



University of Montana Presents

The 14th Annual
UM Conference on
Undergraduate Research



Program
and
Abstracts

April 17, 2015 ~ Missoula, Montana



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University of Montana,
Conference Planning Services
www.umt.edu/sell/cps

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**Special thanks to all the mentors, reviewers, judges,
and volunteers who donated their time!**

UMCUR 2015

UNIVERSITY OF MONTANA

Davidson
Honors
College



University of Montana

Conference on Undergraduate Research

April 17, 2015

Sponsored By:

Office of the President

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Davidson Honors College

UMCUR Welcome

We are pleased to welcome students, faculty, staff, and alumni to the fourteenth annual University of Montana Conference on Undergraduate Research (UMCUR). Over 120 students will present their research today, and we are delighted to celebrate their accomplishments!

This conference has been a tradition at the University of Montana since 2001. Undergraduate research is an important endeavor for both students and faculty because it has the potential to create a tremendous sense of empowerment, confidence, and intellectual growth. Since people will continually encounter problems without established answers throughout their professional careers, the skills gained through participation in original research will have long-lasting, beneficial consequences for students of all majors.

We extend special thanks to President Royce Engstrom and Provost Perry Brown for their support of this conference and their commitment to undergraduate research and creative scholarship. Many undergraduate research projects at UM are carried out with scholarship support, and for that support we are truly grateful to many private donors. We also extend our sincere appreciation to all faculty members who have reviewed conference proposals and mentored the students presenting at the conference. We are likewise grateful to the faculty, alumni, community members, graduate students, and undergraduates who have volunteered their time and expertise as judges and facilitators for the conference. We could not do it without you!

We trust that you will have an enjoyable day, will learn some new information, and will see that celebrating undergraduate scholarship has many benefits.

Liz Putnam

UMCUR Director

Undergraduate Research Committee Chair

Dean, Davidson Honors College



UMCUR Keynote Speaker

12:20 p.m., University Center Theater ~ April 17, 2015



The Wizard of UM in New Zealand

Garon Smith

Professor of Chemistry

University of Montana

Abstract:

If you were a wizard in search of a location for a career-capping sabbatical, what could be more exciting than Middle Earth (a.k.a., New Zealand)? Through the kindness of UM, I was able to spend January through mid-July 2014 traveling throughout this island nation. I drove more than 16,000 kilometers on the left-hand side of the road, performing 117 times to more than 10,000 students as a science and goodwill ambassador for both UM and the New Zealand University system. I was invited to perform for visitors to the Weta Workshop, home of the people who create costumes and props for Middle Earth productions. I wandered through the woods in my wizard regalia at the film location of Rivendell and sipped a cup of cider in Hobbiton's Green Dragon Tavern. While on the South Island, I was hosted by the University of Otago in Dunedin. On the north, I was based at the University of Waikato in Hamilton.

Besides exploring the differences between US and NZ educational systems, I spent plenty of time as an environmental scientist learning about their pressing issues – water quality problems resulting from the intensification of dairy herds that underpin their current agricultural economy and the use of pesticide 1080 (sodium fluoroacetate) for predators that have taken native bird populations to the brink of extinction. I visited two predator-free islands where flightless birds and native plant communities are making a dramatic come-back. I was directed to a secret pool where a hundred baby seals bond in riotous play beneath a sparkling waterfall. I got to carry a year-and-a-half old brown kiwi for release into one of the most successful North Island wildlife reserves. Finally, I tramped many miles on NZ's Great Walks, some of the world's finest back-country trail systems.

About Garon Smith



Dr. Garon Smith has been at the University of Montana since 1991. He won UM's 2004 Most Inspirational Teacher of the Year Award and was named Montana Professor of the Year in 2008 by the Carnegie Foundation for the Advancement of Teaching. Recently, he was voted Best UM Professor in the 2014 Best of Missoula balloting.

His introductory chemistry course is one of the largest classes on campus, serving an annual population of 1,000 students across two semesters and multiple sections. As an affiliate faculty member of the Film Studies program, he offers The History of Science Fiction Films during both the academic year and the summer Teaching with Film Institute. His Potions 101 course is offered as part of the Schwanke Honors Institute every other June. He has been a Senior Leadership Fellow with the National Science Foundation's National Center

for Science Education and Civic Engagement since 2001 and, as a faculty member, teaches at their annual SENCER Summer Institute at various universities across the country.

Dr. Smith conducts research on air pollution, training honeybees to find explosives, green chemistry, theoretical thermodynamics and snowflakes. He was on the Board of Governors for the National Conference on Undergraduate Research for nine years. Twice, in 2000 and again in 2010, he chaired the national NCUR conference when our campus hosted it. He has served first as a scientist and, since 2004, as chair of the Missoula City-County Board of Health, the Air Pollution Control Board and Missoula Valley Water Quality District Board.

UMCUR Schedule Overview

University of Montana

Conference on Undergraduate Research (UMCUR)

April 17, 2015

University Center 3rd Floor

- 8:00 AM** Registration & Poster Setup - UC 3rd Floor, Grand Foyer
- 9:00 - 11:20 AM** Oral Sessions - UC 326-331
- Social Sciences, Physical Sciences, Humanities, and Visual/Performing Arts & Creative Writing
- 11:00 AM - 12:00 PM** Poster Session #1 - South UC Ballroom
- 12:20 AM - 1:30 PM** Keynote Speaker - UC Theater
- 1:40 - 5:00 PM** Global Leadership Initiative (GLI) Capstone Presentation Session - North UC Ballroom
- 1:40 - 3:00 PM** Oral Sessions - UC 326-332
- Social Sciences, Life Sciences, Physical Sciences, Humanities, and Visual/Performing Arts & Creative Writing
- 3:00 - 4:00 PM** Poster Session #2 - South UC Ballroom
- 4:00 - 5:00 PM** Oral Sessions - UC 326-332
- Social Sciences, Humanities, Life Sciences, and Visual/Performing Arts & Creative Writing

**Please check the schedules outside each room for the most up-to-date times for each presenter.*

Awards Ceremony

We are pleased to announce that President Engstrom will be hosting the UMCUR Awards Ceremony on Monday, April 28, 2:00 – 3:00 p.m. in the Theta Rho Room at the Mansfield Library. We hope you will join us to celebrate our UMCUR 2015 award winners.

UMCUR Schedule Breakdown

Only the submitting author will be shown in schedule. Please view abstracts in the back of the program for all authors.

8:00	Participant Registration and Poster Set-Up - UC 3rd Floor Grand Foyer
Oral Sessions: 9:00-11:20 AM	
UC 326 ~ Social Sciences	
9:00	#50 Glacial Retreat in Glacier National Park: A Sample of Global Climate Change ~ Leah Lynch
9:20	#57 Searching for Success in Asymmetrical Conflicts ~ James Papai
9:40	#62 Sexual Assault Reports to the Police: A Pilot Investigation of the Factors that Influence Victimization Reporting and Victim Perceptions of Police Responses ~ Hailey Powers
10:00	#73 University Of Montana's Native Plant Landscaping: Interpretation and a Proposal for Future Educational Strategies ~ Jonathan Nelson
10:20	#111 Women's Voices for the Earth: A Discourse Analysis of Gendered, Environmental Media Advocacy ~ Marit Olson
10:40	#114 NCAA Enforcement and its Impact on College Football Winning Percentage ~ Gavin Hagfors
11:00	#138 Do Families Inspire? ~ Joel Davison
UC 327 ~ Social Sciences	
9:00	#147 Advantages and Challenges of Incorporating Virtual Currency into Small Businesses ~ Spencer Sheehan
9:20	#47 European Youth: Jockeys in Eurosceptic Dark Horse Politics? ~ Chase Ellinger
9:40	#70 Strengthening the Circle: Seeking Healthcare Equity for American Indians Experiencing Homelessness ~ Damion Barnett
10:00	#94 Avoiding the Blue Period in Homeless Populations: Creative Pursuits and Their Potential to Redefine Self Worth in Shelter Populations. ~ Tirza Asbell
10:20 - 10:40	#110 Truth Commissions and Collective Memory in Latin America ~ Mona Schwartz
UC 330 ~ Physical & Life Sciences	
9:00	#72 Retinoic Acid Hydrolase Inhibitors as a Novel Therapy for Alzheimer's Disease ~ Isabel Makman
9:20	#66 Analysis of Recent DDoS Attacks: an Application of Mirkovic and Peng Taxonomies ~ Jose Rodriguez
9:40	None
10:00 - 10:20	#109 Advantages of Halogen Bonding for Halide Recognition in Wet Solvents ~ George Neuhaus

Want to participate in the 2016 UMCUR? Make sure to visit the UMCUR Website and Like us on Facebook to keep up with current happenings.
www.umt.edu/ugresearch/umcur

UC 331 ~ Humanities

9:20	#46 Women's Bodily Integrity: Rosario Castellanos' Critiques in the 21st Century ~ Alanna Wulf
9:40	#11 The Effects of Dual Language Immersion on Kindergartners ~ Carly Wilczynski
10:00	#22 Variability in Riparian Ecosystem Composition and Structure~ Tracy Hall
10:20	#58 Fighting Without Hatred: Ernesto Cardenal, US Catholic Radicals, and the Question of Violence in Nicaragua, 1957-1979~ Brendan Jordan
10:40	#112 History on the Pitch: The Social and Economic Impact of Soccer in Post-War London ~ Shaun Bummer
11:00	None

UC 332 ~ Humanities

9:00	#42 Resisting Purity Politics: Scandal and Dissent in Caminetti's America ~ Jennifer Pepprock
9:20	#49 Romantic Science ~ Tylyn Newcomb
9:40	#100 Marketing Identity: Consumer Society, Ethnic Sectarianism, and the Commodification of the Orient in Little Syria, America ~ Eamon Ormseth
10:00	#104 Butte, America: Poor Practices of the Richest Hill on Earth ~ Shannon Buswell
10:20-10:40	#108 Dibe' Bikee' Deya: Following Sheep in Coal Country ~ Caitlin Piserchia

UC 333 ~ Visual/Performing Arts & Creative Writing

9:00	#21 Utilizing Mental Practice to Combat Performance Anxiety in Performing Musicians ~ Stephanie Quist
9:20	None
9:40	#84 Trigger for Change: Theatre as a Tool for Social Dialogue ~ Sydney Blackmore
10:00	#32 The Story Behind the Story ~ Mahkia Clark
10:20 - 10:40	#56 Two Halves Do Not A Whole Make: The Silent Voices of Bicultural America ~ HanaSara Ito

Poster Session #1: 11:00 -12:00 PM South UC Ballroom (Listed by poster # - abstract # is after the title.)

Humanities

#5	Facebook's Fall in the Social Media Age ~ Sydney Gillette #85		
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Life Sciences

#9	Stereotypical Behavior in Captive Tigers - #145 ~ Jenna Mace	#12	Molecular Biology of a Surface-Exposed Protein Family of Bartonella bacilliformis - #69 ~ Hannah Fay
#10	Motility in Chlamydomonas reinhardtii - #24 ~ Margrethe Boyd	#13	Effects of Genetic Diversity on Winter Seed Production - #93 ~ Kevin Moore

Continued

Poster Session #1: 11:00 -12:00 PM
South UC Ballroom
- Continued

Life Sciences - Continued

#14	A Novel Selective Inhibitor of CYP26B1 Potentiates the Effect of a Nanomolar Concentration of Retinoic Acid in Human Neuroblastoma SH-SY5Y cells. - #123 ~ Michel Santos	#18	Spatial Variability of Soil Nematodes and Arbuscular Mycorrhizal Fungi in Western Montana Grasslands - #91 ~ David Fulton-Beale
#15	Resolving the Western Chipmunk Phylogeny - #41 ~ Erin Nordquist	#19	Developing Non-invasive Microbial Biomarkers to Inform Elk (<i>C. canadensis</i>) Health in Wild Montana Populations - #131 ~ Samuel Pannoni
#17	Nutrient Dynamics in the Upper Clark Fork River - #90 ~ David Fulton-Beale	#20	Betta Less Motivated: Effects of Fluoxetine on Betta Splendens - #146 ~ Clyde Collins

Physical Sciences

#26	Do Westslope Cutthroat Trout (<i>Oncorhynchus clarkii lewisi</i>) and Sculpin (<i>Cottus</i> sp.) compete in Tributaries of the Bitterroot River, MT? - #26 ~ Rennie Winkelman	#31	LabVIEW Data Acquisition System - #105 ~ Andrea Johnson
#27	Did the Colorado River Once Run North from Grand Canyon to Montana? Geologic Field Evidence in the Swan River Valley - Pocatello Area of Idaho - #36 ~ Siobhan Burke	#32	Diastereoselectivity in an Exhaustive Bromination of an Anthracenyl-Isoxazole - #139 ~ Michael Campbell
#28	Using a Spiral to Estimate Spatial Lattice Model Parameters - #82 ~ Geoffrey Glidewell	#33	Comparing the Effects of Low-level Therapeutic Laser and Sham Treatments on Ankle Dorsiflexion Range of Motion in Recreational Runners - #28 ~ Reegan von Wildenradt
#29	Variability in Riparian Ecosystem Composition and Structure - #97 ~ Kevin Carns	#34	The Geologic Progression of the Eastern Snake River Plain - #37 ~ Shah Khan
#30	Did an Amazon-styled river flow through Montana? - #101 ~ David Kilcoyne		

Social Sciences

#44	Investigate Students' Understanding of the Prime Factorization and Use of Prime Numbers in Regards to the Fundamental Theorem of Arithmetic. - #20 ~ Heather Vallejo	#46	Written Language Sampling in Seventh-Grade Students: An Examination of Semantics and Pragmatics - #35 ~ Kalie Schwartzenberger
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**Poster Session #1: 11:00 - 12:00 PM
South UC Ballroom - Continued**

Social Sciences - Continued

#45	Written Language Sampling in Seventh-Grade Students: An Examination of Syntax - #34 ~ Sarah Fink	#49	Teen Mothers' Educational Attainment and Delinquency in Children - #59 ~ Mary McCarvel
#47	Assessing the Feasibility of a New Tongue Base Retraction Exercise - #39 ~ Lauren King	#51	A Different Look into Creativity: Bipolar Disorder and Schizophrenia - #121 ~ Capri Richardson
#48	A Qualitative Analysis of Rural Health Literacy - #45 ~ Lorraine Adams	#52	The Efficacy of an Individualized Treatment Program for a Child with Autism - #13 ~ Phillip Thomas

**12:20 - 1:30 p.m. - Keynote Speaker:
Professor Garon Smith - UC Theater
"The Wizard of UM in New Zealand"**

**New this year: UMCUR will feature a Global Leadership Initiative (GLI)
Capstone Presentation Session**

These presentations feature Capstone Research from students in University of Montana's Global Leadership Initiative (GLI). These GLI students are in their fourth and final year of the GLI fellowship. Throughout their four years they have been involved in unique and enriching academic learning that has combined practical experience with their classroom education. GLI students received access to world-class leaders and opportunities to explore society's questions either locally or around the world. GLI's distinctive program brings together students from different disciplines to tackle real-world problems with diverse ideas.

**GLI Capstone Presentation Session 1:40 - 4:10 PM
North UC Ballroom**

All Presentations

1:40	Making the Most of Intercultural Interactions: Designing a Catalyst for Intercultural Learning at the University of Montana #102 ~Amanda Charron, Joseph Crowley, Taylor Dantic, Hannah Goetz, Ashley Roness
2:00	Missoula Bike Swap: Creating a Step-by-Step Guide - A Community Enhancement Project #83 ~Madeline Halverson, Cody Dems, Brigitte Donahugh, Sheridan Cook, Danielle Albo
2:20	UM Volunteers for Global Health Access #76 ~ Rachael Schmoker, Kyla Crisp, Dylan Chaffin, Taylor Preston
2:50	\$8.05 Montana: Humanizing the Wage Debate #30 ~ Katheryn Houghton, Dani Howlett, Kaci Felstet, Mackenzie Enich
3:10	Getting Wild at School: Adopting a Wilderness-Based Orientation Program #122 ~Emily McKay, Alanna Wulf, Thomas McKean, Jennifer Nelson, Harold Kelley
3:30	Realizing Sustainability: Exchanging Concepts for Solutions #25 ~ Kylie Rebich, Ashley Kanduch, Natalie Black, Azucena Martinez, Rebecca Singleton
3:50	Expressive Arts as a Means of Increasing Well-Being in Children #55 ~ Emily Vascimini, Jordan Frotz, HanaSara Ito, Danielle Smith

Concurrent Oral Sessions: 1:40-5:00 PM

UC 326 ~ Social Sciences

3:20	#19 The Influential Role of the Secretary of State's Office in the Pacific Northwest ~ Hailey Duffin
3:40	#116 Rockin' Formidable Flavor when Rollin' with the Punches: Constellations of Personality Traits and their Observed Effect on Problematic Alcohol Use when Facing Victimization as a Sexual Minority ~ Nate Christianson
4:00	None
4:20-4:40	#135 The Visibility of Homelessness in Missoula ~ Westen Young

UC 330 ~ Physical Sciences

1:40	#89 Charcoal Production In Mixed-Conifer Forest Under High Severity Initial Fire and Repeat Burns ~ Aspen Ward
2:00	#33 Comparing the Effects of Diathermy and Dynamic Stretching on Hip Flexor Flexibility and Postural Control ~ Britt Dickman
2:20	#77 Examining Rewarming Trends Following Cryokinetics Using Different Cooling Modalities on Ankle Skin Surface Temperature ~ Nora Ifft
2:40	#9 Bat Use of Bridges in Missoula, Ravalli, and Mineral Counties in Western Montana ~ Ellen Whittle
3:00	#133 Wilderness in the Face of Climate Change ~ Sarah Capdeville
3:20 - 3:40	#79 Expression and Characterization of Gene Duplicates in Bacterial Endosymbiont Speciation ~ Daniel Mullee

UC 331 ~ Humanities

1:40	#53 Reading, Walking, and Writing the Camino de Santiago ~ Rebecca Collins
2:00	#12 "Have You Got Good Religion?": The SNCC Freedom Singers and American Civil Rights ~ Reagan Colyer
2:20	#54 Fannie Lou Hamer's Pastoral and Prophetic Styles of Leadership as Acts of Public Prayer ~ Breanna Barber
2:40	#67 Global Solutions to Local Problems: How the Global Community Responded to the Ebola Outbreak of 2014 ~ Nicole Thelen
3:00	#80 From Odysseus to Odysia: Exploring a Gender-Bent Adaptation of The Odyssey ~ Cristina Jardon
3:20	#74 Fatal Woman, Revisited: Understanding Female Stereotypes in Film Noir ~ Danielle Smith
3:40	#16 Inviting the Divine: The Role of Clerical Clothing during the Civil Rights Movement. ~ Charley Bromley
4:00 - 4:20	#129 Crop Swap Missoula: Food Waste and the Sharing Solution ~ Cathryn Raan

Concurrent Oral Sessions: 1:40-5:00 PM - Continued

UC 332 ~ Life Sciences

1:40	#8 Wolf-Cougar Occupancy Modelling in the Rocky Mountains of Alberta, Canada ~ Ellen Brandell
2:00	#115 RNA Splicing Cofactor Effect on FBF Protein Function in <i>C. elegans</i> . ~ Sara Feilzer
2:20	#63 Predation Rates and Selection in the Alga <i>Chlamydomonas</i> ~ Charles "Alex" Knox
2:40	#65 Quantifying shifts in soil microbial populations in response to 2,4-dichlorophenoxyacetic acid exposure ~ Jameson Boslough
3:00	#71 Do Big Beetle Larvae Run Big Thermal Risks? ~ Nikita Cooley
3:20	#88 Can the Fibrotic Response of the Lungs to Asbestos Exposure be Mitigated Using Gene Knockdown? ~ Sarah Kinsey
3:40	#52 Post-Surgery Survival in Lake Erie Walleye ~ Sarah Zundel
4:00 - 4:20	#134 Why do Caterpillars Whistle? Acoustic Mimicry of Bird Alarm Calls in the <i>Amorpha Juglandis</i> Caterpillar ~ Jessica Lindsay

UC 333 ~ Visual and Performing Arts (including Creative Writing)

3:40	#92 Managing Identity: Virtual and Real-Life Worlds in YA Fiction ~ Ashley Rezvani
4:00- 4:20	#38 Brief Encounters: A Choreographic Project ~ Emily Curtiss

Poster Session #2: 3:00 - 4:00 PM

South UC Ballroom

(Listed by poster # - abstract # is after the title.)

Humanities

#1	Dynamic Assessment: Speech Sound Disorders - #51 ~ Kylie Bull	#6	International Journalism in the Digital Age - #95 ~ Lauren Lewis
#3	BSAP: Language and Psychosocial Outcomes for Stroke Survivors - #14 ~ Maggie Colstad	#7	Speed Dating and First Impressions in the Age of Social Media - #99 ~ Arif Memovic
#4	Race in Shakespeare: A Critical Analysis of Race and Religion in <i>Othello</i> and <i>Titus Andronicus</i> - #27 ~ Rachel Just		

Life Sciences

#22	Improving Species Recovery: Insights From Community Occupancy Modeling - #86 ~ Allison Bernhisel	#25	Effects of Serotonin 1b Agonists on Aggression in <i>Betta Splendens</i> - #144 ~ Hayden Ferguson
#23	Improvement in Patient-Reported Confidence and Function in People with Anterior Cruciate Ligament Reconstruction Using Jump Training - #87 ~ Lauren Astrup		

Continued

**Poster Session #2: 3:00 - 4:00 PM
South UC Ballroom - Continued**

Life Sciences - Continued

Physical Sciences

#35	The River of Rock: Evolution of the Albion-Raft River-Grouse Creek (ARG) Metamorphic Core Complex of Idaho-Utah-Nevada and Implications for the Miocene Colorado River - #61 ~ Max Yzaguirre	#40	Gait Mechanics Used to Increase Sprint Speed Following a 3D Intervention - #103 ~ Gerald Evenson
#36	Extracting New Periglacial Lacustrine Information from the 1970 Flathead Lake Seismic Survey Data - #142 ~ Christopher Casas	#41	Effectiveness of A Gait Intervention on Top Speed Running - #113 ~ Whitney Cranmore
#37	Petrology, Thermobarometry, and Geochemistry of Amphibolites of the Ruby Range, Montana - #29 ~ Brianna Berg	#42	Expression of Human Indoleamine 2,3-Dioxygenase (hIDO1) Variants with Enhanced Spectroscopic Properties for Biological Studies - #118 ~ Laura Dameron
#38	Effects of Wildfire on Terrestrial Subsidies to Diets of Westslope Cutthroat Trout (<i>Oncorhynchus clarkii lewisi</i>) - #31 ~ Bennett Bursick	#43	Impact of Flame Resistant Synthetic Material Base Layer on Heat Stress Factors - #137 ~ Molly Bentley
#39	Synthetic Undershirts Impact on the Metabolic Demand While Wearing Wildland Firefighter - #75 ~ Kristi McGowan		

Social Sciences

#53	Parent Acceptability of Youth Engaged Through Intervention - #15 ~ Miki Anderson	#60	Digging Deeper: Qualitative Analysis of Rural & Suburban School Psychologists' Job Satisfaction - #17 ~ Jessica Skipper
#54	School Climate for Sexual and Gender Minorities in Montana - #40 ~ Olivia Holter	#61	Middle School Victimization, Social Support, and Feelings of Acceptance: A Phenomenological Analysis of Missoula Respect Club Members - #23 ~ Mercedes Becker
#55	Perceived College and Career Readiness of Students with Autism Spectrum Disorder - #60 ~ Rachel Babbitt	#62	Care-Giver CAPI and Personality: Predicting Child Abuse - #140 ~ Katie Hausauer
#56	The Effects of Modeling Writing Instruction on Early Literacy Development in Preschool Children - #64 ~ Jessica McCauley	#63	Psychological Profiles of Child Abusers - #141 ~ Johanna McCormick
#57	The Effects of phonologically related words on Tip-of-The-Tongue (TOT) - #81 ~ Sean Kavanaugh	#64	COME AT ME! Aggressive Display Behaviors of Adolescent Male Homo sapiens - #143 ~ Theo Hanson
#59	Qualitative Analysis on Consecutive Violent Relationship Risk - #10 ~ Jessica Weiss		

UMCUR Abstracts:

(in numerical order by Abstract ID number)

#8 Wolf-Cougar Occupancy Modelling in the Rocky Mountains of Alberta, Canada

Author(s) - Ellen Brandell, Wildlife Biology; Robin Steenweg, PhD Candidate

Cougars (*Puma concolor*) and wolves (*Canis lupis*) are top predators that influence the dynamics of an ecosystem, including prey behavior and dynamics, and interspecific competition. I am examining co-occurrence between wolves and cougars in the Central Alberta Rockies using occupancy modeling. I hypothesize that cougars will be pushed out of higher quality habitat in the presence of wolves, to higher elevations, more rugged terrain, and areas with lower NPP than the areas occupied by wolves. There is a system of 167 remote wildlife cameras in Banff, Jasper, and Yoho National Parks; I am using the 2013 data for analysis. I have separated the data into logical seasons to better understand cooccurrence patterns, summer (May 1 – October 31) and winter (Nov 1 – April 30), and it is separated into seven-day increments. From naïve occupancy models, summer cougar occupancy is 0.35 with a detection probability of 0.202 and winter occupancy is 0.157 with a detection probability of 0.0674. Summer wolf occupancy is 0.625 with a detection probability of 0.209, while winter occupancy is 0.435 with a detection probability of 0.134. The larger proportional, seasonal difference for cougar occupancy is intriguing because prey density is higher during the winter, meaning cougar-wolf competition may increase during winter; wolf presence may impact cougar detection and occupancy. This will be explored in the study, as well as covariates describing cougar and wolf occupancy separately and together. This study is important because the literature about wolf-cougar cooccurrence provides mixed results: mostly cougars are secondary predators to wolves, but occasionally, cougars are unaffected by wolf presence. Understanding these interactions in this specific site will add to the literature and provide insight into the study ecosystems.

