University of Montana Presents

The 16th Annual

UMCUR

Conference on
Undergraduate Research

Program
and
Abstracts

April 28, 2017 ~ Missoula, Montana

Program Design:
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!

Conference on Undergraduate Research

April 28, 2017

UMCUR Sponsored By:

Office of the President

Davidson Honors College

UMCUR Welcome

WELCOME TO UMCUR!

It is my pleasure to welcome students, faculty, staff, alumni, and community members to the 2017 University of Montana Conference on Undergraduate Research (UMCUR). This event is one our major highlights of the year - over 110 students will present their research and creative scholarship today. We are proud to feature their achievements and hard work, and proud to have them as students at the University of Montana.

Research and creative scholarship experience leads to many practical benefits for our students, including stronger qualifications for graduate school and/or professional positions. Indeed, we know that college graduates will encounter many "unscripted challenges" throughout their professional careers, and that the fundamental skills they gain through participation in original research and creative endeavors will make them much more capable of adapting, analyzing, and flourishing in the global economy of the 21st Century. Perhaps most importantly, undergraduate research and creative scholarship also offers our students substantial personal benefits in the form of a stronger connections with their faculty mentor(s), a tremendous sense of empowerment, more confidence, and significant intellectual growth.

I extend thanks to all of our dedicated faculty mentors, who have tirelessly guided our students through the projects they are presenting today. Thanks also go to University of Montana President Sheila Stearns for making this conference - and undergraduate research and creative scholarship more generally – one of her highest priorities. It is important to note that many UMCUR projects are supported by private scholarships, and I would like to express gratitude to the many generous donors who continue to express their belief in our students and their potential.

Any major event requires a great deal of planning, and UMCUR is no exception. This event would not be possible without the great efforts of the UMCUR Planning Committee, the University of Montana Undergraduate Research Committee, and all the faculty members, staff, alumni, community members, graduate students, and undergraduates who have volunteered their time as facilitators and judges for the conference.

Final and special thanks go to Michelle Eckert and Karen Kaley, who went above and beyond the call of duty in organizing this year's conference. The success of UMCUR 2017 stems from their unbelievably hard work.

Best wishes for a successful (and enjoyable) day,

Brock Tessman, PhD

Dean, Davidson Honors College

UMCUR Keynote Speaker

12:20 p.m., University Center Theater ~ April 28, 2017

Battered and Beleaguered:
Truth in the Age of Trump

H. Rafael Chacón

Professor and Division Coordinator of Art History and Criticism in the School of Art

University of Montana

Abstract

In his address, Professor Chacón will speak about his current research on World War I for the exhibition he is curating at the Montana Museum of Art & Culture, a show timed to commemorate the centennial of the U.S. entry into the Great War and opening in September 2017. Specifically, Dr. Chacón will speak about the state's manipulation of truth and the use of propaganda as a weapon of modern war. Additionally, he will engage a more philosophical discussion on the nature of truth in politics and will argue that the Trump administration's constructions of truth are the fulfillment of post-modernist injunctions.

About H. Rafael Chacón

H. Rafael Chacón is Professor and Division Coordinator of Art History and Criticism in the School of Art at the University of Montana—Missoula. He holds an A.B. in art from Wabash College (1985) and received his M.A. and Ph.D. in art history with honors from the University of Chicago (1987 & 1995 respectively).

A specialist on renaissance and baroque art, Dr. Chacón teaches a broad range of courses on the history of art and criticism, both within and beyond the European tradition. His research interests are predominantly in architectural history, historic preservation, and the development of art in the inland northwest. The 2007 recipient of the Dorothy Ogg Award for Individual Contributions to Historic Preservation, he published a book on the life and work of Montana architect A.J. Gibson (2008) and seminal articles on the art of Glacier National Park (2009 & 2010) modernist architecture in Montana (2013 & 2015) and most recently on the life of modernist architect Daphne Bugbee Jones (2015), the first woman to study with Walter Gropius at Harvard after WWII.

