5</td>
<td>Neuroscience</td>
<td>Faye Caylor</td>
<td>Graduate Administrator</td>
<td><a href="mailto:fcaylor@indiana.edu">fcaylor@indiana.edu</a></td>
</tr>
<tr>
<td>6</td>
<td>Physics</td>
<td>Susan Klein</td>
<td>Associate Director</td>
<td><a href="mailto:sbklein@indiana.edu">sbklein@indiana.edu</a></td>
</tr>
<tr>
<td>7</td>
<td>Psychological and Brain</td>
<td>Patricia Crouch</td>
<td>Academic Services</td>
<td><a href="mailto:psychgrd@indiana.edu">psychgrd@indiana.edu</a></td>
</tr>
<tr>
<td>8</td>
<td>School of Education</td>
<td>Barbara Dennis</td>
<td>Associate Professor, Program Coordinator</td>
<td><a href="mailto:bkdennis@indiana.edu">bkdennis@indiana.edu</a></td>
</tr>
<tr>
<td>9</td>
<td>School of Public and Environmental Affairs</td>
<td>Emily Richardson-Rossbach</td>
<td>Asst. Director of Graduate Student Recruitment</td>
<td><a href="mailto:speainfo@indiana.edu">speainfo@indiana.edu</a></td>
</tr>
<tr>
<td>10</td>
<td>School of Public Health</td>
<td>Trent Applegate</td>
<td>Lecturer, Emergency Care Academic Director</td>
<td><a href="mailto:pahardy@indiana.edu">pahardy@indiana.edu</a></td>
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IUURC 2013 Learning through Research
## INDEX OF PRESENTERS

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<tr>
<th>Last Name</th>
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<th>IMU Room Name</th>
<th>Group/Room</th>
<th>Poster or Oral</th>
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<tr>
<td>Albrecht</td>
<td>Renee</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
<td>Group A</td>
<td>Poster 51</td>
</tr>
<tr>
<td>Ba</td>
<td>Fatou</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
<td>Group A</td>
<td>Poster 27</td>
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<td>Baker</td>
<td>Emily</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
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<td>Poster 25</td>
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<td>Ballinger</td>
<td>J. Taylor</td>
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<td>Group A</td>
<td>Poster 41</td>
</tr>
<tr>
<td>Bennett</td>
<td>William</td>
<td>11:15 a.m.</td>
<td>Solarium</td>
<td>Group B</td>
<td>Poster 46</td>
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<tr>
<td>Berhane</td>
<td>Saba-Na’Imah</td>
<td>10:30 a.m.</td>
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<td>Group A</td>
<td>Poster 33</td>
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<tr>
<td>Boettcher</td>
<td>Thomas</td>
<td>2:00 p.m.</td>
<td>Persimmon</td>
<td>4</td>
<td>Oral</td>
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<tr>
<td>Bonilla</td>
<td>Loreliss</td>
<td>2:20 p.m.</td>
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<td>Braun</td>
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<tr>
<td>Buchanan</td>
<td>Ian</td>
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<td>Oral</td>
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<tr>
<td>Burroughs</td>
<td>Courtney</td>
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<td>Group A</td>
<td>Poster 5</td>
</tr>
<tr>
<td>Cavazos</td>
<td>Ana</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
<td>Group A</td>
<td>Poster 57</td>
</tr>
<tr>
<td>Chingombe</td>
<td>Tsungai</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
<td>Group A</td>
<td>Poster 61</td>
</tr>
<tr>
<td>Chung</td>
<td>Michelle</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
<td>Group A</td>
<td>Poster 43</td>
</tr>
<tr>
<td>Colegrove</td>
<td>Rachel</td>
<td>3:15 p.m.</td>
<td>Dogwood</td>
<td>5</td>
<td>Oral</td>
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<tr>
<td>Crager</td>
<td>Kirsten</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
<td>Group A</td>
<td>Poster 45</td>
</tr>
<tr>
<td>Daane</td>
<td>Nicholas</td>
<td>11:15 a.m.</td>
<td>Solarium</td>
<td>Group B</td>
<td>Poster 46</td>
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<tr>
<td>Dalla Pozza</td>
<td>Giada</td>
<td>11:15 a.m.</td>
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<td>Poster 46</td>
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<tr>
<td>Daniels</td>
<td>Chanelle</td>
<td>11:15 a.m.</td>
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<tr>
<td>DeBruce</td>
<td>Alise</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
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<td>Poster 47</td>
</tr>
<tr>
<td>Despard</td>
<td>Jessica</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
<td>Group A</td>
<td>Poster 19</td>
</tr>
<tr>
<td>Dorton</td>
<td>Melissa</td>
<td>11:15 a.m.</td>
<td>Solarium</td>
<td>Group B</td>
<td>Poster 52</td>
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<tr>
<td>Drake</td>
<td>Camille</td>
<td>11:15 a.m.</td>
<td>Solarium</td>
<td>Group B</td>
<td>Poster 54</td>
</tr>
<tr>
<td>Ekissi</td>
<td>Gloria</td>
<td>10:30 a.m.</td>
<td>Solarium</td>
<td>Group A</td>
<td>Poster 35</td>
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<tr>
<td>Fahim</td>
<td>Muska</td>
<td>10:30 a.m.</td>
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<td>Group A</td>
<td>Poster 1</td>
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<td>Last Name</td>
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<td>IMU Room Name</td>
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In urban forest fragments, insects provide a critical food source for many animals, including most songbirds, and are therefore key components of healthy ecosystems. Many insects in turn rely on native plants as food resources. Invasive plants and intense deer grazing are common pressures in urban forest fragments and both are known to reduce the diversity and abundance of native plants. We hypothesized that insect abundance and functional diversity would be low in the presence of invasive plants and deer grazing, and correspondingly higher where restoration efforts have removed invasive plants, planted in natives, and reduced deer pressure. To test this hypothesis, daytime surveys of Lepidoptera (butterflies and moths), nighttime moth trap samples, and general insect censusing were performed in 3 different forest fragments where ongoing experiments are manipulating invasive and native plants and access to deer. Insect censusing and Lepidoptera daytime surveys were completed at the plot level and moth nighttime traps aimed to determine broad site level differences in existing moth populations. Overall, insects were rare at each site and diversity was low, which is likely reflective of the disturbed nature of these urban forest fragments. In contrast with our hypothesis, more insects were found in invaded areas than areas with low levels of invasive vegetation. In support of our hypothesis, native plantings tended to promote the presence of insects, and insects were also more abundant in plots exclosed from deer. Although insects were rare at this time, this data will serve as a baseline as native restoration efforts continue. Ongoing sampling is necessary to determine if native restoration efforts are causing an increase in insect abundance and biodiversity over time.

Mentor: Heather L. Reynolds, Department of Biology, Indiana University Bloomington
TO LITIGATE, MEDIATE, OR ARBITRATE – THAT IS THE QUESTION: THE EFFECT OF COUNSEL AND ALTERNATIVE DISPUTE RESOLUTION SUBSIDIES ON THE LAY PUBLIC’S PROCEDURAL PREFERENCES

J. Taylor Ballinger¹, Victor D. Quintanilla², and Annie Milkey²

¹Department of Psychological and Brain Sciences, Indiana University Bloomington; ²Indiana University Maurer School of Law

Two alarming patterns have emerged in the past 25 years that implicate access to justice. First, parties are increasingly unable to afford counsel in family law cases; second, Indiana courts are channeling more parties out of the formal legal system and into Alternative Dispute Resolution (ADR), where parties must bear the costs to resolve their dispute. Though state legislation has authorized counties to enact ADR funds to offset these costs, many Indiana counties have failed to do so. This research explores the procedural preferences of the lay public, specifically examining how having counsel affects a party’s preferences for ADR procedures and how these preferences might be shaped by an ADR fund. This study draws on a 2x2 factorial design to manipulate (1) the presence or absence of counsel and (2) the presence or absence of an ADR fund that subsidizes costs borne by the parties. The experiment places subjects in a marital dissolution scenario with a child custody dispute to examine procedural preferences for trial, mediation, and binding arbitration. This study further investigates the causal mechanisms behind these procedural preferences by conducting a mediational analysis through perceptions of fairness, familiarity, cost, expediency, and effectiveness. The study was designed on Qualtrics and participants were recruited from an online subject pool. Data was analyzed using a variety of statistical tests, including t-tests, ANOVA, and OLS/logistic regression. Given the growing number of parties choosing to proceed pro se and courts increasingly requiring parties to bear the cost of ADR, it is important to understand not only which procedures are preferred by parties, but to further identify the underlying factors that shape these preferences. The results will likely shed insight on how lay citizens form judgments of procedural preferences and how public policy can be harnessed to increase perceptions of fairness for those involved.

Mentor: Victor D. Quintanilla, Indiana University Maurer School of Law

APPLYING MACHINE LEARNING TO GLUEX DATA ANALYSIS

Thomas J. Boettcher

Department of Physics, Indiana University Bloomington

GlueX is a high-energy physics experiment with the goal of collecting data necessary for understanding confinement in quantum chromodynamics. By its very nature as a large-scale particle physics experiment, GlueX will collect huge amounts of data describing billions of particle collisions. Any reaction of interest, however, will involve only a small portion of these events, requiring the isolation of a proportionally tiny signal from an immense background. This raises a question of fundamental importance to any data analysis: How can we select a signal sample with the size and purity necessary to observe the phenomena of interest using only the imperfect data our detector provides? GlueX has recently begun approaching this selection problem using machine learning algorithms, specifically boosted decision trees. Preliminary studies indicate that these algorithms have the potential to offer vast improvements in both signal selection efficiency and purity over more traditional techniques.

Mentor: Matthew Shepherd, Department of Physics, Indiana University Bloomington
MULTI-WAVELENGTH ANALYSIS TO MEASURE STAR FORMATION RATES AND STELLAR POPULATIONS OF NEARBY GALAXIES

Timothy T. Braun, Liese van Zee, EDGES Team
Department of Astronomy, Indiana University Bloomington

We can study galactic evolution and formation through a galaxy’s current star formation rate (SFR) and stellar populations. These two parameters are related and measurable, but are sometimes ambiguous due to the attenuation and extinction of dust and gas on the starlight. Therefore, it is vital to view the galaxies across a broad range of wavelengths, from ultraviolet to infrared, in order to get a more complete picture of the star formation activity and stellar populations. For this project, we utilized data from public archives (GALEX and Spitzer Space Telescope) and our own optical imaging database to trace star formation and investigate the stellar populations of 24 nearby galaxies. The galaxies selected for this analysis are a subset of the galaxies observed as part of the EDGES Survey, and are representative of normal nearby galaxies. We measured both the global color and the radial change in color, which reveals the relative locations of certain stellar populations since the redder stars are older and the bluer stars are young and short lived. We found that the star formation rate densities are strongly correlated to the radial color measurements since the younger stellar populations had higher star formation rate densities. By looking at the radial star formation rate density plots, I noticed that the shape of radial SFR density curve was the same for each of the SFR tracers, but the ultraviolet, optical, and mid-infrared observations were slightly offset. This offset is mostly likely due to how the dust has absorbed the light differently at each wavelength. Thus, this multi-wavelength analysis of a small sample of nearby galaxies provides insight into the best techniques for measuring star formation activity. We will use the results of this study to understand the connection between current and past star formation activity in nearby galaxies.

Mentor: Liese van Zee, Department of Astronomy, Indiana University Bloomington

ROLE OF CORTICAL MUTANT HUNTINGTIN ON BEHAVIORAL MODULATION OF CORTICOSTRIATAL DYNAMICS IN BAC HUNTINGTON’S DISEASE MICE

Courtney Burroughs, Ana María Estrada-Sánchez, Scott Barton, Shirley Chen, and George Rebec
Department of Psychological and Brain Sciences, Indiana University Bloomington

Huntington’s disease (HD) is a fatal autosomal dominant neurodegenerative disorder caused by the mutation of the huntingtin protein (mhtt). HD phenotype is characterized by a triad of symptoms including the development of involuntary movements as well as emotional and cognitive deficits. HD postmortem brains show a dramatic loss of neurons in both the cortex and striatum, two key structures involved in motor control. Electrophysiological studies in HD transgenic models indicate that long before neuronal death, there is evidence of dysfunctional neuronal processing in cortical pyramidal neurons (CPNs) and striatal medium spiny neurons (MSNs). This suggests that disrupted corticostriatal communication might underlie the HD behavioral phenotype. The aim of this study is to examine the role of mhtt in impaired corticostriatal communication demonstrated in HD. We used a conditional HD model (BACHD/Emx-Cre or BE) that expresses the mhtt gene in all cells of the brain except the CPNs which project to striatal MSNs. Neuronal activity was assessed using local field potentials (LFPs), a measure of the collective activity among large neuronal populations. LFP data reflects phases of information flow and allows us to analyze corticostriatal activity from a network perspective. Cortical and striatal neuronal activity were simultaneously evaluated while mice explored the plus maze, a behavioral test that provides information about arm choice patterns in order to identify motor deficits in HD models, such as behavioral inflexibility. By comparing neuronal activity between BACHD (HD transgenic model expressing mhtt ubiquitously), BE, and WT we can determine the impact of mhtt in the cerebral cortex on corticostriatal processing and on motor behavior in HD.

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IUURC 2013 Learning through Research
NEUROPROTECTIVE EFFECTS OF TESTOSTERONE FOLLOWING PARTIAL MOTONEURON DEPLETION: SITE OF ACTION

Michelle J. Chung, Dale Sengelaub
Department of Psychological and Brain Sciences, Indiana University Bloomington

Amyotrophic lateral sclerosis (ALS) is one of the most common upper and lower motoneuron disorders that affect as many as 30,000 Americans at any given time. In this progressive neurodegenerative disorder, motoneurons are selectively killed off, eventually leading to permanent paralysis and death. Despite recent developmental research, there is still no cure or permanent treatment for ALS. Additionally, the death of selective motoneurons negatively affects neighboring, surviving motoneurons, causing dendritic atrophy, retraction, and degradation in function. Interestingly, certain hormones such as testosterone and were found to have protective effects on damaged motoneurons. In Little’s study, hormones were given systemically. Further, the studies of Rand and Breedlove (1995) and Huguenard et al. (2011) demonstrate that dendritic length of neurons can be regulated by their targets. In particular, dendrites of motoneurons that innervate the target musculature (e.g. the quadriceps) are shown to lengthen in the presence of hormones. Previous studies have suggested that steroid hormones are powerful regulators of dendritic morphology. By combining concepts proposed by Little et al. (2009), Rand and Breedlove (1995), and Huguenard et al. (2011), we hypothesize that hormonal neuroprotective and neurotherapeutic effects can be shown directly at the target musculature of interest. Identifying a specific location of action that exhibits the same success as hormonal treatment systemically could significantly reduce symptoms that may affect other parts of the body.

CLAUDIA LLOSAS MADEINUSA: MAGIC REALISM’S DISTORTED VISION OF ANDEAN INDIGENOUS CULTURE

Rachel Colegrove
Department of Spanish and Portuguese, Indiana University Bloomington

Magic realism as a literary style has been popular for decades, particularly since Gabriel Garcia Márquez’s publication of Cien años de soledad (1967). Llosa uses this style to her advantage in her film, Madeinusa (2006), but to the detriment of Andean indigenous people that she depicts. By fictionalizing their culture and its practices in keeping with the style of magic realism, Llosa has projected an inaccurate depiction of the people living in the Andes, and to an international audience that will accept this depiction as truth. My research of the reception of the film by mass media and academic critics shows that international audiences received the film well in general, yet there was a substantial amount of criticism because of the suspicion that it did improperly depict Andean indigenous culture. The film won, however, many awards at international film festivals; and as a film understood by the audience to be following the style of magic realism and not reality, it was a cinematic success. This film is important to the field of Hispanic cinema because it marks a shift in the consciousness of the international audience, proving that it is no longer content to watch minority groups that are depicted exclusively by outsiders like the Peruvian non-indigenous director Claudia Llosa. There is now a large movement behind indigenous film and media, which the film and its reaction underscore. In this presentation, I propose to analyze instances of magic realism in Madeinusa, demonstrating how they convey an aesthetically convincing yet controversial image of Peruvian indigenous culture to an international audience. In the second part of my talk, I then discuss the reception of the film by individual academic or journalistic critics and point to where, in the opinion of its critics, the film’s magic realism is misleading and why.

Mentors: Anke Birkenmaier, Department of Spanish and Portuguese, Indiana University Bloomington
THE EFFECT OF EPILEPSY ON SLEEP QUALITY

Kirsten Crager

Department of Psychological and Brain Sciences, Indiana University Bloomington

One in 10 adults will experience a seizure sometime in their lifetime. One in 26 will be diagnosed with epilepsy, giving a total of 2.2 million Americans with the condition. Given the large population that epilepsy effects, quality of life is of concern. For adults with epilepsy, one area that may contribute to a downturn in quality of life is that of negative changes in sleep quality. Without proper sleep, individuals experience negative physical consequences. The characteristics of epilepsy—a neurological condition that affects the brain—predispose those who suffer from it to decrements in sleep quality. Disrupted sleep quality can also negatively affect the epilepsy status of adults, as it can be a trigger for seizures. Exploration of the way in which epilepsy affects sleep quality in adults with the condition is needed to improve both knowledge for research and clinical purposes.

Mentor: Wendy Miller, Department of Psychological and Brain Sciences, Indiana University Bloomington

AN INITIAL EXPLORATION OF THE RELATIONSHIP BETWEEN HOME CHAOS AND TODDLER SLEEP DEFICITS

Alise C. DeBruce

Department of Psychological and Brain Sciences, Indiana University Bloomington

Toddlerhood is a time period characterized by immense increases in neuronal connectivity and brain maturation. Sleep plays an important role during this time, and it has been proposed that sleep deficits have proven negative for toddler development. A three-sleep deficit factor model separates sleep deficits into three categories: short amount sleep, night-to-night variability, and nighttime sleep waking. A number of factors influence the quality of sleep, including home environmental factors. This experiment explores the relationship between the level of home disorganization and the quality of sleep experienced by toddlers. Using observer report of home disorganization and actigraphy sleep data, it was hypothesized that greater home chaos would be associated with greater night-to-night variability in toddler sleep duration. The results support the hypothesis, even after controlling for prior levels of sleep deprivation, which suggests that there is a positive relationship between home chaos and toddler sleep deficits. Though the results are preliminary, they provide insight to a relatively understudied relationship and also provide a gateway for future research in this area.