Mentor: Mark Hebblewhite, Wildlife Biology

#9 Bat Use of Bridges in Missoula, Ravalli, and Mineral Counties in Western Montana

Author(s) - Ellen Whittle, Wildlife Biology; Bryce Maxell; Lauri Hanauska-Brown; Paul Hendricks; Creagh Breuner

Many North American bat species are declining as populations face increasing pressure from disease and degradation or loss of habitat. Bats roost in natural and artificial structures with adequate crevices. It is important to document the structural and thermal characteristics of these roosts across the landscape in order to provide natural resource managers with tools to protect and conserve these species. Bat use of bridges has been well documented in the southwest United States, but bridges in northwest Montana were not surveyed because temperatures were thought to be insufficient for bats. This lack of knowledge was the basis for our survey of roadway bridges in Missoula, Ravalli, and Mineral Counties. In May-October 2014 we visited 412 bridges and categorized them as day roost, night roost, maternity colony, or no detectable use. We detected widespread use of bridges (45.9%) as night roosts used between foraging flights. Bats were detected in day roosts at a smaller number of bridges (2.7%) with use ranging from solitary bats to hundreds of females and offspring. Bridge type and structure appear to be significant in predicting bat use, and initial temperature data indicate that day roosts have a slightly higher temperature regime than unoccupied bridges. Survey and bat detection information is available to resource managers via the Montana Natural Heritage Program's MapViewer web application (<http://mtnhp.org/mapviewer>). In consideration of the potential importance of these artificial roosts to bat species, we encourage the evaluation of roadway bridges for bat use prior to maintenance or replacement activities.

Mentor: Creagh Breuner, Division of Biological Sciences

#10 Qualitative Analysis on Consecutive Violent Relationship Risk

Author(s) - Jessica Weiss, Psychology

Established research shows that women who are physically or sexually victimized are at greater risk for subsequent relationship with Intimate Partner Violence (IPV), than those who are not victimized. In research conducted by H.M. Woodby, he stated, "One of [the] long-term effects is the potential for subsequent re-victimization by abusers other than the original perpetrator". Others, (Belmont, 2011) explored re-victimization further by looking at "differences between victims and non-victims in terms of the characteristics that they are attracted to in potential partners and subsequent risk for being in an abusive relationship". Belmont discovered that "Items that were endorsed as more attractive by previous victims consisted of characteristics indicative of jealousy, controlling behaviors, and aggressiveness". The objective was to continue exploration by discovering what thoughts, beliefs, attitudes, and ideas influence women's attraction to high-risk characteristics in intimate relationship partners. Using a qualitative interview, the study explored the relationship experiences of women who were in more than one violent relationship experience. Questions were developed to inquire about relationship styles, attitudes, and behaviors that describe are current and past relationships. Particular attention is made to lessons women identify that they discover through intimate relationships. Participants were 10 women who were victims of physical or sexual violence who agreed to interviews through the psychology department or the YWCA Program. The qualitative design will use Grounded theory, "...a series of cumulative coding cycles and reflective analytic memoing to develop major categories for theory generation" (Miles, Huberman, & Saldana). Qualitative analysis of the themes and information provided by the women will be conducted using NVIVO. The results of the study will be used to guide our understanding of possible variables to explore in a larger quantitative study intended to develop to approaches to prevention of further victimization of women already exposed to interpersonal violence.

Mentor: Chris Fiore, Psychology

#11 The Effects of Dual Language Immersion on Kindergartners

Author(s) - Carly Wilczynski, Elementary Education

It is nearly necessary in today's world for aspiring educators to have some knowledge of a second language. Dual Language Immersion (DLI) programs are popping up all over the United States and Missoula's education realm is no exception. The purpose of my research project is to share my personal firsthand experience in the Paxson DLI kindergarten classroom and inform community members about the benefits of teaching a second language at the kindergarten level. The creative research process that I followed by participating in this classroom as a volunteer, planning an English/Language Arts lesson, and finally carrying out the lesson to 16 students in Spanish, provided me with intriguing insight regarding how an educator effectively instructs English-speaking students entirely in Spanish. This project and process are applicable and beneficial to my future in education because of my interest in becoming involved in teaching students through a language immersion program. Through my experience, I hope to encourage community members, parents, and students to become involved in a program that, backed by ongoing educational and psychological research, will truly benefit the futures of today's youth.

Mentor: Jan LaBonty, C&I

#12 "Have You Got Good Religion?": The SNCC Freedom Singers and American Civil Rights

Author(s) - Reagan Colyer, Journalism

In the turbulent environment of the American civil rights movement, music served a multitude of purposes: it provided unity, emotional release, social commentary, and simply an occupation for participants in sit ins, marches, and rallies. The Freedom Singers were a group of college-age musicians brought together through the Student Nonviolent Coordinating Committee. While they were active, they performed for hundreds of thousands of people on college campuses, at marches and even in prisons. Their main goal was to further SNCC's

mission of registering black voters, but they accomplished much more: they played an integral role in incorporating northern white college students into the movement, and without them the activist community with its many social classes, faith backgrounds, and political slants would have been even more difficult to unite. Writing this paper, I conducted extensive primary and secondary research. I was lucky enough to interview Rutha Mae Harris, one of the original members of the Freedom Singers, and learn about her experience and memories. Recordings and videos also added to the context of the paper. The argument presented here is unique for several reasons. It places the Freedom Singers in their own time and place with other actors in the movement rather than applying their methods to today's society. I applied Ninian Smart's tiered analysis of religion in a unique exploration of sacred music by focusing on music as a complex social force rather than simply entertainment or art. While some scholars have examined music's role in the civil rights movement, very few have focused specifically on the Freedom Singers, who were unique because of both their age and their integration of political, religious and social commentary in song. Without them, the upheaval that was the civil rights movement would likely have lasted much longer, and could have ended quite differently.

Mentor: Tobin Shearer, History

#13 The Effectiveness of an Individualized Treatment Program for a Child with Autism Spectrum Disorder

Author(s) - Phillip Thomas, Psychology; Miki Anderson, Psychology; Alexa Huschka, Psychology; Jessica Skipper, Psychology; Kinzie Tilleman, Psychology

Autism Spectrum Disorder (ASD) is characterized by deficits in social communication, social interactions and restricted, repetitive patterns of behaviors, interests, or activities (American Psychiatric Association, 2014). Symptoms associated with social communication and interactions are particularly debilitating due to its association with feelings of loneliness, fewer friendships, and less satisfaction with friendships (Bauminger & Kasari, 2000). Disruptive behaviors are also concerning as they can interfere with the education of both the child creating the distraction and the others in the class. The behaviors also affect the social interactions of the child creating the disruptions (Scattone, Wilczynski, Edwards, & Rabian, 2002). These symptoms make it difficult for children with ASD to maintain relationships with peers, family, teachers, and others. This study examined the effectiveness of an individualized treatment program for a child with ASD and disruptive behaviors, who participated in a social skills group. Five children with ASD participated in an 8-week intervention called Youth Engaged Through Intervention (YETI) at a university clinic. One 9-year-old child "Brandon" exhibited disruptive behaviors, which were operationally defined as talking out of turn, using objects to make noise, and using high pitched, loud, or repetitive verbal expressions. An ABA single-subject methodology was used to examine whether adult attention and structured ignoring reduced the number of disruptive behaviors. Two researchers collected data using momentary time sampling to track the occurrence of disruptive behaviors. Momentary time sampling is an interval recording method where an observer looks up at the end of a 30 second interval, to see if the behavior is presented. A 15-minute observation occurred during the beginning, middle, and end of each session. Inter-rater reliability was obtained by comparing notations of behavior and discussing the disagreements between recordings. Results of the single subject intervention suggest that attention and structured ignoring was effective in changing "Brandon's" behavior.

Mentor: Anisa Goforth, Psychology

#14 BSAP: Language and Psychosocial Outcomes for Stroke Survivors

Author(s) - Maggie Colstad, Communicative Sciences & Disorder; Chloe Kanning, CSD; Victoria Hinthner, Communicative Sciences & Disorder

Aphasia is an acquired impairment of language resulting from a focal brain lesion that impacts speaking, listening, reading, and writing (Papathanasiou & Coppens, 2013). More than 200,000 individuals in the United States acquire aphasia every year (National Aphasia Association, 2014). Intensive comprehensive aphasia programs (ICAPS) are specialized therapy protocols designed to help individuals who suffer from aphasia secondary to stroke. These emerging programs help clients improve their quality of life and daily functioning by

building communication skills. The Big Sky Aphasia Program (BSAP) is an ICAP housed in the RiteCare Speech, Language, and Hearing Clinic at the University of Montana. This program has been under development since the summer of 2011. Currently, BSAP runs twice per year, for five weeks at a time. This model incorporates weekly caregiver counseling, and strives for client/caregiver satisfaction. The purpose of this study is to contribute to the ICAP evidence base by examining outcome measures from the perspectives of researchers, clinicians, and clients. Student clinician feedback, caregiver perspectives, and participant communication outcomes will be reported and discussed with an emphasis on socio functional skill improvement.

Mentor: Catherine Off, Communicative Sciences and Disorders

#15 Parent Acceptability of Youth Engaged Through Intervention

Author(s) - Miki Anderson, Psychology; Phillip Thomas, Psychology; Alexa Huschka, Psychology; Jessica Skipper, Psychology; Kinzie Tilleman, Psychology

Children with Autism Spectrum Disorders (ASD) possess a variety of characteristics including the need to follow a rigid routine, difficulty responding appropriately to conversations and struggling to make friends (American Psychiatric Association, 2013). To address these social deficits, a number of studies have examined the effectiveness of social skill groups. These studies found that being in a social skills group intervention significantly improved youth's social interaction, such as an increase in communication with peers and greater use of greetings (Barry, Klinger, Lee, Palardy, Gilmore & Bodin, 2003; Kroeger, Schultz & Newsom, 2007; Mrug & Hodgens, 2008). There have been fewer studies, however, that have investigated parent's views of the effectiveness of group interventions for their children. One study examined how parents of youth with ASD would rate the social skills interventions (Lopata et al., 2012). Parent's perceptions and parent acceptability of treatment is important because parents know their child the best and can detect the subtlest of changes in behavior as a result of intervention. The purpose of this study was to examine the effectiveness and parent acceptability of Youth Engagement Through Intervention (YETI), an eight-week social skills group intervention for children with ASD ages 8 to 13. Sessions focused on improving the children's social skills using evidence-based practices such as behavioral supports, video modeling and social narratives. After the intervention was completed, parents completed the Parent Acceptability Survey, which measures the degree to which parents find the YETI intervention useful, and favorable. Preliminary data are currently being analyzed and results will be prepared for the conference.

Mentor: Miki Anderson, Psychology

#16 Inviting the Divine: The Role of Clerical Clothing during the Civil Rights Movement.

Author(s) - Charley Bromley, History

During the Civil Rights Movement, the Catholic Church underwent many internal changes as a result of the Second Vatican Council. The church's new views toward human rights often conflicted with the actions and policies of southern segregationist Dioceses. But when clergyfolk who supported integration made a stand and protested in favor of equality, they were met with special obstacles. This paper examines the role clerical clothing played in the Civil Rights Movement. When priests wore their clerical collars, and nuns wore their habits in political action, it was not only a form of protest; it was prayer. Drawing on the private papers and correspondence of the men and women who marched and fought for change as well the accounts of those who threatened, attacked, and in some cases murdered them, this paper shows that the members of the clergy who wore their religious garb during political protest faced increased hardships and violence. The actions of the clergy during this time are well documented, but this paper, by focusing on clerical garb, represents a new understanding of its role in the movement.

Mentor: Tobin Miller-Shearer, History

#17 Digging Deeper: Qualitative Analysis of Rural & Suburban School Psychologists' Job Satisfaction

Author(s) - Jessica Skipper, Psychology; MacKinzie S. Tilleman, Psychology; Alexa Huschka, Psychology; Phillip Thomas, Psychology; Miki Anderson, Psychology

School psychologists play an important role in children's academic success and overall well-being. These professionals experience a number of career-related challenges and job satisfaction may play an important role in their ability to support children. Job satisfaction is associated with work quality, organizational commitment, motivation, burnout, achievement, and absenteeism (Worrell, Skaggs & Brown, 2006). One study suggested that nearly 91% of school psychologists are either satisfied or very satisfied with their jobs (Worrell, 2007). Recent research, however, shows differences in job satisfaction between school psychologists who work in RTI schools versus non-RTI schools (Bade-White 2013). Thus, job satisfaction of school psychologists could greatly vary depending on the school and location. There are a number of other factors, however, that may contribute to school psychologists' job satisfaction that warrant further investigation. In an earlier pilot study, preliminary qualitative analyses showed that rural school psychologists are concerned with having more time and implementing interventions, whereas suburban psychologists' want increased time and direct contact with their students. The purpose of this study is to further examine the roles and contributing factors surrounding the job satisfaction of rural and suburban school psychologists through qualitative research methodology. Specifically, we will examine the themes derived from rural and suburban school psychologists' comments about their careers. An online survey was completed by 188 school psychologists in rural (n = 94) and suburban (n = 94) areas in the Pacific Northwest and Rocky Mountain regions. Participants answered open-ended questions about their current and desired roles. We will conduct a qualitative analysis using NVivo software to reveal common and differential sub-themes of the previous concerns found within the pilot study. Improving school psychologists' job satisfaction may result in more effective services rendered towards children in rural communities, such as those in Montana.

Mentor: Jessica Skipper, Anisa Goforth

#19 The Influential Role of the Secretary of State's Office in the Pacific Northwest

Author(s) - Hailey Duffin, Political Science

The purpose of this research is to provide a cross-state comparison of the role that the Secretaries of State play in their given state as well as the influence it has on national politics. In order to evaluate the role of the Secretary of State, this research will examine states in the Northwest region of the U.S. (i.e. Pacific Northwest) to determine how their formal and informal powers affect their role in their respective state. The driving research question is: what role does this position play in impacting state and national electoral politics in the U.S? In an attempt to address this question, semi-structured interviews will be conducted with staff at the five offices in the Pacific Northwest. Moreover, public administration theory will be applied as a descriptive framework to examine the interview responses. The Secretary of State's office is an agency that 47 out of the 50 states in United States have in their government – this office can play an essential role in defining U.S. elections and politics more broadly. Moreover, 12 out of the 47 states that have a Secretary of State either appoint via governor or state legislature, while the remainder of the states elects their Secretary of State via the general public. The duties and level of participation of the Secretary of State's office varies based on the state's government and the powers that have been allotted to them by their respective state constitution. This research will provide a first hand account of the work that is being done in each office and the broader societal implications.

Mentor: Sara Rinfret, Political Science

#20 Investigate Students' Understanding of the Prime Factorization and Use of Prime Numbers in Regards to the Fundamental Theorem of Arithmetic.

Author(s) - Heather Vallejo, Elementary Education; Jordan Frotz, Education

In the field of education, we are facing a dilemma of having a large number of struggling students in the field of math. Research has been done on both middle school students and pre-service elementary school teachers' understanding of the multiplicative structure of the natural numbers. Research demonstrates an under-utilization of unique prime factorization ($30=2 \times 3 \times 5$; primes) in the identification of a number's factors ($30=1,2,3,5,6,10,15,30$; all the factors). However, research methods have not been applied to elementary school student even though Common Core State Standards (CCSS) require that 4th graders attain this understanding in the following standard: CCSS.Math.Content.4.OA.B.4 Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite. The question of distinguishing prime numbers as a base for students to better understand multiplication has been widely debated with scholars such as Rina Zazkis and Peter Liljedahl. Recent studies (i.e. Roscoe & Feldman, in press) have shown that teachers' understanding of factor can be strengthened by engaging in a sequence of instructional tasks that explore the relationship between a number's prime factorization and its factors. Our groups' study sought to extend the scope of investigation in this area to the population of elementary school students, with a goal of observing whether the methods we implemented had a successful student gains by measuring pre and post-tests. The CCSS are requiring that students explain their understanding of mathematical methods and logic, and we have found, in students post-tests, that our method of instruction helped bridge the gap for students to solidify their understanding and students explanations improved in both visual and written planation.

Mentor: Matt B. Roscoe, Department of Mathematical Sciences

#21 Utilizing Mental Practice to Combat Performance Anxiety in Performing Musicians

Author(s) - Stephanie Quist, Piano Performance/Pre-Pharmacy

Performance anxiety is a crippling problem for many performing musicians. Success in dealing with such a problem can make or break a performance; therefore, it becomes necessary for musicians to learn ways to cope with debilitating nerves. As a performing pianist myself, I am interested in investigating ways current performance anxiety research can be best applied to ease musicians' stage fright. As there is a gap between current academic research on this subject and pedagogical practice, many teachers lack good advice to give students suffering stage fright. My presentation incorporates my personal experiences in mental practice with current academic literature in the fields of music as well as sports psychology and surgical medicine. Drawing from these resources, I will suggest a more structured pedagogy to help students and musicians develop a mental practice routine to combat performance anxiety. Practice techniques such as mental awareness and visualization can provide musicians with tools to alleviate performance anxiety and achieve a better performance.

Mentor: James Randall, Music History

#22 Audible Power: the Cultural Impact of American Experimental Music

Author(s) - Tracy Hall, Creative Writing

I produce a show called The Print Lab at the university radio station, featuring eclectic music and short stories. The show has allowed me to experiment with the ways a text's meaning can change when read aloud or set to music. As a supplement to my radio show, I conducted research comparing my personal experimentation with the broader cultural impact of musical experimentation. I studied various texts, focusing on the "outsiders" of American music, people who defied societal expectations of how music ought to sound, often without training or commercial support. Outsider music became a force for political change; during the Black Power movement of the late 60s, African Americans used spoken word music and other experimentation to form an identity

separate from white society. Other experimental movements developed America's cultural identity; America became an ideal space for creation, as it lacked long-standing cultural traditions. Non-commercial and amateur radio widened the audience for experimental music. Radio shows like mine can exist because of those unconventional producers' and musicians' struggle for creative freedom. By increasing accessibility and experimentation in the music industry, they were able to increase their culture's open-mindedness. After discussing these ideas, I'll describe my personal experimentation with my radio show, The Print Lab. The show often utilizes recorded readings of literary texts complemented by my personal commentary and eclectic pieces of music. I'll play a short segment of my radio show which displays a combination of these elements.

Mentor: Erin Saldin, English

#23 Middle School Victimization, Social Support, and Feelings of Acceptance: A Phenomenological Analysis of Missoula Respect Club Members

Author(s) - Mercedes Becker, Psychology

School-based victimization has been linked to poorer health outcomes for youth (Bontempo & D'Augelli, 2002; Saewyc et al., 2006). Current research has documented the positive impacts of high school clubs that focus on inclusion and school safety, such as high school gay-straight-alliances, but very little research has been done on similar clubs for middle school – aged children (Heck, Flentje, & Cochran, 2011). This study analyzes the experiences of middle school members of Respect Club in Missoula, Montana, a school program which focuses on violence prevention, prejudice reduction, and leadership development. Members were interviewed about their experiences with Respect Club and their impressions of their school environments. Their responses were coded using phenomenological methodology and commonalities were recorded. The coding process involved a thorough examination of the interview data and determination of the general themes present in the participants' accounts of their experiences. The results of this study highlight the participants' perceptions of victimization or bullying within their schools, the social support they experience as members of Respect Club, and their general feelings of acceptance while participating in Respect Club. The positive outcomes indicated by Respect Club members and the potential for school groups to reduce the negative impact of victimization on student health calls for further investigation into the influence inclusion-focused and violence preventing clubs can have on middle school-aged students.

Mentor: Bryan Cochran, Psychology

#24 Motility in *Chlamydomonas reinhardtii*

Author(s) - Margrethe Boyd, Human Biology

Chlamydomonas reinhardtii is a single-celled, photosynthetic green alga. With two flagella and a light-sensing eyespot, each cell is capable of moving itself into a light-rich environment to optimize its photosynthetic output. The ability to move in response to light is crucial in a natural setting because otherwise algal cells would sink out of the photzone and be unable to photosynthesize, severely restricting energy production and viability. Motility is therefore a crucial contributor to fitness in *C. reinhardtii*. In response to predation and settling rate-based selection, Dr. Herron and colleagues have observed the evolution of simple multicellular structures in several populations of *C. reinhardtii*. These multicellular isolates should rely on photosynthesis just as the unicellular strains do, meaning they will have a similar dependence on motility to optimize energy production and to be viable. It is then important that we test whether or not they are capable of exhibiting phototaxis. I will measure phototactic ability in unicellular and multicellular strains by comparing photographs before and after timed exposure to directional light. Images will be analyzed using ImageJ software, which will allow any algal movement over a set time period to be clearly distinguished. Should it be discovered that multicellular isolates or their predecessors are capable of phototaxis, as unicellular strains are, it will indicate that multicellular isolates are likely capable of motility and are potentially viable in a natural environment. These results will provide insight about potential ways unicellular organisms evolved to produce functioning multicellular organisms.

Mentor: Frank Rosenzweig, Biology

#25 Realizing Sustainability: Exchanging Concepts for Solutions

Author(s) - Kylie Rebich, Accounting; Ashley Kanduch, Accounting; Natalie Black, Accounting; Azucena Martinez, Management Information Systems; Rebecca Singleton, Chemistry; Luke Ninteman, Finance

Global climate change is becoming a visible global issue. Many sectors of our society are taking on the challenge of mitigating climate change through sustainable practices. The business community in particular is tackling the challenge. Sustainability may be defined as doing things today that do not compromise the ability of future generations to meet their own needs. However, the business community has a distinct definition of sustainability. Many companies view “sustainability as an opportunity to gain a competitive edge and create tangible, economic value,” (Sommer, 2012, p. 3). Because our review of the literature demonstrated that businesses have a significant influence on trends in society, we wanted to further explore sustainable business as a platform for global and local climate change mitigation. Our project analyzed the interplay between business practices and sustainability on a local scale. We are working with a Missoula business to develop and implement, where possible, a specific sustainable business plan, which is realistic, affordable, and coincides with the goals of the business. We are working closely with the business to analyze current business practices, identify barriers in the environment that may prevent sustainable practices from being implemented, develop a current carbon footprint analysis, and look into local best practices for comparison. We also developed a survey to augment our work that was administered to local business owners to assess their understanding of sustainable business practices. This project will provide a proposal of business practices that equips the local business with ideas on how to implement sustainable practices into their current business operations.

Mentor: Megan Stark, Library

#26 Do Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) and Sculpin (*Cottus* sp.) Compete in Tributaries of the Bitterroot River, MT?

Author(s) - Rennie Winkelman, Wildlife Biology

Interspecific competition between fish species can have a large effect on population dynamics. Competition between species of high economic or conservation value is regularly examined, but non-game species are often overlooked. Previous studies from the Pacific Northwest region have demonstrated competition between several trout species and sculpin, but little is known about the strength of competition. In western MT, westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) often live in the same streams as sculpin (*Cottus* sp.). We examined diet overlap for these species in sympatry and potential diet shifts for cutthroat trout in sympatry versus allopatry in the Bitterroot River basin, MT. We expected that sculpin are primarily feeding on aquatically-derived invertebrates. Therefore if there is competition, we expected diets of trout in the presence of sculpin to contain a greater proportion of terrestrial food sources than where they occur alone. In the summer of 2014, we collected preliminary data by lavaging westslope cutthroat trout and sculpin in two 100m reaches in each of four streams where they occur in sympatry and where cutthroat trout occur alone (due to a small barrier for sculpin). We identified invertebrates to the highest taxonomic level (Order or family) required to determine habitat of origin. We detected diet overlap between westslope cutthroat trout and sculpin highlighting the potential for competition. However, there was no significant difference in westslope cutthroat trout diet regardless of the presence of sculpin. Given the high variation in season, sculpin density, and habitat among streams, we plan on expanding our sample size to improve our inference strength. Understanding species interactions between westslope cutthroat trout and sculpin is a useful step for understanding complex food webs and how anthropogenic changes and wildfire may be influencing our food webs and ecosystems.

Mentor: Lisa Eby, Wildlife Biology

#27 Race in Shakespeare: A Critical Analysis of Race and Religion in Othello and Titus Andronicus

Author(s) - Rachel Just, Sociology

When analyzing Othello and Titus Andronicus, many scholars cite race as the primary cause of tragedy for Othello and Aaron, both of whom were Moors. Although there is certainly credence to some scholars' treatment of race, an element complementary to racism that is often overlooked in these plays is the role religion played in Elizabethan times. In this presentation, I contend that the color of their skin is not the primary factor for either character; the primary concern is that they subscribe to Islam rather than Catholicism or Protestantism. In Elizabethan England, "Moor" was a term that held no ethnological value; Moors came from various countries such as India, Asia, and Africa. Rather, the term "Moor" denotes subscription to Islam. In nearly every epoch, racism and religion are inextricably intertwined, and Elizabethan England is not an exception. Shakespeare's unprecedented account of life in Elizabethan England and perspectives on human nature are equally relevant in the 21st century, especially given that both are significant sources of tension and misunderstanding today. My sources will be primarily from the University of Montana library databases with an emphasis on literary journals and a collection of essays, Shakespeare and Race from Cambridge University Press. In addition, excerpts from the plays will be used to demonstrate that the main concern regarding the Moors in the plays is religion, not race.

Mentor: Rachel Just, Sociology

#28 Comparing the Effects of Low-level Therapeutic Laser and Sham Treatments on Ankle Dorsiflexion Range of Motion in Recreational Runners

Author(s) - Reegan von Wildenratt, Athletic Training; Tobias Johansson, Athletic Training; Seth Lindauer, Athletic Training

Context: Low-level laser therapy was recently introduced as an instrument of treatment in rehabilitation medicine. Speculation remains as to what is happening at the molecular level when laser therapy is used. Laser therapy has been shown to assist tissue healing by increasing movement in tissue molecules and accelerating repair. It has also demonstrated effectiveness in pain reduction. **Purpose:** The purpose of this study was to observe if low-level laser therapy had an effect on ankle dorsiflexion and self-reported pain in subjects with Achilles tendon pain compared to healthy individuals. **Participants:** A convenience sample included 8 recreational runners (running 15-40 miles per week), which included both healthy individuals and individuals with Achilles tendon pain. **Methods:** Subjects were divided into one of four groups: healthy subjects treated with laser (3), tendon pain treated with laser (1), healthy subjects receiving a sham treatment (control group) (3), and tendon pain group receiving a sham treatment (1). Each subject completed ten trials, receiving two treatments per day for five consecutive days. Ankle dorsiflexion was measured before and after each trial using a standard tape measure. Participants were asked to rate their Achilles pain on a 0-10 pain scale, 0 being no pain and 10 being excruciating pain. The Achilles tendon of each subject's dominant foot or foot with Achilles tendon pain was treated using a Vectra Genisys Laser, parameters set to 35 Joules, 9 diode 5x100 mW, continuous, 64 seconds. **Results:** Mean scores revealed no significant changes or trends across all groups pre to post treatment for both ankle dorsiflexion and pain perception. **Conclusion:** It is unclear if low-level laser therapy influences ankle dorsiflexion or pain perception in patients who have Achilles tendon pain. A larger sample size is warranted to further investigate the effects of low-level laser on healing and pain.

Mentor: Valerie Moody, HHP

#29 Petrology, Thermobarometry, and Geochemistry of Amphibolites of the Ruby Range, Montana

Author(s) - Brianna Berg, Geosciences

The Ruby Range in southwest Montana preserves a record of the tectonic events that occurred >2.5 to 1.7 billion years ago and records the growth and evolution of the North American continent at that time. In particular, metamorphic rocks and deformational structures found in the range preserve evidence for a regional continental collision 1.8 to 1.7 billion years ago, which has been termed the Big Sky orogeny. Garnet amphibolites found in three distinct compositional suites hosted within the Ruby Range contain appropriate mineral assemblages to constrain the peak pressures and temperatures at which the rocks were metamorphosed. Determining the peak pressure and temperature conditions experienced by the amphibolites can be used to determine the grade of metamorphism that occurred during orogenesis. Samples of garnet amphibolites were collected from the Ruby Range for whole rock geochemistry, petrography, and SEM (scanning electron microscope) mineral chemistry analysis. Major and trace element compositional data was obtained for one of the three suites to determine possible protolith rock types and petrogenesis. Mineral chemistry data was also collected with the SEM-EDS (energy dispersive spectroscopy) to use in the calculation of the pressure and temperature conditions for each of the three compositional suites. This information will determine if there is a gradient in peak metamorphic conditions across the range. The information obtained from these rocks can be integrated to gain a better understanding of the origins and characterize the metamorphic event(s) that affected this margin of North America during the Big Sky orogeny.

Mentor: Julie Baldwin, Geosciences

#30 \$8.05 Montana: Humanizing the Wage Debate

Author(s) - Katheryn Houghton, journalism; Dani Howlett, Political Science; Kaci Felstet, Journalism; Mackenzie Enich, Journalism

Minimum wage has been debated throughout American history. As society weighs wage inequality against employer burden, statistics define the discourse. Our team will humanize this debate by telling the stories of people working in Montana in low-income jobs. Rather than statistics, we will offer the faces of those living on the bare minimum. Our project gathers a variety of stories – from the single parent working multiple jobs to the small business owner – to explore the debate's complexities. We will write at least three stories, each profiling a different person affected by wage inequality. For each story we will talk to a minimum of three sources. Our vehicle for change will be a website that includes print reporting, multimedia reporting, and social media posting. The print reporting will cover wage inequality through in-depth features and profiles written as newspaper articles and features. The multimedia reporting will cover the same topic but through short videos or radio pieces and miniature packages. Our social media campaign will create awareness about wage inequality through updates on our work, teasers to our finished product, and highlights of other people's work through four different platforms. Some might argue our project will not solve wage inequality. We believe one of the most effective ways to incite change is to put a face to the issue and to motivate people to initiate action by changing their perception of the average low-income worker.

Mentor: Tobin Shearer, History

#31 Effects of Wildfire on Terrestrial Subsidies to Diets of Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*)

Author(s) - Bennett Bursick, Wildlife Biology

Western United States forest wildfire frequency and severity have dramatically increased in recent decades and are predicted to continue to increase with climate change. However, few studies have addressed, how wildfire may influence the aquatic-terrestrial ecosystem connectivity. Therefore, we investigated the decadal influences of wildfire on the diet composition of Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*). We examined fish diets in four burned and unburned streams to evaluate three alternative hypotheses (1) terrestrial

invertebrate (TI) consumption will be greater in burned sites due to the influence of the vegetation's earlier successional stage on insect production, (2) TI consumption will be similar between treatments, or (3) TI consumption will be lower due to the lack of overhanging/canopy vegetation. We captured fish using a backpack electrofishing unit, identified them, and measured their total length. Additionally, we sampled stomach contents of fish using gastric lavage and returned samples to the lab for identification. Finally, we described fish size distributions and densities across sites and burn treatments. Initial results did not demonstrate differences in consumption of TI between treatments. However, we detected differences in taxa consumed between treatments; specifically, we found more Ephemeroptera (mayfly) and Hemiptera (true bug) in fish diets from burned sites, and more Lepidoptera (butterfly and moth) in diets at unburned sites. There was no difference in the size range or density of trout between treatments. As landscapes warm and resulting wildfire regimes change, it is critical to investigate how these changes to riparian structure may be having lasting impacts on terrestrial-aquatic linkages and subsequently stream food webs and fisheries resources.

Mentor: Lisa Eby, Wildlife Biology

#32 The Story Behind the Story

Author(s) - Mahkia Clark, Journalism

The goal of this research was to examine how well the University of Montana School of Journalism prepares students for jobs within the journalism industry (particularly at local television stations) by looking at the skills obtained through intensive capstone classes such as UM News, a short news segment produced each week by journalism students for air on KTMF-TV and KPAX-TV. In a 13-page paper, I detail the contrasts in newsgathering between KECI-TV NBC Montana (where I completed a supervised journalism internship during Summer 2014) and UM News where I produced and reported throughout Autumn Semester 2014. I discussed the process of newsgathering from the beginning of a story idea to the final on-air product and how that process differs for the two groups. I also analyzed the specifics of the day-to-day operations of the local station in comparison to the operations of the capstone class the UM School of Journalism. In addition to the paper, I produced, photographed, wrote, and edited a video showing the behind-the-scenes look at the weekly production of UM News. During production of this video, I captured video and still photographs of the other students in my UM News class as they worked. Through my research, I found that students at the University of Montana School of Journalism are well prepared for careers in broadcast news and radio-television production because they are held to professional standards are given hands-on opportunities to practice the many useful skills they learn.

Mentor: Ray Ekness, Journalism (RTV)

#33 Comparing the Effects of Diathermy and Dynamic Stretching on Hip Flexor Flexibility and Postural Control

Author(s) - Britt Dickman, Athletic Training; Cali VanValkenburg, Athletic Training

Context: Dynamic stretching has become a universally accepted practice used to increase flexibility, reduce muscle injury, and improve performance. In addition to stretching, deep heating modalities such as pulsed shortwave diathermy have been used to increase range of motion through deep heating. The premise for this study was to see if combining a dynamic stretching routine with a diathermy treatment would improve range of motion (ROM) and postural control. Purpose: The purpose of this repeated measures study was to assess the effectiveness of both pulsed shortwave diathermy and dynamic stretching on hip flexor range of motion and postural control. Participants: Four males and six females between the ages of 18 and 30 completed the study. All of the participants were moderately active and had not sustained an injury to their dominant leg six months prior to the study. Methods: Each participant completed all four trials (diathermy alone, dynamic stretching alone, diathermy and dynamic stretching combined, and a control trial) over the course of a month. Active hip extension and the Y- Star Excursion Balance Test (Y-SEBT) were completed before and after each trial. Results: The 2 X 4 (time by trial) repeated measures ANOVA revealed no statistical significance for hip extension and Y-SEBT ($p=0.817$ and $p=0.367$ respectively). However, there was a main effect for time from pre- to post ($p=0.001$ and

p=0.003 respectively). Conclusion: This research intended to determine diathermy's outcomes on increasing ROM and postural control in the hip flexors and how these effects could be enhanced by a dynamic stretching routine. All of the participants regardless of trial improved however, this was due to a practicing effect. Therefore results of this study were found to be inconclusive for all trials performed.

Mentor: Valerie Moody, HHP-Athletic Training

#34 Written Language Sampling in Seventh-Grade Students: An Examination of Syntax

Author(s) - Sarah Fink, Communicative Sciences and Disorders

Purpose: The investigator created a database of written language samples with the purpose of describing the nature of students' persuasive discourse and providing local normative data for typically developing seventh-graders. **Methods:** Written language samples were collected from seventh-grade students from Meadow Hill Middle School. All students were prompted to write a persuasive essay on a common topic. Written samples will be analyzed for syntactic complexity, vocabulary complexity, and coherence. Results will be analyzed for common themes along demographic data (gender, age, ethnicity, socio-economic status, etc.). When assessing persuasive discourse samples of adolescents with language disorders, this repository of language samples may be useful for comparison to determine which areas of language are underdeveloped. **Originality:** Language sample analysis is under-utilized when assessing older students, since few language norms for this age group have been established. **Significance:** Language sample analysis is considered a best practice in clinical analysis of young children's language skills. Standardized assessment tools are used to determine the presence or absence of a language disorder, whereas language sample analyses are useful for determining how an individual communicates in an authentic setting. Few studies have used language sample analysis to determine developmental milestones in adolescent language, so this study will contribute to the gap in the literature regarding adolescent language norms.

Mentor: Ginger Collins, Communicative Sciences and Disorders

#35 Written Language Sampling in Seventh-Grade Students: An Examination of Semantics and Pragmatics

Author(s) - Kalie Schwartzenberger, Communicative Sciences and Disorders; Ashlee Simmes, CSD

Purpose: We will create a database of written language samples produced by typically developing seventh-grade students in an attempt to establish local normative data regarding writing skills for this age group. We intend to describe the nature of these students' persuasive discourse writing skills with respect to semantics and pragmatics. **Significance:** Language sample analysis is considered a best practice in clinical analysis of school-aged children's language skills. Standardized assessment tools, which are commonly used, are effective in determining the presence or absence of a language disorder, whereas language sample analyses are useful for determining how an individual communicates in an authentic setting. Language sample analysis is under-utilized when assessing older students, since few language norms for this age group have been established. There is little evidence of "typical expressive written vocabulary" performance in adolescents; that is, standardized assessment can be used to test for knowledge of discrete words, but there is little known about functional vocabulary usage in this age group. Pragmatic written language skills are typically overlooked, but are highly important for academic writing since it is essential for the writer to infer the needs of the reader. This study will contribute to the gap in the literature regarding adolescent language norms. **Method:** Written language samples will be collected from seventh-grade students at Meadow Hill Middle School (n≈90). All students will be prompted to write a persuasive essay using the Circus Controversy Protocol. Written samples will be coded and analyzed for semantic and pragmatic complexity and accuracy. **Conclusion:** Results will be analyzed for common themes along demographic data (gender, age, ethnicity, SES, etc.). When assessing persuasive discourse samples of adolescents with language disorders, this repository of language samples may be useful for comparison.

Mentor: Ginger Collins, Communicative Sciences and Disorders

#36 Did the Colorado River Once Run North from Grand Canyon to Montana? Geologic Field Evidence in the Swan River Valley - Pocatello Area of Idaho

Author(s) - Siobhan Burke, International Field Geosciences; Wayne Bazo, Geosciences; Michael White, Geosciences; Stuart Parker, Geosciences

The Colorado River did not always run south into the Gulf of California. Studies suggest it may have once flowed north through Idaho and Montana before discharging into the Labrador Sea. During past geologic periods, the river's path may have taken it through the Swan River Valley-Pocatello area of SE Idaho. Research into this area indicates that it was possibly the site of an ancient riverbed. Did it flow north, as predicted by recent studies? The area underwent large-scale geologic changes through glacial processes, faulting, volcanism, and uplift, causing drainages to shift their courses. In the study area, the bed of the old river valley may have eroded deep into Cambrian and Precambrian quartzites. If exotic quartzite cobbles stranded on high mountain passes in SW Montana were derived from bedrock in the study area, the river must have run north. Over the semester, this project will analyze the geologic history of the study area through analysis which includes literature review, field observations, petrologic analysis, structural interpretation, field measurements of geologic formations, and the GPS co-ordinates of the field sites. A map of the area will be created along with a cross-section of the subsurface geology. By conducting this research we intend to establish if the study area contains the deeply eroded bed of the old north-flowing river. We hope to date remnants of the old river deposits near Pocatello and Swan River Valley, and determine ancient flow directions from field observations. Geology of this area has been studied and mapped extensively. However, the concept of regional tectonics influencing the course of the proposed north-flowing river is a hypothesis that has not been considered. This will contribute to our understanding of tectonic impacts on river systems and help identify possible untapped ground water resources in semi-arid areas.

Mentor: James Sears, Geosciences

#37 The Geologic Progression of the Eastern Snake River Plain

Author(s) - Shah Khan, Systems Ecology/Geography; Norland Hagen, Geology; Brian Crail, Geology

Basin and Range

The Snake River Plain is a complex mega geological structure in the western United States. The Plain is considered to be the result of rifting processes, the lowering of the extinct Yellowstone caldera due to heat loss and gravity effect, or a combination of both processes. Our purpose is to determine which of the process is most strongly supported by previously published studies and first hand observation. Our review of literature focused on two primary methods that have been used to investigate the area. First, we looked into the GPS geodesy method, which tracks the geologic plates movement. GPS velocity measurements indicate that the rate at which the size and shape of the Eastern Snake River Plain is changing is much lower than the adjoining Centennial Tectonic Belt and Great Basin areas. These contrasts in movement indicate rifting and as a result rift basin development. Second, we examined studies performed using mineral analysis of geologic formations in the area. Testing of detrital zircons can indicate the presence of water at the time of their formation. Studies conducted along the Plain show that during the Neogene age (from 23 million to 2.5 million years ago) water drainages flowed away from the current position of the East Snake River Plain to the north and east. The drainages then reversed their flow to the west following the Snake River system to the Pacific coast. Thus, the theory of a Yellowstone Hotspot uplift and its corresponding subsidence, along the path of the Plain is supported as well. Field observations provided evidence of both hotspot activity and lowering due to rifting processes. By super-imposing research methods with field observations, our conclusion is that the East Snake River Plain is a rift basin formation altered significantly by hotspot activity.

Mentor: James Sears, Geology

#38 Brief Encounters: A Choreographic Project

Author(s) - Emily Curtiss, Dance

How do two people move together naturally, and what emotions can different partnerships emit? These are the research questions I explored as I developed this project in creative scholarship. The result was a work of choreography entitled "Brief Encounters." In this work, five dancers interact with a focus on partner work and how a duet can emulate a relationship or a conversation. A rehearsal process of collaboration and experimentation has resulted in an intricate and cohesive piece of choreography that incorporates motifs, relationships, and a natural story arch. The idea for this piece came from an interest in partner work, and how a duet can tell a story without being blatantly narrative. In building the piece there was a particular interest in improvised partnering, and how one person's actions can depend upon the actions of their partner. This approach to choreography is original and significant because it represents abstract ideas about relationships that are relatable, and it comes from a rich creative process that heavily involved the dancers, resulting in movement that they can fully embody and own. Each duet is open to audience interpretation, which makes the piece intellectually stimulating, and yet there are also moments of beautiful physicality and architecture, making the piece visually appealing as well. "Brief Encounters" was premiered in the UM School of Theatre and Dance's Dance Up Close and was selected by the faculty to be presented in the University's largest dance event of the year. I also plan to present a live excerpt at the UM Conference on Undergraduate Research.

Mentor: Heidi Jones-Eggert, Dance

#39 Assessing the Feasibility of a New Tongue Base Retraction Exercise

Author(s) - Lauren King, Communicative Sciences and Disorders

Tongue base retraction (TBR) is a process that helps move food or liquid from the mouth to the esophagus. Tongue base retraction exercises for patients who have swallowing impairment, or dysphagia, are used to help improve the muscle strength necessary for successful tongue base retraction. For this study, muscle strength will be measured using surface electromyography (sEMG) and electrodes placed on the submental triangle (the muscle below the chin). The purpose of this research is to assess differences in TBR strength during six different types of TBR exercises in order to assess feasibility of a new TBR exercise. There will be one group of participants who will perform six conditions. Each participant will perform a simple saliva swallow, a swallow after drinking water, an extra hard swallow called an effortful swallow, two current TBR exercises, and a TBR exercise that utilizes a new resistance device developed by Laurie Slovarp. The conditions will be randomized, so there is no concern that each type of TBR affects the next type. The sEMG values from each condition will be contrasted to determine which exercise elicits the strongest muscle contraction and if the resistance device used during a TBR exercise could be feasible in treatment of dysphagia.

Mentor: Laurie Slovarp, Communicative Sciences and Disorders

#40 High School Experience for Sexual and Gender Minorities in Montana

Author(s) - Olivia Holter, Psychology

High School Experience for Sexual and Gender Minorities in Montana seeks to gain insight on the experiences of LGBT students across the state of Montana. Current literature has shown that sexual and gender minorities experience a disproportionate amount of bullying in schools, as well as experience a more negative school climate. Literature also suggests that because of this negative school climate, sexual and gender minority students have a lower rate of academic success. However, no current literature is specific to the sexual and gender minority students in the state of Montana. This study serves to fill the gap in current literature by surveying sexual and gender minority students at the University of Montana, between the ages of 18-25, who went to a high school in the Montana public school system. Inspired by the work done by the Gay Lesbian and Straight Education Network (GLSEN), This original survey gains to seek insight in three different areas; 1.) Demographic information about participants, 2.) Information about sexual identity and gender expression, 3.) Information pertaining to

participant's high school experience in relation to their sexual/gender minority status, including relations between peers, staff, and activities in the educational setting. This study will be quantitative with an opportunity for participants to expand on their answers in a qualitative fashion in order to gain personal narrative and perspective from participants. 6 Surveys were completed by students who fit the criterion. With such a small sample size, no statistically significant information was gathered. However, trends in the participants' answers were congruent with GLSEN's National data in showing an increased amount of bullying and lack of resources for students in this rural state. The data also showed a need for continued research in the area of sexual and gender minorities' school experiences in Montana.

#41 Resolving the Western Chipmunk Phylogeny

Author(s) - Erin Nordquist, Biology

Speciation is the biological process by which new species arise. Hybridization occurs in nature when two distinct lineages produce hybrid offspring and exchange genes. Understanding these events is key to understanding the process of evolution and the origin of biodiversity. Western chipmunks are one of the most diverse groups of small mammals found in forest ecosystems across Western North America. The 23 described species of western chipmunks are frequently co-distributed across their ranges. While these different species often occupy the same general regions, they typically partition into specific ecological niches with very narrow zones of contact. These narrow areas of overlap provide the potential for hybridization and gene flow between species. Past studies examining this system suggest that there has been some hybridization and gene flow during the recent, rapid radiation of Western chipmunk species. However, the overall importance and frequency of hybridization between chipmunk species remains unclear. Previously, the evolutionary relationships among chipmunk species have been reconstructed using sequences from mitochondrial DNA and four nuclear genes. The full resolution of the chipmunk phylogeny rests on additional sequencing of DNA to provide a more complete picture of the relationships among species and the frequency and extent of hybridization. This project will begin to address this by generating genome-wide sequencing data using samples from 40 chipmunks of 13 species and various localities. DNA extracts from each sample were prepared for next-generation genetic sequencing. A custom exon capture experiment was then used to target nine million base pairs of the chipmunk genome for Illumina sequencing. These sequencing efforts generated data spanning thousands of genes in all 40 samples, which was used to construct an overall phylogeny for the group. These data provide the foundation for ongoing studies to resolve the chipmunk phylogeny and the history for hybridization in this system.

Mentor: Jeffrey Good, Division of Biological Sciences

#42 Resisting Purity Politics: Scandal and Dissent in Caminetti's America

Author(s) - Jennifer Pepprock, History

In March of 1912, Farley Drew Caminetti and Lola Norris fled to Reno to avoid scandal. Shortly after their arrival, police arrested Caminetti and charged him with violating the Mann Act. The act stemmed from public hysteria over the forced prostitution of young women, termed "white slavery." Immediately following Caminetti's arrest, the press saw the potential for scandal in his story. It included an important element of gossip – socially unacceptable sex. More importantly, Caminetti was the son of the newly appointed Federal Commissioner General of Immigration. The Wilson Administration scrambled to cover up the scandal. Their attempt, however, only reaped more scrutiny as it interfered with the judicial process. Over the course of the case, the media's muckraking did significant damage to the reputation of anyone who threatened the Mann Act. In their final decision, the Supreme Court upheld and expanded the act. Both Congress and the Supreme Court were unwilling to take on the Mann Act's expansion even as it created and aided blackmailing groups. As blackmail continued, public opinion ostracized the Mann Act for the first time in its history. By synthesizing newspapers, court cases and government documents, my project concludes that Caminetti's scandal demonstrates the growing power of media in politics during the Progressive Era. The media effectively dominated the Caminetti conversation by scrutinizing anyone who posed a threat to the Mann Act. While the media's actions protected

the Mann Act from government dissent, they ultimately turned public opinion against the act by supporting its expansion which aided blackmailers. While many historians emphasize the power of Progressive Era muckrakers as reformers, my project reveals how the media's scandals actually inspired government inaction and public dissent through debauched legislation. It speaks to the power of national media in dominating and corrupting the political process.

Mentor: Kyle Volk, History

#45 A Qualitative Analysis of Rural Health Literacy

Author(s) - Lorraine Adams, Psychology

Health literacy (i.e., the ability to seek, use, and understand health related information) plays a paramount role in receiving quality health care. Lower health literacy levels have also been associated with worse overall health outcomes (Paasche-Orlow, 2007; Jordan, 2009). Interestingly, rural populations tend to have lower health literacy levels compared to their urban counterparts (Zahnd, 2009). Therefore the purpose of this study was to examine potential contributing factors to rural population's lower health literacy levels. Ten structured, qualitative interviews were conducted on rural residents from Powell, Sanders, Beaverhead, and Flathead counties who had been discharged from St. Patrick's Hospital Missoula, Montana within the last year. The interview transcripts were analyzed using a grounded theory approach and emergent themes were coded using NVivo8. Three main themes were identified: self-sufficiency, communication, and expectations. Previous research indicates little is known about what is contributing to lower health literacy among rural residents. The results of this study will strengthen our understanding of rural health literacy and create a framework for potential interventions to increase patient's overall ability to seek, use, and understand health related information.