Mentor: John Bates, Department of Psychological and Brain Sciences, Indiana University Bloomington

DO ADVANCED PLACEMENT TESTS HELP AFRICAN AMERICANS IN HIGH SCHOOL COMPLETE COLLEGE?

Camille A. Drake

Department of Sociology, Indiana University, Bloomington

One’s educational attainment often leads to material success. This study asks, “If the offering and taking of Advanced Placement courses in high school, would increase or decrease the chances of blacks’ completion in accredited college and universities.” This study will consist of an analysis of the National Education Longitudinal survey. Studies have been previously tested on whether high school courses are strong indicators of a student’s performance in college and chances of graduation. Do high school courses disproportionally influence success in college?

Mentor: Fabio Rojas, Department of Sociology, Indiana University Bloomington
**SMALL MAMMAL HERBIVORY LIMITS RECRUITMENT IN AN URBAN WOODLAND**

**Chelsea Howard¹, Heather Reynolds¹**

¹Department of Biology, Indiana University, Bloomington

Restoring native grasses and wildflowers to urban woodlands after removal of exotic invasive plants is critical for providing wildlife habitat and many other ecosystem services. Herbivory from white-tailed (Odocoileus virginianus), can decimate forest understory foliage by over browsing, preventing native plants from successfully establishing. Yet white-tailed deer rarely forage in Dunn’s Woods, an urban woodland on Indiana University’s Bloomington campus, and pilot studies suggested that small mammal herbivory might be limiting native plant establishment there. To test this hypothesis, seedlings of three native species, Aster cordifolius (heart-leaved aster), Solidago flexicaulis (zig-zag goldenrod), and Elymus hystrix (bottle-brush grass) were transplanted into caged or uncaged plots in May 2013 at eight randomly selected sights in Dunn’s Woods from which invasive plants had previously been removed. Data on percent survival and shoot damage were gathered May 2013-Aug 2013 and a final shoot biomass of each species was taken in September 2013. Results support the hypothesis that grazing by small mammals is preventing native plants from establishing. The final survival rate for the seventy-two caged plants was 98.6%, compared to a survival rate of only 88.9% and 91.7% in uncaged plants. Final rank shoot damage for caged plants was 3.07, compared to 4.10 and 4.04 for uncaged plants. Final shoot biomass for all caged plants was 11.99 g, compared to 2.71 g and 2.65 g for uncaged plants.

In research to date little focus has been given to the important role small herbivores can play in the success of restoration efforts in urban woodlands. This study helps to show that small herbivores can be a large limiting factor to recruitment, and that more research is needed in order to understand the best methods of preventing herbivores from damaging woodland plantings.

Mentor: Heather Reynolds, Department of Biology, Indiana University Bloomington

**INVolvement of ftsE ATPase and ftsX extracellular Loops 1 and 2 in ftsEX:pcsB complex function in cell division of streptococcus pneumoniae D39**

**Katelyn R. Jensen, Lok-To Sham, Kevin E. Bruce, and Malcolm E. Winkler**

Department of Biology, Indiana University Bloomington

The FtsEX protein complex has recently been proposed to play a major role in coordinating peptidoglycan (PG) remodeling by hydrolases with the division of bacterial cells. According to this model, cytoplasmic FtsE ATPase interacts with the FtsZ-divisome and FtsX integral membrane protein and powers allosteric activation of an extracellular hydrolase interacting with FtsX. In the major human respiratory pathogen, Streptococcus pneumoniae (pneumococcus), a large extracellular-loop domain of FtsX (ECL1FtsX) is thought to interact with the coiled-coil domain of the PcsB protein, which likely functions as a PG amidase or endopeptidase required for normal cell division. This work provides evidence for two key tenets of this model. First, we show that FtsE protein is essential, that depletion of FtsE phenocopies cell defects caused by depletion of FtsX or PcsB, and that changes of conserved amino acids in the FtsE ATPase active site are not tolerated. Second, we show that temperature-sensitive (Ts) pcsB mutations resulting in amino acid changes in the PcsB coiled-coil domain (CCPcsB) are suppressed by ftsX mutations resulting in amino acid changes in the distal part of ECL1FtsX or in a second, small extracellular-loop domain (ECL2FtsX). Some FtsX suppressors are allele specific for changes in CCPcsB, and no FtsX suppressors were found to date for amino acid changes in the catalytic PcsB CHAP domain (CHAPPcsB). Unexpectedly, pcsBCC (Ts) mutants also exhibited delayed stationary-phase autolysis at a permissive growth temperature. These results strongly support roles for both ECL1FtsX and ECL2FtsX in interactions with the coiled-coil domain of PcsB and identify amino acids important for in vivo signal transduction between FtsX and PcsB.
for the first time. This work also supports the central hypothesis that signal transduction between pneumococcal FtsX and PcsB is linked to ATP hydrolysis by essential FtsE, which couples PG hydrolysis to cell division.

Mentor: Malcolm Winkler, Department of Biology, Indiana University Bloomington

**IS THERE SPECIFIC INDUCTION OF GFP-Labeled Antimicrobial Peptides Within Drosophila melanogaster After Infection With Yersinia pestis?**

**Rasheedah Johnson**

Department of Biology, Indiana University Bloomington

Plague, caused by Yersinia pestis, was responsible for millions of deaths during pandemics such as the “Black Death”. The plague’s primary reservoir includes wild rodents and animals and fleas can transfer the disease between mammalian hosts, including humans. Current infection models suggest that blocked fleas are an efficient mode of transmission, but this model cannot account for the rapid spread of infection seen in previous plague pandemics and current epizootics that occur in nature. Mechanisms behind the rapid spread of plague still remain largely unclear, but recent proposals suggest that transmission by unblocked fleas is a viable and, perhaps, more efficient method of transmission. Once transmitted, the bacteria must still properly colonize within the insect vector and evade the host’s defense. Drosophila melanogaster, a prominent contributor to the study of invertebrate host defense, will be used to observe a well-studied component of invertebrate innate immunity, antimicrobial peptides. Each class of peptide is said to be induced specifically according to target and region. Upon infection with Y. pestis, larva with dipterici labeled with GFP showed a strong fluorescent signal, but it is not clear whether other unknown factors are contributing to the strong signal.

Mentor: Melanie Marketon, Department of Biology, Indiana University Bloomington

**HOW STEREOTYPES ABOUT SOCIAL CLASS PSYCHOLOGICALLY AFFECT WHITE STUDENTS’ EXPERIENCES IN COLLEGE**

**Tyler R. Kelley, Mary C. Murphy, Evelyn R. Carter**

Department of Psychological and Brain Sciences, Indiana University Bloomington

In the American society, a social class education gap continues to exist. Lower income people are not going to, and completing college at the same rate as individuals of higher income levels. In this study, we examine how lower socioeconomic status (SES) White students are psychologically affected (e.g., their experiences of stereotype threat, their sense of belonging on campus, and their Social Dominance Orientation) by stereotypes associated with their SES compared to higher SES White students. We hypothesized that lower SES students would score significantly lower on all measures compared to higher SES students, suggesting that lower and higher SES students have different college experiences. We found that lower SES and higher SES White students actually have similar college experiences (e.g., belonging, future aspirations), with the exception of their endorsement of Social Dominance Orientation (SDO). Lower SES students differ from higher SES students in that they are lower in SDO and more likely to endorse a world where all groups have equal opportunity.

Mentors: Mary C. Murphy and Evelyn R. Carter, Department of Psychological and Brain Sciences, Indiana University Bloomington
Synthesis and Electrochemical Study of Polypyridyl Ruthenium(II) and Bimetallic Complexes

William J. Keown\textsuperscript{1}, Meghan McCormick\textsuperscript{1}, and Mu-Hyun Baik\textsuperscript{1, 2}

\textsuperscript{1}Department of Chemistry and \textsuperscript{2}School of Informatics Indiana University Bloomington

Polypyridyl ruthenium(II) complexes are often used in chemical processes ranging from water oxidation to carbon dioxide reduction due to their ability to be reduced efficiently and perform catalysis. While the abilities of these compounds are widely known, the reason behind their efficiency is not well studied. Here a variety of polypyridyl ruthenium(II) systems are studied and synthesis of a new polypyridyl ligand is begun.

Mentor: Mu-Hyun Baik\textsuperscript{1,} \textsuperscript{1}Department of Chemistry and \textsuperscript{2}School of Informatics Indiana University Bloomington

On the Value of Faith-Based Organizations and Childhood Development

Julius Lee, Cecilia S. Obeng

Department of Applied Health Sciences, Indiana University Bloomington

Faith-based organizations (FBO) play an important role in enhancing the quality of life in adults and children. Incidentally, the research available only describes their role beginning at adolescence and not early childhood. These years could be equally important to the psychological and social development of the child by serving as a foundation for their life. Although many articles were found to discuss the benefits of faith-based organizations in an adolescent’s life, there is a deficiency in literature that describes the overall development prior to starting the adolescent years. The convenience sample of thirty-five participants are chosen at three local faith-based organizations and one Bible Study Group at a Midwestern University. These participants were chosen based on the paucity of research from pieties such as Presbyterian, Christian Science, Baptist and African Methodist Episcopal. Phenomenology and focus groups were used to promote recollection of past experiences by each participant. Faith-based organizations are significant in the contexts of morality and social structure. For instance, one participant is a fourth generation Christian Scientist and learned her faith through her grandmother and mother. Another participant learned the value of helping others through volunteering at the nursing home and soup kitchen in her area. Overall, the theme among all four groups is their faith help shaped their development as children and determine their values as adults. For instance, one participant describes how her faith is perpetuated in her children- who are now adults. This research provides insight on how influential faith has been to young and older adults aged eighteen to seventy. Their experiences bring to light the significance it has made in their current perspective, how it challenged their past experiences, and how it’s gave greater value to their understanding in terms of interpersonal/ intrapersonal relationships.

Mentor: Cecilia S. Obeng, Department of Applied Health Sciences, Indiana University Bloomington
INFORMATIVENESS EFFICIENCY AND COHESION IN ADULTS WITH ACQUIRED BRAIN INJURY

Sarah McNeil and Olivia O’Dell

Department of Speech & Hearing Sciences, College of Arts and Sciences, Indiana University Bloomington

Following acquired brain injury (ABI), it is common for individuals to have issues in social, language, and cognitive processing. Language research has indicated that adults with ABI have decreased discourse informativeness efficiency (measured via correct information units per minute) compared to their non-brain-injured (NBI) peers. Inadequate use of both local and global coherence (i.e., interrelatedness between adjacent utterances and larger spans of discourse, respectively) contributes to low informativeness efficiency in individuals with ABI. Cohesional analyses using T-units and cohesive markers (e.g., conjunctions) have also been useful in characterizing the ability of ABI adults to organize content in their spoken narratives. Generally, adults with ABI perform more poorly than their NBI counterparts when organizing narrative content. Importantly, decreased discourse informativeness is correlated with a lower quality of life among individuals with ABI. Additional negative impacts of compromised language include greater levels of depression and lower indices of overall community integration. Given these discourse problems and their effects on the well being of individuals with ABI, this study examines whether a Brain Injury Social Skills Group (BISSG) will improve discourse informativeness efficiency and cohesion in adults with ABI. Using Computer Language ANalysis (CLAN), the researchers are transcribing and analyzing interviews with 8 adults with ABI. Each participant was recorded in a pre- and post-BISSG interview, in which he or she was asked to talk about his or her brain injury and about an event important in his or her life. The researchers hypothesize that directly teaching social skills to adults with ABI generalizes to their discourse skills of informativeness efficiency and cohesion. The implication is that a setting such as a BISSG could be one facet in an effective, evidence-based treatment plan for individuals with ABI.

Mentor: Laura Murray, Department of Speech & Hearing Sciences, Indiana University Bloomington

COMPARING MARKERS SPECIFIC TO NIPPLE FIBROBLASTIC STROMAL CELLS, FIBROBLAST CELL LINE 3T3 AND PRIMARY DERMAL FIBROBLASTS

Kendra Morris, and John Foley

Medical Sciences Program, Indiana University Bloomington

According to the American Cancer Society more than 230,000 American Women are diagnosed with Breast Cancer and will undergo cancer removal surgeries and reconstruction after mastectomy. Even with breast reconstruction surgery, however, the breast still has no nipple. This study will look at the growth characteristics of the fibroblasts from the nipple. We hypothesize that fibroblast-derived growth factors direct the correct differentiation of nipple epidermis. The results can apply to reconstruction of the nipple for breast cancer patients who had a mastectomy. But to use nipple fibroblasts or mesenchymal stem cells harvested pre surgically, we need to determine if they can proliferate in culture and maintain their unique cellular identity.

Mentor: John Foley, Medical Sciences Program, School of Medicine, Indiana University Bloomington
**SLEEP DEPRIVATION AND ITS POTENTIAL EFFECTS ON TODDLERS’ SELF-REGULATION: ASSESSING THE LIKELIHOOD FOR DEVIANT BEHAVIOR**

**Austin Nicoson, John E. Bates**

Department of Psychological and Brain Sciences, Indiana University Bloomington

Young children vary in their ability to self-regulate behavior. Some excel while others lack obedience and impulsivity control which are commonly associated with deviant behavior. Sleep has been hypothesized to significantly influence children’s regulatory behaviors. This study considered how sleep deficits affect self-regulation and behavioral adjustment. Sleep deficits were measured by short sleep duration, sleep variability and sleep activity. This investigation analyzed data derived from psychometric lab tests, parent observation questionnaires and in-home observations of toddlers from ages two-and-a-half to three-and-a-half years old to determine if an association exists between sleep deficits and toddlers’ self-regulation. This study will utilize a cross-lagged model correlation, controlling for past self-regulation and sleep variables in predicting future self-regulatory behavior.

Mentor: John E. Bates; Department of Psychological and Brain Sciences, Indiana University Bloomington

This study was funded by the Ronald E. McNair Scholars Program, Indiana University-Bloomington

**WHAT’S GOING ON IN THERE: A STUDY ON BROME MOSAIC VIRUS**

**AdePeju F. Oshodi**

Chemistry Department, Indiana University Bloomington

The virus is a simple infectious agent. Overall, it can be thought of as a container in that it is comprised of genetic material or nucleic acids in the forms of DNA or RNA and this genetic information is enclosed by a protein capsid or cage. The virus I will examine is Brome Mosaic Virus (BMV). BMV is an ideal specimen because of its structure an innocuous nature. Structurally, BMV is apart of the icosahedral viruses, which are the most ideal structure for a virus because they use the smallest subunits to a build a symmetrical protein cage. This is to say that the icosahedral structure is favorable for symmetrical packaging. Another reason why BMV is an ideal specimen is because it is harmless to human beings, but helpful in that its components are similar to other viruses that affect human beings since it is apart of the Alpha virus family. BMV is made of a protein coat and RNA. My interest is on the RNA and its behavior within the protein coat. With the advanced microscope techniques the RNA’s condensed or uncondensed nature within the capsid protein shell can be studied.

Mentors: Bogdan Dragnea Chemistry Department, Indiana University Bloomington; Virginia M. Smith Biochemistry Graduate Program, Indiana University Bloomington
SPEECH PERCEPTION IN EARLY BILINGUAL ADULTS

Rachel Shepherd, Tessa Bent
Department of Speech and Hearing Sciences, Indiana University Bloomington

People who grow up learning two languages have many advantages – linguistically, culturally, and cognitively – but early bilingualism can also result in cognitive-linguistic deficits relative to monolinguals. For example, early bilinguals tend to be at a disadvantage when perceiving speech in noise; however, the cause of the deficit is unknown. Further, adverse listening conditions result from the environment (e.g., background noise) and the source (e.g., a nonnative accent). The cognitive processes used to overcome different sources of degradation are likely to vary. The current study investigated speech perception under environmental and source degradation by 24 monolingual and 24 bilingual listeners. The bilingual adults began learning English and at least one other language before age 6. The bilingual participants’ additional language included Bulgarian, Cantonese, French, Hindi, Italian, Korean, Malay, Mandarin, Portuguese, Punjabi, Russian, Spanish, and Vietnamese. Speech perception was assessed with sentences produced by one native- and one Japanese-accented talker in quiet and in noise. To identify skills that promote accurate speech perception, participants’ vocabulary, reading, cognition, memory, and phonological processing skills were assessed with standardized measures. Results demonstrated that the presence of noise was more detrimental to bilinguals than monolinguals, as shown in previous studies. In contrast, the adverse listening condition stemming from the source – the presence of a nonnative accent – had a similar detrimental effect on monolingual and bilingual listeners.

Mentor: Tessa Bent, Department of Speech and Hearing Sciences, Indiana University Bloomington

TEACHERS’ DESCRIPTIONS OF LUMBEEL PRESCHOOL CHILDREN’S COMMUNICATION ABILITIES

Jesse Smith, Erna Alant
Department of Curriculum and Instruction, Indiana University Bloomington

This research is intended to describe the way teachers perceive and classify the communication abilities of Lumbee preschool children (ages 3 to 5) to enhance our understanding of how teachers view the abilities of these children. Lumbee Indians are a distinct tribe and have their own dialect and embedded culture. Even though research has been conducted in the past on the prevalence and awareness of communication disorders in Native Americans, it is unlikely that the Lumbee population has been included due to not being a federally recognized tribe. In an attempt to broaden our understanding of the communication abilities of Lumbee preschool children, this research will compare how teachers describe the communication disorders of the Lumbee children to teachers’ perceptions of communication disorders in other Native American communities off reservations. Structured interviews were conducted with four teachers employed by a preschool in Lumberton and Pembroke, North Carolina to obtain information on their perceptions of the Lumbee dialect and to ask them to describe the individual children in their class. They were asked to complete a separate form for each child in their class to rate their abilities as perceived within the classroom context. Thirty-seven children’s information was obtained and analyzed. Results showed that teachers recognize the Lumbee children and described them within the normal range of functioning within the classroom context.

Mentor: Erna Alant, Department of Curriculum and Instruction, Indiana University Bloomington
FROM FRAZZLED MOTHERS TO FANTASTIC DAUGHTERS: ADULTIFICATION THROUGH MAKEOVER TELEVISION

Sarah Thomas, Maresa Murray

Department of Applied Health Science, Indiana University Bloomington

Makeover television is a unique genre of programming that goes beyond physical transformation of the individual. This paper explores the ways in which family relations and family roles within these programs are transformed within the narrative process by analyzing a specific episode of MTV’s Made. This content analysis uses qualitative methods to unite content and literature to create a basic conceptual framework for family roles and neoliberalism in makeover television.