Mentor: Craig Raveslout, Psychology

#46 Women's Bodily Integrity: Rosario Castellanos' Critiques in the 21st Century

Author(s) - Alanna Wulf, Environmental Studies and Spanish

Rosario Castellanos born to a traditional family in Chiapas, Mexico in 1925 experienced through her lifetime the oppressive, deeply patriarchal society that dominated the human experience within the country. Although many differences exist between the United States in 2015 and Mexico in 1960, Castellanos' criticism in regards to male defined female sexuality applies to the way in which some sectors of our society view female sexuality today. Considering current legislation attempting to restrict access to birth control and abortions which can directly affect pay inequality, the poetic works of Castellanos offer a voice of opposition to popular ideologies prevalent throughout the United States despite the 40 years that have passed since her death and the differing geological locations. The patriarchal discourse foundational to many societies denies women bodily integrity and autonomy on local, national, and international levels. At the heart of this investigation, I research and describe Castellanos' societal critique through the medium of poetry in regards to the language and discourse surrounding women's sexuality in mid-Twentieth Century Mexico. How does Castellanos critique the society around her? Does her language create space for a redefinition of female sexuality? To answer these questions, I have chosen the poems "Kinsey Report," "Speaking of Gabriel," and "Self-Portrait." I analyze and present the implications of the three poems in the specific order outlined above for they highlight the different, yet inextricably interconnected, aspects of female sexuality: sex, pregnancy, and motherhood. I then relate these critiques to the current environment of female sexual repression in the US. Today in the United States, social conservative legislative measures and societal norms borne from a similar patriarchal discourse that Rosario Castellanos confronts in her poetry impede women from freely controlling their sexuality, female reproductive health, and professional lives.

Mentor: Maria Bustos, Modern and Classical Languages and Literature

#47 European Youth: Jockeys in Eurosceptic Dark Horse Politics?

Author(s) - Chase Ellinger, Political Science

“Eurosceptic” or anti-European Union (EU) political parties are notably gaining traction in EU elections across the political bloc. The continued importance of the Eurosceptic phenomenon was most recently evidenced in the pan-EU elections of May 2014, when parties like the UK Independence Party and France’s Front National gained scores of seats – and, therefore, influence – in the European Parliament (EP). This trend is disturbing to pro-EU politicians and Europhiles alike. Based on my review of existing literature, however, there is a notable lack of research into the role of youth voters in electing these political parties. In this paper, I draw on extensive EP post-election survey data to analyze trends among young voters – aged 18-24 – in eight EU member states between 1994 and 2014. I then compare unemployment statistics for people under age 25 in the four fiscal quarters prior to and including each election to the observed voting trends in the eight states in an attempt to explain the potential rise in popularity of Eurosceptic parties among young voters. Given the stagnant European recovery from the 2009 global financial crisis, coming-of-age voters may take a more anti-establishment approach to future European elections in order to voice their discontent with EU policies at the ballot box. Recognizing these trends is important for European political scholars and policymakers that would like to see the role of Eurosceptic parties diminished.

Mentor: Christopher Muste, Political Science

#49 Romantic Science

Author(s) - Tilyn Newcomb, German

The German authors Johann Wolfgang von Goethe and Friedrich von Hardenberg, known as Novalis, left behind important literary and scientific legacies that helped shape the way the world considers nature. Both of these authors have backgrounds in science – Goethe highly regarded scientific observation and study, especially in the field of botany, and Novalis was a scientist skilled in mineralogy, physics, chemistry, mathematics, and physiology – and their appreciation of science comes through in much of their writing, and in this paper, I examine their scientific background within the context of how each author writes about nature. While different from each other’s, their respective treatments of nature go against the traditional Enlightenment approach to nature, which was to view it as something to be observed, catalogued, and subsequently controlled. In his early work, *Die Leiden des jungen Werthers*, Goethe uses nature as a tool to mirror the moods and emotions of his title character. Werther has an intensely personal connection with the natural world around him, and this kind of relationship with nature was quite novel at the time. Novalis, who greatly admired Goethe’s writing and his background in science, approached nature in a very quintessentially romantic fashion. His fragment novel *Heinrich von Ofterdingen* places nature at the forefront of his main character’s spiritual and poetic transformation. In this presentation, I will analyze both works from the perspective that the authors’ scientific backgrounds helped shape their treatment of nature and thus helped shape the view of nature for following generations.

Mentor: Elizabeth Ametsbichler, German

#50 Glacial Retreat in Glacier National Park: A Sample of Global Climate Change

Author(s) - Leah Lynch, Environmental Studies

Glacier National Park used to hold 150 glaciers, and today that number has reduced to 25. Over the next 100 years it is believed the glaciers will continue to melt, leaving 0 glaciers by the projected year 2030. A melt rate and spatial distribution of glaciers has been predicted under two possible future climate scenarios. The two models include: carbon dioxide-induced global warming and a linear temperature extrapolation. Using these models, it allows for vegetation to be analyzed through soil moisture and increasing temperature to predict a future alpine landscape and future plant communities. Glacier National Park serves as a great example of the globe’s warming. With the national park having little pollutants and human activity over the whole park, it stands as an untouched piece. It simply has seen the results of the globe rising in temperature. In the time period from 1910-1980 the

Earth raised by .45 degrees Celsius, this is when a large amount of glacier melting occurred. This period of time had an accelerated heat in the summer ultimately losing 73 percent of the glaciers. The impact that has already occurred is irreversible unless a similar climatic occurrence such as the Little Ice Age occurs. Beyond this situation, it must be understood how the loss of glaciers will influence other vegetation and plant communities. The scientific proof of global warming is occurring and glacier melting in Glacier National Park provides us with tangible proof that the rise in temperature has a great effect. Perhaps not immediately, but as represented in the article ice melting occurs on a decadal time period. This allows room each decade to better our green initiative and if the glaciers have not slowed in melting pace then we will be able to collect data to understand how the world will alter.

Mentor: Rosalyn LaPier, Environmental Studies

#51 Dynamic Assessment: Speech Sound Disorders

Author(s) - Lauren Steinmetz, Communicative Sciences and Disorders; Kylie Bull, Communicative Sciences and Disorders

Children who have speech sound disorders have a limited number of speech sounds that they are able to produce correctly. Speech-language pathologists identify these disorders in children and provide treatment. Static assessment is most commonly used to evaluate a child's speech abilities. However, this process can often leave out key components of a child's speech abilities by not considering different environments in which speech is used. The purpose of this study is to examine the use of dynamic assessment, which is used less often, to measure speech changes and treatment effectiveness by providing support to the child throughout the assessment. This research is significant because there are currently no methods of measurement being used that fully encompass a child's speech abilities. In this study, the researchers used a new type of dynamic assessment, the Glaspey Dynamic Assessment of Phonology (GDAP), where the clinician provides help when needed. This approach is one of the first dynamic assessments that can be used to evaluate and treat a child's speech production issues. The methods included researchers watching therapy sessions of a six-year old boy with a moderate speech sound disorder. The researchers analyzed and compared his results from both a static assessment and a dynamic assessment. The researchers measured the changes of four target sounds treated over eight therapy sessions using the GDAP. Anticipated results of this study are increased responsiveness to a child's specific needs, and clinical implications could include increased efficiency of identification and treatment of speech sound disorders in children through the use of dynamic assessment.

Mentor: Amy Glaspey, Communicative Sciences and Disorders

#52 Post-Surgery Survival in Lake Erie Walleye

Author(s) - Sarah Zundel, Wildlife Biology

Lake Erie is the most productive and economically important fishery in the Great Lakes. In Lake Erie, Walleye (*Sander vitreus*) are one of the most sought after fish species. Because of their economic importance, fisheries biologists are studying their mortality, spatial ecology, and spawning migration movements. To estimate mortality in large aquatic ecosystems, we often tag individual fish and follow their fate. The capture, handling, and tagging procedure can result in stress and mortality that need to be determined for accurate estimates of annual natural mortality. The purpose of my project was to use acoustic telemetry to determine the post-tagging mortality of 100 Walleye in the Sandusky River stock and examine whether mortality rate was associated with sex, size, or date released. Walleye were collected in the Sandusky River over the course of three days: the 2nd, 10th, and 16th of April 2014. Once captured, individuals were implanted with transmitters and released. There were a total of six receivers used to detect tagged individuals moving downstream from the spawning area. The number and pattern of detections from each individual was used to determine mortality. Twenty-two Walleye (15 males and 7 females) out of 95 non-harvested Walleye (46 males and 49 females) died within the river or bay during the observation period, which ran from the release date to early June. There was no statistical difference in mortality between individuals based on length, sex, or release date. Now that the post-tagging mortality has been

determined, the surviving Walleye will be used to determine natural mortality when they return next season to spawn.

Mentor: Lisa Eby, Ecosystem and Conservation Science

#53 Reading, Walking, and Writing the Camino de Santiago

Author(s) - Rebecca Collins

Santiago de Compostela, a city in Galicia, Spain, has been said since the 8th century to hold the remains of St. James, an apostle and the patron saint of Spain. Old walking routes, still in use, fork all throughout the European continent toward this singular destination, with the collective label of the “Way of St. James,” (the Camino de Santiago in Spanish, Le Chemin du St. Jacques in French). For nine months of this past year, the Camino de Santiago and the study of pilgrimage was my singular destination as well. I studied the history of pilgrimage, European pilgrimage literature, and travel- and spirituality-based nature writing. I then left my books and completed the pilgrimage myself, starting about a thousand miles away in the town of Le Puy outside of Lyon, France. The nature writing I will present is my attempt to synthesize my research and experience into an account of my pilgrimage. I have reworked my notes from journals on the pilgrimage, pieces of the studies I completed in the summer, and tales and histories that I learned on the Camino route into my essays, works of creative scholarship, which use my personal experience as a medium to speak of essential themes in pilgrimage—rites of passage, burdens, creating new temporary communities, walking through a blend of myth and history, and searching for a great mystery.

Mentor: Henriette Lowisch, Journalism

#54 Tell It On the Mountain: Fannie Lou Hamer’s Pastoral and Prophetic Styles of Leadership as Acts of Public Prayer

Author(s) - Breanna Barber, History and Liberal Studies with an Emphasis in Women's and Gender Studies

Fannie Lou Hamer grew up in an impoverished sharecropping family in Ruleville, Mississippi. In 1962, she became active in the Civil Rights Movement and her dual leadership style would prove central to the African-American struggle for civil rights. The duality of Hamer’s model of leadership centered on acts of public prayer in a prophetic style, through public speaking and discourse, and a pastoral style, through the use of sung prayer. This research examines why Hamer used this model of leadership, how this leadership style was constructed, and relays why this leadership style proved to be so influential to the grassroots organization of the Civil Rights Movement. This research also analyzes the ways Hamer’s acts of public prayer culminated in a prophetic style and pastoral style during her time as a civil rights leader. It explores the results of this combined leadership style and how this inspired strength, solidarity, and a sense of safety with her community in Ruleville and the Civil Rights Movement at large. This research draws from a rich primary source base, gathered largely from the Mississippi Department of Archives and History in Jackson, Mississippi. Unlike past biographical accounts of Hamer’s life, this work examines her dual leadership style which provides a deeper understanding of the role of religion in the Civil Rights Movement. Importantly, this scholarship demonstrates the importance of African-American women’s leadership during the Civil Rights Movement. Women’s participation historically has been understood in terms of supporting roles instead of leadership positions. Rarely explored, Hamer’s foundational activism embodies both religious heritage and African-American women's traditions.

Mentor: Tobin Miller Shearer, African-American Studies

#55 Expressive Arts as a Means of Increasing Well-Being in Children

Author(s) - Emily Vascimini, English, Dance; Jordan Frotz, Education; HanaSara Ito, Theatre/Anthropology; Danielle Smith, English - Creative Writing

Across the country and throughout the world, children are receiving less exposure to expressive arts than in previous decades. Research has shown that expressive arts provide major benefits to young people.

We implemented a student-directed program in a local fifth grade classroom to add to the current research on the benefits of expressive arts to children. Our program allowed students to select a central theme and self-select the expressive arts they participated in each day. They had the choice of creative writing, visual arts, dramatic play, and creative movement. Students completed measures of psychological well-being, specifically their self-esteem and self-confidence, both before and after participating in the four-week program. We hope our program and research will bring more awareness to the expressive arts, challenge schools to keep them in the curriculum, and increase their global presence. Our research findings from this program will be used to develop a comprehensive expressive arts program able to be distributed in a variety of global settings, such as orphanages, schools, or private organizations.

Mentor: Stephen Yoshimura, Communications

#56 Two Halves Do Not A Whole Make: The Silent Voices of Bicultural America

Author(s) - HanaSara Ito, Theatre/Anthropology

Currently, there is a lack of understanding in the Western artistic and theatrical canon when it comes to multiculturalism-- and in the globalized society of today, that is no longer acceptable. This project is an exploration into how art can be used to give a voice to the bicultural youth of today. Using my own personal experience growing up as an Asian-American/Indigenous Person, as well as research into post-colonialist and applied theatre, I have created a short performance and presentation exploring how and where race, culture, and society intersect to form a specific bicultural identity. The performance will include folk music and already published text. Through this work, I hope to set a small precedent for other students struggling with identity formation, and a greater understanding of how art can be used to deconstruct cultural pressures.

Mentor: Jillian Campana, Theatre

#57 Searching for Success in Asymmetrical Conflicts

Author(s) - James Papai, History/Political Science

As the threat of ISIS spreads in the Middle East and North Africa, the nations of the world find themselves involved in numerous asymmetric conflicts of both low and high intensity. Among the most noticeable counterinsurgency efforts involve the United States in Afghanistan and the Syrian government within their own civil war. Despite these prominent cases, this paper focuses on several different asymmetric, inter-state conflicts, which do not involve external actors and occurred during the period of 1998-2008. The purpose of doing so is to attempt at distinguishing the actual capabilities of the host government at conducting a counterinsurgency, not evaluate the ability of the United States or other Western nations. Drawing on government reports as well as other documentary and academic sources, this paper examines these conflicts, chosen at random from the databases of the World Bank and the Economist Intelligence Unit Index of Democracy, and sets them against the argument of the potential relationship between power and democracy to reveal if one element is better at producing a more successful counterinsurgency strategy than the other. This paper illustrates that each of the six different nations examined took differing approaches to their local insurgencies and each of these approaches met with differing levels of success. Finally, this paper was able to conclude that, while more research is needed before expansive policy recommendations can be produced; the Realist theory of international relations was able to accurately predict the capability of the weakest states. This paper ultimately encourages the further exploration of the lessons learned in these conflicts as a means to one day develop a more universally successful counterinsurgency strategy.

Mentor: Karen Ruth Adams, Political Science

#58 Fighting Without Hatred: Ernesto Cardenal, US Catholic Radicals, and the Question of Violence in Nicaragua, 1957-1979

Author(s) - Brendan Jordan, History

In 1957, a young Nicaraguan poet named Ernesto Cardenal, recently graduated from Columbia University, entered the Trappist Abbey of Gethsemani, located outside Louisville, Kentucky. There he met a prominent Catholic thinker and pacifist, Thomas Merton, who soon mentored young Cardenal. Though Cardenal departed Gethsemani in 1959, Merton continued to counsel him in spirituality, poetry, and social activism until Merton's death in 1968. While Cardenal during these earlier years was a committed pacifist, his experiences after returning to Nicaragua in 1965 radically altered his view of social action. Cardenal established a semi-monastic community in the Solentiname islands in southern Nicaragua, and in a series of bible studies with the people who came to stay there, found himself increasingly committed to the social vision of the Marxist Sandinista movement. In the early 1970s, Cardenal formally declared his support for the FSLN, the military wing of the Sandinista revolution. By 1977, another student of Merton's, Daniel Berrigan, began openly criticizing Cardenal for his assertion that violent revolution could, when necessary, serve a just cause of social transformation. This thesis will address the formative influence of Thomas Merton on both Ernesto Cardenal and Daniel Berrigan, and how they came to accept or reject the use of violence in the pursuit of social justice. In particular, analysis will concentrate on Ernesto Cardenal and the ideological transformations that led to his ultimate support for and involvement in the Sandinista revolution. My research draws from the written correspondence between Merton, Cardenal, and Berrigan, and from interviews, major publications, and a few key government documents. This thesis will argue that while Cardenal never fully supported violence, he nonetheless joined the revolution both out of devotion to Merton's teaching and out of necessary solidarity with his countrymen.

Mentor: Brendan A Jordan, History

#59 Teen Mothers' Educational Attainment and Delinquency in Children

Author(s) - Mary McCarvel, Psychology

Although births to adolescent mothers have been steadily declining since the 1990s, each year more than 400,000 adolescent women in the United States give birth and teen parenting still represents a significant social problem. Adolescent child bearing has been associated with a variety of negative outcomes for young mothers including, lower levels of education, unemployment, poverty, unstable relationships, and greater life transitions. In addition to the risks for young mothers, it has been well established that children born to teen mothers are at a greater risk for experiencing adverse outcomes such as lower academic achievement, and greater likelihood of behavioral problems and delinquency. Given the risks associated with teen parenting, it is important for researchers to identify factors that may decrease the likelihood of such negative outcomes. So far, researchers have not examined the relationship between mothers' educational attainment and delinquency in children. The present study will analyze data obtained from the Fragile Families and Child Wellbeing study. FF is a nationally representative longitudinal study that has systematically gathered data on children exposed to multiple risks. The present study will focus on a subset of teen mothers (N=815) in order to examine the relationship between mothers' education completion and children's delinquent behavior, exploring several potential mediators and moderators. We predict that as maternal education levels increase, a child's likelihood of engaging in delinquent behaviors will decrease. Logistic regression analyses will be used to examine mother's educational attainment as a predictor of children's delinquent behavior and to look for potential mediators. This study will add to the growing body of research that seeks to identify characteristics of teen mothers that buffer the negative outcomes associated with teen parenting. Providing young mothers with opportunities to complete additional schooling may benefit teens and their offspring in many ways.

Mentor: Nicole McCray, Psychology

#60 Perceived College and Career Readiness of Students with Autism Spectrum Disorder

Author(s) - Rachel Babbitt, CSD; Jaime Morelli, Communication Sciences and Disorders

Many graduating students with Asperger syndrome or high functioning autism are leaving high school without the necessary skills for success in college and employment. One of the main characteristics of autism spectrum disorder is having deficits in communication and planning skills that are necessary for success in college and workplace settings. Currently Montana is not obligated to educate through age 21 for people with special needs and does not have a comprehensive transition program within its borders. Educators and policy makers currently lack reliable information regarding the educational needs of Montana's students with autism. This study will determine what areas students with autism need continuing education and support in. The research will be conducted through a survey assessing the opinions of professionals and paraprofessionals in the state of Montana who have experience working with high school students with high functioning autism. The survey will be sent out via email through the Montana Speech Hearing Association and distributed through superintendents of various Montana school districts. The sample will be determined by the number of participants that respond to the survey. The survey questions are designed to assess the language and communication skills of higher functioning students on the autism spectrum compared to their peers with learning disability and typically developing peers. Most questions are specific to the skills laid out by the Montana Common Core anchor standards, while other questions cultivate general impressions on the independent living skills of the student categories. For each anchor standard question, the participants will rate the skills of each student category. Comparing the average skills of each student category will provide validity to the survey. To establish reliability, participants will report their professional experience with each group, those with no experience will be excluded.

Mentor: Jennifer Schoffer Closson, Communication Sciences and Disorders

#61 The River of Rock: Evolution of the Albion-Raft River-Grouse Creek (ARG) Metamorphic Core Complex of Idaho-Utah-Nevada and Implications for the Miocene Colorado River

Author(s) - Max Yzaguirre, Geosciences; Brianna Berg, Geosciences; Kyle Brangers, Geosciences; Michael Arthur, Geosciences

Evidence suggests that the present southerly course of the Colorado River was not possible until the Pliocene. Despite this, geologic evidence suggests erosional processes due to river flow occurred 20 million years earlier in the upper reaches of the Grand Canyon. The proposed ancient course of this river went north to the Labrador Sea, traversing the ARG region. The tectonic chronology of the ARG metamorphic core complex of the Utah-Idaho-Nevada tristate region is preserved in the minerals and deformational structures of the rocks exposed today. This timeline reveals peak metamorphism related to regional plutonic deformation during the Eocene and Oligocene and subsequent extensional exhumation during the middle Miocene. The proposed northerly path of the prehistoric Colorado River follows a course that traverses the present day range that formed due to extensional normal faulting related to the exhumation of the ARG core complex. The geomorphic evolution of the river suggests these events were critical to impeding the northerly direction of flow, resulting in the internal drainage of the Great Basin that we observe today. Using age datasets already established, previous field notes, and our own field observations we can establish a timeline that connects the extensional tectonic events that resulted in the exhumation of the ARG core complex to the diversion of flow of the Miocene Colorado River. The ARG metamorphic core complex has been well studied and documented but the timing of events as of yet has not been related to geomorphic processes in the evolution of the former path of the Colorado River. This connection is vital to justify the timing of events and to better understand the landscape evolution of this region.

Mentor: James Sears, Geosciences

#62 Sexual Assault Reports to the Police: A Pilot Investigation of the Factors that Influence Victimization Reporting and Victim Perceptions of Police Responses

Author(s) - Hailey Powers, Sociology

The purpose of this thesis is to examine issues associated with the reporting of sexual assault victimization to the police and police responses to these reports. The information gathered will be used to inform best practices regarding future responses to these crimes by the Missoula Police Department (MPD) and other stakeholders. The information will also be used to inform a larger investigation that will take place after the pilot phase of the project ends. The methodology for this project included conducting a comprehensive literature review, the development of a victims' questionnaire and an advocates' questionnaire, a pretest, and is ultimately a pilot test of the developed surveys. My project is new to the city of Missoula, as a survey of sexual assault victims and police responses have not been conducted before. This project is also being completed in response to a formal request from the Department of Justice to the Missoula City Police Department. My project holds great significance for the Missoula community because it will be informing the MPD and detectives who are the initial point of contact on how to most effectively respond to reports of sexual assault, while creating a safe and positive environment for victims. The issue of sexual assault has gained a lot of attention, particularly in our community, very recently. This project speaks directly to the problem, and the ways our city and university, are working to implement more effective and comprehensive means of responding to victims who come forward. Using the information gathered in this project, future projects will be informed about the best methods of data collection and analysis, as well as implementation practices for victim service providers.

Mentor: Dusten Hollist, Sociology

#63 Predation and Selection in the Green Alga *Chlamydomonas*

Author(s) - Charles "Alex" Knox, Biology-Genetics and Evolution

For most of the 3.5 billion year history of life on Earth, organisms were confined to a single-celled existence. When some lineages made the transition from single-celled to multicellular life, there were profound implications both for the planet and the organisms that remained unicellular. A leading hypothesis suggests that predation drove this important evolutionary transition in some multicellular lineages. In recent experiments, populations of the unicellular green alga *Chlamydomonas reinhardtii* evolved simple multicellular structures under selection on settling rate or from predation. *C. reinhardtii* is a model system for genetics, photosynthesis, circadian rhythms, flagellar motility, and sexual and asexual reproduction. I tested whether and to what degree simple multicellularity provides a viability advantage for *C. reinhardtii* exposed to two of its natural predators by comparing growth rates of unicellular and multicellular strains with and without predators. I found that multicellularity provides a meaningful advantage for *C. reinhardtii* with respect to predation under laboratory conditions. This provides support for the hypothesis that predation was an important factor in the evolution of multicellular lineages leading to the vast diversity seen in life today.

Mentor: Matthew Herron, Division of Biological Sciences

#64 The Effects of Modeling Writing Instruction on Early Literacy Development in Preschool Children

Author(s) - Jessica McCauley, Communication Sciences and Disorders; Baylee Oligmiller, Communication Sciences and Disorders; Kara Dobie, Communicative Sciences and Disorders; Lara Kenyon, Communicative Sciences and Disorders

Early literacy, with foundations in oral language, phonological awareness and print knowledge, is essential to later academic achievement (National Early Literacy Panel, 2008; National Reading Panel, 2000). A growing body of research has documented developmental trends for these skills and has provided guidance for interventions in oral language, phonological awareness, and alphabet learning for young children; however, limited research has been performed in the area of writing instruction (Purinak & Wagner, 2011). Utilizing a quasi-experimental design containing a control group, a comparison group, and an experimental group, this study investigates if

modeling the stages of writing for preschoolers enhances early literacy skills more than traditional writing instruction or instruction in which writing is absent from the curriculum. Researchers have conducted pre-testing measures of 91 participants. Participants from two experimental classrooms will receive instruction that models the developmental stages of writing. Participants from two comparison classrooms will receive instruction on writing at the adult level only. Participants from two control classrooms will not receive writing instruction from researchers. Participants in the experimental and comparison group will participate in a Picture Story/Word Story activity following a storybook reading until 20 instructional sessions have been provided. For the Picture Story/Word Story activity, children will be encouraged to draw a picture, then write about their drawing. It is expected that the children receiving explicit writing instruction, beyond the adult model, will demonstrate more advanced early literacy skills measured through writing samples and post-assessment than children not receiving explicit writing instruction. Findings from this research will be relevant to the fields of speech-language pathology and education to help identify and implement a more effective form of writing instruction which will provide preschoolers with the literacy foundations needed for later academic achievement.

Mentor: Lucy Hart-Paulson, Communication Sciences and Disorders

#65 Quantifying Shifts in Soil Microbial Populations in Response to 2,4-Dichlorophenoxyacetic Acid

Exposure

Author(s) - Jameson Boslough, Microbiology

2,4-dichlorophenoxyacetic acid (2,4-D) is the third most commonly used herbicide in the U.S., thanks to its ability to selectively control broad-leaf plants. The pathways enabling 2,4-D degradation in microbes are well characterized, and many native soil microbes are known to either possess plasmid or chromosomally-encoded DNA for such. Selection for 2,4-D degraders is known to occur in soils exposed to 2,4-D in-situ or in lab. However, there have been limited experiments in understanding how soil microbial populations from different, previously untreated soils respond to 2,4-D exposure, and the ecological dynamics of which specific pathway variants are selected for within each population due to herbicide concentration. We set out to explore these dynamics in 2,4-D naive soils around the Missoula Valley. Soils with no or minimal prior herbicide exposure were taken from the Garden City Harvest farm at River Road and from Mt. Sentinel. These soils were then amended in triplicate with either 2,4-D to 500 ppm, or with phosphate-buffer as a negative control, then incubated at room temperature in the dark over the course of several weeks. The amount of 2,4-D in the treated samples was monitored using HPLC and the soils were respiked to the initial concentration when $\geq 80\%$ had been degraded during the course of the experiment. At weekly intervals, the number of 2,4-D degraders in each sample were enumerated using MPN and 2,4-D minimal medium, while total aerobic, heterotrophic counts were obtained by plating on R2A general growth medium. Once the amendment series is completed, we will further analyze how each soil microbial community has responded based on genetic marker surveys. With further testing and experimentation, our research has the potential to illuminate the selective and ecological dynamics of soil microbial communities in response to 2,4-D exposure.

Mentor: William E. Holben, Cellular, Molecular and Microbial Biology Program and Systems Ecology Program Division of Biological Sciences

#66 Analysis of Recent DDoS Attacks: an Application of Mirkovic and Peng Taxonomies

Author(s) - Jose Rodriguez, Information Technology

Distributed Denial of Service (DDoS) is a threat for all companies. Every second that the company is offline, a tremendous amount of money is lost. Since the introduction of the Internet, DDoS attacks have been a common occurrence, yet solutions to counter them have been limited. This research project analyzes the recent DDoS attacks based upon the financial, societal and technical impact. Besides that, the taxonomies of Mirkovic and Peng will be used to classify details of recent DDoS attacks with the goal of identifying common characteristics. Mirkovic's taxonomy analyzes in a very technical depth the DDoS attacks meanwhile Peng's taxonomy is more generic. Both these taxonomies are quoted by several authors although nobody has used them to create a classi-

fication of attacks. This research project is useful to individuals interested in developing solutions for computer network and information security since there is no classification made or any method for classifying them.

Mentor: Thomas Gallagher, Applied Computing & Electronics

#67 Global Solutions to Local Problems: How the Global Community Responded to the Ebola Outbreak of 2014

Author(s) - Nicole Thelen, Psychology

Health crises are often met with much support from the global health aid communities, who strive to contain the current health crisis and improve the conditions of the affected society. The recent Ebola outbreak of 2014 is no exception. Driven by public panic and media coverage, the global health community responded in force, dispatching aid organizations, monetary help, and military assistance to both assist those affected with the disease and prevent it from spreading. The World Health Organization, along with Doctors without Borders and many other global organizations, swept in to provide aid to the affected areas. This project examines how these organizations responded to this particular outbreak as well as examining how the global health community responds to health crises in general. It will look at the possible negative impacts of unhindered foreign aid, specifically how the presence of so many possibly conflicting aid organizations in one area attempting to solve a health problem can inhibit local aid work, damage local infrastructure, and insult local culture and practices. The project will examine the importance of empowering and retaining the autonomy of local communities and working with them to create a framework that will sustain itself, address future potential problems, and rely on local organizations and resources. Using a combination of news articles, books, social studies of the area and of providing health aid in general, and interviews with Michele Sare (a nurse, author, and advocate for local autonomy in developing countries) and George Risi (a doctor who responded to the Ebola epidemic), this project will use the crisis of Ebola in Africa as a study in how the global health community should aim to respond to health crises.

#69 Molecular Biology of a Surface-Exposed Protein Family of Bartonella Bacilliformis

Author(s) - Hannah Fay, Microbiology

Bartonella bacilliformis causes Carrión's disease, a potentially life-threatening infection transmitted by sand flies in the Andes. The illness has a mortality rate of 88% when untreated and 10% when treated. Diagnostics and control measures are underdeveloped and no vaccine is available. The range of the pathogen is increasing with nearly 1.7 million people at risk, but little is known about the pathogenesis of *B. bacilliformis*. A recent study found a paralogous gene family (*impA*) that is solely shared between the *Bartonella* and *Leptospira* genera. This is intriguing since these bacteria are phylogenetically unrelated. The gene family is suspected to affect the virulence of the bacterium, based on the findings that it was one of a few that were mutated during attenuation and all members of the gene family were up-regulated considerably during leptospirosis in a mouse model. The objective of our research is to investigate the function of the paralogous gene family and elucidate why both *Leptospira* and *Bartonella* have maintained it. This will lead to a better understanding of *Bartonella*'s pathogenesis and indicate if the proteins are potential virulence factors. Determining the cellular location of the *ImpA* proteins will give us a better understanding of their function. To this end, a fragment of one *impA* gene (BAR-BAKC583_0452) was cloned into an expression vector (pQE31) to generate a fusion protein with a His6 tag. The recombinant peptide was expressed and purified from *E. coli* and used to generate rabbit polyclonal antibodies. The antibodies were tested for seroreactivity against the Bb0452 peptide on western blots and reacted positively. However, the antibodies did not detect the protein in cell lysates. We are currently determining if the protein is only expressed under certain growth conditions. Once the protein is expressed, we will localize it using cell fractionation techniques and the anti-Bb0452 antibodies.

Mentor: Mike Minnick, Division of Biological Sciences

#70 Strengthening the Circle: Seeking Healthcare Equity for American Indians Experiencing Homelessness

Author(s) - Damion Barnett, Sociology

Equitable healthcare is a concept that calls for more than just providing equal access to primary care services. In order to achieve equity for a particular community, the healthcare system must address the social factors that prevent better health for members of that community. Many studies have shown that the U.S. healthcare system does not provide equitable care either to American Indians or to people who are homeless. These studies have identified poverty, trauma, and low educational attainment as obstacles to improving health within both of these populations. However, there are no published studies that specifically explore healthcare equity for American Indians who are experiencing homelessness. My research attempts to fill this gap. In 2013, American Indians made up 4.3 percent of the total Missoula County population but 13.5 percent of Missoula's homeless. In an effort to determine how the healthcare system provides equitable care to American Indians who are homeless, I am conducting both informal and formal interviews with local American Indians living in the Poverello Center, an emergency housing shelter, or who are otherwise without stable housing. I am also collecting demographic data from public sources including the U.S. Census Bureau, the Montana Department of Public Health & Human Services, and the Indian Health Service (IHS), as well as obtaining utilization data from the Poverello Center and Missoula Indian Center (MIC), the local IHS-funded healthcare organization. I will use the data I collect to gauge whether or not the healthcare system is currently meeting the needs of American Indians in Missoula who are homeless. I will also work with the Poverello Center and MIC to develop strategies for making the local healthcare system more equitable, such as incorporating traditional healers, expanding workforce development opportunities, and adding programs or reshaping current program designs to address trauma and co-occurring disorders.

Mentor: Daisy Rooks, Sociology

#71 Do Big Beetle Larvae Run Big Thermal Risks?

Author(s) - Nikita Cooley, Organismal Biology and Ecology

Extremes of body size captivate biologists. In insects, the lack of extant giants has prompted the question, what is constraining insect size? While multiple physiological and ecological hypotheses have been presented, there is no widely accepted explanation. One unexplored physiological hypothesis is that large insects are unable to shed metabolic heat rapidly enough and are at increased risk of overheating. My project examines this idea using larvae of the Japanese rhinoceros beetle (*Trypoxylus dichotomus*), chosen for their huge size, simple body plan, and underground lifestyle. Using CO₂ respirometry, I measured larval metabolic rates at room temperature. Although these beetle larvae are among the largest insects ever measured, their metabolic rates fell squarely on the expected values extrapolated from other, smaller insects. This permitted me to build a simple mathematical model of heat balance for insects across a wide range of body sizes. Specifically, I converted my measured rates of gas exchange into rates of metabolic heat production, and used the model to predict how much equilibrium body temperature would increase in insects larger than naturally occur. I then used CO₂ respirometry during temperature ramping experiments to determine thermal tolerance limits. This showed that larvae could survive temperatures of 46-48°C. Together, these show that for every 100-g increase in body size, there is a 0.5°C increase in equilibrium body temperature, and that body temperatures are predicted to be well below the thermal maximum for animals ten times larger than any extant insect. In addition, larvae placed on runways extending across a thermal gradient were surprisingly active, and clearly capable of behavioral thermoregulation through movement to cooler locations. Collectively, my results suggest that insect size is not limited by metabolic heat production. This study provides a greater understanding of insect size constraints and behaviors associated with thermal regulation.

Mentor: H. Arthur Woods, Biological Sciences

#72 Retinoic Acid Hydroxylase Inhibitors as a Novel Therapy for Alzheimer's Disease

Author(s) - Isabel Makman, Russian

Alzheimer's Disease (AD) is one of the most prevalent neurodegenerative diseases afflicting the modern world. As no cure for AD has yet been discovered we sought to explore a potential treatment option based on the inhibition of retinoic acid (RA) metabolism, the active metabolite of vitamin A. Beta-amyloid plaques form in the brain and decrease cognitive function in AD patients. In a recent preclinical study RA was shown to decrease these plaques and rescue memory deficits in an Alzheimer's mouse model (Ding et al. 2008). However, in the human body RA is quickly cleared away by an enzyme, resulting in a loss of activity during long-term treatment. We hypothesize that the inhibition of the enzyme that clears RA would cause an increase in the amount of RA present in the brain. This increased amount of RA would decrease plaques, thereby improving AD patient outcomes. Using two behavioral maze tests, the Morris Water Maze (MWM) and Y maze, we assessed cognitive function based on how quickly the mice maneuvered the mazes. We have begun preclinical testing of the prototypical enzyme inhibitor in Alzheimer's mice relative to wild type (WT) litter-mates. A MWM measure of latency to the end of the maze showed a discrepancy between the performances of AD and WT mice, with the AD mice exhibiting a considerable cognitive deficit. The mice then received 8 weeks of treatment with the enzyme inhibitor (3 times per week at 10 mg/kg i.p.). A follow-up MWM was performed and no significant reversal of cognitive deficits in AD mice was detected. A more recent MWM study of 31 treated AD mice is currently being analyzed and shows promising similarities between AD and WT latencies. These results provide a strong foundation from which to further explore the use of these inhibitors in treating AD.

Mentor: Josh Lawrence/Philippe Diaz, Neuroscience

#73 University Of Montana's Native Plant Landscaping: Interpretation and a Proposal for Future Educational Strategies

Author(s) - Jonathan Nelson, Environmental Studies

The manipulation and interpretation of landscape reflects the attitudes, values and knowledge of the people within a particular cultural context. Of the many potential educational applications for the native plant landscaping on the University of Montana campus, I am proposing a strategy for educating students, the campus, and the community about native plants and local ecology in a way which appropriately reflects the historical relations of Native American cultures with local plant communities. The Payne Center for Native American Studies is the site of extensive native plant landscaping which is currently underused for education and lacking clear, appropriate and intentional directions for maintenance and interpretation. The Payne Center landscaping is one of several proposed service learning sites for the developing Native Plant Internship Program, and while the cross disciplinary potential of the program provides a context for various types of discussion, the strategy proposed for this particular site is developed around semiotic and rhetorical analysis of the landscape as a social or cultural construction. I am proposing that internship students tend the Payne Center native landscaping in a manner which highlight local Native American cultural relevancies and aesthetic qualities, while also working to develop interpretive and educational materials which guide the interpretive and educational experience of visitors, such as signs with written information about the cultural and ecological characteristics of the plants, as well as quick response (QR) codes which link smart phones and tablets to related website content which students compile about the plants from this and other Native Plant Internship Program learning sites.

Mentor: Marilyn Marler, Biological Sciences

#74 Fatal Woman, Revisited: Understanding Female Stereotypes In Film Noir

Author(s) - Danielle Smith, English - Creative Writing

Film noir stereotypes female characters through the femme fatale: fatal woman or wife. However, critics are currently re-examining the femme fatale. For example, in Film Noir's Progressive Portrayal of Women, Blaser and Blaser write "even when [film noir] depicts women as dangerous and worthy of destruction, [it] also shows that women are confined by the roles traditionally open to them." With that sentiment in mind, can one say that the femme fatale generates fear of feminism? Can one read her as a martyr and a heroine? I will examine facets of the femme fatale in modern and classic iterations, while contextualizing women's historical roles in society.

Mentor: Kathleen Kane, English Department

#75 Synthetic Undershirts Impact on the Metabolic Demand While Wearing Wildland Firefighter

Author(s) - Kristi McGowan, Exercise Science

Wildland Firefighters benefit from additional fire resistant clothing; however this may increase metabolic demand. Purpose: This study evaluates the effects of a flame resistant synthetic base undershirt on the metabolic demand while exercising in a hot environment. Methods: Ten recreationally active male subjects completed two walking trials clothed in either a Cotton (C) or Synthetic (S) undershirt. Additionally, subjects were equipped with Forest Service issued Person Protective Equipment consisting of a 35 lb pack, Nomex shirt, Nomex pants, gloves, and hard-hat. Trials consisted of 180-minutes of walking (2.5 mph, 4% grade) in a climate-controlled chamber (35°C and 40% relative humidity). Each 180-minute trial was divided into three 50-minute exercise bouts followed by 10-minute seated rest. Expired gases were collected at time intervals 5, 40, 100, 160 minutes during exercise to determine oxygen consumption (VO₂) and Respiratory Exchange Ratio (RER). Heart Rate (HR), Rate of Perceived Exertion (RPE) Core temperature (T_c), and skin temperature (T_{sk}) were collected every 10 minutes. Repeated measures of ANOVA's were performed using SPSS 22.0. Results: HR showed an increase over time (p<0.001), but did not have a significant difference between S and C (p=0.27). RPE displayed significant effects in time (p=0.001) but no significant in trials (p=0.55). T_c and T_{sk} also increased over time (p<0.001), but did not show a difference between the two under shirts (p=0.73). RER increased over time (p=0.01) but did not differ between trials (p=0.92). VO₂ demonstrated a timeXtrial interaction (p=0.048), with S being greater than C by the end of the trial (18.2 ± 0.5 ml•kg⁻¹•min⁻¹ vs 17.7± 0.6 ml•kg⁻¹•min⁻¹). Conclusions: While the data does not show differences between the two shirts in HR, T_c, T_{sk}, and RPE, there was an increase in VO₂ suggesting that a flame resistant synthetic undershirt elicited an increase in energy expenditure.

Mentor: Charles Dumke, HHP

#76 UM Volunteers for Global Health Access

Author(s) - Rachael Schmoker, Community Health; Kyla Crisp, Biology; Dylan Chaffin, Journalism; Taylor Preston, MIS

As part of the Global Leadership Initiative of the University of Montana, the UM Volunteers for Global Health Access (UMVGHA) was developed to increase healthcare access in Missoula and South Africa. After an extensive literature review and focus groups with healthcare professionals, doctors, and patients, we isolated the challenge of healthcare access among low-income populations in Missoula and the surrounding areas. Through our research we identified a need within our community for increased transportation from the surrounding areas of Missoula as well as an online resource that can increase the health literacy of patients. We created a website that provides health information specific to Missoula, resources that cater to the low-income population, and a link to our transportation program. The transportation program is a framework which aims to connect volunteers from the community with patients who need rides to appointments at Partnership Health Center. We have developed this framework in such a way that it can be implemented in the next few years. Due to the global focus of the GLI, we also created a framework that can be carried out in Cape Town, South Africa. This aspect includes defining the parameters of our program and how it can be adapted and implemented in the townships

surrounding Cape Town, South Africa. Our interest in Cape Town is due to the connection one of our group members has with organizations there. We plan to utilize these relationships.

Mentor: Peter Koehn, Political Science

#77 Examining Rewarming Trends Following Cryokinetics Using Different Cooling Modalities on Ankle Skin Surface Temperature

Author(s) - Nora Ifft, Athletic Training; Jeff Spaulding, Athletic Training

Context: Cryotherapy is the most common modality used after acute injury to reduce edema. One of the most beneficial uses of cold is for its analgesic effects. Typically, following the application of cold, exercises are completed as part of the rehabilitation plan, a technique termed “cryokinetics”. Current literature reveals that exercise immediately following cold application leads to rapid rewarming, reducing the overall effectiveness of the treatment. However, there are no studies examining the rewarming trends of different cooling modalities. Purpose: The purpose of this study was to examine the rewarming trends of ankle skin surface temperature following a cryokinetics protocol consisting of one of three cryotherapy modalities combined with rehabilitative ankle exercises. By comparing the results, we hope to determine if one modality is more effective than the others for use with cryokinetics. Participants: Eleven college aged University of Montana students (age 18-35) participated in this study. Methods: A repeated measures design was used for this study whereby all participants underwent three 15 minute trials consisting of cold whirlpool, ice pack, and an ice water immersion treatments. Following each cryotherapy treatment, participants completed a series of rehabilitative ankle exercises. The temperature of the dominant ankle was measured at the anterior talofibular ligament (ATFL) prior to treatment, immediately post-treatment, and immediately post exercise. Results: A 3X3 repeated measures ANOVA revealed statistical significance between the cooling modalities and ankle surface temperature ($p=0.05$). Pairwise comparisons revealed statistical significance among the different cooling modalities immediately after treatment and immediately after exercise. Ice water immersion cooled the ankle the most and for the longest duration. Conclusion: Ice pack and ice water immersion produced more cooling than cold whirlpool. Ice water immersion provided slightly greater cooling when compared to an ice pack, which suggests that it is the most effective modality for use in cryokinetics.

Mentor: Valerie Moody, Health and Human Performance

#79 Expression and Characterization of Gene Duplicates in Bacterial Endosymbiont Speciation

Author(s) - Daniel Mullee, Biochemistry

The goal of my project is to investigate the process of genome reduction following speciation. We hypothesize that an apparently functional gene of an endosymbiont bacteria is in fact an incipient pseudogene. The long lifespan of cicadas has provided a unique opportunity to study the effects of genome reduction in endosymbiont bacteria. In the cicada *Tettigades undata* (TETUND), the endosymbiont *Candidatus Hodgkinia* lineage has split into two discrete genomic lineages, each isolated to distinct *Hodgkinia* cells. These two new genomes are smaller and have both lost genes compared with the single-genome ancestral *Hodgkinia* present in *Tettigades ulnaria* (TETULN). Interestingly, gene loss in metabolic contributions of the TETUND *Hodgkinia*, such as the synthesis of histidine, show interpathway complementation so that the ancestral genes encoded in *Hodgkinia* TETULN are retained on at least one of the new *Hodgkinia* TETUND genomes. As a result, the host cicada now relies on two species of *Hodgkinia* with a combined genome nearly twice the size of their single genome ancestor. Given the large number of pseudogenized genes in different states of degradation that Dr. John McCutcheon's lab has observed in the TETUND genomes, some apparently functional genes may be incipient pseudogenes that have not yet acquired an inactivating substitution. To test this idea, I have cloned one of the histidine genes (*HisB*) for each the two TETUND lineages and the ancestral TETULN into the genome of *E. Coli*. I then induced expression of *HisB* in *E. Coli* and performed assays on the *HisB* proteins to determine if any are nonfunctional. This will provide evidence that this genomic reduction is following a pattern of interpathway complementation.

Mentor: John McCutcheon, Biology

#80 From Odysseus to Odysia: Exploring a Gender-Bent Adaptation of The Odyssey

Author(s) - Cris Jardon, Literature/Women's and Gender Studies

This interdisciplinary research project combines the disciplines of literature and women's and gender studies by examining a gender-bent graphic novel adaptation of a literary classic where the gender roles have been switched. The Greek classic *The Odyssey* follows the journey of the warrior Odysseus and his men as they return home from the Trojan War. The graphic novel adaptation *ODY-C* by Matt Fraction and Christian Ward creates a gender-bent version of the primarily masculine realm of Odysseus' world. This adaptation explores the implications of gender by transferring the tale into the feminine realm of the female warrior Odysia and the women who follow her. Switching the gender of the characters prompts the readers to more directly view our assumptions about the gender roles in the original text. My analysis of *The Odyssey* through its adaptation *ODY-C* illuminates these gendered aspects of the plot and characters that may often be overlooked. *ODY-C* incorporates feminine elements such as maternity while also maintaining the elements of warrior culture that are traditionally coded as masculine. This analytical comparison of the original text and its adaptation is informed by existing scholarly contributions about *The Odyssey* and allows us to reexamine culturally constructed roles of masculinity and femininity.

Mentor: Elizabeth Hubble, women's and gender studies

#81 The Effects of Phonologically Related Words on Tip-of-The-Tongue (TOT)

Author(s) - Sean Kavanaugh, Psychology

The "tip-of-the tongue" (TOT) experience occurs when a person cannot fully recall a word (target word) but has a very strong sense of what the word is. TOT is a common and frustrating experience that is often perceived as a memory deficit as opposed to an issue with language. The purpose of my study was to measure the effects of quickly presented phonologically related words (words related in sound) on TOT experiences. James and Burke (2000) discovered that TOT experiences diminished for participants when the participants read phonologically related words for more than one second. Salmelin (2006) cited that sound is activated in the brain in as little time as 50-100 milliseconds (msec) upon the onset of seeing words. This study investigated whether phonologically related words presented at a time between 50-100 msec (75msec) would reduce TOT experiences thus advocating TOT is affected by the words without having to fully process them. This study collected data from college students using an individualized computer experiment. Participants were given a shape identification task that asked to identify a "correct" shape (distractor task). Participants received presentations of the words for 75 msec directly before each alternating shape in the distractor task. Participants were given a TOT evoking question, then asked to respond: 1) answer the question 2) indicate they did not know the answer or 3) indicate TOT for the answer. The experiment compared correct and TOT responses between the 2 conditions of phonologically related and unrelated words. Using T-tests statistical analysis, results showed no significant differences for correct and TOT responses between the two conditions. Although presenting words at 75 msec had no effect on TOT experiences, further research could test the effects of words presented at faster speeds that are still less than one second (such as 250 msec).

Mentor: Yoonhee Jang, Psychology

#82 Using a Spiral to Estimate Spatial Lattice Model Parameters

Author(s) - Geoffrey Glidewell, Mathematics

This project explores the autologistic model for spatially correlated binary lattice data and uses a one-dimensional spiral to approximate two-dimensional data. An example of this type of data is the presence of disease in plants in a lattice framework and labeled "diseased" or "non-diseased." The presence of disease in one plant would either increase, decrease or not affect the likelihood of disease in a neighboring plant. In order to fit an autologistic model to real data, the method of maximum likelihood would ideally be used to estimate the model parameters for the entire lattice. However, the model form involves an intractable normalizing constant

preventing this method from being used directly. Although multiple methods have been developed to estimate the model parameters, such as Markov Chain Monte Carlo (MCMC) maximum likelihood, these methods either rely on approximations of the normalizing constant or ignore the inherent spatial correlation. To calculate the constant directly, every possible lattice structure must be tabulated. However, for even a small lattice of size 20x20, this would mean 2400 different configurations, which is far too many for even a modern computer to compile. This normalizing constant can be computed directly using S, the number of diseased sites, and N, the number of neighboring diseased sites from each configuration. This project explored a method of generating all S and N combinations for a linear subset of the lattice, allowing for calculation of the normalizing constant for the subset. For data on a spatial lattice, a spiral of locations can be “pulled out,” and the spiral’s exact normalizing constant calculated. Unfortunately one spiral uses only half of the data so it must be combined with results from the remaining locations. Further investigation is being done to compare this method to known approximation methods in order to determine its viability.