Mentor: Maresa Murray Department of Applied Health Science, Indiana University Bloomington

WHAT TO EAT: HEALTHY RESOURCES FOR SNAP ELIGIBLE WOMEN LIVING IN BLOOMINGTON, INDIANA

Bethany Thurman1, 2

1General Studies, Indiana University Bloomington , 2Department of Applied Health Science, Indiana University Bloomington

Research indicates individuals at or below the poverty level may be limited in obtaining expensive nutritious foods, leading to the purchase of refined, prepackaged foods instead. Studies show refined food products contain higher amounts of fat, sodium and sugar which contribute to chronic health issues such as metabolic syndrome, obesity, and hypertension. This pilot study examined the availability of nutrient dense foods (NDFs) for individuals at or below the U.S. poverty guidelines for a household of one residing in Bloomington, Indiana. The Supplemental Nutrition Assistance Program maximum monthly benefit was used to examine if these residents could purchase NDFs sufficient to meet USDA nutritional requirements. Data from the USDA Thrifty Food Plan (TFP) that includes current USDA dietary guidelines were also used in determining the amount of food from each food group necessary for a one-month period. USDA TFP data are delineated in groupings by specific gender and age. Since it was beyond the scope of this paper to include all TFP groupings, data for females between the ages of 19 and 50 were chosen as the priority individuals in this research.

Mentor: Virginia Githiri, Department of Applied Health Science, Indiana University Bloomington
SOME FINDINGS USING PRESTO—A NOVEL PERCEPTUALLY-ROBUST SENTENCE RECOGNITION TEST FOR HEARING-IMPAIRED ADULTS WITH COCHLEAR IMPLANTS

Taylor Twiggs1,2, Kathleen F. Faulkner1,3, David B. Pisoni1,3

1Indiana University, Speech Research Laboratory, Department of Psychological and Brain Sciences, Indiana University Bloomington; 2Department of Biology, Indiana University Bloomington; 3Indiana University School of Medicine, DeVault Otologic Research Laboratory, Indianapolis, IN

Understanding speech in background noise is a common problem for patients with cochlear implants. To perform well in everyday noisy environments, listeners must quickly adapt, switch their attention, and adjust to multiple sources of variability in speech and the listening environment. Sentence recognition tests in noise are useful for assessing speech recognition abilities and are the “gold standard” for evaluating performance of cochlear implant users. When tested in quiet, cochlear implant users often perform well, but speech recognition tests in quiet do not represent every day listening conditions. PRESTO was developed at Indiana University as a new sentence level test of speech perception that more closely approximates real-world speech communication with multiple talkers, engages more cognitive processing resources, and does not reach ceiling levels of performance in quiet, allowing for analysis of individual differences. PRESTO differs from other sentence recognition tests because every test sentence differs in talker, gender, and regional dialect. In this study, PRESTO was compared to two conventional clinical sentence recognition tests. The participants in this study included 20 postlingually-deaf cochlear implant users and 35 normal-hearing young adults. Both groups were presented with three sentence recognition tests in quiet and in background noise. To reduce ceiling effects, the normal hearing participants listened to the sentences under cochlear implant acoustic simulation. Because of the high variability properties of PRESTO, poorer scores were obtained for both groups in quiet and noise. However, while both groups did not differ on the two conventional sentence tests in noise, they consistently did more poorly on PRESTO suggesting that this test is a more sensitive assessment. These findings provide evidence that PRESTO is a feasible addition to the clinical toolbox for tracking the progress of patients with cochlear implants and may provide additional clinical information for determining cochlear implant candidacy for borderline candidates.

Mentors: Kathleen F. Faulkner, Department of Psychological and Brain Sciences and Indiana University School of Medicine, DeVault Otologic Research Laboratory; David B. Pisoni, Department of Psychological and Brain Sciences, Indiana University

DARK MATTER IN NINE LOW MASS GASS-RICH GALAXIES

Daniel C. Wavle, Liese van Zee, EDGES Team

Department of Astronomy, Indiana University Bloomington

We present results from an optical, near-infrared, and neutral gas study of a sample of 9 nearby gas-rich low mass galaxies. Half of the galaxies in this sample were previously known to host unusually extended gaseous disks. Low mass galaxies are typically dominated by dark matter, and understanding how this affects the structure and dynamics of these systems is crucial in understanding galaxy formation and evolution. We trace the stellar distribution using new deep, wide field-of-view 3.6 micron images from the Spitzer Space Telescope and use archival data from the Very Large Array to trace the gas distribution and kinematics. Rotation curves were derived by interactively fitting tilted-ring models to observed velocity fields from the neutral hydrogen synthesis observations. We derive a dark matter halo profile by fitting the observed rotation curve to the sum in quadrature of the baryonic components (stars and gas) and an isothermal dark matter halo, solving for stellar mass-to-light ratios in both the optical and near-infrared. We confirmed our sample to be dominated by dark matter, and found baryon fractions to be roughly constant throughout galaxy disks. Interestingly, total baryon fractions did not appear to depend on the extent of the gaseous disks.

Mentor: Liese van Zee, Department of Astronomy, Indiana University Bloomington
LOCALIZATION OF THE MEIOTIC REGULATORS REC8 AND ZIP1 IN THE ABSENCE OF THE SPINDLE CHECKPOINT PROTEIN BUB3

Nichelle S. Whitney, Yang Yang

Department of Biology, Indiana University Bloomington

Saccharomyces cerevisiae (SC), commonly known as baker’s yeast, is a eukaryotic organism that has the ability to produce haploid germ cells through the process of meiosis. SC is beneficial as a biological model because of its short generation time, and its ability to be easily transformed. Previous studies have shown that bub3 strains do not make it through meiosis in its entirety; bub3 is one of 4 main spindle assembly checkpoints (SAC) proteins. However, exact location of meiotic arrest has yet to be determined, and it is hypothesized that bub3 plays additional roles in the cause of this. The role of bub3 in SAC is assumed to be different that it’s signaling role. Arrest point will be pinpointed by looking specifically at Zip1 and Rec8 which localize in prophase and S phase respectively. A series of transformation and PCR reactions were paired to knockout the BUB3 open reading frame (ORF) and replace them with Hygromycin B ORF. After transformation was successful, haploid cells were mated to form a bub3 homozygote in strains with Zip1-GFP or Rec8-GFP. The knockouts were verified by PCR. Fluorescence expression was measured to check percentage of cells expressing Zip1. The purpose of this experiment was to determine at which phase in the cell cycle meiosis is blocked in bub3 cells. Our lab team has already shown that the cells enter into meiosis based on the presence of the Ime1 marker, a transcription factor that is turned on as cells enter meiosis. In the event that cells express Zip1 synaptonemal complex component, we can conclude that the cells have entered meiotic prophase. In the event that cells express Rec8-a meiotic cohesion- we can conclude that the cells have entered S phase. The absence of either marker will narrow down the possible location of meiotic arrest.

Mentor: Soni Lacefield, Department of Biology, Indiana University Bloomington

HAVERSACK RUSES: CREATIVITY IN INTELLIGENCE OPERATIONS FROM WWI TO THE DIGITAL AGE

Alexander J. Wilson

Department of History, Indiana University Bloomington

Creativity is not necessarily a quality often associated with government activities, yet creative thinking has played a key role in many of the most successful espionage and intelligence operations in history. One such type of operation is the “haversack ruse,” which involves the deliberate planting of misleading or harmful information, with the intent to deceive the enemy and thus preempt his decision-making. This type of operation was made famous during the First World War, but is no less relevant today than it was a century ago. A careful study of selected haversack ruses and similar operations, using an array of primary and secondary sources, reveals key aspects of the dynamics of creativity on both a personal and organizational scale. An examination of four specific historical operations – two British and two American – seems to demonstrate a strong correlation between the success of an operation and the relative creative capacity of the individuals involved. The continued study of these and similarly inventive intelligence operations not only demonstrates that human creativity is far from irrelevant in the digital age, but also begs larger questions: Is creativity a matter of nature, or nurture? Can government organizations – so often the victims of bureaucratic inefficiency and myopia – teach individuals to be creative and foster an environment conducive to imaginative ideas? Or is creative thinking an inborn trait? It is an important concept to consider not merely from a psychological or neurological perspective, but from a historical point of view as well.

Mentor: Gene Coyle (CIA, ret.), School of Global and International Studies & School of Public and Environmental Affairs, Indiana University Bloomington
THE EPIDEMIOLOGICAL EVOLUTION OF PROTEIN INTERACTIONS BETWEEN THE MAJOR CAPSID PROTEIN, MINOR CAPSID PROTEIN, AND RNA POLYMERASE IN HUMAN NOROVIRUS

Emma S. Winkler

Department of Cellular and Molecular Biochemistry, Indiana University Bloomington

Noroviruses are the most common cause of acute gastroenteritis worldwide. Within the past ten years, three major pandemic outbreak strains in Farmington Hills (2004), New Orleans (2008), and Australia (2012) have emerged. The human norovirus genome encodes for nine proteins, including a RNA-dependent RNA polymerase (RdRp), major capsid protein (VP1), and minor capsid protein (VP2). Although the functions of RdRp and VP1 in viral replication and encapsidation have been understood to some extent, the specific role of VP2 in viral infection is still relatively unknown. Through observation of the protein interactions between VP2, VP1 and RdRp, the epidemiological evolution of VP2 was examined over the course of the three outbreak strains mentioned above. Using a cell-based luciferase reporter assay detecting RNA synthesis, RdRp activity in the presence of VP2 was measured. Species-specific VP2 suppression of RdRp activity was observed. Species specific inhibition by VP2 was still observed when the RdRp of the 2004 outbreak strain was transfected with the VP2 proteins of the New Orleans and Australia strains. Western blots were used to measure the expression level of VP2 when VP1 was coexpressed and vice versa. Increased VP2 protein expression was observed when VP1 was coexpressed compared to VP2 expressed alone, indicating greater VP2 stability in the presence of VP1. The reverse was also true. Increased VP2 expression when VP1 was coexpressed was not observed when the VP1 of the 2004 strain was coexpressed with the VP2 protein of the Australian strain. From the characterization of VP2-VP1 and VP2-RdRp interactions in different pandemic norovirus strains, it can be suggested that VP2-RdRp interaction has been relatively conserved in the epidemiological evolution of norovirus, while VP2-VP1 interaction has been modified, perhaps contributing to the virulence and infectivity of new emerging norovirus strains.

Mentor: Cheng C. Kao, Department of Cellular and Molecular Biochemistry, Indiana University Bloomington

MOTOR RESPONSE AND GAIT EVALUATIONS OF A STROKE PATIENT

Kristopher Wolford

Department of Kinesiology, Indiana University Bloomington

This study looks at the motor response time and gait of a female woman as evaluated approximately one year after suffering from a stroke. Studying reaction times and gait is critical component to understanding both cognitive and motor consequences experienced by a stroke patient. Analyzing this information can offer a better understanding about how the body compensates for physical disabilities and can help construct a more effective plan for physical rehabilitation. Differences in cognitive reaction time, motor reaction time, response selection and foot placement were evaluated in a laboratory setting using EMG, foot pressure mapping and motion capturing technology. This is a single subject evaluation of a stroke victim comparing her paretic vs non paretic sides. We broke our research up into two components, one to evaluate when our subject was to look directly ahead of her during her gait inanition vs looking at her legs and another where she was to step with her right foot first vs her stepping with her left foot first. We further divided the gait inanition of her first step into four phases, the onset, the release phase, the unloading phase and the stepping phase. Using ANOVA and SPSS data analysis systems we found that in the up and down category there were significant findings in the stepping phase, and in the left vs right there were significant findings in the onset. This can be utilized by the patient to construct a plan of action when doing her rehabilitation with her physical therapist and the research itself will add to the collective wealth of stroke rehabilitation information.

Mentor: John B. Shea, Department of Kinesiology, Indiana University Bloomington
DISCREPANCIES BETWEEN IMPLICIT AND EXPLICIT SELF-ESTEEM AND WELL-BEING: THE ROLE OF NEGATIVITY BIASES

Nelson O. Zounlome, Robert J. Rydell

Department of Psychological and Brain Science, Indiana University Bloomington

In past research, experimenters have found that implicit self-esteem and explicit self-esteem predict different types of responses. It has been found that people with certain self-esteem discrepancies (i.e., low implicit self-esteem and high explicit self-esteem or “defensive self-esteem”) report lower levels of mental health. However, little research has looked at why having defensive self-esteem can lead people to have lower levels of mental health and overall well-being. In the current work we examined if people who have defensive self-esteem have lower levels of well-being because of the differences in how they perceive negative vs. positive situations. We used an explicit self-esteem measure to assess participant’s explicit self-esteem, an Implicit Attitude Test to assess their implicit self-esteem, the BeanFest game to assess whether they attended more to negative or positive novel information, and a well-being measure to assess their level of overall well-being. Although we didn’t find the predicted three-way interaction between explicit self-esteem, implicit self-esteem, and well-being, we did find that people with low explicit self-esteem and high negativity asymmetry counter intuitively categorized novel objects as being more positive; going against what they learned. We believe this to be a result of an effort by these people to regain control over their performance in BeanFest that is threatened by the negative environment caused by the game. It may be that these people feel a loss of control because of the amount of negativity present in BeanFest and therefore try to reclaim their feeling of control by going against what they learned and categorizing novel beans as being positive. Further research is needed to understand this occurrence. By understanding how the interaction between explicit self-esteem and people’s learning styles in the BeanFest game work, we can potentially help to better treat those who have certain mental disorders such as social anxiety.

Mentor: Robert J. Rydell, Department of Psychological and Brain Science, Indiana University Bloomington
Photoelectrochemical Studies at TiO2/Poly 2-Anilino 1,4 Naphthoquenone Interfaces

William Bennett, Nick Daanen, Giada Dalla Pozza and Kasem K. Kasem

Department of Chemistry, Indiana University Kokomo

Photo-activities at Inorganic/Organic/Interfaces (IOI) consisting of TiO2/ Poly 2-Anilino 1,4 naphthoquenone (PANQ) assemblies were investigated in nanoparticle suspension and in thin solid film forms. The effects PANQ modifier cause on the photoelectrochemical behavior of the IOI were investigated using [Fe(CN)6]4- as photoactive hydrated electron donor agent. Results show that the adsorption process of [Fe(CN)6]3- (photolysis product) control the photoactivity outcome of IOI assemblies. PANQ shows lower heterogeneous photochemical response than native TiO2. Studies shows that TiO2 layer over Ti substrate give the greatest photo-responses among all studies assemblies. The lower electron affinity of PANQ (1.8 -2.0 eV) than that of TiO2 (3.9 eV) indicates great difference in electron affinity of the IOI assembly. The band alignment between TiO2 and PANQ is of n-p junction straddling gap. The interface activities were explained by analyzing the IOI junction’s characteristics, such as electron affinity, work function and hole/electrons barrier heights. The aqueous nano-systems retained moderate stability as indicated by the reproducibility of their photocatalytic activities. Both [Fe(CN)6]4- and PANQ contributed to the stability of native TiO2 surfaces.

Towards a System for Code Understanding, Reuse, and Recommendation Utilizing Semantic Web Technologies

Ian Buchanan¹, Andrew Boehner²

¹New Media Communication, School of Humanities and Social Sciences, ²Informatics, School of Sciences, Indiana University Kokomo

There exist a myriad of object-oriented reuse libraries that are not extensively and accurately documented. This complicates the process of understanding and eliminates any potential reuse benefit the library might provide. To this end, we propose a three-part system that enhances software understanding and reuse. The system can detect software patterns in library’s source-code, allow the user to search for specific components by method signatures or design pattern role, and dynamically generate code snippets that transform a given source object into a target object. Detecting patterns in a given library gives the user a better understanding of how the components of the library work together. With this new information, the user will be able to search for different classes or methods that the user might need for her project. Furthermore, when a given object must be transformed into another object, the system analyzes the library at hand, determines the path for object creation, and then generates the code snippet that completes the programming task. The system utilizes Semantic Web technologies such as the Web Ontology Language (OWL), the Resource Description Framework (RDF), and the Semantic Web Rule Language (SWRL). We have created various OWL ontologies including a source-code representation ontology named SCRO that captures the semantic representation of the structure and relationships of library components. We have also developed a Java-based parser that parses the byte-code of a given library and automatically construct an RDF ontology that conforms to the semantics defined in SCRO. A query can then be created to retrieve information that the user requires or generates the desired code snippet. This system is currently being developed as a plugin for the Eclipse Java platform. Preliminary evaluation of the proposed technique shows that Semantic Web techniques can provide effective means for enhancing software understanding and reuse.

Mentor: Dr. Awny Alnusair, Informatics and New Media Communication, Indiana University Kokomo
INTIMIDATING BEHAVIORS WITHIN SCHOOLS

Snezana Garic
Department of Psychology, Indiana University Kokomo

The purpose of the study is to examine how students have experienced intimidating behaviors within schools, such as physical and verbal bullying. Although these behaviors have been previously studied, few studies have looked at whether intimidating behaviors continue in college. Students’ experiences and opinions about bullying within elementary, middle, and high schools as well as in college settings were measured. Students were asked not only about their experiences of being intimidated, but also their witnessing and engaging in intimidating behaviors. An online survey, containing 35 questions, was completed by 175 college students. Four hypotheses investigated gender differences, differences in verbal and physical intimidation, where they turn for help from being bullied, and their likelihood of dropping out based on their being intimidated. The results of this study suggest that students can have concrete issues regarding intimidating behaviors within schools, even in college. Future research should investigate students’ understanding of bullying and intimidation in schools.

Mentor: Kathryn Holcomb, Department of Psychology, Indiana University Kokomo

INDIANA UNIVERSITY NORTHWEST

TEXTURAL AND LITHOLOGICAL ANALYSIS OF BERM SEDIMENT ALONG THE SOUTHERN SHORES OF LAKE MICHIGAN

Melissa Dorton
Department of Geosciences, Indiana University Northwest

This study presents textural and lithological analysis of seventeen samples of berm sediment collected from the beaches of Lake Michigan in Indiana. Granule size (2-4mm) sediment fraction was examined with optical microscope and compared with lithology of modern beach gravel (>8mm). Subangular to subrounded particles predominate in all samples and suggest relatively immature sediment. Most of the berm sediment, from Gary to Michigan border (Northeastern, Eastern, and Central sectors of Indiana’s shoreline), is similar in composition, with most abundant clastic (~40-50%) and crystalline particles (~25-30%). Even though clastic granules are most abundant grain lithology, their relative abundance never reaches as high content (>90%) as in gravel size (>8 mm) fraction. Carbonate granules relative abundance diminishes westward (from Michigan border to Gary), from ~20% to ~7%, while chert granules relative abundance increases westward from ~6% to ~17%. Carbonate granules never reach as high content (> 70%) as they do in gravel size fraction. Relative abundance of anthropogenic particles (7-12%) is larger than in gravel size fraction (0.5-3%). From Gary to Illinois border (Western sector of Indiana’s shoreline), chert (26%) and clastic (26%) are slightly more abundant than crystalline (19%) granules, while anthropogenic and carbonate granules comprise the rest and are more abundant than in other sectors of the coast. This study indicates that there is a less impact of beach nourishment, lake fill, and release of industrial waste in changing lithology of granule size beach sediment than in changing lithology of gravel size sediment along southern beaches of Lake Michigan. Most of carbonate particles introduced through beach nourishment, and most of chert grains brought in as a lake fill, were of gravel size or larger diameter and likely did not yet break down into smaller particles. More constant presence and relatively larger amount of anthropogenic particles in granule than in gravel size fractions likely reflect relatively more rapid weathering of glass, brick, concrete, and slag, released by industrial and urban areas along the shoreline.

Advisor, Zoran Kilibarda, Department of Geosciences, Indiana University Northwest
THE REASONING ABILITIES OF PROCRASTINATORS USING PROBABILITY

Rachel Peyton

Department of Psychology, Indiana University Northwest

Procrastination tends to affect academics. For example, those characterized as procrastinators have poor time management skills, perform worse in school, and have more test anxiety than those characterized as non-procrastinators. It is possible that the negative effects of procrastination extend to more cognitive behaviors such as thinking and reasoning. The current research investigated how procrastination influenced a probability reasoning task. To test reasoning skills, participants will complete a task that requires them to choose one of three doors. After which, one of the unchosen doors will disappear. Then, participants will either chose to stay with their originally chosen door or move to the other available door. Participants will also complete two procrastination measures. This study will compute a 2 (procrastination: high, low) X 2 (Response: stay, switch) chi square test of independence. I predict an interaction such that those characterized as high procrastinators will stay with their door more than those who are characterized as low procrastinators. Because it is statistically a better strategy to switch doors, switching doors indicates better reasoning skills. If high procrastinators stayed with their door more, this suggests that they have worse reasoning skills. Having deficits in reasoning could explain why procrastinators delay important tasks.

Mentor: Frances Daniel, Department of Psychology, Indiana University Northwest

SECONDARY PSYCHOPATHIC TRAITS INFLUENCE THE PROCESSING OF CONTEXTUAL INFORMATION

Jessica Tylicki, Jillian Joyce, Frances Daniel

Department of Psychology, Indiana University Northwest

Individuals characterized with high levels of secondary psychopathic traits tend to have abnormal selective attention than those with low levels of secondary psychopathic traits. As such, it is possible that those characterized with high levels of secondary psychopathic traits may be less susceptible to contextual information that guides decisions. For example, heuristics are quick decisions that rely on contextual information, but they can lead to biased decision-making. One such bias is the conjunction fallacy, which occurs when people judge that an instance is more likely to be a member of a conjunctive category (includes additional information) than of a constituent category (includes one piece of information). However, it is less probable for two events to occur than either event occurring exclusively. Furthermore, individuals judge a conjunctive category as more likely when the scenario described seems more typical. The current research explored how self-reported secondary psychopathic traits influence susceptibility to the conjunction fallacy. We hypothesized that individuals characterized with high levels of secondary psychopathic traits will be less susceptible to the conjunction fallacy. Participants read short descriptions of a person that were either typical or atypical. Then, they rated the likelihood the person had a hobby or profession. Scenarios were single events, in which only one profession or hobby was presented, or conjunction events, in which two descriptions were presented. We found the conjunction fallacy for those with low levels of secondary psychopathic traits, such that they rated typical situations more likely regardless of single or conjunctive events. However, for atypical situations, single events were rated as less likely than conjunctive events. For those characterized with high levels of secondary psychopathic traits, there was no evidence of rating differences. One reason for this null finding is that those characterized with high levels of secondary psychopathic traits are less influenced by context.

Advisor: Frances Daniel, Department of Psychology, Indiana University Northwest
DIFFEREN CE IN LEARNING APPROACH BETWEEN THOSE WITH AND WITHOUT ADHD

Geoff D. Marcum

Department of Psychology, Indiana University South Bend

The Study Process Questionnaire (SPQ) was originally used to identify the process that students utilize to learn material in class. After some refinement, the SPQ has been narrowed down to a concise 20 questions that effectively measure two approaches to learning; a surface approach and a deep approach have been identified, and each of these consists of concurrent motives and strategies. The purpose of the current study was to use the SPQ to search for potential differences in learning approaches between individuals with and without ADHD. Participants (n = 362) between the ages of 19 and 38 completed an online questionnaire that included the SPQ, the ADHD symptoms checklist, and miscellaneous information about their college experience. The results of the study showed that there was a difference between the control group and the ADHD group on learning approaches. The controls possessed a deep motive to learning whereas the ADHD group revealed a strong inclination to use both a surface strategy and a surface motive when approaching their schoolwork. No difference was shown between the groups on deep strategy.

Mentor: Dennis Rodriguez, Department of Psychology, Indiana University South Bend

TESTING HOST SPECIFICITY AND GROWTH RATES OF FUSARIUM ISOLATED FROM AN INVASIVE PLANT (ALLIARIA PETIOLATA) AND NATIVE PLANT (HYDROPHYLLUM APPENDICULATUM)

Louay Masri, Gregory Powell, Deborah Marr

Department of Biological Sciences, Indiana University South Bend

Garlic mustard (Alliaria petiolata) is an invasive plant that is decreasing populations of native woodland plants such as Hydrophyllum appendiculatum. Fusarium is a diverse genus of soil fungi that can cause wilt in plants and is present in both garlic mustard and H. appendiculatum. Previous studies have shown that garlic mustard suppresses mycorrhizal fungal growth. The objectives of this investigation were (1) to determine whether three species of Hydrophyllum are mycorrhizal or nonmycorrhizal, (2) to determine whether the presence of garlic mustard root affected growth of Fusarium isolated from either H. appendiculatum or garlic mustard, and (3) to determine if Fusarium isolated from garlic mustard and H. appendiculatum could colonize roots from either host species. Root samples of Hydrophyllum appendiculatum, H. canadense, and H. virginianum were stained using an ink/vinegar stain to observe mycorrhizal hyphae. We found that H. appendiculatum and H. canadense had mycorrhizae, but mycorrhizal hyphae were not observed in the roots of H. virginianum. The growth of Fusarium cultures exposed to roots of either garlic mustard or H. appendiculatum was recorded. Fusarium had more extensive growth in 6-day old cultures with garlic mustard roots than in 6-day old cultures with H. appendiculatum roots. We inoculated potted plants of garlic mustard and H. appendiculatum using Fusarium strains that had been isolated from either host. Roots were harvested after 72 hours and stained for presence of Fusarium hyphae. Fusarium hyphae were present on H. appendiculatum roots in pots inoculated with Fusarium strains from either host. Hyphae were not observed on garlic mustard roots, but a longer time frame may be necessary to determine host specificity of Fusarium-garlic mustard. This suggests that strains of Fusarium from H. appendiculatum or garlic mustard can both infect H. appendiculatum.

Mentor: Deborah Marr, Department of Biological Sciences, Indiana University South Bend
ROBUST ACOUSTIC TRANSDUCERS FOR BUBBLE CHAMBERS

Jonathan D. Wells

Department of Physics and Astronomy, Indiana University South Bend

The PICO collaboration utilizes bubble chambers filled with various superheated liquids as targets for dark matter. Acoustic sensors have proved able to distinguish nuclear recoils from radioactive background on an event-by-event basis. We have recently produced a more robust transducer which should be able to operate for years, rather than months, in the challenging environment of a heated high pressure hydraulic fluid outside these chambers.

Advisor: Ilan Levine, Department of Physics and Astronomy, Indiana University South Bend

THE INCOMPLETE COMPLETE: THE IMPORTANCE OF WHAT WAS LEFT UNSAIĐ IN TRISTRAM SHANDY

Christopher J. Williams

Department of English, Indiana University South Bend

The main purpose of my research is to figure out why Laurence Sterne chose to leave out so much text in his work Tristram Shandy, at a time when Copyright Law was just beginning to protect the authors rights why leave so much of the text up to the reader. Using the Statute of Anne, the only copyright law to be spoken of at Shandy’s publication, and works by other authors that discuss the form of literature in the Eighteenth Century, I was able to compile a set of data about published works at the time that allowed me to put Shandy in context to the rest of literature in the Eighteenth Century. Through this I learned more about Eighteenth Century Copyright Law than I was expecting, which allowed me to come to very interesting conclusions about why Tristram Shandy was not only important then, but why it is important now. Between doing the research and coming to the conclusion of importance of the work, I was able to create a bigger picture about the work and how what it did is important because it is a prime example of the freedom that authors have in making their work be what they want it to be.

Mentor: Lee Kahan, Department of English, Indiana University South Bend

THE EFFECT OF GARLIC MUSTARD ON PLANT SPECIES DIVERSITY AND GROWTH OF FUSARIUM

Aimee Yarde, Deborah Marr

Department of Biological Sciences, Indiana University South Bend

Garlic mustard (Alliaria petiolata) is a biennial herb that is rapidly spreading through forests in North America. Previous studies have shown that garlic mustard tends to dominate the understory and that it can suppress mycorrhizal fungi. We investigated whether removing garlic mustard had a short-term effect on plant diversity. Plant diversity was compared in plots where garlic mustard plants were either removed or left intact. We found that garlic mustard removal had a relatively little short-term effect on plant diversity. We also tested whether garlic mustard roots inhibit the growth of Fusarium sp. (an endophytic fungus) isolated from either garlic mustard (non-native biennial) and Hydrophyllum appendiculatum (native biennial). In general, Fusarium growth rates were greater when Fusarium was paired with the host that it was isolated from. Hydrophyllum appendiculatum roots showed the largest inhibitory effect on growth of Fusarium isolated from garlic mustard.

Mentor: Deborah Marr, Department of Biological Sciences, Indiana University South Bend
INDIANA UNIVERSITY SOUTHEAST

MUTATION TESTING: AUTOMATION FOR MEASUREMENT IN PROGRAM ERROR DETECTION

Steven Garrett

Department of Computer Science, Indiana University Southeast

Mutation testing is a method of determining whether or not there are weaknesses within a program’s test cases (test suite). By hand, this can be a long process involving many steps. The goal of my research was to automate this process with little initial user input. To accomplish this, a simulation program for mutation testing was created using Java and SQLite3. The software uses a Structured Query Language (SQL) database to read and save any data, and is supposed to print the results of the simulation to inform the user how strong the test suite is for a given FORTRAN program. That is, how effectively the mutants are able to detect errors within the program. Though the automation is not yet fully developed, the program can still be used to detect errors manually by checking the results of any executed tests.

Mentor: Ronald Finkbine, Department of Computer Science, Indiana University Southeast

GROWING UP: SOCIAL SKILLS, BASIC LIFE SKILLS, AND PARENT-CHILD RELATIONSHIPS

Amanda Gowers

Department of Psychology, School of Social Sciences, Indiana University Southeast

The purpose of this study was to investigate the link between gender, social skills, basic life skills, and parent-child relationships. Participants provided information about their relationships with their parents, if their parents taught them basic life skills, and their social skills. The results indicated a negative relationship between the parent-child relationship and the child’s social skills during their adolescents. Adolescents who had better relationships with their parents reported having lower social skills. No relationship was found when the mother-child or the father-child relationships were analyzed separately. The results also indicated no relationship between parents training of basic life skills and their children’s social skills during adolescents.

Faculty Advisor: Diane Wille, Department of Psychology, School of Social Sciences, Indiana University Southeast

QUADRAPOLE MAGNET ANALYSIS

Ryan Kessler¹, Brad Luyster², Gene Boland², Paul Todd², and John Doyle³

¹Computer Science, Indiana University Southeast; ²TechShot Inc.; ³Department of Computer Science, Indiana University Southeast

At a fixed distance, a magnetic pole will produce a magnetic field gradient that will vary in strength depending on the distance from the ends; the gradient is steepest near the corners. We explore altering the geometry of a quadrupole magnet in conjunction with finite element analysis software to optimize magnetic alignment and minimize magnetic field gradient, resulting in a nearly-uniform magnetic field within the quadrupole. Through this analysis, a solution was selected that minimized the magnetic field gradient along the length of the magnetic pole.

Mentor: John Doyle, Associate Professor of Computer Science, Indiana University Southeast
THE EFFECT OF GLACIATION ON THE DEVELOPMENT OF VEGETATION ECOSYSTEMS AND THE EMERGING AGRICULTURAL ECONOMY OF INDIANA

Jalissa Kleczynski

Department of Geography, Indiana University Southeast

Glaciation has transformed and created much of the terrain we see today in the state of Indiana, from the Dunes to the farming plains. This has drastically altered the land to be a very ecologically rich region. We will focus on the processes of the past that has transformed the geography of this state, and how it has created an ecologically rich foundation for agriculture. Through understanding the past it will allow continued growth in one of Indiana’s most abundant economic fields.

Advisor: James Hollenbeck, School of Education Indiana University Southeast

THE RELATIONSHIP BETWEEN BULLYING VICTIMIZATION DURING PRIMARY OR SECONDARY SCHOOL AND GREATER SYMPTOMS OF ANXIETY AND DEPRESSION IN COLLEGE STUDENTS

Ashley Morrison

Department of Psychology, School of Social Sciences, Indiana University Southeast

Prior research has shown that bullying victimization may lead to immediate and long-term negative psychological effects such as anxiety, depression, and trauma symptoms. The current study examined the relationship between bullying victimization in primary or secondary school and symptoms of anxiety and depression in a sample of 212 Indiana University Southeast undergraduate students. There was a significant association between being victimized by bullying and greater symptoms of anxiety and depression. The author also investigated the relationship between gender and the type of bullying that participants reported. Males reported experiencing significantly greater physical bullying victimization while females reported significantly more indirect victimization. A victim’s level of social support has been shown to moderate the effects of bullying victimization. As a result, it was predicted that those participants who were bullied and also reported lower levels of social support would demonstrate the greatest symptoms of anxiety and depression. In fact, participants who were bullied and felt isolated without social support had the highest levels of anxiety and depression. The current study highlights the necessity for implementing empirically valid bullying prevention methods in our schools and demonstrates the importance of remediating immediate psychological effects from bullying victimization to prevent them from becoming long-term effects.

Mentor: Todd Manson, Department of Psychology, School of Social Sciences, Indiana University Southeast

IDENTIFICATION OF NOVEL PROTEIN INTERACTIONS OF THE VITAMIN B6 BIOSYNTHETIC COMPLEX

Lauren Ogburn, Joshua Scantland, and Elizabeth Rueschhoff

Department of Biology, Indiana University Southeast

Pyridoxal 5’-Phosphate (PLP) the active form of vitamin B6 is an important coenzyme that is involved in over one hundred metabolic reactions. Previous research indicates that PLP is synthesized by a multi-subunit protein complex consisting of twelve PDX1 protein subunits and twelve PDX2 protein subunits. Recent evidence suggests that these proteins may interact with proteins other than those found in the biosynthetic complex. The purpose of our research is to investigate the protein interactions between the biosynthetic complex subunits (PDX1 and PDX2) and the protein
products of the cDNA library of A. thaliana. To investigate these protein interactions we used the Matchmaker Gold Yeast 2-Hybrid System. From this assay, we have identified several putative proteins that interact with the PDX1 and PDX2 proteins. We are presently confirming these interactions in the Yeast 2-Hybrid system in the opposite direction by “vector swapping.” Once these interactions are confirmed we will test these interactions in planta. Further investigation to these novel protein interactions between the biosynthetic complex subunits and other proteins may grant a greater understanding of vitamin B6 metabolism within the cell.

Mentor: Elizabeth Rueschhoff, Department of Biology, Indiana University Southeast

COOL BOYS: MASCULINITY, DRUGS, AND FATHER ABSENTEEISM

Dustin Sevier

Department of Psychology, School of Social Sciences, Indiana University Southeast

The purpose of this study was to find and investigate causes for the gender gap in education. Participants provided information about their coolness for school attitude, who raised them (parental make up), and drug and alcohol use. The Bem-Sex role inventory was used to measure masculinity and femininity among participants. Boys were more likely than girls to exhibit a “too cool for school” attitude. Results indicate a relationship between drug and alcohol use and “too cool for school” attitudes. Paternal absence, and student income did not predict “too cool for school” attitude. Masculinity-femininity did predict school attitude and suggests hyper-masculinity as a response to norm violations. This suggests that boys demonstrate too cool for school attitudes as a coping mechanism, when boys have a “nearly masculine” gender, to compensate for norm violations of androgyny development.

Mentor: Diane Wille, Department of Psychology, School of Social Sciences, Indiana University Southeast

GENERAL JOHN HUNT MORGAN, CORYDON, AND MEMORIAL SITES

Jesse Lee Stamper

History Department, Indiana University Southeast

Civil War battle sites are a significant feature of the American landscape. In Corydon, Indiana, there are a dozen historical markers which commemorate the Battle of Corydon that took place in 1863. This battle is known as part of Morgan’s Raid, so named after Confederate General John Hunt Morgan. Much smaller in scale and less significant in deciding the outcome of the war as compared to the much celebrated Battle of Gettysburg, this fight in Corydon has left a lasting memory in the local community. This presentation focuses on the relationship of history and memory by examining the process of how collective memory was constructed and evolved. Relying on written sources as well as monuments, this research highlights the importance of the Civil War in shaping local community memory and identity.

Mentor: Yu Shen, Department of History, Indiana University Southeast

MAPPING OF UNKNOWN ENVIRONMENTS USING AUTONOMOUS ROBOTS

Jeramey Tyler, Alan Laffoon

Department of Computer Science, Indiana University Southeast

Our goal is to create an algorithm that will allow an autonomous robot to navigate through an unknown environment and determine uniform coverage. While navigating, the robot shall create in memory a map of the observed area, as well as objects detected, in a series of memory models. The memory models are generated using the A*(A-Star) algorithm. The robot shall utilize front-mounted and side-mounted ultra-sonic range sensors to scan the environment
while using DC motors to power the wheels for navigation. We plan to track the robot’s progress by transferring the robot’s memory model to a computer to display the map onscreen.