Mentor: Jon Graham, Mathematics

#83 Missoula Bike Swap: Creating a Step-by-Step Guide - A Community Enhancement Project

Author(s) - Madeline Halverson, Environmental Studies; Cody Dems, Resource Conservation; Brigitte Donahugh, Geography; Sheridan Cook, Environmental Studies; Danielle Albo, Health and Human Performance

In 2003, The League of American Bicyclists named Missoula, MT a Bicycle-Friendly Community. Missoula works hard to increase the use of sustainable transportation through various municipal and non-profit programs. Sustainable transportation is part of The City of Missoula’s mission to address global climate change. A strong local business network of bike shops and non-profit organizations promotes sustainable transportation to build a strong bike ethos. To enhance these local efforts to tackle global climate change, a GLI capstone group has teamed up with two Missoula organizations to create the first ever Missoula Bike Swap. The Bike Swap will help families and individuals find inexpensive bike upgrades, and put more bikes into circulation. The Missoula Bike Swap is like a community garage sale, but for bikes: people can sell their old bikes and bike gear, and have the opportunity to buy a new bike. Creating the Missoula Bike Swap required research on similar events nationally. Coordinating the event has required (1) the crafting of a marketing plan; (2) networking among various business sectors (selling sponsorships); (3) volunteer recruitment; and (4) operational/facility coordination. To make this event a lasting and viable part of Missoula’s bike culture, the GLI group is writing a step-by-step guide for holding the event, for Bicycle Walk Alliance for Missoula (BWAM) and Missoula Institute for Sustainable Transportation (MIST or Free Cycles). This guide will include a marketing scheme, a contact list ranging from sponsors to venue options, a sample sponsorship package, volunteer set up and organizational information, and an operations plan. The guide and this presentation, tell the story of the creation of the Missoula Bike Swap, and detail how the SWAP can be held again.

Mentor: Josh Slotnick, Environmental Studies

#84 Trigger for Change: Theatre as a Tool for Social Dialogue

Author(s) - Sydoney Blackmore, BFA Theatre: Acting

The goal of my senior project was to promote dialogue about the issue of sexual assault and consisted of three parts. The first part was a company-constructed multimedia presentation that quickly introduced the audience to facts, figures, and perspectives regarding sexual assault. The second is a performance of Carmen Aguirre's *The Trigger*. It is a stage play about the playwright’s experience before, during, and after her rape, with other characters’ perspectives interjecting throughout. The purpose of this performance was to provide an experience for the audience that promoted empathy and critical thinking. The performance was a staged reading, complete with minimal set, sound, lights, and costumes. The final part of the project was facilitated discussion groups after the performances. In addition to these three parts, community and university organizations addressing the issue of sexual assault set up tables after the performances for audience members to peruse and become involved. The

audience feedback in the post-discussion surveys and in person was overwhelmingly supportive. Ninety-four percent of survey participants felt that the theatrical performance enhanced their understanding of the issue of sexual assault, while ninety-seven percent felt the post-performance dialogue helped them understand issues and concepts. Most overwhelmingly, every survey participant felt safe to express their opinions in the discussion. But our true success can be expressed through company members' individual conversations with audience members. They were keen on speaking with us about these tough issues. One story that highlights this is the perpetrator that approached a company member and admitted that the event had helped him realize the gravity of his actions.

Mentor: Randy Bolton, School of Theatre & Dance

#85 Facebook's Fall in the Social Media Age

Author(s) - Sydney Gillette, Journalism

Almost from its inception, the social media universe was centered around one all-encompassing network, Facebook. Today with technological advancements and a more sophisticated audience of social networkers, Facebook is struggling to meet the increasingly sophisticated and complex array of demands from its users. That is primarily because social networking is now a mass media, and networks focusing on niche markets and specific uses are more effectively addressing the needs of specific groups better and are therefore becoming more popular. Facebook is still the largest social network by size, but that's not enough to guarantee its future. This project is based on my analysis of reports conducted in the field of social networking. To understand the life cycle of a social network, I studied the history of former social networks to see why they succeeded and then failed. I also analyzed social media users - who is using social networks, how they are accessing them, and how often. My study includes research that describes the growth and populations of the largest and fastest growing social networks. I conducted a series of interviews with academics the social networking field to gain a further understanding of today's social media market and the future of social networking. Through this systemic view of how people use social networks we can understand the market forces influencing and altering social media. Informed by this research I discovered a hole in the current social media market. Therefore, I created the framework for a social networking app to fill this void.

Mentor: Lee Banville, Journalism

#86 Improving Species Recovery: Insights From Community Occupancy Modeling

Author(s) - Allison Bernhisel, Wildlife Biology

The U.S. Endangered Species Act (ESA) has been instrumental in the protection of imperiled species; however, despite the ESA's ability to protect species and their habitats, recovery successes have been limited. The inefficiency of the ESA to recover species may be due to reliance on single-species recovery plans, which exclude considerations of community dynamics (e.g. interspecific competition). Due to the potential for variable responses of species to landscape changes that may alter community dynamics, it is critical to understand community responses to these changes as managers try to recover imperiled species. Currently, the Mexican Spotted owl (MSO) is listed under the ESA and efforts are underway to recover this species and to understand its response to stand-replacing wildfires. I collected presence/absence data for 8 owl species that are sympatric with the MSO, while conducting surveys for MSOs during a single breeding season (May-Aug 2014) in east-central Arizona. My objectives were to: 1) test the ability of MSO surveys to estimate multispecies detection and occupancy rates for 8 sympatric owl species; and 2) model the effect of burn severity on species occupancy probability, while controlling for the effects of survey date, wind, and elevation on detection probabilities. Overall, mean detection rates were low across species ($p < 0.10$), resulting in high uncertainty in estimates of community occupancy rates. Detection rates were highest for the Great-horned owl and these rates were comparable to the MSO, suggesting that community occupancy may be low across the study area. The very low detection rates for some species may have resulted from non-response to MSO calls, and future survey methods could use automated call

boxes to increase species detection rates. Given high enough detection rates across species, these methods hold potential for application to other imperiled species projects where multispecies data is concurrently collected.

Mentor: Mark Hebblewhite, Wildlife Biology

#87 Improvement in Patient-Reported Confidence and Function in People with Anterior Cruciate Ligament Reconstruction Using Jump Training

Author(s) - Lauren Astrup, Exercise Science

Following anterior cruciate ligament (ACL) reconstruction, patients often show decreased confidence in and function of their surgical limbs. Landing from a jump is a task that often evokes patient apprehension. Jump training to gradually expose patients to this fear-inducing task may increase patient confidence and mitigate their fear. Such strategies have not been employed in a population with ACL reconstruction, nor has the subjective experience of high-level training following knee surgery been explored. We sampled 16 people (10 female, 6 male) between the ages of 15 and 32 (mean = 25 ± 5 yrs) who had undergone ACL reconstruction and returned to activity, but had poorer than expected daily function, low levels of confidence, and mechanical deficits in landing. All subjects completed 8 weeks of twice-weekly jump training. The International Knee Documentation Committee (IKDC) Subjective Knee Form and the ACL-Return to Sport after Injury (ACL-RSI) surveys were administered to subjects pre-training (0 weeks) and post-training (8 weeks) to evaluate how confidence in their knee as well as their report of knee function changed over time. Compared to other studies in which subjects do not undergo extensive training, our subjects saw significant changes. Physical function, as measured by IKDC, increased 15% over 8 weeks (week 0: mean = $77 \pm 9\%$; week 8: mean = $88 \pm 8\%$; $p = .001$), while confidence, as measured by ACL-RSI increased 44% (week 0: mean = $55 \pm 17\%$; week 8: mean = $79 \pm 18\%$; $p < .001$). Jump training substantially improves patient-reported functional outcomes and psychological readiness to return to strenuous activity for people with less than optimal outcomes after ACL reconstruction. Implementing jump training should be considered as a part of post-operative rehabilitation as a means to address prevalent psychological impairments.

Mentor: Ryan Mizner, Department of Physical Therapy

#88 Can the Fibrotic Response of the Lungs to Asbestos Exposure be Mitigated Using Gene Knockdown?

Author(s) - Sarah Kinsey, Human Biology and Psychology

When someone is diagnosed with asbestosis (a chronic lung disease caused by inhaling asbestos fibers), there are few treatment options, none of which can halt or reverse the progression of the disease. The adverse health effects of asbestosis are due, in large part, to the response of the lungs to the asbestos fibers. Cells in the lungs deposit collagen around the fibers in an attempt to contain them, but this results in fibrosis and scarring of the lung tissue, making it difficult to breathe. In our studies we aimed to reduce the response of the lungs to the asbestos fibers using gene therapy techniques. If successful, this could offer a new avenue of potential therapy for those who have already been exposed to asbestos. A protein called SPARC (Secreted Protein Acidic and Rich in Cysteine) has been identified in previous studies as being important in the deposition of collagen and the fibrosis response. We interrupted the expression of this protein using a small interfering RNA molecule (siRNA) which we delivered via a viral vector. After identifying the most effective viral vectors in cells, we began our studies in mice. Mice in our study were first exposed to asbestos or a control solution and then, 2 months later, to our active virus or a control virus. After a month waiting period their lungs were analyzed: 1. histologically, to visually observe the presence of fibrosis, 2. Using RT-PCR to measure the presence of SPARC mRNA, 3. Using a Western Blot to measure the presence of collagen. If our results are consistent with our hypothesis, we will observe that the mice treated with active virus after asbestos exposure will experience less fibrosis and have less SPARC mRNA and less collagen in their lungs than the mice receiving the control virus.

Mentor: Elizabeth A. Putnam, Pharmacy

#89 Charcoal Production In Mixed-Conifer Forest After a High-Severity Initial Fire and Repeat Burn

Author(s) - Aspen Ward, NRSM

Charcoal is a fundamental component for the available carbon in a forest system and is most commonly produced through fire events. Factors controlling the net amount of black carbon in the form of charcoal have yet to be well understood in mixed-conifer forest ecosystems. Fire events produce charcoal through incomplete combustion of vegetative material. To understand the influence of fire on a landscape's potential charcoal production, samples were taken at ten sites where an initial fire burned at high severity in 2003 with ten corresponding sites of the same initial fire that experienced a repeat burn in 2011 and 2013. Samples were cross-sections of coarse woody debris present on the ground where charcoal depth was measured along transects. The volume of charcoal on coarse woody debris was calculated using the diameter of the coarse woody debris compared to the charcoal depth at each site. The total volume of charcoal produced was greater in sites that experienced a repeat burn with the mean of the repeat burn sites accumulated charcoal equaling 11.8 m³/ha compared to the once-burned mean of 6.4 m³/ha. From a Wilcoxon Rank Sum Test for the charcoal comparison between site types the p-value equaled 0.09. Charcoal volume varied in sites that experienced only the initial high severity fire. The charcoal production appeared different between the two types of sites, indicating that repeat burns of various severity types may produce differences in charcoal availability. Management practices allowing repeat burns may increase available black carbon that may be sequestered into soils to contribute to soil productivity and fertility as well as positively contribute to nutrient cycling in forests.

Mentor: Andrew J. Larson, CFC

#90 Nutrient Dynamics in the Upper Clark Fork River

Author(s) - David Fulton-Beale, Ecological Restoration

The Upper Clark Fork River (UCFR) has a long history of contamination from historic copper mining; restoration efforts are underway. Nutrient concentrations in the UCFR will be of central importance to ecological form and function. Excess nutrients can cause eutrophication, leading to decreased water quality. Little work has addressed how the relative abundance of nitrogen (N) and phosphorus (P) influence rates of primary production and algal growth within the UCFR. We hypothesized that biotic demand for N and P will differ because of inequalities between the stoichiometry of dissolved nutrients and algal biomass should dictate the stoichiometry of biological uptake. Based on availability, we predicted that N would be limiting. To test this prediction, we evaluated nutrient limitation by measuring algal growth in nutrient diffusing substrata (NDS) with different levels of N and P availability. We also performed a nutrient addition experiment during base flow. We used chloride (Cl) as a conservative tracer, and added salts of nitrogen and phosphorus. We took grab samples at two locations during the additions, and analyzed them for Cl, N, and P to determine when the solute pulse passed. Results from NDS confirmed that N is limiting to autotrophic production. Algae grown on N or N and P enriched substrates contained significantly ($p < 0.05$) more chlorophyll than algae grown P enriched substrates. Similarly, the solute release experiment revealed no significant uptake of P, while N was consumed at 2200mg m⁻² d⁻¹. Together these data indicate that biotic demand for N is significantly higher than biotic demand for P. Our experiment will connect spiraling metrics with a measurement of nutrient limitation. In addition, since our results indicate that nitrogen is limiting to growth, reducing inputs of nitrogen to the river would be an effective method of preventing excessive autotrophic growth in the river.

Mentor: H. Maurice Valett, Division of Biological Sciences

#91 Spatial Variability of Soil Nematodes and Arbuscular Mycorrhizal Fungi in Western Montana

Grasslands

Author(s) - David Fulton-Beale, Ecological Restoration; Taylore Willis, Biology

Belowground flora and fauna often are neglected in ecological studies, even though the composition of the soil organismal community is a key indicator of ecosystem function. To understand the role of soil flora and fauna in regulating grassland ecosystems, it is critical to understand spatial variability in soil organisms. In addition,

knowledge of this variation is needed to design effective programs for monitoring their responses to degradation and management. We are investigating spatial variation in two common taxa of soil organisms, nematodes and arbuscular mycorrhizal fungi (AMF), in invaded and un-invaded grasslands in western Montana. Findings will contribute to understanding of: the scales at which these organisms vary; the replication required to design effective monitoring programs for nematodes and (AMF); and relationships between variability in nematode abundance and plant community diversity. We collected soil cores and plant presence/absence data for two 15x15 m plots at each of three sites. We then grew corn in field soil to perform a plant-bait bioassay to assess AMF abundance. Roots were stained, and viewed under a microscope to determine the proportion of roots colonized by AMF. Nematodes were extracted from soil samples using a sugar-floatation method, and counted using a microscope.

Mentor: H. Maurice Valett, Division of Biological Sciences

#92 Managing Identity: Virtual and Real-Life Worlds in YA Fiction

Author(s) - Ashley Rezvani, Communication Studies

Princeton Survey Research Associates report that 93% of teens ages 12-17 use the internet on a daily basis, 81% use social media, and 27% of them play games with people with whom they connect through the internet with who they have never met in real life[1]. In recent years, not only do adolescents have to manage their changing lives in the physical world, but they also have to construct and manage an online identity. Regardless of such staggering numbers, the vast majority of current young adult literature is underutilizing a rich opportunity for examining themes of how adolescents negotiate their identity and self-representation, and is also neglecting to portray an almost universal part of a teenager's life. A few YA authors, namely Vivian Vande Velde and Corey Ann Haydu, are starting to incorporate a virtual world into their books and the lives of their characters. I analyze their work against my own in my thesis in order to examine how forming a virtual and real-life identity conflict and complement one another. My project is the beginnings of the kind of young adult novel that I'd always wanted when I was growing up.

#93 Effects of Genetic Diversity on Winter Seed Production

Author(s) - Kevin Moore, Biology

High species richness, or diversity, can increase productivity, resource cycling, water use, and resistance to exotic invasion in plant communities. However, we know much less about how intraspecific, or genotypic diversity affects such ecosystem functions. Here, I explore the effects of intraspecific diversity in winter wheat on grain production. I constructed a common garden experiment at Fort Missoula in which ten phenotypically diverse genotypes of winter wheat were grown together in small plots. These ten genotypes were each grown in monoculture (one genotype), and mixtures of 3,6, and 10. Results show that polycultures produced larger grain heads than monocultures; polycultures had an average grain mass of 0.90g compared to 0.57g for monocultures. These results support the idea that the positive effects of intraspecific competition can be applied to cash crops as well.

Mentor: Ray Callaway, DBS

#94 Avoiding the Blue Period in Homeless Populations: Creative Pursuits and Their Potential to Redefine Self Worth in Shelter Populations.

Author(s) - Tirza Asbell, Sociology

As inequality grows, and social safety nets shrink due to dramatic funding reductions, homelessness is becoming a more pressing problem in our society. Shelters can provide food and housing to people experiencing homelessness, but may miss other opportunities for holistic aid because of funding based limitations. It has been well documented that Art therapies can help individuals overcome adversity or trauma. Used in therapeutic settings, art can enable individuals to communicate stresses and to create identities for themselves in a safe environment. Art therapies may provide a unique avenue to empower populations experiencing homelessness. This project seeks

to understand how art therapies, and creative endeavors such as cooking, help redefine identities and bolster self worth in populations experiencing homelessness. In order to answer this question, I will conduct 36 hours of participant observation. Then I will identify themes in the data and write up my findings. Based on these observations, I expect to find that participants in both food preparation and art therapy develop different personal descriptors than those who are not participating. Knowing more about this topic can help shelters and other programs providing services to people experiencing homelessness create and sustain more holistic services.

Mentor: Daisy Rooks, Sociology

#95 International Journalism in the Digital Age

Author(s) - Lauren Lewis, Journalism; Mahkia Clark, Journalism; Sydney Gillette, Journalism; Rylan Boggs, Journalism; Eric Clements, Journalism; Megan Daniels, Journalism

Technological and journalistic innovation is currently changing the ways in which the millennial generation is obtaining international news. News outlets originating online, or digitally native news organizations, have begun competing for the global news interest of younger audiences. These new digital publications are filling a void left by cutbacks of global coverage by legacy media, or the traditional news outlets of years past. Digital publications like Vice News and BuzzFeed are capitalizing on these changes, and effectively doing it in ways that appeal to younger audiences. This research project will analyze how digital publications are approaching international news coverage, and how they draw in younger, college-aged audiences. As a team, we are currently compiling a comprehensive list of news platforms that originated online and have a focus on international news. We will categorize those outlets by distribution channel, target audience, content focus, and signature storytelling formats. Using the information gained on those organizations, we will produce in-depth profiles of select digital news outlets, and conduct a survey looking into the international news consumption habits of University of Montana students. Our profiles will apply journalistic techniques, such as Internet research and phone interviews with editors of the selected digital publications. Our online survey aims to quantify how and to what extent those digitally native news outlets are being used by their audiences. Based on the results of our research, we will evaluate how effective these digital platforms are at captivating the attention of college students, and determine how they are filling the targeted international news niche. Finally, we will compare the results of our study with similar research conducted at Freie Universitaet Berlin, which is partnering with our International Reporting course (JRNL 473).

Mentor: Henriette Lowisch, Journalism

#97 Variability in Riparian Ecosystem Composition and Structure

Author(s) - Kevin Carns, Ecological Restoration

The ecological function of many streams in the western United States has been altered by human activities, including logging, mining, and grazing. Concern over stream degradation has led to widespread stream restoration efforts, with an annual price tag of over a billion dollars. In western Montana, groups such as the Blackfoot Challenge, the Forest Service, Clark Fork Coalition, and Trout Unlimited are working to restore the function and ecological processes of degraded streams. An important component of this work is restoration of riparian vegetation, which has a large effect on aquatic ecosystem processes. Many riparian restoration efforts in western Montana are based on vegetation characteristics of a single or limited number of reference sites, rather than a broader assessment of mean conditions of intact riparian ecosystems. This practice, however, may compromise restoration efforts and understanding of ecological condition if there is high within and among stream variation. In this project I assessed variability in the composition and structure of intact riparian ecosystems along second order streams in western Montana, in order to improve understanding of reference ecosystems.

Mentor: Cara Nelson, College of Forestry and Conservation

#99 Speed Dating and First Impressions in the Age of Social Media

Author(s) - Arif Memovic, Sociology

Over the course of the last decade, social media has transformed the way in which many people meet, interact, and stay connected. The impact it has had on courtship has been well documented by sociologists. Issues such as the accuracy of online dating photos, self-conceptualization, and deception are addressed, (Ellison et al., Guadagno et al, Hancock et al). However, research on smart phone dating apps like Tinder remains incomplete. Tinder is a popular dating app utilized by smart phone users in order to make new friends or find dates. Users create profiles on which they post pictures of themselves, alongside roughly a paragraph of text. This text portion typically includes a short bio, a joke, or is left blank. The app displays the bios of other users in a random fashion. If two people choose to like each other's profiles, they are added to one another's friend lists. This enables the sending of personal messages. This paper seeks to examine trends in the self-descriptive bios of Tinder users in Missoula, MT. The way in which individuals present themselves to strangers using three hundred words or less could provide valuable insight into what members of Missoula's Tinder community view as socially desirable. I propose a content analysis method. First a pilot test of 30 bios would be conducted in order to develop a code sheet. Then data from 120 bios would be coded and finally analyzed. I hypothesize that a self-conceptualization strongly rooted in place, references to things like outdoor recreation, the University of Montana, and the downtown bar scene, will be highly prevalent. In conclusion, this project, aims to further the research of courtship within social media by closely examining Tinder usage in Missoula, MT.

Mentor: Daniel P. Doyle, Sociology

#100 Marketing Identity: Consumer Society, Ethnic Sectarianism, and the Commodification of the Orient in Little Syria, America

Author(s) - Eamon Ormseth, History

From 1870-1920, Syrians—primarily but not entirely Christian—emigrated to the United States for a suitably modern reason: the devastation of the Lebanese silk industry due to the opening of the Suez Canal and, with it, the Chinese silk market. After stepping off the boat, they found themselves in an America industrializing and urbanizing. As their diasporic economy increased in sophistication, Syrians embraced the growing consumer society. Peddlers went from door-to-door, town-to-town, selling 'Oriental' kimonos (scarves) and rugs, illustrating the commodification of the 'Orient' in American consumer culture. Their economic success impressed many Americans, but it did not translate into widespread acceptance. Mainstream newspapers often depicted them as spiritually timeless, yet intellectually primitive. Leaders of the community mobilized to prove the whiteness of the Syrians by advancing an argument that partially relied on tropes about the Orient. The mediums and style of their discourse—books, Arabic-language newspapers, and civic associations—showed that race had become commodified in the new market economy. Ideas about race, religion, and their associated privileges had entered the marketplace, and constructing and marketing them became a crucial new aspect of identity politics in America. Much critical work has been done concerning the ways in which Syrians experienced their ethnicization, but this scholarship has not been connected to a wider discourse about broader social forces such as the rise of American consumerism. This paper contributes to a large body of scholarship founded by Edward Said's seminal work *Orientalism*. He places the genesis of the American Orientalism immediately after WWII. It joins Naomi Rosenblatt and antedates Said by placing the onset of Orientalism within the swirling onset of consumer society in modernizing America. It contributes by interrogating the how Syrians employed racial and religious constructs to assert their identity within both America and the Syrian/Lebanese nation.

Mentor: Kyle Volk, History

#101 Did an Amazon-Styled River Flow Through Montana?

Author(s) - David Kilcoyne, Geology

The Colorado River flows through the Grand Canyon, Arizona and has done so for tens of millions of years. Today it drains in the Gulf of Mexico, yet this route opened up 5.3 million years ago. Erosional data suggests that 20 million years ago the river was very different to today. My research will test the hypothesis that the Colorado River ran north through Montana, and drained to the Labrador Sea 30 million years ago. The proposed river would be on a similar scale to the Amazon River today. Should the hypothesis be proved, the path of this river could help locate potential water aquifers, which would be important to drought-ridden California and Utah, or gold and other metallic resources deposited by this paleo river. Also, the river banks could hold fossil evidence which may improve our knowledge of climate change, evolution, and improve biostratigraphic accuracy. My research will focus on the Caliente-Enterprise Zone (CEZ), SW Nevada. Intensive volcanics from 36-13 Ma, along with crustal extension from 17-5 Ma create a complex geologic zone that resembles nothing of its paleoenvironment. I will also investigate if there is any relationship between the volcanics and the Renova formation, an ash deposit in Montana which holds important fossil evidence, whose origin is currently unknown. The volcanics and the Renova formation occur in tandem in geologic time. My research is sedimentology-based, examining ash deposits in the CEZ, sedimentary structures and other evidence of fluvial agents 25-6 Ma. The region has not been examined using this approach previously, and is currently mapped as purely volcanic in nature, which may be incorrect. New field data taken from appropriate sedimentary outcrops of the CEZ will be presented.

Mentor: James Sears, Geosciences

#102 Making the Most of Intercultural Interactions: Designing a Catalyst for Intercultural Learning at the University of Montana

Author(s) - Amanda Charron, Anthropology and Media Arts; Joseph Crowley, Business; Taylor Dantic, Business; Hannah Goetz, Anthropology; Ashley Roness, Journalism

In recent decades, there has been a push for internationalization in higher education because many educators believe that cultural diversity is an essential element of the campus environment as universities strive to prepare graduates for a globalizing world. As international education scholar Darla Deardoff claims, "The question of integrating international and domestic students is an ongoing question that's been with us for many years and unfortunately I haven't found any institution that's yet found the answer." We aim to make use of untapped opportunities for mutual intercultural learning among students of diverse cultural backgrounds in higher education; to help bring about desired learning outcomes among both student groups. Specifically, we explore various kinds of interactions between foreign and U.S. students that can serve as vehicles for mutual intercultural learning, involving the development of transnational competence (Koehn and Rosenau, 2010). Through a student survey and interviews with university program officers and faculty conducted at the University of Montana, we found two main problems; non-engaging intercultural learning environment and a lack of motivation on the part of U.S. students. We endeavor to design a program that can address these issues. We will collaborate with offices on campus that already have relevant programs in place, such as the Office of International Programs, English Language Institute, and Student Involvement Network. Our program design is based on insights from a literature review, survey findings, and interview data. It involves a systematic three-step process that incorporates educational, social, and community service components that would help participants develop various aspects of transnational competence. Our program uniquely establishes analytic and emotional dimensions of transnational competence, to serve as the foundation on which participants can build communicative, functional, and creative dimensions. This paper reports on the research and the program development process that we engaged in to address the global problem.

Mentor: Phyllis Ngai, Communication Studies

#103 Gait Mechanics Used to Increase Sprint Speed Following a 3D Intervention

Author(s) - Gerald Evenson, Exercise Science; Kelsey Alley, Exercise Science; Trent Schweitzer, Exercise Science; Jaimee Paffhausen, Exercise Science

Studies have shown the stance and swing phases of human stride mechanics limit humans from running at high speeds. To increase running speeds, the time to complete the swing phase of running, referred to as aerial time, needs to decrease while applying greater ground reaction forces (GRFs) during shorter periods of foot-ground contact. We developed a three-day intervention to determine whether it was possible to alter the foot-ground collision of sprint-based athletes. Five collegiate sprinters and one recreational runner completed the study (male = 2; female = 4). Their average speed increased by an average of $6.7 \pm 0.13\%$, which equates to 0.57 m/s . The three-day intervention period aimed to improve gait mechanics by increasing ground reaction forces (GRFs) and horizontal impulse and by decreasing aerial frequency, average braking time between steps, and time between footfalls. During the pre- and post-testing periods, we measured GRFs and simultaneous 3D joint mechanics using force plates and high-speed cameras, respectively. Unique to previous studies, we performed a 3D analysis of each subject's gait mechanics to test whether mechanical adjustments made in the intervention increased sprinting speed. Force and kinematic analysis revealed the average time braking between steps decreased by $0.0026 \pm 0.0018 \text{ seconds (s)}$, the average horizontal impulse (i.e., force x time) increased by $0.03 \pm 0.0002 \text{ Newton seconds (Ns)}$, and the average time between footfalls decreased by $0.003 \pm 0.0021 \text{ s}$. The results indicate the intervention was successful in decreasing aerial frequency, increasing horizontal GRFs, and decreasing the foot-ground contact times. Therefore, our intervention effectively modified gait mechanics to improve sprint performance in all participants. We do not understand the musculoskeletal changes that allowed subjects to increase foot ground collision.

Mentor: Matt Bundle, Health and Human Performance

#104 Butte, America: Poor Practices of the Richest Hill on Earth

Author(s) - Shannon Buswell, Environmental Studies

Butte, America has long been referred to as "the Richest Hill on Earth." The discovery of massive ore deposits in the area in the nineteenth century ignited what would become decades of resource extraction that would forever change Butte. Not only would the subsequent decades of mining drastically alter the geographic landscape, environment, and history of the region, but also the very people of Butte. The job opportunities that copper mining in Butte provided at the time led to a wave of (predominately Irish) immigration that helped grow and foster a burgeoning economy, but at huge costs. These costs of Butte's mining practices are environmentally obvious, as one glance at the Berkeley Pit will demonstrate. However, there are significant human costs that are much less evident. The toll that mining in Butte had on human health was immense. The high levels of silicosis in miners from this area offers an example of the human aspect of the toll that mining had on Butte, and the environmental injustices that occurred there. My research will utilize the perspective of environmental justice to examine the impact that mining had on human health in Butte, especially regarding silicosis. Through exploring human health impacts, I will examine an issue that is often overshadowed in the case of Butte's mining - environmental degradation is most often at the forefront of research and concern. Additionally, I will explore the issue in regard to environmental justice, which is not often considered, even though it is significant. I will utilize historical documents and statistics related to the Butte area and its history to gain knowledge of Butte's mining practices, and then apply the current understanding of health and environmental justice to this subject to highlight an issue that is an important part of Montana history that deserves more attention.

Mentor: Robin Saha, Environmental Studies

#105 LabVIEW Data Acquisition System

Author(s) - Andrea Johnson, First: Computer/Mathematical Science, Second: Physics

An integrated data acquisition and hardware control system is being designed as part of a new physics research laboratory at the University of Montana. The interface is being created within the National Instruments LabVIEW programming environment to control all aspects of this newly commissioned laser-based nanomaterials laboratory in the Department of Physics and Astronomy. The interface will control an in-vacuo, three-dimensional translation stage with 50 nanometer spatial resolution and will collect all data including photoelectron counting and Raman photon collection. These data will then be used to create two-dimensional images of the sample in real time to be displayed in LabVIEW. The interface is also being designed to accommodate the addition of a LabVIEW-controlled high-speed galvanometer mirror head scanning system that will improve the resolution of the instrument by a factor of 3. Included within this design is the capability to monitor and control several additional hardware systems, including a turbomolecular vacuum pumping system, a Coherent Verdi V6 high power continuous wave laser, and several sub systems controlling laser power and system temperature.

Mentor: David Macaulso, Physics/Astronomy

#107 Assessing Knowledge & Attitudes of School-based Mental Health Clinicians toward Evidence Based Practice

Author(s) - Callie Jacobson, Psychology; Daniel Gray, Psychology; Cameo Stanick

Research has recognized that school-based mental health services are a critical component in building our mental health system for children (Stephan et al., 2007). With more than 52 million children attending over 110,000 schools and over six million adults working in schools, one-fifth of the U.S. population can be reached in schools (Stephan et al., 2007). Additionally, schools are the most common setting in which children access mental health services (Stephan et al., 2007). There is little research dedicated to the evaluation of knowledge and attitudes of school-based mental health clinicians toward evidence-based practices (EBPs), which is an important gap in the literature given the proportion of children treated in schools (Connors et al., 2015). The current study addressed this gap by assessing knowledge of and attitudes toward EBPs among school-based mental health clinicians taking part in a school mental health grant project. It was predicted that knowledge and attitudes would be higher than what previous studies have found examining clinicians who work in traditional clinic settings, given research that suggests academic-related EBPs are already well-accepted practices in many schools (Bradley, Danielson, & Doolittle, 2007). Results supported this hypothesis in that school-based clinicians reported slightly more positive attitudes toward EBPs than what has been reported in previous research ($M = 23.10$, $SD = 3.74$; two points higher than mean scores reported in two other studies; Borntrager, et al. 2009; Stanick, et al., unpublished) at pre-training. In addition, school-based clinicians demonstrated higher knowledge of EBPs than found in previous studies, even at pre-treatment ($M = 133.25$, $SD = 12.44$) by as high as 40 points compared to previous studies (Nakamura, et al, 2011). Pre- to post-training findings, as well as variations in error rates in knowledge among clinicians will be described. Implications regarding school-based clinician training will also be discussed.

#108 Dibe' Bikee' Deya: Following Sheep in Coal Country

Author(s) - Caitlin Piserchia, Environmental Studies

Black Mesa is a mineral-rich area of the Navajo and Hopi Nations in Arizona; it is both the locus of the historic so-called Hopi-Navajo land conflict and the coal mines that have helped make possible the electricity usage of Las Vegas. It is also a case study in cultural change and resistance in response to pressures of industrialization and capitalism. In an interdisciplinary, creative nonfiction writing project, I am looking in particular at the pressures on shepherding as livelihood in Black Mesa. I will examine how shepherding has changed since the advent of the Black Mesa and Kayenta coal mines. I will examine the question of why certain Dine' continue to oppose the coal mines, and how much agency traditional Dine' have in "deciding" whether or not to relocate or take part in a coal-driven economy. My approach is qualitative, self-reflexive, and participatory; I am drawing on

historical documents, previous economic and anthropological studies, contextual histories of the region, interviews, and my personal experience herding sheep in the vicinity of Black Mesa Coal Mine. Trying to understand these interactions as a nonnative has highlighted for me the importance and politics of storytelling in shaping physical reality. It has also highlighted for me the complications and importance of appropriate interactions between Native and non-native Americans. This is a personally important project that will be relevant to the people struggling to end coal mining in Black Mesa. Aside from that, I hope the integration of my research and experiences will shed some light on lessons of power and resilience, cultural survival, the politics of storytelling, the complicated interactions between white and Native cultures, and understanding land use decisions from Navajo country.

Mentor: David Moore, Literature

#109 Advantages of Halogen Bonding for Halide Recognition in Wet Solvents

Author(s) - George Neuhaus, Chemistry

The goal of anion recognition is to develop molecules capable of binding to specific anions, such as chloride, in solutions that mimic biological and environmental systems. Anion detection in biological solutions has implications for medical technologies, such as diagnostics. For example, cystic fibrosis is often diagnosed by measuring chloride levels in sweat. However, challenges arise while designing receptors because anions and their receptors are affected by anything with a charge. Because water, the solvent of biology, is polarized, it is an especially challenging solvent for anion recognition. To overcome recognition challenges, we can make small structural changes to the anion receptor, such as switching an atom, and drastically change how the receptor interacts with the anion and solvent. Understanding non-covalent interactions (e.g. hydrogen bonding, and hydrophobic interactions) is the driving force in the evolution of anion recognition because it allows chemists to predict the properties of a molecule in a given environment and how changing these properties can alter activity in different solvents. An underexplored non-covalent interaction is the halogen bond—an attractive force between an electropositive halogen and an electronegative Lewis base (e.g. anion). Our research develops two anion receptors, only differing through exchange of hydrogen for iodine, which allows comparison of halogen and hydrogen bonding. X-ray diffraction, NMR titrations, and computational methods were used to explore the significance of this exchange. Interestingly, the halogen bond was found to maintain strong selective halide recognition in competitive polar environments (1% D₂O:CD₃CN), while the hydrogen bond showed poor recognition capability in the same conditions. This provides evidence that halogen bond donors can be used to overcome anion recognition challenges of competitive biological environments (e.g. water) and have a positive impact on the development of medical technologies.

Mentor: Orion Berryman, Chemistry & Biochemistry

#110 Truth Commissions and Collective Memory in Latin America

Author(s) - Mona Schwartz, Political Science

Human rights violations have an enormous effect on future generations and have the potential to divide or unite society in their wake. My research examines how a national, collective memory is formed after human rights abuse occurs, and how the work of a truth commission contributes to this process. My hypothesis is that when a truth commission is instated after an experience of human rights abuse, a nation will be better able to reconcile conflicted memories and experiences and to create a unified, collective memory of that human rights experience. Another component of my hypothesis is that, in order to be effective in collective memory facilitation, a truth commission should have strong investigative and reporting powers, make detailed recommendations for future action, and have a broad mandate. I used a case study approach of Latin American countries—Argentina, Chile, El Salvador, and Guatemala. These countries vary in their respective truth commission mandate, the commission's investigative and reporting powers, and recommendations made by the commission. In order to gain a detailed understanding of the collective memory situation in each nation, I examined different elements of memory, including memorials, monuments, museums, and days of commemoration. I examined the number,

location, and timing of memorials and monuments, and their relationship to the recommendations and timing of the truth commission. I also noted the presence of a museum or day of commemoration to honor the human rights abuse. This research provides a foundation for examining the consequences of human rights violations and links the separate lines of research that exist on truth commissions and on collective memory. An understanding of the impact of truth commissions on memory will help nations in the future to determine the most effective ways to heal from human rights abuse.

Mentor: Christopher Muste, Political Science

#111 Women's Voices for the Earth: A Discourse Analysis of Gendered, Environmental Media Advocacy

Author(s) - Marit Olson, Sociology

Women's Voices for the Earth (WVE), a Missoula based, nationally recognized non-profit, empowers women to advocate against toxic chemicals that cause individual and community health hazards. There is little analysis of the intersection of women's and environmental subjugation and how these intersections influence women's environmental organizations. My research examines the influence of ecofeminist ideology, as framed by Karen Warren's ecofeminist and class analysis, in WVE's online discourse, primarily social media. To do so I apply a Foucaultian discourse analysis to WVE's online publications, and compare that to an analysis of the online presence of Toxics Action Center, a non-gendered activist group with a similar mission. Preliminary results show a connection between ecofeminist ideology and how these organizations address the issue of toxins. Through this analysis I hope to understand the role women's perspectives play in environmental advocacy groups, and how a shared experience of oppression can motivate advocacy work.

Mentor: Cassandra Sheets, Sociology

#112 History on the Pitch: The Social and Economic Impact of Soccer in Post-War London

Author(s) - Shaun Bummer, Political Science and History

Today, the United Kingdom's multi-billion dollar soccer industry is driven by global interest, lucrative advertising and television contracts, and sports betting. Furthermore, the creation of the Premier League in 1992 shows the sport is not just a game, but rather a way of life. Yet over a half-century earlier the United Kingdom began their recovery process in the aftermath of World War II, with London in particular in physical and emotional ruin. Given the important role soccer has played in British society throughout the sport's history, it is crucial to pinpoint the exact social and economic role of the sport within the context of one of the most critical periods of British history: the post-war, Cold War era. Although the Marshall Plan and other international aid helped London in the recovery process, domestic non-political assistance was still needed. This recovery process was far from rapid as stadiums were damaged and players were slow to return from military service, resulting in a period of several years for the sport to begin to aid in the recovery process. As time passed however, soccer served as part of this non-political assistance providing a major social and economic boost, exemplified by the economic opportunity the sport presented while serving as a social outlet for those hurt by the war. Therefore by looking at the sport through a historic lens as seen through documents, club programs, newspapers and attendance and financial records of London's soccer clubs during the period in question, soccer's influence on 20th century British history can be determined and the overarching impact of sport in society can be understood further.

Mentor: Gillian Glaes, History

#113 Effectiveness of A Gait Intervention on Top Speed Running

Author(s) - Whitney Cranmore, Health and Human Performance; Mark Messmer, Exercise Science; David Norris, Exercise Science; Evan Claxton, Exercise Science

Fastest running speeds are achieved by applying greater ground reaction forces (GRF) in shorter periods of foot-ground contact. Recently, the dynamics of the foot-ground collision have been recognized as the primary gait difference between elite and recreational sprinters. We attempted to train subjects to hit the ground more

like elites by developing an intervention to alter their gait. Five collegiate sprinters and one recreational runner (male= 2; female= 4) completed the study. The intervention involved a pre-test where subjects were taken to top speed on a high-speed, instrumented treadmill. From this, we measured the GRFs and obtained simultaneous high-speed 3D joint kinematics. Subjects reached their top speed when they achieved a minimum of eight footfalls without backward drift on the treadmill. Then subjects completed a 3-day intervention consisting of running-form drills and treadmill sprint trials at 90% of their top speed. Between the treadmill sprints, feedback was given on whether subjects practiced front side or backside kinematics, which refers to the portion of the step wherein the stance leg is in front or behind the body's center of mass. We emphasized the front side-kinematics to enhance the collision. Following the intervention, subjects completed a top speed post-test to determine whether the intervention was a success. The average increase in top speed was $6.7 \pm 1.3\%$. These results indicated that the gait intervention was successful and suggests that sprinting speed can be enhanced by mechanisms other than muscular training. Since the time course of this study was too brief, it can be concluded that adaptations were not due to physiological mechanisms.

Mentor: Matthew Bundle, Health and Human Performance

#114 NCAA Enforcement and its Impact on College Football Winning Percentage

Author(s) - Gavin Hagfors, Economics

The NCAA (or National Collegiate Athletic Association) regulates college sports in the United States. Due to its regulation of input costs (through scholarship and recruiting limits) and output, it is widely regarded as a cartel amongst economists. Although several authors have studied the NCAA as a reference to cartel behavior, very few (if any) have analyzed the impact of NCAA enforcement on the teams it oversees. In any cartel, there is an incentive to cheat on rules put in place to gain market share from other members of the cartel. The NCAA is no different, as each team could easily pay student athletes beyond the scholarship limit, gain better athletes, and win more games. It is up to the NCAA to discourage this behavior through punishments for teams caught cheating. To gain a further understanding of cartel behavior, it is important to ask whether these punishments are effective in deterring the cheaters. I plan on statistically analyzing the impact of NCAA punishments on college football teams' winning percentages using a difference in difference regression model. I will be able to estimate the impact of NCAA enforcement on a team's winning percentage and extrapolate this into whether or not the NCAA is effectively punishing teams who break the rules.

#115 RNA Splicing Cofactor Effect on FBF Protein Function in *C. elegans*.

Author(s) - Sara Feilzer, Biochemistry

The FBF proteins (FBF-1 and FBF-2) are critical to stem cell maintenance in the nematode, *Caenorhabditis elegans*. The hermaphroditic *C. elegans* initially produce sperm, and then continue with oogenesis. The FBF proteins function by regulating the transition between mitosis and meiosis by suppressing translation of specific mRNAs into proteins. FBF-1 and FBF-2 also regulate the sperm to oocyte switch in the hermaphrodite, and when FBF protein function is disrupted, there is complete sterility in the nematode. The objective of this research is to determine if certain components of pre mRNA splicing machinery have an effect on FBF protein function. For this research, an RNAi assay was used to disrupt the splicing factor function, and determine the effect of this disruption on FBF function in mutant or control worms. In two mutant strains, either FBF-1 or FBF-2 were functioning in isolation, and the control worms had both FBF-1 and FBF-2 functioning normally. The strains were synchronized by bleaching, and placed on RNAi plates containing bacteria that had been transformed to target the splicing factors of interest. The *C. elegans* were allowed to grow to adulthood and then the number of fertile adults were counted and recorded. Of the six total splicing factors studied, three of the knock-downs show a possible effect on FBF-2 protein function when it doesn't have FBF-1 as a backup, two have little to no effect and one produces complete sterility in all strains. This research uncovers what could be an exciting link between RNA splicing in the nucleus and regulated protein production in the cytoplasm necessary for stem cell maintenance.

Mentor: Ekaterina Voronina, Division of Biological Sciences

#116 Rockin' Formidable Flavor when Rollin' with the Punches: Constellations of Personality Traits and their Observed Effect on Problematic Alcohol Use when Facing Victimization as a Sexual Minority

Author(s) - Nate Christianson, Psychology

Research has consistently shown that sexual minority individuals are at an elevated risk for substance use. Furthermore, studies have demonstrated links between personality and substance use among lesbian, gay, bisexual, and transgender (LGBT) populations, as well as a relationship between victimization and alcohol use. However, no known research has investigated whether rates of alcohol use in the context of LGBT victimization differ among individuals depending on their underlying personality trait configuration (i.e., personality trait profile; "types"). The current research investigated the influence particular personality "types" have on individuals' propensity toward alcohol use in the context of LGBT victimization. Participants for this study are drawn from a larger dataset of sexual minority individuals who participated in a one-time online survey. Among the variables measured were demographics, personality traits, LGBT-specific stressors (e.g., victimization), and alcohol usage. Hierarchical OLS regression was employed to test hypotheses, while a Bonferroni correction was applied to further test individual subscales of the AUDIT (consumption, dependence, and use-related problems). We used cluster analysis to empirically derive personality profile "types", which resulted in the emergence of a two personality profile cluster solution, effectively splitting participants into "adaptive" and "at-risk" profile groups. Support for moderation when experiencing LGBT-victimization, as well as for overall regression models, were statistically significant with regard to AUDIT total and use-related problems, suggesting that "adaptive" individuals are at decreased risk for problematic alcohol use in the context of LGBT-based victimization, relative to their "at-risk" counterparts. An understanding of the different constellations of personality traits that decrease the risk of problematic alcohol use when experiencing LGBT-victimization not only allows for treatments approaches to attenuate their position to certain components of the individuals' personality/environment more effectively, but can also contribute to an increase of emphasis on combating victimization in prevention efforts, as compared to other sexual minority stressors.

Mentor: Bryan Cochran, Psychology

#118 Expression of Human Indoleamine 2,3-Dioxygenase (hIDO1) Variants with Enhanced Spectroscopic Properties for Biological Studies

Author(s) - Laura Dameron, Cellular & Molecular Biology

The heme containing protein, Indoleamine 2,3-Dioxygenase (hIDO1), is the rate limiting enzyme for tryptophan metabolism and initiates what is known as the kynurenine pathway, which accounts for 90% of human tryptophan catabolism. High levels of hIDO1 have been identified in malignant tumor cells, which diminish the amount of tryptophan available for downstream biosynthesis such as T Cell production and maturation. In order to engineer an hIDO1 inhibitor that will provide maximal benefits, it is crucial to understand the dynamics of this enzyme during catalysis. Wild type hIDO1 is a protein made from 403 amino acids. The published crystal structure shows an unresolved region near the active site, from amino acid residues 361 to 380 and the suspected structure that these 19 residues form is a loop. We hypothesize that this loop is the gate keeper for substrate entry, thereby involved in turn over efficiency and a key to understanding protein dynamics. In order for this research to take place, we constructed an hIDO1 clone in the vector, pQE30, which possesses a T5 promoter that is essential for a (Trp-) auxotrophic strain of ecoli. Of the 403 amino acid residues which form hIDO1, six of which are tryptophans. We have successfully created tryptophan to either phenylalanine or tyrosine mutants, Quik-change Site-Directed Mutagenesis Kit from Agilent. Our approach for studying dynamics is tryptophan fluorescence by characterizing wild type hIDO1, tryptophan mutants and the tryptophan insertion into the loop. In effort to test the hypothesis of the unresolved loop involvement, we are taking time-resolved fluorescence measurements and comparing wild type hIDO1 to the tryptophan mutant which contains additional tryptophan residue, (L374W) near the active site and part of the loop structure in order to observe changes in protein dynamics.

Mentor: Valeriy Smirnov, Department of Chemistry & Biochemistry

#121 A Different Look into Creativity: Bipolar Disorder and Schizophrenia

Author(s) - Capri Richardson, Psychology; David Schuldberg

Creativity was assessed in two adult male psychiatric patients with two separate mental disorders, one with bipolar disorder and one with schizophrenia. Both men were of the same education level, Caucasian, and young adults. The current study was of a paired case study where the two men had previously been assessed with symptom rating scales: the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1962) and Symptom Checklist 90 (SCL-90) (Derogatis, 1992). These assessments showcased the men's different psychoses and their symptoms. They were then interviewed using the Yale Creativity Interview (Schuldberg, 1989) developed for this study. The interview assessed the men's attitudes and personal examples of creativity. When both men's data were compared, the man with schizophrenia spectrum disorder showed more evidence of creativity than the man with bipolar disorder. With these results, future research may be able to provide more insight on the matter of creativity among individuals with psychoses. Implications of this study could lead to more people with mental disorders, who are creative, to have the confidence to showcase their ideas and talents; possibly, giving them more opportunities to have jobs and happiness.

Mentor: David Schuldberg, Psychology

#122 Getting Wild at School: adopting a Wilderness-based orientation program

Author(s) - Emily McKay, Political Science & Environmental Studies; Alanna Wulf, Environmental Studies and Spanish; Thomas McKean, Wildlife Biology; Jennifer Nelson, Wildlife Biology, Mathematics; Harold Kelley, Forestry; Thomas Eglund, Exercise Science

The Freshmen Wilderness Experience (FWE) is the first extended orientation program at the University of Montana, and its long-term viability, success, and financial status are unknown. In seeking to address these unknowns, we have identified three research questions: are there areas in which the program may be improved, can this program succeed in successive years, and does this program benefit the University of Montana's recruiting and retention goals? We identified areas of potential improvement by talking to participants in the first year. The areas they suggested are leadership curriculum, and education modules. We will incorporate leadership and skills curricula from outside sources. In addition, we plan to create our own education modules for students in areas such as map reading and navigation skills, and natural history content. Evaluating the potential success of this program will require research into similar institutions with similar programs and review published literature on the subject. We will assess aspects of comparable university programs and incorporate these components in this program. Primarily, we will examine the accessibility of access to the public lands on which this program will take place. We will speak with five ranger districts in Montana to build relationships with and work towards receiving permits for present and future participants of FWE. FWE will address problems that the University of Montana faces such as student recruitment and retention. The allure of a Wilderness focused orientation draws in many potential students that are choosing their school based on geography.