Mentor: Suranga Hettiarachchi, Department of Computer Science, Indiana University Southeast

**STEM INITIATIVES OF THE CIVIL AIR PATROL-UNITED STATES AIR FORCE AUXILIARY: AN INTRODUCTION TO STANDARDS BASED AEROSPACE EDUCATION ENRICHMENT**

**Darrel D. Williamson**

School of Education, Indiana University Southeast

The Civil Air Patrol, known commonly as CAP, was founded in 1941 as an organization that would promote aviation and service. CAP is a force multiplier to local communities and its parent organization, the United States Air Force, as its official auxiliary. Throughout the years their congressional mandated charter developed into three core missions; Cadet Programs, Emergency Services, and Aerospace Education. The least publicized mission of Aerospace Education is a potential gold mine for educators to implement into their curriculums. Through this research as a member of the Civil Air Patrol, I have discovered and evaluated the resources that are available from a mostly unknown educational resource. Their aerospace education materials have already been linked to common state standards, which is a time consuming and labor intensive endeavor for educators in an already time demanding field. Through the use of such resources, educators can utilize materials that can enrich their classrooms, and involve their students in an active learning environment.

Advisor: James Hollenbeck, School of Education, Indiana University Southeast
INDIANA UNIVERSITY – PURDUE UNIVERSITY COLUMBUS

EXPLORING GENDER REPRESENTATION IN TRADITIONAL AND NON-TRADITIONAL FAIRYTALES

Mike Fry

Division of Education, Indiana University-Purdue University Columbus

Gender-bias remains an important topic of discussion in the modern world. Due to gender conventions that are present in our society today, stereotypes relating to gender have a large influence in the social and emotional development of children. Particularly in the field of education, the under-representation of the female character continues to influence young readers within children’s literature. Although female characters play the central role in many fairy tales, like Cinderella and Snow White, they promote stereotypical female roles of subservience, dependence, and feebleness. Not only do the main characters display weak characteristics, coined as feminine, the supporting cast of stepmother and stepsisters also play roles of stereotypical female characters, in that powerful female characteristics are viewed as evil. Lead female characters are often engaged in pining over a prince, the ultimate resolution to her problems, while being obstructed by her evil stepmother. Prior research has demonstrated the damaging effects of gender stereotypes not only with regard to the promotion of stereotyped interests and role; but more importantly with how children value themselves including self-concept, self-determination, and their perception of self as learners, particularly in young girls. Though gender bias in children’s literature has been wide examined, few studies have gathered and analyzed the perspective of children with regard to gender roles and construction in direct response to such literature. Given the widely accepted stereotypical views portrayed in traditional fairy tales, this study examined the impact of traditional versus non-traditional fairy tales (that provide a more empowered representation of the female character) on how children spontaneously represented gender.

Mentor: Allison Howland, Division of Education, Indiana University-Purdue University Columbus

THE IMPACT OF RESILIENCE TRAINING UPON FEMALE PRISONERS

JoAnn Mitchell

Department of Science, Indiana University-Purdue University Columbus

Resilience is a powerful tool that increases positive outcomes in light of negative life events, and research shows that resilience can be taught. The goal of this study was to evaluate a new resilience training program administered to adult female prison inmates—women who have experienced negative life events and are at risk for more. Testing the effectiveness of resilience training in inmates is critical because it demonstrates generalization and efficacy of resilience training to an at-risk sample.

Mentor: Joan R. Poulsen, Department of Science, Indiana University-Purdue University Columbus
READING BETWEEN THE LINES OF RACIAL SHAME: OBSESSIVE-COMPULSIVE DISORDER AS A SYMPTOM OF TRAUMA IN MORRISON’S THE BLUEST EYE

Bailey K. Moss
Division of Liberal Arts, Indiana University-Purdue University Columbus

This paper uses Toni Morrison’s The Bluest Eye as an example of the effects of childhood trauma on adults. Mrs. Breedlove is arguably the premier example of trauma victimization in the novel, and it is through her characterization that I suggest she displays symptoms of Obsessive-Compulsive Disorder (OCD) as an indication of traumatic abuse and neglect. I use trauma theories collected from the leading researchers in the field of trauma including, but not limited to, Cathy Caruth, J. Brooks Bouson, and Laura S. Brown, as well as statistical evidence collected from research on the connection between trauma and OCD. The statistics are limited due to a surprisingly inadequate amount of case-studies researching the correlation between trauma and OCD. These sources were collected via classroom assignments, as well as outside personal research. It is my contention that further evidence is needed to prove childhood trauma may lead to adult-onset OCD, but until such research is conducted, the theory cannot be dismissed. Further research of my theory is necessary because narrowing the definition of trauma to vague, interpretable language does not promote healthy recovery. We must be open to new ideas such as the development of mental illness as resulting symptoms of trauma and PTSD so that sufferers and victims may retain the treatment they so desperately deserve. In this vein, I will present interpretations of Morrison’s The Bluest Eye that showcase the results of my research.

Mentor: Julie Goodspeed-Chadwick, Division of Liberal Arts, Indiana University-Purdue University Columbus

EMILY DICKINSON’S HIDDEN CONFLICT WITHIN HER POETRY: AN INTERROGATION OF AMERICAN SOCIETY’S MASCULINE AND FEMININE BINARY OPPOSITIONS

Michaela Wischmeier
Department of English, Indiana University-Purdue University Columbus

Emily Dickinson perhaps unknowingly and thoroughly achieves her complete defiance of the patriarchal society of her time by redefining her subject within “My Life had stood—a Loaded Gun—.” One can interpret the gun as both an object and a potential subject: an ineffective and useless item within the “Corners,” until the Owner utilizes the gun for a specific purpose, resulting in a transformation. In this metamorphosis, Dickinson bestows masculine and feminine characteristics on her subject, the gun, and, in this way, destroys the socially defined binary oppositions of gender. By producing such poetry, Dickinson grants herself a place among past and present feminists in the ongoing battle against marginalization of all minorities, including females: she imagines pathways to empowerment. Influential female authors, such as Dickinson, deserve a continual focus and analyses of their works by society to highlight the importance of equality and choice for all underrepresented people of the world. Without an awareness of feminist issues, such as gender inequality, represented by Dickinson and others, people will not be able to coexist and cooperate to further advance society as a whole.

Mentor: Julie Goodspeed-Chadwick, Department of English, Division of Liberal Arts, Indiana University-Purdue University Columbus
INDIANA UNIVERSITY – PURDUE UNIVERSITY FORTH WAYNE

PURIFICATION OF SC4O2@C80 VIA CUCL2 AS A SELECTIVE PRECIPITATING AGENT

Muska Fahim, and Khrisna A. Rottinger

Department of Chemistry, Indiana University-Purdue University Fort Wayne

The “metallic oxide fullerenes” represent a new class of endohedral metallofullerenes. Found in soot extracts obtained from electric-arc reactors, Sc4O2@C80 is the dominant species for these metallic oxide fullerenes. It is necessary to develop an efficient purification method for its sample dissemination to other researchers, who are eager to perform experiments with this new molecule. However, the enthusiasm for studying this new molecule is dampened due to its low abundance in soot extracts. The typical starting sample contains <0.1% Sc4O2@C80. By manipulating reactivity differences between empty-cage fullerenes (dominant, high abundant species) and metal oxide fullerenes (low abundant species), we can selectively precipitate Sc4O2@C80 from extract solution via reaction of its electron-rich carbon cage with the Lewis acid, CuCl2. In this presentation, we discuss our new method for isolating Sc4O2@C80. This 2-step approach consists of a Lewis acid precipitation of Sc4O2@C80 (Stage 1), followed by minimal HPLC fraction collection (Stage 2) for its final purification.

Mentor: Prof. Steven Stevenson, Department of Chemistry, Indiana University - Purdue University Fort Wayne

STRATEGIES FOR ISOLATING ERBIUM NITRIDE CLUSTERS IN OVERSIZED FULLERENE CAGES

Jessica S. Field, Khrisna A. Rottinger, and Muska Fahim

Department of Chemistry, Indiana University-Purdue University Fort Wayne

In this contribution, we add to the field of erbium nitride clusters entrapped within fullerene cages. Typically, Er3N clusters are found in smaller carbon cages, with the most dominant species being Er3N@C80. We have now detected Er3N clusters in much larger cages (e.g., C84-C112). These metallic nitrides in giant cages are expected to have intriguing properties due to the voluminous nature of their larger carbon cages. Because the abundance of these Er-based nitride endohedrals is <0.1% of the soot extract, we must develop new separation methods to remove the contaminants in the remaining 99.9% of this starting sample. In this research, we present a successful separation approach which is based on reactivity differences between hollow fullerene cages (i.e., the abundant species) and the oversized fullerenes with entrapped Er metallic nitride clusters (i.e., trace abundance of these endohedral metallofullerenes). Optimal results are obtained by using a combination of our stir and filter approach (SAFA) and selective precipitation of Er metallofullerenes with Lewis acids (e.g., CuCl2). In this presentation, we present the molecular formulas for Er3N clusters in oversized fullerene cages. The ultimate goal is to isolate sufficient quantities of purified samples for X-ray crystallographic analysis and structural data.

Mentor: Prof. Steven Stevenson, Department of Chemistry, Indiana - Purdue University Fort Wayne
EFFECT OF OSMOLYTEs ON THE ENZYMATIC PROPERTIES OF BOVINE CHYMOTRYPSIN

Melissa Garringer, and Mohammad Qasim
Department of Chemistry, Indiana University-Purdue University Fort Wayne

Osmolytes are small solutes that regulate turgor pressure within cells that undergo various extreme stressors from high salt or urea concentration, drastic pressures, high temperatures, among other parameters. Since their mechanism of action is not well understood, the emphasis in most scientific investigations is to study their effect on the structure, function, and stability of proteins and enzymes. In my research work described in this presentation I have studied the effect of different concentrations of osmolytes such as urea, guanidine hydrochloride, betaine, trimethylamine-N-oxide (TMAO) on the enzymatic properties of a serine protease, bovine chymotrypsin. Serine proteases are proteolytic enzymes that have crucial roles in bodily functions by performing specific peptide bond hydrolyses in proteins and peptides. Bovine chymotrypsin shows specificity towards large hydrophobic amino acid side chains such as Leu, Phe, Tyr, and Trp but also hydrolyzes peptide bonds contributed by Arg. In my research investigations I used substrates bearing Leu, Phe, and Arg at the reactive site peptide bond. The results of this investigation will be presented in terms of effects of osmolytes on the enzymatic hydrolysis of different substrates by bovine chymotrypsin.

Advisor: Mohammad Qasim, Department of Chemistry, Indiana University-Purdue University Fort Wayne

'GENS ANGLORUM' & 'NORMANITAS': THE BAYEUX TAPESTRY AND THE EFFECTS OF THE NORMAN CONQUEST ON LANGUAGE AND THE ARTS IN MEDIEVAL ENGLAND

Sara Elaine Jackson
Department of History, Indiana University-Purdue University Fort Wayne

Appreciating the role of identity within the medieval period presents certain problems. Identity, insofar as we define it, does not seem to translate well to this period, where the conception of self seems naturally limited. While there is substantial scholarship over the course of many periods in history that highlights specific facets of identity (including ethnicity, religion, language, and government), there exists perhaps the opportunity for even greater understanding if we assess contemporary notions of identity through examining the artistic and self-expressive endeavors created within an age. This paper considers the elements of identity reflected within the creation of the Bayeux Tapestry; specifically, the research looks at the artistic style and linguistic indicators present within the inscriptions, which provide insight into what might be termed the synthesis of an Anglo-Norman identity following the Norman Conquest. I argue that a full appreciation of the effects of the Norman Conquest on the evolution of English identity might be discernable in an examination of how those effects are represented within the Bayeux Tapestry, with an eye towards cultural synthesis rather than cultural subjugation.

Mentor: Suzanne LaVere, Department of History, Indiana University-Purdue University Fort Wayne
THE LEGACY OF CHRISTINE DE PIZAN

Rebecca Jacobs

Department of History, Indiana University-Purdue University Fort Wayne

This paper discusses the legacy of Christine de Pizan and what she contributed to her time period as a writer and as a proto-feminist. She is labeled as a proto-feminist due to the controversy over the extent of her impact on women’s rights and status in society. Christine was a French author writing in the late fourteenth and early fifteenth centuries, and the first female professional author. She is important in both the history of literature and women because not only did she produce important works that were available to large numbers of middle/upper class people, but she also gained a reputation as a champion of women due to the stances she took in her writing and in a public forum during the debate over the Romance of the Rose. For this paper I investigated Christine de Pizan’s own writings, The Book of the City of Ladies, The Three Virtues, and letters between Christine and her opponents and allies, as well as scholarly analysis of her writings. Throughout various times in history people have held varying opinions about Christine’s intentions and her effectiveness as a leader for women’s rights. Her views toward literature she considered misogynistic have led modern scholars to wonder rather she can be considered a feminist in any way; however, this paper illustrates her goals of equality between the sexes as a means to universal access to knowledge rather than a goal of radical social change for women. This paper concludes that while Christine did not radically reform women’s roles within France’s social structure, she was influential in creating the building blocks to change the views of women in the Middle Ages.

Mentor: Suzanne LaVere, Department of History, Indiana- Purdue University Fort Wayne

DETECTING AND SEPARATING NEW GADOLINIUM ENDOHEDRAL METALLOFULLERENES

Khrisna A. Rottinger, and Muska Fahim

Department of Chemistry, Indiana University-Purdue University Fort Wayne

This contribution is in the field of new molecule discovery and isolation. The ultimate goal of the research is to identify any new Gd-containing molecules in fullerene soot. We have developed a method to remove the well-known molecules (C60, C70) from fullerene soot extracts so that we can detect trace amounts of new molecules containing gadolinium clusters entrapped in fullerene cages. The enrichment and separation method we have developed is a combination of our stir and filter approach (SAFA) combined with selective precipitation of Gd-containing molecules with Lewis acids. Using this strategic experimental design, we have fractionated the >50 different types of molecules present in soot extracts based on their differences in reactivity. At present, we have detected and concentrated at least five new molecules containing Gd clusters. In this presentation, we will discuss candidate formulas for these new Gd endohedral metallofullerenes. We will disseminate purified samples of our new molecules for subsequent X-ray crystallography to obtain structural data.

Mentor: Prof. Steven Stevenson, Department of Chemistry, Indiana University - Purdue University Fort Wayne
Levels of Xenin-25 in Obese Diabetic Patients, and in Response to Meal Tolerance Test Before and After Bariatric Surgery

Fatou Ba, Anthony Acton, Robert V Considine

Department of Medicine, Indiana University-Purdue University Indianapolis

Obesity is an important risk factor causing Type 2 Diabetes Mellitus (T2DM). T2DM is considered today to be a serious public health problem worldwide. The Roux-en-Y Gastric Bypass Surgery (RYGB) has been shown to improve insulin sensitivity in patients with type 2 diabetes. Xenin is a 25 amino-acid peptide produced primarily by K cells, a sub-type of enteroendocrine cell in the small intestine. According to previous study plasma levels of Xenin-25 are elevated in obese compared to lean individuals. We measured the fasting levels of Xenin-25 in two obese and five obese diabetic patients scheduled for bariatric surgery, and four lean control subjects. We also measured Xenin-25 in response to a meal test before bariatric surgery and three months after surgery. Xenin and insulin were measured in plasma by radioimmunoassay. Plasma glucose was measured with a Randox clinical analyzer. We found that Xenin-25 was lower in obese subjects with and without diabetes, than in lean subjects. Xenin-25 and insulin area under the curve decreased after bariatric surgery, while that of glucose remained the same.

Mentor: Robert V. Considine, Department of Medicine, Indiana University-Purdue University, Indianapolis

Forgotten Lives: Discovering the Role of Domestic Servants at the Benjamin Harrison Home

Emily A. Baker

Department of History, Indiana University-Purdue University Indianapolis

This project investigates the lives of the domestic servants who worked for U.S. President Benjamin Harrison. Located at 1230 N. Delaware St. Indianapolis, Benjamin Harrison’s house is currently a historic site known as the Benjamin Harrison Presidential Site. While the Benjamin Harrison site provides ample information on Benjamin Harrison, his wife, and his family, there is currently little to no information on the servants who lived and worked in the house. My research has been an investigation into the forgotten lives of these individuals who were employed by Harrison. Discovering the roles of domestic servants has been of increasing interest to historians and historic homes in recent years. Historic site staff and public historians alike are interested in educating the public on the vital role that ordinary men and women played in our nation’s past. I have analyzed United States census records from 1870, 1880, 1900, and 1910 to learn the names of servants who were included in Harrison’s household (and their age, occupation, and place of birth). I have also utilized Indianapolis City Directories to discover Harrison’s address from before he moved to his N. Delaware home. Through these directories, I have discovered additional names of servants who worked for Harrison in the intermediary years between censuses. With this information, I can look up the servants in census records to discover what they did before and after they worked for Harrison. This research also helps us understand how many servants worked at the Harrison home and to begin to envision, for public interpretation, what their roles in the house were. Discovering the role of the servants at the Harrison Home will help Americans appreciate the forgotten lives from the past that have shaped the future.

Mentor: Rebecca Shrum, Department of History, Indiana University-Purdue University Indianapolis

This project is funded by the Undergraduate Research Opportunities Program (UROP) Summer Fellows, a program of the Center for Research and Learning at Indiana University-Purdue University Indianapolis.
MENTAL MATH: EFFECTS OF TEACHING MATH IN A NON-TRADITIONAL WAY WITH AFRICAN AMERICAN MATHEMATICS LEARNERS

Saba-Na'Imah A. Berhane

Mathematics Department, Indiana University-Purdue University Indianapolis

Given the paucity of studies that focus specifically on African American students, in relation to mathematical development, this study is an effort to address the gap in empirical knowledge. This study explores how African American middle school students view mathematics and their mathematics learning experiences, how instructional approaches emphasizing the nonsynonymous nature of ‘arithmetic’ and ‘mathematics’ may alter their perceptions of their mathematics learning experiences, and how these instructional approaches impact their performance in mathematics. Data will be collected via pre and post tests, interviews, and survey data.

Mentor: Crystal H. Morton, School of Education, Indiana University-Purdue University Indianapolis

THE INTERNALIZED OPPRESSION OF DOMINICANS

Loreliss Bonilla

Indiana University School of Liberal Arts, Indiana University - Purdue University Indianapolis

We often think of racism as something that is expressed from one person or a group of people who belong to a similar ethnic or racial group expressing negativity of a particular kind towards a group of people belonging to a different ethnic or racial group. We think about the stereotypes that exist depending on what country someone is from or perhaps even the language they speak. This research is focused on a very specific demographic in the Caribbean. The Dominican Republic is a very diverse island in the Caribbean whose views on race may be considered by some in the United States to be unusual. In this research we will find out why there is such a divide between the different “shades” of people’s skin tone, the reason why there are so many different looking people with the same ancestry in such a small country and whether the fact that this country shares an island with Haiti is part of the reason behind what can be referred to as an internalized oppression of the people of the Dominican Republic. This type of internalized oppression specifically refers to the attitudes and thoughts that are portrayed in the culture in terms of racism and discrimination.

Mentor: Rosa Tezanos- Pinto, Indiana University School of Liberal Arts, Indiana University- Purdue University Indianapolis
EFFECTS OF TOBACCO COMPONENTS ON STREPTOCOCCUS MUTANS AND THE ROLE OF S. MUTANS IN APOPTOTIC CELL DEATH THROUGH MACROPHAGE INTERACTIONS

Ana Cavazos

Indiana University School of Dentistry, Indiana University- Purdue University Indianapolis

Cigarettes have thousands of components aside from tobacco and nicotine that are harmful to the smoker’s body. Smoking is considered a significant risk factor for cardiovascular disease (CVD) and periodontal disease. One of the aims of this study is to determine the effect of different tobacco components on the growth of S. mutans. S. mutans is an oral bacteria found in most humans that is considered to be the causative agent for dental caries. S. mutans can potentially lead to the inflammation of the heart and arteries which can turn to atherosclerosis. Atherosclerosis is a complex inflammatory disease and is the leading cause of death in the United States. Inflammation is the main concern as it has a key role in the development of atherosclerosis. Irritation can be caused by the relationship of bacteria like S. mutans with macrophages and other white blood cells defending against foreign pathogens. The main focus of the research in this specific project is to establish how macrophage interactions with S. mutans are causing apoptosis in the endothelial cells lining the arteries and veins. Apoptosis is programmed, energy-dependent cell death that causes cells to shrink with no loss of the membrane integrity. The long term goal of this study is to determine if smokers are at higher risk of being diagnosed with atherosclerosis in correlation to S. mutans and tobacco components. Apoptosis is studied by the determination of apoptotic mediator levels. Apoptotic mediators allow for the measurement of cell death. This allows for the configuration of the data presented.

Mentor: Drs. Ghada Batarseh, L. Jack Windsor and Richard L. Gregory, Department of Oral Biology and Pathology and Laboratory Medicine, Indiana University - Purdue University Indianapolis

THE EFFECT OF ACUTE TREADMILL EXERCISE ON RIGHT VENTRICLE CELLULAR APOPTOSIS IN A RAT MODEL OF PULMONARY ARTERIAL HYPERTENSION

Tsungai Chingombe¹, Jag Reddy², Jacob Crist¹, Amanda Fisher², Robert Presson², Tim Lahm², Irina Petrache²

¹Department of Physical Therapy, Indiana University School of Health and Rehabilitation Sciences, ²Pulmonary and Critical Care, Department of Medicine, Indiana University School of Medicine, Indiana University-Purdue University Indianapolis

In pulmonary arterial hypertension (PAH) elevated pulmonary pressures increase the work of the right heart, which can lead to maladaptive wall hypertrophy, right heart failure and death. The purpose of this research is to determine in a rat model of PAH if a single bout of exercise at moderate relative intensity can be performed without promoting an acute and detrimental right ventricular (RV) wall stress-induced apoptosis. Apoptosis, or programmed cell death, is an energy dependent process that effects the controlled removal of a cell and is activated in response to cellular injury. Male Sprague-Dawley rats received monocrotaline (MCT, 40 mg/kg, intraperitoneally) to induce PAH (n=12), or saline, for healthy controls (n=8). After 2 wks, with MCT-induced PAH established, a single 45 min treadmill run was performed for a subset of PAH animals (n=6) and healthy controls (n=4) at moderate relative intensity, 75% of maximal aerobic capacity (VO2max). Animals were sacrificed and tissues were obtained immediately following the treadmill run. A group of PAH and healthy rats served as unexercised controls (n= 6 and 4, respectively). Two methods were used to quantify post-exercise cellular apoptosis: Caspase 3 activity was assayed in RV homogenates and Terminal deoxynucleotidyl
transferase dUTP nick end labeling (TUNEL staining) to mark nuclear DNA fragmentation associated with cell death was performed on RV cryosections. We hypothesized that a single treadmill run performed at moderate relative intensity will result in no greater RV apoptosis of PAH rats compared to that in healthy rats. Results and conclusions are pending final experiments; however data thus far shows a tendency for higher activation of Caspase 3 in PAH rats but no significant increase in exercise-induced apoptosis in either group.

Mentor: Mary Beth Brown, Department of Physical Therapy, Indiana University-Purdue University Indianapolis

Funded by the Indiana University–Purdue University Indianapolis Undergraduate Research Opportunities Program (UROP)

THE EFFECTS OF RAPAMYCIN ON GLUT 1 EXPRESSION IN THE RIGHT VENTRICLE OF RATS WITH SUGEN/HYPOXIA-INDUCED PULMONARY HYPERTENSION

Chanelle Daniels¹, Marjorie E. Albrecht², Anthony Cucci², Jordan Wood², Irina Petrache² and Tim Lahm²

¹Bridges to the Baccalaureate, Center for Research and Learning, IUPUI, ²Pulmonary Critical Care, Department of Medicine, Indiana University-Purdue University Indianapolis

Pulmonary Hypertension (PH) is caused by narrowing of the pulmonary arteries. If left untreated, the disease leads to right ventricular (RV) failure and death. Increased Glut1 expression is a feature of RV failure in PH, and indicates mitochondrial dysfunction with inability to create sufficient amounts of ATP. Glut 1 is a glucose transporter that plays a significant role in the uptake of glucose. Treatment with rapamycin will attenuate increases in Glut 1 expression in the RV of rats with SuHx-induced PH. The experimental groups were as follows: SuHx Untreated, SuHx rapamycin and SuHx with rapamycin vehicle for four weeks, tissues were harvested and frozen. Cryosectioning and immunofluorescence staining were used to examine RV Glut 1 expression. Tissues were stained with Glut 1. After the tissues sat overnight, they were stained with Alexa 568. The process concluded by staining with DAPI, images were taken to see the results, and Glut 1 expression was quantified with Image J. RVs of untreated SuHx rats strongly expressed Glut 1, but there was not a significant difference in the SuHx rats treated with rapamycin. This data indicates that rapamycin did not attenuate RV mitochondrial dysfunction and cytoplasmic glycolysis in SuHx-induced PH.

Mentors: Tim Lahm, Pulmonary Critical Care, Department of Medicine, IUPUI; Marjorie E. Albrecht, Pulmonary and Critical Care, Department of Medicine, IU School of Medicine, Indiana University-Purdue University Indianapolis

ATTRACTIVENESS IN JOB AND MARRIAGE MARKETS: WHAT’S GOOD FOR THE GANDER ISN’T GOOD FOR THE GOOSE

Jessica L. Despard

Department of Psychology, Indiana University-Purdue University Indianapolis

In an effort to explore reasons why women are less likely than men to pursue management careers, the current study examined potential constraints that women but not men face in choosing between career and family pursuits. This study examined college students’ perceptions of male and female targets under a variety of career and family-related conditions and analyzed the correlation between ratings of their attractiveness as a potential managerial candidate and their attractiveness as a potential marriage partner. We predicted that factors that make young women attractive in the marriage market will be negatively correlated with their attractiveness in the job market; whereas, factors that make young men attractive in the marriage market will be positively correlated with their attractiveness in the job market.
College students enrolled in a Midwest urban university (n=106 females and 39 males) completed an online or paper survey in which they rated 16 vignettes of a hypothetical individual and rated each on their attractiveness for management or attractiveness for marriage. The vignettes varied by gender, college major (computer science vs. education), desired job schedule (full- vs. part-time), and desired family size (0 vs. 3 children). A strong negative correlation was found between marriage and management ratings of female targets (r=-0.62), whereas a slightly negatively correlation was found for male targets (r=-0.21). In addition, a significant Condition (marriage vs. management ratings) X Gender interaction was found such that men were rated more positively than women for management ratings; whereas women were rated more positively than men for marriage ratings. Results show that there is more flexibility for men and their prospective attractiveness as a potential manager or marriage partner with regard to their college major and college schedule. However, women are faced with a steep trade-off to how they are perceived across these domains. Future research should further explore should be conducted to further explore the affects of the target individuals major, which seems to be the predominate quality that predicts whether or not a male and female target is attractive in the job market.

Mentors: Milena Petrovic, Margaret Stockdale, Department of Psychology, Indiana University-Purdue University Indianapolis

NEAR WESTSIDE COMMUNITY GARDEN PROJECT.

Gloria Ekissi, Christina Mushi-Brunt

Department of Health Sciences, Indiana University-Purdue University Indianapolis

Obesity, diabetes and high blood pressure are all illnesses that disproportionately affect the low income population of the United States. As the number of overweight and obese adults rises across the nation the number also increases in Indianapolis. Research has shown that people in poorer socioeconomic neighborhoods have poorer health outcomes, some of which is attributed to poor dietary behaviors such as limited fruit and vegetable consumption. Community produce gardening has been identified as an activity that has the potential to increase access to fresh produce and improve consumption of fruits and vegetables, particularly in low-income communities labeled as “food deserts” (neighborhoods with limited availability and accessibility of healthful food options). Our research considered the relationship between current level consumption of fruits and vegetables among gardeners and non-gardeners, the social involvement and whether participating in community produce gardening might change their behavior towards fruit and vegetable consumption. We conducted a survey among 89 adults from a low-income community in Indianapolis. We found that 20% of those surveyed have participated in community gardening in the past 12 months and 19.1% have participated in a home produce garden. Nearly 45% of the residents fail to meet the recommended daily consumption of five or more servings of fruit and vegetables. The individuals who reported participating in community garden in the past 12 months eat more fruits and vegetables than those who did not (72.2% verses 50.7%). The majority of respondents (86.1%) reported they would be more likely to increase fruit and vegetable consumption if they were involved in community gardening. These results suggest that community produce garden participation may be aid in increasing fruit and vegetable intake. Future research will engage key community stakeholders and residents in establishing community gardens as a means of reducing disparities in healthy eating.

Mentor: Christina Mushi-Brunt, Department of Health Sciences, Indiana University-Purdue University Indianapolis
Influential Factors in Providers’ Chronic Pain Treatment Decisions: A Comparison of Physicians and Medical Students

Charnelle A. Free, Nicole A. Hollingshead, Samantha Meints, Stephanie Middleton, and (Adam T. Hirsh)

Department of Psychology, Purdue School of Science, Indianapolis

Chronic pain is difficult to manage, and treatment guidelines are unclear and conflicting. Little is known about the factors providers use to make chronic pain treatment decisions or whether these factors differ based on providers’ experience level. The purpose of this study was to examine the factors that providers use to make treatment decisions and whether these factors differed between physicians and medical students. We hypothesized that physicians and medical students would: prioritize objective factors over subjective ones and be particularly interested in information about patients’ substance use. We did not have specific hypotheses about differences between physicians and medical students; thus, these comparisons were exploratory for the purposes of informing future research directions. Eighty-five providers (41% medical students, 59% physicians) viewed 16 computer-simulated patients; each included a picture with text describing the patients’ condition (i.e., chronic lower back pain, open to any treatment, presence/absence of depression). After making treatment decisions, participants selected from a list the factors they used and would have used to make their treatment decisions. Most providers reported being influenced by patients’ pain histories (97.6%) and pain descriptions (95.3%). Providers indicated they would have used information about patients’ previous treatment (97.6%), average pain (96.5%), and current pain (96.5%) had this information been available. Compared to physicians, medical students endorsed more often that they would have used patients’ employment and/or disability status (p<.01), and history of illicit drug (p=.09) and alcohol use (p=.08) to make treatment decisions. Given the high prevalence of chronic pain and the abuse potential for certain pain treatments (e.g., opioids), future studies should examine the factors (patient and provider) that influence decisions for specific treatment options.

Are Men and Women Equally Likely to Be Invited Speakers in a Field with Relative Gender Parity?

Anna Frink, Leslie Ashburn-Nardo

Department of Psychology, Indiana University-Purdue University Indianapolis

Even in fields where men and women earn doctorates in roughly equal numbers, female tenure-track faculty do not progress through the ranks at the same rate as male tenure-track faculty. One criterion for promotion is reputation as an expert in one’s specialty area(s), and one way to build this reputation is giving invited talks. The present study investigates the role of gender stereotypes in the frequency with which men vs. women are invited to give talks and the nature of the talks they give. The top fifty national universities as ranked by the US News and World Report were examined for this study. Psychology department websites were examined for publicly available information about department colloquia. We recorded speaker gender and title of talk, among other information. Data collection is ongoing, but social role theory suggests two possible outcomes: First, it is possible that men are invited with greater frequency than women overall, as women are stereotypically less likely to be perceived as authorities. Alternatively, men and women may be invited with equivalent frequency but asked to give talks that are consistent with gender stereotypes (i.e., that women give talks on more "communal" topics and men on more "agentic" topics). The findings of this study may help shed light on one reason why women advance more slowly or to lesser ranks than do men, even in fields where they are relatively equally represented in terms of doctoral degrees.

Mentor: Leslie Ashburn-Nardo, Department of Psychology, Indiana University-Purdue University Indianapolis
DEFINING THE ROLES OF VARIOUS LYSINES AND ARGININES IN AMOT LIPID BINDING

L’eCelia Hall

Department of Biochemistry, Indiana University-Purdue University Indianapolis

One of the defining traits of cancerous cells is proliferation. We are focusing on the proliferation of mammary cells. As an adaptor protein, the Amot membrane binding event is key to the localization and sorting of proteins responsible for cellular differentiation, proliferation, and migration. The Amot coiled-coil homology domain (ACCH) is a lipid-binding domain responsible for affinity and binding to endothelial membranes. Our working hypothesis is that the ability to modulate Amot lipid-binding will lead to means to prevent ductal cell hyperplasia progression into breast cancer tumors. We will determine which residues are responsible for lipid-binding by changing positively charged lysine and arginine into uncharged or negatively charged amino acids. Those mutations which show a significant decrease in lipid-binding will then be used to determine their down-stream effects in human cells. The laboratory has screened approximately 40 of these mutations using a liposome binding assay. This assay mimics how the protein binds with the cell membrane by using an in vitro mixture of lipids similar to that seen in endothelial cells. Forster resonance energy transfer (FRET) was used to confirm significant decreases in lipid binding of ACCH mutants selected from the liposome binding assay, as energy transfer only occurs when the tyrosines in the protein and the Dansylated liposome are in close proximity to each other. Based on these two screens we have narrowed the list to seven mutants that have a significant decrease in lipid binding. Currently, FRET is being used to determine the lipid binding coefficient for each mutant of interest. Mutants deemed important from this study will then be transformed into human cells to study their effects on cell polarity, signal transduction, cell shape, and cellular proliferation.

Mentor: Ann Kimble-Hill, Department of Biochemistry, Indiana University-Purdue University Indianapolis

SOMATOSENSORY AMPLIFICATION AND HOT FLASHES IN BREAST CANCER SURVIVORS AND MIDLIFE WOMEN

Christele M. Igega, and Janet S. Carpenter

Center for Enhancing Quality of Life in Chronic Illness, Indiana University-Purdue University Indianapolis

Background: Somatosensory amplification is a cognitive explanation of the tendency to sense normal somatic and visceral sensations as intense, noxious, and disturbing. An individual with somatosensory amplification takes existing physical sensations and/or conditions and focuses on them to the point that the perception of these often-normal sensations becomes overly bothersome and intense. Objective: The goal of this study is to describe the concept of somatosensory amplification and its role in the menopausal symptom experience of two target groups: menopausal breast cancer survivors and healthy midlife women. Design: This is a cross-sectional, descriptive, correlational study. This study looked at baseline data containing the demographics, somatosensory amplification data, and mood, sleep and hot flash data (frequency, bother, control, interference, and perceived control) of 98 breast cancer survivors and 135 midlife women. Each item on the Somatosensory Amplification Scale (SSAS) was looked at in order to determine if there is a significant difference between healthy menopausal women and menopausal breast cancer survivors. The total SSAS scores were also analyzed to determine if there was a difference between the two groups. Results: Midlife women had a higher total SSAS score than breast cancer survivors, but the group differences in total scores and individual items were not significant. Somatosensory amplification was significantly correlated with hot flash interference, perceived control of hot flashes, mood and sleep. Conclusion: The outcomes offer more insight into how somatosensory amplification can affect the everyday lives of menopausal women and the perceived control they have over their hot flashes. Implications for
practice: Findings may prove to be useful in selecting more appropriate and relevant interventions that have the potential of improving quality of life of menopausal women.

Mentor: Janet S. Carpenter Center for Enhancing Quality of Life in Chronic Illness, Indiana University-Purdue University Indianapolis

EXAMINATION OF GAP JUNCTION INTERCELLULAR COMMUNICATION IN HUMAN PLURIPOTENT STEM CELL-DERIVED RETINAL PIGMENT EPITHELIUM

Clara L. Iglesias¹, Jason S. Meyer¹,²,³

¹Department of Biology, ²Stark Neurosciences Research Institute, ³Department of Medical and Molecular Genetics, Indiana University - Purdue University Indianapolis

A variety of retinal degenerative diseases such as age-related macular degeneration (AMD) result in the loss of retinal cells leading to a gradual loss of vision. Human pluripotent stem cells (hPSCs) offer the unique ability to serve as a vehicle for the development of new therapeutic approaches to blinding disorders involving the replacement of cells that had been lost to disease. Retinal pigment epithelial (RPE) cells serve to support retinal neurons and are adversely affected in blinding disorders such as AMD. While current strategies are focused on the replacement of RPE cells using hPSCs, the proper functionality of these stem cell-derived RPE remains elusive. Previous studies have identified gap junctions as important for communication between RPE cells in vivo. However, there are limited studies testing the functionality of these cells derived from a hPSC source. Thus, efforts were undertaken to examine the role of gap junction proteins in intercellular communication in hPSC-derived RPE. To initiate differentiation hPSCs were grown in a medium consisting of DMEM/F12 (1:1) containing 20% knockout serum replacement, L-glutamine, and MEM non-essential amino acids. Within eight weeks of differentiation, RPE cells were readily identified by their hexagonal cobblestone shape and accumulated pigmentation. RPE was isolated by microdissection and expanded in the presence of FGF-2, EGF and heparin. To confirm the identity of these cells, the expression of genes and proteins characteristic to RPE were analyzed using both RT-PCR and immunocytochemistry. The identification of gap junction proteins present in hPSC-derived RPE was initially performed by RT-PCR and candidate genes were confirmed by immunocytochemistry. In future studies, the functionality of these RPE gap junctions will be analyzed.