Mentor: Natalie Dawson, The Wilderness Institute

#123 A Novel Selective Inhibitor of CYP26B1 Potentiates the Effect of a Nanomolar Concentration of Retinoic Acid in Human Neuroblastoma SH-SY5Y Cells.

Author(s) - Michel Santos, Pharmacy; Nicolas Guilloteau, Medicinal Chemistry

Retinoic acid (RA) and its natural and synthetic derivatives are critical molecules for many biological processes, including cell proliferation and differentiation. Several studies demonstrated the RA therapeutic potential in neurodegenerative diseases treatment, showing higher tolerance to neurotoxicity and oxidative stress in vitro and in a Parkinson's disease rodent model. Unfortunately, RA has a poor fate when administered externally in humans, inducing its own breakdown, resulting in activity loss during long-term treatment. Since systemic administration of RA to overcome this situation require a high dose which can induce side effects in non-targeted organ/tissue, we sought to develop a new strategy to selectively increase RA concentration in the brain and

induce a neuroprotective effect. Among of the three CYP26 proteins indentified for mediating RA breakdown, CYP26B1 predominates in the brain whereas CYP26A1 on peripheral regions. Previously developed CYP26 inhibitors caused additional drug metabolizing enymes inhibition, resulting in limited usefulness. Therefore, is it possible to accurately and safely control RA concentrations for therapeutic benefit? Based on these evidences, we hypothesize that selective CYP26B1 inhibition will increase RA concentrations in brain and provide therapeutic advantages for patients with neurodegerative diseases without side effects associated with previously described non-specific CYP26 inhibitors. We designed a library of CYP26 inhibitors, among which are nanomolar-selective dual CYP26A1/B1 inhibitors, CYP26A1 inhibitors and selective CYP26B1 inhibitors. Cell culture were execut-ed using human neuroblastoma SH-SY5Y cell line that can acquire neuron-like phenotypes after RA treatment. In this poster, we will report the effects on gene expression using PCR tecnic in SH-SY5Y cells treated with our CYP26 inhibitor and discuss about the neuroprotective effect of this compounds. The selected genes are modu-lated by RA-mediated signaling. We demonstrate RA metabolism inhibition, resulting increased RA concentra-tion thereby inducing RA signaling in neuronal type cells.

Mentor: Philippe Diaz, BMED

#129 Crop Swap Missoula: Food Waste and the Sharing Solution

Author(s) - Cathryn Raan, Environmental Studies

Collaborative consumption is defined by the expression's founder, Rachel Botsman, as an economic model based on sharing, swapping, trading, or renting products and services, enabling access over ownership. Whereas peer-to-peer exchanges were only practical within small networks of friends, family, and neighbors before, the internet and mobile technology has allowed us to share almost anything, anytime. The movement began slowly in the mid-nineties with websites such as Craigslist and eBay allowing for the exchange of goods between users, but with the 2008 recession putting a financial strain on millions, along with the awareness that we must con-serve the planet's diminishing resources, the “sharing economy” began to grow at record pace, and is showing no signs of slowing down. Yet while there are countless examples of community exchange platforms, and more springing up everyday, there is not an efficient widespread platform for the sharing of food. It is estimated that nearly one half of all food produced is discarded, wasting valuable natural resources and costing billions. Using existing models of peer-to-peer exchange, this report will guide the creation of Crop Swap Missoula, a small-scale online food exchange in Missoula, Montana. The exchange will allow for the sale, donation, or trade of sur-plus food items among users, reducing food waste within the community. The potential financial, environmental and social benefits of the project will be considered, and problems that may occur in the process anticipated. Similar platforms often fail due to insufficient supply and demand, a lack of product focus, an unclear value scheme, not enough funding, or regulatory issues. Each of these concerns will be discussed as they apply to Crop Swap, and potential solutions explored.

Mentor: Cathryn Raan, Environmental Studies

#130 Truth is Simpler in Fiction: Comparing the Cognitive Complexity of Real-Life and Fictional Tyrants

Author(s) - Hayley McCullough, Psychology

What is fiction's functional purpose in regards to a person's mental landscape? Psychological research has provided only a few broad brushstrokes to help us answer this question. Current veins of research indicate a link between reading fiction and increased empathetic ability (Hakemulder, 2000; Mar et al., 2006; Djikic and Oatley, 2014), but on the whole, it seems that fiction has been taken for granted as simply a psychological mirror of the real-world. Little research directly addresses whether or not this assumption is accurate. The present study aims to address this gap in our understanding of the psychology of fiction by pursuing linguistic differences between the dialogue of fictional characters and real-life people on a matched domain. Specifically, dialogue from six-teen tyrants (eight real and eight fictional) was scored for measurements related to integrative complexity and compared using an one-way analysis of variance (ANOVA). Integrative complexity is defined as a person's ability

to differentiate between the different but relevant perspectives of a problem and, at higher levels, the ability to integrate those perspectives in some coherent manner (Suedfeld & Tetlock, 1977). Consistent with expectations, findings revealed that real-life tyrants were significantly more complex than their fictional counterparts for integrative, dialectical, and elaborative complexity. Additional analyses revealed that these findings are largely not accounted for by the length of the scored materials. The findings of this study reveal a linguistic divergence between our representation of tyrants and the reality they are supposed to represent, and as such are consistent with a model suggesting that the deep psychological functions served by abstractions of tyrants lead us to characterize their fictional representations in ways that do not reflect reality.

Mentor: Laure Pengelly Drake, Honors College

#131 Developing Non-invasive Microbial Biomarkers to Inform Elk (*C. canadensis*) Health in Wild Montana Populations

Author(s) - Samuel Pannoni, Wildlife Biology

Background: The composition of the fecal microbiome of mammals is associated with changes in diet, stress, disease and physical condition of an animal. When managing wildlife, Federal and State agencies currently must rely on invasive sampling and coarse observational demographic data to make their decisions. By developing microbiome-based biomarkers that vary as a function of animal body condition and disease, we hope to provide managers with the ability to monitor direct impacts from environmental stressors on individual animals and the herd. This approach represents a low cost, non-invasive sampling method based simply on fecal pellet collection in the field and intestinal microbiome analysis in the lab. **Methods:** We analyzed 111 individual wild elk (*Cervus canadensis*) using Illumina MiSeq sequencing of partial 16S-rRNA gene amplicons from the fecal microbiome. Montana Fish, Wildlife and Parks collected the scat and linked body condition metrics from three GPS collared populations in Montana in winter using helicopter teams and invasive sampling methods. Using the QIIME program and a floating search feature selection with leave-one-out cross validation (CV) we were able to elucidate informative bacterial taxa and general bacterial composition profiles and compare them to known body conditions. **Results:** This experiment succeeded in initial development and confirmation of microbial biomarkers in elk with individuals from the Sapphire population clustering significantly using CV by pregnancy (CV 92.31%), sex (CV 96.15%) and body fat percentage (CV 96.15%) in females using linear discriminate analysis (LDA). **Conclusion:** As our microbial biomarker approach matures, we hope to apply it broadly toward the management of wildlife species non-invasively. Non-invasive biomarkers can support endangered species research and conservation when animal populations are fragile and cannot sustain traditional invasive sampling or when more cost effective information is desired.

Mentor: William Holben, DBS

#133 The Nature of Disconnect: Wilderness in the Face of Climate Change

Author(s) - Sarah Capdeville, Resource Conservation and Spanish

In the midst of a congressional address on the topic of conservation and restoration, President Lyndon B. Johnson stated, "This generation has altered the composition of the atmosphere on a global scale through . . . a steady increase in carbon dioxide from the burning of fossil fuels." It was 1965. One year prior, Congress had passed the Wilderness Act of 1964, defining wilderness as "an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain." When the founders of the Wilderness Act wrote these words, they likely had no idea of the repercussions global climate change would bring to these designated areas, even with the issue's tentative beginnings at the time. They did not understand how an altered atmosphere would threaten the core value of wilderness as untrammelled. Today, half a century later, both these definitions, of climate change and of wilderness, have hardly changed, but the debates surrounding them are vast and heated. Through analysis using existing literature in the fields, I examine the confluence of these two issues, focusing on the history and management of wilderness in the context of anthropogenic climate change. I use this scientific literature along with environmental and philosophical writings and personal experience to help under-

stand the separation society places between wilderness and civilization, reflected in the Wilderness Act, and how that disconnect affects how we approach the issue of climate change.

Mentor: Nicky Phear, Climate Change Studies

#134 Why Do Caterpillars Whistle? Acoustic Mimicry of Bird Alarm Calls in the *Amorpha Juglandis* Caterpillar

Author(s) - Jessica Lindsay, Wildlife Biology

Caterpillar species possess a range of anti-predator defenses, from regurgitation to sonar jamming. The North American walnut sphinx caterpillar (*Amorpha juglandis*) produces a variety of whistling noises when pinched. Limited observations indicate that this causes avian predators to retreat, leaving the caterpillar alone. However, it is unknown why this whistle is such an effective deterrent. Interestingly, the *A. juglandis* whistle is acoustically similar to the “seet” alarm call that many bird species produce in response to their own predators. We tested the hypothesis that the caterpillar whistles mimic bird alarm calls by playing recordings of *A. juglandis* whistles, chickadee seet calls, and a control sound to flocks of small songbirds and comparing the birds’ responses to the different stimuli. Birds tended to freeze or dive for cover in response to the seet call and two types of caterpillar whistles. Our results suggest that these caterpillar whistles may protect caterpillars by mimicking the alarm calls of their avian predators.

Mentor: Erick Greene, Biological Sciences

#135 The Visibility of Homelessness in Missoula

Author(s) - Westen Young, Sociology with ISJ option & Political Science

When people experiencing homelessness are seen sleeping in public places, rather than at a shelter such as the Poverello Center, the question of “why” is posed. By analyzing ethnographic field notes documenting 36 hours of participant observation, I will explain why homelessness is visible in Missoula. I will focus on three reasons that people experiencing homelessness sleep outdoors in Missoula: permanent outs from the Poverello Center, lack of access to affordable hotel rooms, and the lure of autonomy and freedom the North Reserve Street camps provide. By examining why some people without homes opt not to stay at the Poverello Center, I will demonstrate that a public street may be the safest, most cost effective place to sleep in Missoula for some people experiencing homelessness.

Mentor: Daisy Rooks, Sociology

#137 Impact of a Flame Resistant Synthetic Material Base Layer on Heat Stress Factors

Author(s) - Molly Bentley, Exercise Science

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Protective clothing worn by wildland firefighters (WLFF) may increase physiological strain and heat stress factors due to increased insulation and decreased ventilation. **PURPOSE:** To examine the effects of a flame resistant synthetic material base layer on heat stress. **METHODS:** Ten recreationally active males completed two trials of intermittent (50-min walking, 10-min sitting) treadmill walking (2.5mph, 4% grade) over 3 hours in a hot, dry environment (35°C, 30% rh). Participants wore standard WLFF Nomex pants, shirt with either a cotton base layer (C) or a flame resistant synthetic base layer (S), while carrying a 35lb pack, hard hat, and gloves. Core (T_c) and skin (T_{sk}) temperature was measured continuously throughout the trial. Skin blood flow (SBF) and skin temperature (DT_{sk}) was recorded via laser doppler throughout the exercise. Statistical analyses were performed using SPSS 22.0. 2X4 repeated measures ANOVA were used for T_c and T_{sk}. 2X5 repeated measures ANOVA were used for SBF and DT_{sk}. **RESULTS:** Significant main effects for time were found on T_c (p=0.000) and T_{sk} (p=0.003). No significant trialXtime interactions were found in T_c (p=0.077) and T_{sk} (p=0.086). SBF showed significant main effects for time (p=0.001) and trialXtime interaction (p=0.001). Significant main effects for time

were found on DTsk ($p=0.001$). Comparisons for SBF and DTsk were made between peaks, nadirs, and the three post-exercise periods for C and S. Significant main effects for time were found on SBF peaks ($p=0.001$), nadirs ($p=0.028$), and posts ($p=0.001$). Significant main effects for time were found on DTsk peaks ($p=0.019$) and posts ($p=0.001$). CONCLUSION: Although not significant, trends were seen that suggest the flame resistant synthetic material base layer may increase physiological strain and heat stress factors.

Mentor: Charles Dumke, Health and Human Performance

#138 #Do Families Inspire?

Author(s) - Joel Davison, Economics

Does having children or being married inspire an artist to create more valuable works? This question stemmed from a recent article which suggests that when artists travel, they create more valuable art. After researching how having children or being married affects professions similar to artists, either in work process or wage type (like published researchers or the self-employed), it seems there is a connection. I then decided to apply economic models (ordinary least squares and fixed effects) to evaluate art with regard to artists' families. I gathered biographical data regarding artists, corresponding art auctions from 2013, and connected them on a yearly basis to determine if they were married or had at least one child when the piece of art was completed. After performing several regressions, while correcting for other variables like size or medium used, I found evidence of a relationship. While in most of the regressions, both the child and marriage variables were insignificant, when using female interaction variables, both having a child and being married were found to be significant. The results suggest that for female artists being married or having a child is detrimental to the price of their art. It is important to note that the quantity of art produced was not measured, but the value art buyers were willing to pay in 2013. In addition to the family variables, I also included broad categorical variables of what each piece of art depicted as its subject, and found that together, these variables were jointly significant. While this was not the primary question, finding that these results were so strong was surprising. My study suggests that having a family may negatively affect the value of a female artist's work, and that subject choice may influence the price of art. This study was completed in May 2014.

Mentor: Katrina Mullan, Economics

#139 Diastereoselectivity in an Exhaustive Bromination of an Anthracenyl-Isoxazole

Author(s) - Michael Campbell, Chemistry; Matthew Weaver, Medicinal Chemistry

The focus of this project is to improve the efficacy of anthracenyl isoxazolyl amides (AIMs) by adding axial chirality via strategic halogenation. AIMs are a novel class of antitumor agents specially synthesized to bind and interact with G-quadruplex (G4) DNA; binding G4 DNA has been shown to repress the replication of oncogenes in cancerous tumors. By using asymmetric halogenation our goal is to create an axially chiral molecule, that is a molecule divided by a bond, or axis, that cannot freely rotate due to steric hindrance. Many biologically active molecules are chiral and the stereoisomers often display a significant difference in activity due to interactions with chiral targets, such as DNA. Methods of over halogenation of unsubstituted anthracenes, in synthetically useful yields, have been published by Cakmak. However, with the added complexity of a substituted anthracene, the addition of halogens has been a challenge. We have successfully isolated a 1,2,3,4,10-pentabromo-anthracenyl-isoxazole-ethyl ester. The methods that yielded the overbrominated product require consideration of the mechanism of the reactions, in which ionic and radical intermediates are expected to predominate. The current focus is the selective reductive elimination of the overbrominated compound. The future focus will shift to selective substitution that will afford an axially chiral final product. The benefit of stereospecific activity is that a patient may be able to take less of the chemotherapeutic agent and achieve equally beneficial results with fewer side effects. Our progress will be described.

Mentor: Nicholas Natale, Biomedical Sciences

#140 Care-Giver CAPI and Personality: Predicting Child Abuse

Author(s) - Katie Hausauer, Psychology; Johanna McCormick, Psychology; Elise Juraschek, Psychology; Mikayla Harmon, Psychology

Previous research has identified several risk factors for child abuse perpetration. These risk factors include both demographic and certain personality characteristics. Another measure used for identifying child abuse perpetrators is the Child Abuse Potential Inventory (CAPI). The CAPI is a widely used screening tool for detecting risk of physical abuse by parents or primary caregivers (Begle, Dumas, Hanson, 2010). Previous research shows that this measure has an accuracy of between 45 and 90 percent. Can prediction accuracy of CAPI be increased by the additional analysis of perpetrator's personality characteristics? Archival evaluation records of at-risk parents have been collected, coded, and examined for abuse potential. Using a sample of approximately 100 parental evaluations; composed of both abusers and non abusers. Personality characteristics that predict abuse were identified using the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) and Personality Assessment Inventory (PAI). In addition, demographic and CAPI information was collected. Personality dimensions were added to the demographic and CAPI predictors using regression analyses. We predicted a significant increase in accuracy in identifying child abusers using these personality measures. The results of this study might be applied in identifying perpetrators to prevent or reduce child abuse.

Mentor: Paul Silverman, Psychology

#141 Psychological Profiles of Child Abusers

Author(s) - Johanna McCormick, Psychology; Sabina Sabyrkulova, Psychology; Cheyenne Rivera, Psychology; Jessie Glosser, Psychology

Research has examined both roles of demographic characteristics in predictions and the role of only single variables that may help identify parents who are at risk for perpetrating child abuse. A study using the Minnesota Multi-phasic Personality Inventory (Shealy, 1991) suggests that there are several, diverse profiles of male sex offenders rather than a homogeneous (single) profile. Previous research done by this UM Team has identified subscales on the MMPI-2 and PAI that predict child abuse perpetration above and beyond demographic information, such as gender, age, socioeconomic status, marital status, victimization history, and education level which have all been previously identified as risk factors for perpetrating child abuse (U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau, 2013). The following archival data, collected from approximately 100 parenting evaluations, were used in the present study: the Minnesota Multi-phasic Personality Inventory (MMPI-2), the Personality Assessment Inventory (PAI), Child Abuse Potential Inventory (CAPI), and demographic information. Parents are identified as abusers and non-abusers using the Child Maltreatment Certainty Scale. Two questions were examined: Is a scale developed by this team (Child Maltreatment Certainty Scale) a valid measure of child abuse perpetration? And, what are the psychological profiles of adults identified as perpetrators? Discovering typical psychological profiles of child abusers can assist in better identification of who may be more likely to perpetrate child abuse.

Mentor: Paul Silverman, Psychology

#142 Extracting New Periglacial Lacustrine Information from the 1970 Flathead Lake Seismic Survey Data

Author(s) - Christopher Casas, Geoscience

On several seismic lines from the Flathead Lake Seismic Data signal, arrival patterns exhibited curving shapes that might indicate they are diffraction arrivals. This project attempted to resolve whether those patterns were the result of diffracted energy or were true reflections from subsurface features. Approximately 25 seismic lines were generated during the 1970 Flathead seismic survey and are stored online via the University of Montana Scholar Works site. I catalogued locations along various lines that fit the visual criteria for diffraction arrivals, and utilized computational engines (Python, and Awk) to calculate suites of diffraction curves taking into

account the possible distribution of seismic velocities in the lake water and the underlying sediments. I calculated a suite of diffraction curves and overlaid them on actual seismic sections to assess whether or not the curving arrivals in the data matched the predicted curves, Seismic Unix tools were used for the overlay comparison. For those lines where the curves overlay, the events in the data were interpreted to be diffractions. Migration, using Seismic Unix tools, was applied in an attempt to remove the curving patterns. Despite the age of the dataset, no systematic and quantitative analysis of the diffraction-like patterns has ever been done. In 1970, University of Montana facilities lacked computational resources and seismic processing tools for the analysis and correction of the diffractions. In addition, the embryonic nature of digital migration in the era of the Flathead Lake Seismic survey prevented a study of this type from being completed. During the initial Flathead Lake Seismic Survey the data were recorded analog and not digital. The digital data that I have used are the result of a 2012 image to data conversion process. The analysis and migration processing clear up some interpretation questions and provide a clearer view of the true reflections from the sediments.

Mentor: Robert Lankston, Geoscience

#143 COME AT ME! Aggressive Display Behaviors of Adolescent Male Homo sapiens

Author(s) - Theo Hanson, Psychology

Research into the aggressive behavior of nonhuman animals has revealed a general pattern of high intensity aversive signaling displays at the start of an aggressive encounter that gradually progress towards more overt physical attacks as the duration of the encounter increases. The present study sought to further the comparative psychological insight into how conflicts progress between human and nonhuman animals. Drawing some analogies from the aggressive display behaviors of Siamese fighting fish (*Betta splendens*), we studied 100 videos ranging from 1-5 minutes in length. The aggressive display behaviors of adolescent male *Homo sapiens* was extrapolated and coded from videos on the video site YouTube. Specific behaviors coded for were chest beating, arm flaring, aggressive vocalization (swearing, yelling, and insults), aggressive darting, feinting attacks, and genuine attacks. We recorded both the frequency and duration of the aggressive responses. Results from this study correspond with reported results from the animal literature indicating that aggressive encounters follow a typified pattern of aversive signaling to overt physical attacks in humans in the same manner as nonhuman animals.

Mentor: Ben Eisenreich, Psychology

#144 Effects of Serotonin 1b Agonists on Aggression in *Betta splendens*

Author(s) - Jenna Mace, Psychology; Clyde Collins, Psychology; Theo Hanson, Psychology; Hayden Ferguson, Psychology

Research in mammalian species has indicated that the serotonin 1b receptor may be an important pharmacological target for the control of aggressive behaviors. In particular, research has shown that the serotonin 1b receptor agonists, for example zolmitriptan, produce anti-aggressive effects in rats. The present study sought to extend these findings to *Betta splendens* (Siamese fighting fish), a species well known for their aggressive behavior. In particular, the impact of zolmitriptan on the preference of fish to engage in aggressive behavior towards a mirror was examined. Results from this study indicate that contrary to findings from mammalian research, zolmitriptan increased the preference for aggressive encounters, indicating that the role of serotonin in the mediation of aggression may be more complex than previously thought.

Mentor: Jenna Mace, Psychology

#145 Stereotypical Behavior in Captive Tigers

Author(s) - Jenna Mace, Psychology

Stereotypical behaviors are repetitive behaviors that appear to have no obvious goal or function - such as repetitive pacing, swaying, head-bobbing or circling. It is thought that these behaviors may be caused by frustration, an inability to develop natural behavior patterns, impaired brain function, or repeated unsuccessful attempts to

deal with some problem. The present study sought to create an ethogram for examining stereotypical behaviors of eight tigers at the Bush Gardens tiger exhibit. The ethogram was created to include the location within the habitat where behaviors occurred as well as whether the behaviors were undesirable, locomotive, social, observational or self-motivated. Of interest was whether stereotypical behaviors were confined to specific enclosure areas or in response to elements of the daily park routine such as keeper interactions. Findings from this research will aide in the development of better habitats to promote the well-being and care of the tigers.

#146 Betta Less Motivated: Effects of Fluoxetine on Betta Splendens

Author(s) - Clyde Collins, Psychology; Theo Hanson, Psychology; Jenna Mace, Psychology; Jeffrey Kelly, Psychology

Previous studies have demonstrated that the selective serotonin reuptake inhibitor (SSRI) Fluoxetine reduces aggression in Siamese fighting fish (*Betta splendens*). While this finding has been replicated across multiple studies, the behavioral mechanism of Fluoxetine's action upon aggression is not known. *Betta splendens* are great candidates for Fluoxetine exposure based on their well documented serotonergic activity as well as their choice for aggressive opportunities. In particular, Fluoxetine may produce its anti-aggressive effects by altering the motivational component of aggressive responding in *Betta splendens* or through the sedation of motoric activity. To examine this hypothesis a maze swimming task for access to aggressive opportunities was designed. Results from this task indicated that Fluoxetine exposures reduce the appetitive properties of the aggressive encounters and provide evidence for a role of serotonin in the control of motivational processes. The results leave room for discussion of the impacts of antidepressant medications used by humans.

Mentor: Benjamin Eisenreich, Psychology

#147 Advantages and Challenges of Incorporating Virtual Currency into Small Businesses

Author(s) - Spencer Sheehan, Management Information Systems and Accounting

This research paper discusses my findings in assisting Lake Missoula Tea Company become one of the first businesses in Missoula, Montana to accept Bitcoin, a virtual currency, as payment. First, I will offer a background of how Bitcoin technology works, and draw on notable historical issues to better understand its evolution, leading up to how it is currently used. I will explore possible economic benefits realized through utilizing Bitcoin in a business environment, such as transaction fee savings through substitution of traditional credit card processors, alleviating security and privacy issues, as well as publicity and marketing benefits. Serious roadblocks of the applicable usefulness of Bitcoin for a business are also discussed based on my experience with Lake Missoula Tea Company and other examples. I hope to educate the small business sector on the risks and rewards of virtual currency, as well as enable them to properly accept and process it as payment for goods or services.



Special thanks to all the mentors, presenters & co-authors for making the 14th annual UM Conference on Undergraduate Research (UMCUR) a huge success.

THANK YOU!

We look forward to seeing you all at the 2016 UMCUR!