Mentor: Jason S. Meyer, Department of Biology, Stark Neurosciences Research Institute, Department of Medical and Molecular Genetics, Indiana University-Purdue University Indianapolis

Funding from the NSF Undergraduate Research and Mentoring in the Biological Sciences Program, Indiana University-Purdue University Indianapolis School of Science Startup Funds, IU Collaborative Research Grant, American Health Assistance Foundation, and Fight for Sight are gratefully acknowledged.
STUDY AND ANALYSIS 100-CAR NATURALISTIC DRIVING DATA

Amanda Justiniano, Stanley Chien

Department of Electrical and Computer Engineering, Indiana University-Purdue University Indianapolis

Every year, there are a large number of injuries and fatalities caused by vehicles crashes. In particular, pedestrian accidents are often fatal and have greatly impacted people’s lives. Vehicle active safety system can sense and identify potential crash events and prevent or mitigate the collision either by warning the driver or by taking appropriate control actions such as autonomous braking. To design such these kinds of systems, we need to study how accidents happen and to avoid the accident in real-life scenarios. In this research, the Transportation Active Safety Institute (TASI) has recruited 110 drivers to collect naturalist driving data for pedestrian behavior analysis. In this project, my work is first to study how automatic pedestrian detection system works and verifies the detection results. I have worked analyzing picture frames from videos and by identifying pedestrians in these picture frames. Other components that are taken into consideration are the human factors, bio-mechanics, data acquisition and analysis, and consumer awareness. TASI uses facilities such as car simulators, Drive Safety DS-600c, directed towards the research of the driver’s behaviors and for testing the active safety system. It is the main source for testing the system since it projects a scenario of road images that interacts with a cab of a car to provide an immersive driving experience. Upon completion of the research, there should be a successful safety system for implementing in cars that can effectively reduce vehicle crashes by alarming drivers of different dangers that might appear while driving.

Research for this project was supported by Indiana University-Purdue University Indianapolis’ Diversity Scholar Research Program and Toyota.

USING AMINO ACID DERIVATIVES TO INHIBIT PSEUDOMONAS AERUGINOSA BIOFILM FORMATION ON CYSTIC FIBROSIS BRONCHIAL EPITHELIA CELLS

Jonathan LaCombe, Gregory G. Anderson

Department of Biology, Indiana University-Purdue University Indianapolis

Cystic Fibrosis is a genetic disease caused by a mutation which inhibits the proper transport of sodium and chloride ions across epithelium. Improper ion transport results in the accumulation of thick mucus in critical organs such as the lungs, pancreas, liver, and intestines. The genetic mutation is incurable, but treating the symptoms can vastly increase life expectancy. CF patients are often afflicted with bacterial infections which colonize the excess mucus within the lungs. The most prevalent pathogen associated with CF lung infection is Pseudomonas aeruginosa, a Gram-negative bacterium found in soil and water. Pseudomonas aeruginosa exists in two forms: planktonic (free-swimming) and sessile (immobile within a biofilm community). The planktonic form is about 1,000x more susceptible to antibiotics and immune cells than the sessile form. Biofilm communities of sessile bacteria are protected by an exopolysaccharide layer outside of the cell wall. Small molecules which inhibit biofilm formation or initiate biofilm disassembly can dramatically increase the effectiveness of drugs and the immune system. In order to identify novel biofilm-inhibitory molecules, we assessed the activity of a library of small molecules in biofilm assays. Active compounds were then screened for activity on living Cystic Fibrosis bronchial epithelial cells infected with Pseudomonas aeruginosa. Compounds which successfully inhibit biofilm formation without affecting the Cystic Fibrosis bronchial epithelium cells can potentially be a new drug for treating Cystic Fibrosis infections.
A DESCRIPTIVE QUANTITATIVE STUDY OF DIFFERENCES IN GLOBAL PERSPECTIVE SCORES BY CLASS STATUS IN A BACCALUAREATE NURSING PROGRAM

**Trisha Lecher, Mary E. Riner, Eman Allam**

Department of Global Affairs, Indiana University-Purdue University Indianapolis

This study explored differences in global perspectives scores of BSN students in first and second degree programs. Integrating global nursing education into the BSN curriculum is growing in importance and expected by national academic program accrediting organizations. Little has been reported in the literature about how nursing students’ global perspectives differ when they progress through the nursing program. The Global Perspective Inventory (GPI) was administered online to undergraduate nursing students. The 82 item 5-point Likert-like instrument included three scales, each with two sub-scales. In order to explore differences by semester, an item was added to the original GPI. Students received an email invitation, the link to the survey, and the access code to take the survey. Reminder emails were sent at one, two and four weeks. A total of 127 students or 15% of the student body completed the GPI. The IU School of Nursing admits in the third semester of a four year or eight semester program. Participation was fairly evenly distributed. The cognitive knowledge, intrapersonal affect, and interpersonal social interaction sub-scales showed significant differences. The ANOVA showed significant differences on sub-scale scores of cognitive knowledge and intrapersonal affect between students in semesters 3 and 7. There were more pairing differences on the interpersonal social interaction sub-scale. The seventh semester was significantly higher than the third, fifth, and sixth semesters. The seventh semester was present in all the significant positive pairings. One explanation is the learning assignments included in the community health course taken in this semester. During this course, students attend various locations in the community for their clinicals and complete a community assessment project. Both activities force students to get out of their comfort zones. Therefore, this study shows that a cultural project should be implemented each semester of the nursing program.

Mentor: Mary E. Riner, Department of Global Affairs, Indiana University-Purdue University Indianapolis

**INTERACTION OF MODEL LIPID VESICLES WITH ALVEOLAR MACROPHAGES**

**Robinah K. Maasa1,2, Matthew J. Justice1,2, Daniela N. Petrusca2, Irina Petrache1, and Horia I. Petrache1**

1Department of Physics, Indiana University Purdue University Indianapolis, 2Department of Medicine, Indiana University-Purdue University Indianapolis

Macrophages are a type of white blood cells that play key roles in host defense by detecting and dispensing of foreign bodies. They are also able to recognize and recycle cells that have undergone apoptosis. Apoptosis is a normal, programmed cell death that leads to elimination of unwanted cells without releasing harmful substances into the surrounding area. To perform their function properly, macrophages rely on complex molecular interactions involving both lipids and proteins. Previous studies have shown that surface exposure of phosphatidyserine by apoptotic cells is required for their successful clearance, suggesting specific lipid-protein interactions at least for the initiation of phagocytosis of apoptotic cells. However, macrophages can engulf foreign and apoptotic bodies that substantially vary in size suggesting that non-specific interactions over a range of length scales may be relevant. The purpose of our study is to investigate the correlation between physical properties of lipid bilayers and their engulfment by macrophages. We modify bilayer properties systematically as a function of phospholipid headgroup composition and by addition of ceramide and cholesterol. We use a combination of scattering and spectroscopic methods to quantify lipid interactions and flow cytometry to measure engulfment rates. Preliminary findings so far suggest that presence of phosphatidyserine increases the rate of engulfment from about 10% in the presence of phosphatidylcholine alone to
nearly 50% in the presence of equivalent amounts of both phosphatidylserine and phosphatidylcholine. This study can help distinguish between the role of lipids and proteins in clearance of apoptotic and foreign particles.

Mentor: Horia I. Petrache, Department of Physics, Indiana University Purdue University Indianapolis

Funding from NSF Undergraduate Research and Mentoring in Biological Sciences Program is gratefully acknowledged.

WNT SIGNALING IN ZEBRAFISH FIN REGENERATION: CHEMICAL BIOLOGY USING GSK3-β INHIBITORS

Jennifer L. Mahin\(^1\), Mark Farrel\(^1\), Courtney Curtis\(^1\), Swapnalee Sarmah\(^1\), Kayla Collins\(^1\), Shaoyou Chu\(^2\), Mas Sato\(^2\), Manuel Sanchez-Felix\(^2\), and James A. Marrs\(^1\)

\(^1\)Department of Biology, Indiana University-Purdue University Indianapolis; \(^2\)Lilly Research Labs

Due to its vital role in bone growth and development, understanding and manipulating the Wnts signaling pathway is essential to the future of bone repair and treatment. Current therapy for anabolic bone growth in osteoporosis patients in the United States is limited to costly parathyroid hormone (PTH) treatments. The anabolic effects of PTH treatment are due, in part, to modulation of the Wnts/b-catenin pathway. Bony rays are the main structure of the Zebrafish regenerating fin, making them a time and cost effective model for the study of bone remodeling. Experiments were conducted using various concentrations of a GSK3b inhibitor, and regenerative outgrowth was measured. Continuous low concentration (4-5 nM) treatments were most effective at increasing bone proliferation in the caudal fin. Higher concentrations inhibited fin growth, perhaps by excessive stimulation of differentiation programs. In situ hybridization experiments were performed to examine effects of GSK3b inhibitor on Wnt responsive gene expression. Initial experiments show temporal and spatial changes on individual gene markers following GSK3b inhibitor treatment. Immunofluorescence labeling and confocal microscopy reveal b-catenin, the Wnt intracellular transducer, accumulation throughout GSK3b inhibitor treated tissues and increased cell division in treated tissues. Experimental activation of the Wnt signaling pathway by inhibiting the enzyme GSK3b increased bone growth in regenerative tissue. The zebrafish proves itself to be an effective model for studying repair mechanisms; and, therefore has great potential in the field of bone repair and drug discovery.

Mentors: James A. Marrs, Department of Biology, Indiana University-Purdue University Indianapolis; Swapnalee Sarmah, Department of Biology, Indiana University-Purdue University Indianapolis.

BREAKFAST CONSUMPTION HABITS AND BARRIERS OF PREADOLESCENT FEMALES

Allison L. McCord, Anne E. Belcher, and Carol Shieh

Department of Environments for Health, Indiana University-Purdue University Indianapolis

Breakfast consumption improves concentration, academic performance, and class attendance in children, but many students do not eat breakfast especially inner city low-income Hispanics. The purpose of this study was to use fotonovelas as a qualitative method to investigate breakfast consumption behaviors by pre-adolescent females and what barriers they experience in having a healthy breakfast. Fotonovelas are a reading tool used in the Hispanic population, similar to a comic book. The booklets used in this study were developed from this concept to provide a culturally attractive research collection material for Hispanic participants. Five participants (aged nine to twelve; two Caucasian, three Hispanic), recruited from an after school program at a community center in the Midwest, wrote and drew pictures of their daily morning routine in a blank booklet during a one-hour time period. Booklets were analyzed for common themes by two members of the research team. Three common themes were found. Breakfast was not a priority in the morning routine by preadolescent females. The timing of eating breakfast was often following other activities. Non-nutritious breakfast was consumed. Pre-adolescent females ate high sugar content food for breakfast. Barriers to eating a nutritious breakfast included distraction by technology (video games, TV) and lack of parental involvement in the morning routine. Breakfa
eating is not a priority for pre-adolescent females, and when they eat, non-healthy food is consumed. The results of this study support the idea that healthcare providers and community members should encourage more parental involvement and discourage the use of technology in the morning routine to provide more time to prepare a healthy breakfast in the morning.

Mentors: Anne. E. Belcher and Carol Shieh, Department of Environments for Health, Indiana University-Purdue University Indianapolis

CAN WE MAKE AN AXON FROM SEMICONDUCTOR MEMRISTORS?

Qurat-ul-Ann Mirza

Department of Physics, Indiana University-Purdue University Indianapolis

Memristor, a short for memory resistor, is the fourth fundamental circuit element whose instantaneous resistance depends not only on the voltage, but also on the history of the voltage applied to it. This recently discovered titanium dioxide thin film device has characteristics that are analogous to voltage-gated ion channels in biological membranes. In 1952, Alan Hodgkin and Andrew Huxley (HH) introduced an electrical circuit model that described the behavior of a neuron membrane. The electrical circuit consists of a capacitor which is due to phospholipid bilayer, three resistors that represent each ionic channel, and batteries that drive the ionic currents. The purpose of our research was to investigate the characteristics that are shared by both the biological membranes and the memristors. We introduce a minimal Hodgkin-Huxley model for DC applied stimulus in which the leakage channel, membrane capacitance, and potassium equilibrium voltage are absent. We conclude that spiking requires sodium and potassium channels in Hodgkin-Huxley model and, therefore, we predict that two or more distinct memristor species are necessary to mimic the electrical response of a neuron.

Mentor: Yogesh Joglekar, Department of Physics, Indiana University-Purdue University Indianapolis

This study was funded by the Indiana University-Purdue University of Indianapolis Undergraduate Research Opportunities Program (UROP).

RACIAL DIFFERENCES IN VISUAL FUNCTION AND OCULAR BLOOD FLOW IN PEOPLE WITH HEALTHY EYES

Carine Olinde, Alon Harris, Brent Siesky, Jennifer Eikenberry, Damilola Awonusi, Lyne Racette

Eugene and Marilyn Glick Eye Institute, Indiana University-Purdue University Indianapolis

People of African descent (AD) are disproportionately affected by primary open-angle glaucoma (POAG), a progressive age-related visual disease that causes irreversible visual loss. We sought to determine whether differences in visual function (VF) and ocular blood flow (OBF) exist between people of AD and European decent (ED) with healthy eyes. One eye of each of 68 subjects (25 AD, 43 ED) with healthy eyes based on a complete ocular examination was included. VF was measured using Standard Automated Perimetry (SAP), Short-Wavelength Automated Perimetry (SWAP) and Frequency-Doubling Technology (FDT) perimetry. Each test targets a sub-population of retinal ganglion cells. OBF was measured using the Color Doppler Imaging (CDI) in the ophthalmic artery (OA), central retinal artery (CRA), nasal (NPCA) and temporal posterior ciliary arteries (TPCA). Racial differences in OBF were assessed using peak systolic velocity (PSV), end diastolic velocity (EDV) and resistive index (RI). While no racial differences were found in VF (all p>0.05), trends indicated worse sensitivity in people of AD for each test. Significantly lower PSV was observed in the OA (p=0.02) in people of AD and lower EDV was observed in the OA (p=0.01), NPCA (p=0.03), and TPCA (p=0.02) in people of AD. Significantly higher RI was observed in people of AD in the CRA (p=0.01) and NPCA (p=0.01). The results of this
study show a trend towards worse performance in VF and worse OBF in people of AD compared to people of ED, suggesting a possible association between OBF and VF.

Mentor: Lyne Racette, Eugene and Marilyn Glick Eye Institute, Indiana University-Purdue University Indianapolis

**INCREASED BINDING OF NICOTINE-TREATED STREPTOCOCCUS MUTANS WITH U937 MACROPHAGES**

**Jonathan C. Pearson**, Richard L. Gregory, L. Jack Windsor, Ghada Batarseh

Department of Oral Biology, Indiana University-Purdue University Indianapolis

Objective: *Streptococcus mutans*, the oral bacteria primarily responsible for the development of dental caries, has also been detected in atherosclerotic lesions. *S. mutans* has been shown to increase the recruitment of macrophages and inflammation, fostering the development of atherosclerotic plaque. Because smoking is a key risk factor of atherosclerosis, and nicotine up-regulates the biofilm growth of *S. mutans*, it is important to test if nicotine-treated *S. mutans* cells have a greater ability to bind with inflammatory macrophage cells, offering insight to the pathophysiology of atherosclerosis in smokers.

Methods: *S. mutans UA159* strain cells were treated with varying concentrations of nicotine (0 - 4.0 mg ml⁻¹) and then allowed to incubate with U937 human macrophage cells. The cells were then observed using light microscopy, and the number of *S. mutans* cells bound to the U937 cells was recorded. Results: Microscopic observation revealed a positive relationship between nicotine treatment and an increase in the number of *S. mutans* cells binding to the macrophages, beginning with the lowest concentration of nicotine tested (0.5 mg ml⁻¹; 29% increase), and increasing through the highest concentration of nicotine tested (4.0 mg ml⁻¹; 62% increase). Conclusions: A positive correlation between nicotine exposure and the binding of *S. mutans* cells with macrophages suggests the role smoking has in the increased risk of atherosclerosis. This may influence future studies involving the effects of nicotine on *S. mutans* and macrophage interaction and encourage the development of treatments to reduce the risk of atherosclerosis among smokers.

Mentors: Richard L. Gregory, L. Jack Windsor, Department of Oral Biology, Indiana University-Purdue University Indianapolis

**EFFECTS OF AEROBIC EXERCISE TRAINING ON DIAPHRAGM MUSCLE METABOLISM IN A RAT MODEL OF PULMONARY ARTERIAL HYPERTENSION.**

**Angela D Pittman**

Department of Physical Therapy, Indiana University-Purdue University Indianapolis

Pulmonary arterial hypertension (PAH) is characterized by a progressive increase in pulmonary vascular resistance that leads to right ventricular (RV) overload and eventually RV failure and death. PAH is associated with diaphragm muscle dysfunction and increased work of breathing which contributes to the exercise intolerance that is hallmark in this patient population. Our lab and others have described a shift in substrate utilization toward non-oxidative (glycolytic) metabolism in the RV and skeletal muscle of PAH rodent models as well as in patients. This project will determine if ‘glycolytic shift’ also occurs in the diaphragm muscle which may contribute to exercise intolerance and dyspnea. Since regular aerobic exercise is well-known to promote adaptations enhancing oxidative metabolism in cardiac muscle and skeletal muscle of the extremities, this project will also investigate the impact of exercise training on diaphragm muscle metabolism. Diaphragm muscles were harvested upon completion of a 6 week, 4x/wk. treadmill training program that consisted of 60 min runs at a relative intensity of 50% of aerobic capacity (VO2max). Abundance of glucose transporter Glut-1, a marker of glycolytic metabolism, is being evaluated by immunofluorescent (IF) staining at the cell membrane of diaphragm
myocytes. We expect to find that PAH rats have greater abundance of diaphragm Glut-1 and that exercise training at least partially ameliorates this PAH-induced ‘glycolytic shift’.

Mentor: Mary Beth Brown, Department of Physical Therapy, School of Health and Rehabilitation Sciences; Indiana University, Indianapolis

UTILIZING THE C2MAPS PLATFORM FOR CHARACTERIZING DRUG-PROTEIN RELATIONS, GENERATING MOBILE GAMES, AND CONSTRUCTING INTEGRATED PATHWAY MODELS

Mehdi Shadmand1 Pragat Wagle1, Evan Rouse1, Sara Ibrahim1

1Department of Biology, Indiana University Purdue University Indianapolis; 2Department of Computer Science, Indiana University-Purdue University Indianapolis

The C2Maps platform is a collection of genome-wide data that display the connections between drugs, diseases and genes. The C2Maps is used as a tool to compare and extrapolate known map data into unknown areas. By using C2Maps, researchers can compare genetic, sequential and physical information about disease specific proteins. Manual curation is important for the C2Maps platform in order to validate the literature mining approach and to overcome high levels of data noise generated from molecular networks. Currently we are examining specific drug-protein relationships in several diseases. In this research, the C-Maps website is being used to manually curate abstracts about disease specific drug-protein relations and then it is determined whether a drug “Up Regulates”, “Down Regulates”, or “Indirectly” affects a specific protein. Presently, more than 2000 specific protein-drug relations have been examined through the platform. We theorize that new drug-protein relations will be discovered through curation efforts. The data generated from the manual curation approach can be used to validate various protein-drug relationships in pharmacology and can determine the best possible drugs targeting specific proteins in cancer. Optimal drugs and their respective targets for a specific disease can then be incorporated into an integrative pathway model to analyze the mechanism of the drug. Specific properties of the drug, including chemical structure, can then be examined to determine how a specific drug acts on particular target proteins.

Mentors: Jake Chen, Department of Bioinformatics, Indiana University-Purdue University Indianapolis; Xiaogang Wu, Department of Bioinformatics, Indiana University-Purdue University Indianapolis

PRODUCT RECALL STRATEGIES: UNITED STATES VS. CHINA

Gabrielle Rayner, LaKeisha Cross

Department of Supply Chain Management, Indiana University-Purdue University Indianapolis

A product recall is defined as an action by a manufacturer or distributor to remove a product from the market because it may possibly cause health problems or death (Zhao & Hu, 2011). Product recalls occur because of inadequate inspection techniques, employees who are unfamiliar with the process, improper product design, etc. Companies can make decisions concerning their proactiveness/reactiveness (procedure) and compensation (outcome) toward the affected consumers when dealing with product harm crises. Will there be national cultural differences in consumer responses to these decisions and in the proposed moderating effect of the degree of product hazard? Based on the above analysis, a quantitative analysis using questionnaires was performed. The methodology was a controlled experiment, manipulating 2 levels of compensation (high vs. low), 2 recall strategies (proactive vs. reactive) and 2 levels of product hazard (high vs. low). A group of 200 undergraduate business students in the U.S. and Hong Kong were given surveys that assessed their purchase intention and other factors, based on the manipulated variables. Using t-test and one-way ANOVA analyses in SPSS 16.0, the results show that, when companies are proactive in their recall strategy, consumers care less about the outcome; no matter how severe the product hazard is, while, when companies use a passive recall strategy, consumers...
care more about the outcome. Although companies are not able to avoid recalls completely, it is important that they develop an effective method to increase consumer repurchases and recover quickly when dealing with a product harm crisis. The results also demonstrate that both procedure and outcome have significant effect on consumers’ attitudinal and behavioral reactions.

Mentors: Barbara B. Flynn, Hua Feng, Department of Supply Chain Management, Indiana University-Purdue University Indianapolis

This study was funded by the Indiana University-Purdue University Indianapolis Ronald E. McNair Postbaccalaureate Achievement Program (McNair) and Diversity Scholars Research Program (DSRP).

WHAT ARE THE CORRELATIONS BETWEEN MUSCLE STRENGTH, MOTOR COORDINATION, AND DAILY FUNCTION OF THE UPPER EXTREMITIES IN OLDER ADULTS?

Keishona Roby, Chiung-ju Liu, and Alyssa Gutierrez

Department of Occupational Therapy, Indiana University-Purdue University Indianapolis

Muscle strength is needed to perform everyday activities. However, age-related decline in muscle strength can impair older adults’ independence at home. Age-related decline in muscle strength occurs in the lower and upper extremities. The literature has shown a strong correlation between the loss of muscle strength in the lower extremities and mobility disability. However, little is known about the loss of muscle strength in the upper extremities and daily function. The purpose of this study is to see how muscle strength relates to motor and daily function in the upper extremities of older adults. We hypothesize that when muscle strength is lost in the upper extremities, it would be difficult to perform dexterous and skillful hand functions: such as carrying, pulling, pushing or lifting things. We plan to recruit 60 community dwelling older adults. The assessment testing will include: the Purdue Pegboard (a performance measurement to test coordination), Jebsen Test of Hand Function (a performance measure to test dominant upper extremity), a Hand Dynamometer (to measure grip strength), Late Life Function and Disability Instrument (a self-report tool that measures daily functioning of the upper extremities) and a 30 second Arm Curl (which assess the strength of the dominant upper extremity). This will be a one-time study that will take about 20 to 30 minutes to complete the whole process of screening and all tests. We anticipate a positive correlation between muscle strength, motor coordination, and daily functions of the upper extremities in older adults.

Mentor: Chiung-ju Liu, Department of Occupational Therapy, Indiana University-Purdue University Indianapolis

BIOMECHANICS OF SMOOTH MUSCLE CELL DIFFERENTIATION: EXPERIMENTAL STUDY USING AN INNOVATIVE IN VITRO MECHANICAL SYSTEM

Zahir Sheikh, Julie Ji, Omar El-Mounayri and Hazim El-Mounayri

Department of Biomedical Engineering, Indiana University-Purdue University Indianapolis
We have implemented an innovative mechanical device which simulates the pulsatile stretching SMCs undergo in their in vivo environment. This device is made up of ABS polymer using a rapid prototyping machine with a resolution of 1/10000 inch. It provides a sterile environment tailored for SMCs plated on silicone substrates. Using the new system and techniques from molecular biology, we will evaluate cell differentiation when phenotypically modulated SMCs undergo cyclic mechanical loading at varied percentage strains (5-50%), time durations (up to 12 hours) and frequencies (up to 60 cycles). We will run Western blots for α-actin, γ-actin, transgelin, and calponin and use quantitative RT-PCR (qRT-PCR) to analyze changes in protein and gene expression. These techniques will investigate how stretch conditions affect SMC lineage specification, and elucidate the role of strain on SMC differentiation. This facet of research may prove valuable in the analysis of the effect of mechanical stress on maintaining SMC lineage as well as the study of how pathological stretch conditions affect SMC gene and protein expressions. In the future we hope to further improve upon the efficiency of the device and implement real time analytical capabilities with live cell fluorescence imaging.

Research for this project was funded by the Multidisciplinary Undergraduate Research Institute

IONIZING RADIATION AFFECTS EPIGENETIC PROGRAMMING IN ADOLESCENT MICE

Darryl S. Watkins1, Marc Mendonca2, Amy Lossie3, and Feng C. Zhou1, 4, 5

1Department of Anatomy and Cell Biology, IU School of Medicine; 2Department of Radiation and Cancer Biology, IU School of Medicine; 3Department of Animal Sciences, Purdue University; 4Department of Psychology, Indiana University-Purdue University Indianapolis; 5Stark Neuroscience Research Institute

Humans are exposed to low and mild doses of radiation frequently, ranging from the natural environment to medical procedures like x-ray and CT scans. Ionizing radiation of various doses has been known to potentially cause not only cellular but also genomic changes. Here, we demonstrate that epigenetics is also altered by the radiation. Epigenetics is a chemical coding above the gene, which plays crucial roles in brain development, cognitive aberrations and other neurological impairments. How radiation, as an external environmental factor, causes epigenetic change is not understood. DNA methylation, key in epigenetics, including 5-methylcytosine (5M) and 5-hydroxymethylcytosine (5-hmC) have been shown to either suppress or activate gene transcription. To aid in elucidating the role in which radiation affects epigenetic outcomes, we examined the effects of radiation on both epigenetic and phenotypic markers within the hippocampus. In this study we treated, via x-ray C57BL/6 mice, postnatal day (P) 21 with various doses (2Gy-4.5Gy) of radiation coupled with varying frequencies (0.5 Gy x 4, 1.5 Gy x 3, or 4.5Gy x 1) during a 4-week period. We used immunohistochemistry staining with cell proliferation, transcription and epigenetic markers. We found loss of 5M in the sub-granular layer of the dentate gyrus (DG). Likewise a loss of 5-hmC in the sub-granular layer of the DG, as well as in the cornu Ammonis (CA) layers 1 and 2. There was also loss of a transcriptional activation marker within the DG of the hippocampus. Furthermore, decreased cell proliferation in the adult neurogenesis in the hippocampus was found. Exposure to ionizing radiation altered the normal epigenetic profile of the mice. Understanding the mechanism by which ionizing radiation affects epigenetic programming will provide insight into how to develop protection against the potentially harmful risks associated with radiation exposure.

Mentor: Feng C. Zhou

Department of Anatomy and Cell Biology, IU School of Medicine; Department of Psychology, Indiana University-Purdue University Indianapolis; Stark Neuroscience Research Institute, Indianapolis, IN

Funding provided by the National Institute of Health (NIH), Bridges to Baccalaureate Program (Bridges), and Indiana University Collaborative Research Grant (IUCRG).
EFFECTS OF GREEN TEA EXTRACTS ON BONE HOMEOSTASIS IN THE TS65DN DOWN SYNDROME MOUSE MODEL

Jared R. Thomas1, Irushi S. Abeysekera2, Joshua D. Blazek2, and Randall J. Roper2

1Ivy Tech Community College- Central Indiana, Bridges to the Baccalaureate; 2Department of Biology, IU School of Science, Indiana University-Purdue University, Indianapolis

Down Syndrome (DS) is a genetic disorder caused by trisomy of human chromosome 21 (Hsa21). DS phenotypes include cognitive impairment, craniofacial abnormalities, low muscle tone, and skeletal deficiencies. We utilized the Ts65Dn mouse model that exhibits similar phenotypes as found in humans with DS. In this study we focused on deficits in bone mineral density (BMD), architecture, and bone strength. Over-expression of DYRK1A, a serine-threonine kinase encoded on Hsa21, is linked to deficiencies in DS bone homeostasis. Epigallocatechin-3-gallate (EGCG), an aromatic polyphenol found in green tea (GT), is a known inhibitor of Dyrk1a activity. Normalization of Dyrk1a activity by EGCG may have the potential to regulate bone homeostasis, increase BMD and bone strength. In this study, we hypothesized that EGCG obtained over the counter would not perform as effectively as EGCG from Sigma, in correcting bone deficits associated with DS. We performed High Performance Liquid Chromatography–Mass Spectrometry (HPLC-MS) on EGCG compounds to determine purity of EGCG and the concentration in our stock solution from each vendor. Next, we treated three-week-old Ts65Dn and control male mice with EGCG for three weeks. At six weeks of age, mice were sacrificed. DXA and micro CT analysis were performed on the femurs and skulls of the mice to assess trabecular and cortical BMC and BMD. HPLC results showed that EGCG from other vendors did not exhibit the same purity as pure EGCG. Degradation analysis displayed that pure EGCG retained higher concentration compared to other vendors. Preliminary microCT analysis shows EGCG from other vendors were more productive in correcting deficits found in trabecular bone. DXA results appeared to show pure EGCG improved deficits BMD found in the femur. Our preliminary results indicate the ability of EGCG to ameliorate skeletal deficiencies and a significant assessment between pure EGCG and those purchased from other vendors.

Mentors: Randall J. Roper, Department of Biology, Indiana University-Purdue University, Indianapolis; Josh D. Blazek, Department of Biology, Indiana University-Purdue University, Indianapolis

This study was sponsored by Bridges to the Baccalaureate Program.
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Campus: IU Bloomington

Program: Archeology / YankeeTown, Indiana
Contact: Dr. Susan Alt, susalt@indiana.edu
Campus: IU Bloomington

Program: Chemistry (several programs)
Website: http://www.chem.indiana.edu/undergraduate/opportunities/research.asp
Campus: IU Bloomington

Program: Cox Research Scholars Program
Website: http://www.scholarships.indiana.edu/scholarships/cox/Research.php
Contact: Legene White, Director, whitell@indiana.edu; or, Robin Walker, Program Assistant, walkerrm@indiana.edu
Campus: IU Bloomington

Program: Groups STEM Initiatives
Website: http://www.indiana.edu/~groups/stem.html
Contact: Mr. Vincent Isom, visom@indiana.edu
Campus: IU Bloomington

Program: Integrative Cancer Biology Program
Website: http://www.bio.indiana.edu/undergraduate/opportunities/research/index.shtml
Contact: Dr. Ken Nephew
Campus: IU Bloomington

Program: Kinsey Research Institute
Website: http://www.kinseyinstitute.org/research/student_grants.html
Contact: Dr. Barbara Van Der Pol, KISRG@indiana.edu
Campus: IU Bloomington

Program: LATS L105 - Diversity by the Numbers
Contact: Dr. Sylvia Martinez, symartin@indiana.edu
Campus: IU Bloomington

Program: Physics Research Program
Website: http://www.indiana.edu/~physreu/
Contact: physreu@indiana.edu
Campus: IU Bloomington

Program: STARS (Science, Technology , and Research Scholars) Program
Website: http://college.indiana.edu/undergradscienceresearch/stars/
Contact: Jeremy Bennett, jebennet@indiana.edu
Campus: IU Bloomington
RESEARCH OPPORTUNITIES CONTINUED

Program: Office of Student Research (OSR)
Website: www.iupuc.edu/studentresearch. 10 x $1,000 grants to individual students or research teams during the academic year
Contact: Dr. Julie Goodspeed-Chadwick, juligood@iupuc.edu
Campus: IUPUC Columbus

Program: Indiana Clinical and Translational Sciences Institute (Indiana CTSI)
Contact: Elizabeth Rubens, erubens@iupui.edu
Campus: Indianapolis

Program: IUPUI Nanotechnology Discovery Academy (INDA) for High School Students and Teachers
Contact: Dr. Mangilal Agerwal, crlstaff@iupui.edu
Campus: Indianapolis

Program: Louis Stokes Alliances for Minority Participation (LSAMP)
Contact: Kim Nguyen, knguyen@iupui.edu
Campus: Indianapolis

Program: Summer Diversity Scholars Research Program (S-DSRP)
Contact: Vicki Bonds, vgayfiel@iupui.edu
Campus: Indianapolis

Program: Undergraduate Research Opportunities Program (UROP) Summer Fellows
Contact: Richard E. Ward, reward@iupui.edu
Campus: Indianapolis

Program: Undergraduate Summer Research Support Program—$1,000 to support research during the summer
Contact: Dr. J. Albaayyari, albayyaj@ipfw.edu
Campus: IPFW

Program: Undergraduate Research Supplies and Expenses Mini-Grant Program -$250 to defray costs of summer research efforts
Contact: Dr. J. Albaayyari, albayyaj@ipfw.edu
Campus: IPFW

Program: Pathways to Science database includes over 1,500 research programs in a variety of disciplines and education levels across the U.S.
Contact: Chris Cash, Director of Student Assistance Programs, ccash@ibparticipation.org
Organization: Institute for Broadening Participation
SUMMER RESEARCH EXPERIENCES FOR UNDERGRADUATES
What are they good for? How does it all work?
Finding and Applying to Programs

WHAT IS “SUMMER RESEARCH”?
Research experiences for undergraduates give students a chance to work in meaningful ways with faculty and researchers conducting ongoing research programs or projects. These programs offer a hands-on experience in the lab or in the field with professional development support. It’s meant to build your skills, to be fun and inspiring, and it’s often paid – most programs offer a stipend and many cover travel and housing as well. It’s often in the summer – but not always! Some programs occur during the academic year as well.

WHY SHOULD I APPLY?
⇒ Build your academic foundation.
⇒ Get hands-on experience in the field.
⇒ Explore fields of interest.
⇒ Make valuable connections with faculty.
⇒ Enjoy travel, new friends, and fun!
⇒ A stepping stone to graduate school.

www.pathwaystoscience.org
contactus@ibparticipation.org

Last updated
1/30/12

Dr. Rick Wahle with Gulf of Maine and World Ocean REU students on the annual research cruise (2011)

REU students at the Shoals Marine Laboratory

REU intern Cristina Lugo-Centeno at the Snowmass, CO mastodon site (2011)

REU intern Breanna Skeets, working in a lab in her hydrologic study (2011)

REU intern Reannah Shokudou at the field lab in the hydrology study (2011)

REU in Chemistry U.Michigan

REU in Chemistry U.Michigan

Professional Development

Fun!

Lab work!

Field work!
Great! So How Do I Apply?
It takes time and effort to search for, select and apply to programs you are interested in – and it’s time and effort that has to fit in around all your other schoolwork! Here’s a suggested timeline that will help you plan for success.

I. Summer / Early Fall
- Get organized
- Begin drafting cover letter & personal statement
- Update and revise your resume
- Use your campus career and writing centers!
- Discuss the potential of summer research experience with family

II. Fall
- Search for programs. Use www.pathwaystoscience.com!
- Note application deadlines, requirements and contacts
- Seek input from peers and mentors
- Make use of extra time during Thanksgiving break!
- Identify & talk with potential recommenders
- Research process for requesting transcripts
- Stay organized!

III. Early to Mid Winter
- Make your final selection of programs to apply to
- Request letters of recommendation 2 months in advance
- Polish - and re-polish - your essays & cover letter
- Request transcripts

IV. Mid to Late Winter
- Make use of your winter break to work on your apps.
- Follow up with your recommenders
- Make sure your contact info will be active in spring
- APPLY! Complete and submit applications.
- Call to confirm your application was received in full.

V. Spring
- Keep a look out . . . check your email!
- Consider offers: stipend? housing? travel?
- Select and respond

VI. Early Summer
- Receive and read materials for your program
- Sign and return forms as appropriate
- Join the program’s listserv or social media tools
- Touch base with your recommenders - let them know your successful outcome, and say thank you!

Congratulations! Have a great summer, and enjoy your undergraduate research experience!

For more details, visit The Resource Toolbox at www.pathwaystoscience.org and print PDF handouts on:

- The Benefits of an Undergraduate Summer Research Experience
- Discussing Summer Research with Your Family
- Searching for a Program: Great Online Search Tools
- Creating a Winning Application
- Writing Strong Essays and Personal Statements
- Getting Strong Letters of Recommendation

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