He also keeps his eye on global issues, both ancient and contemporary. He has studied the art associated with medieval and renaissance pilgrimage routes in Europe and has walked the Camino de Santiago twice and has lectured abroad on topics as wide ranging as contemporary public arts projects that go viral. The Cuban-born scholar delivered a TEDx talk (2014) on genetic testing and family history, a topic that sprang from a project in his Latin American art history class. Most recently, he was named among the Top Ten lecturers of the Smithsonian Institution's prestigious Journeys program (2015) and received the Captain William Driver Award, for his research on "The Global Legacy of the Estrella Solitaria, Cuba's Lone Star Flag" from the North American Vexillological Association (2016). In the last year, Dr. Chacón has been on sabbatical, curating "Over There! Montanans in the Great War," an exhibition commemorating the centennial of the U.S, entry into World War I.

UMCUR Schedule Overview

Conference on Undergraduate Research (UMCUR)

University of Montana

April 28, 2017

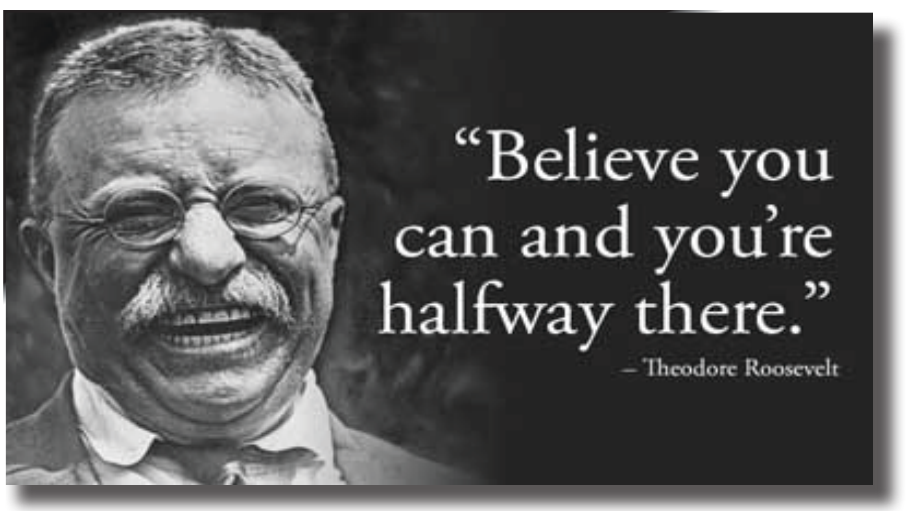
University Center 3rd Floor

8:00 AM	Registration & Poster Setup - UC 3rd Floor, Grand Foyer
9:00 - 11:00 AM	Oral Sessions - UC 326-331 • Social, Life and Physical Sciences & Humanities
10:20 - 12:00 PM	Franke Global Leadership Initiative (GLI) Capstone - UC North Ballroom
11:00 AM - 12:00 PM	Poster Session #1- UC South Ballroom
12:20 AM - 1:30 PM	Keynote Lecture - UC Theater
1:40 - 3:00 PM	Franke Global Leadership Initiative (GLI) Capstone - UC North Ballroom
1:40 - 3:00 PM	Oral Sessions - UC 326-331 • Social & Life Sciences, Humanities
3:00 - 4:00 PM	Poster Session #2 - UC South Ballroom
4:00 - 5:00 PM	Oral Sessions - UC 326-332 • Social Sciences, Humanities, 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 Stearns will present UMCUR Awards. Please join host Davidson Honors College in celebrating this year's UMCUR Awardees in the Theta Rho room, Mansfield Library - Tuesday, May 2nd, 2:00 - 3:00 pm. Cake and coffee will be provided.



UMCUR Schedule Breakdown

Concurrent Oral Sessions: 9:00 AM - 11:00 AM

TIME	UC 326 Social Sciences	UC 327 Life Sciences	UC 330 Humanities	UC 331 Physical Sciences
9:20	Habitual Intravenous Drug Use and the Connection to Self-Medication in the Missoula Country Area - Meaghan Gaul	Purification and Functional Analysis of Glycerol-3-Phosphate Dehydrogenase (GlpD) from Borrelia burgdorferi - Zhibing Zhou	Wild Places and A Thing Called Gender. Does This Social Construction Inform How We Work and Play Outside? A Qualitative Narrative of Working in the White Mountain National Forest - Eliza Hazen	Free
9:40	Vulnerable Vietnam: Climate Change in the Mekong Delta - Lione Clare	Responding to soil fungal communities: a look at interactions between arbuscular mycorrhizal fungi and the common yellow monkeyflower - Mariah McIntosh	The Earthship and A Livable Future - Katy Hopkins	Analysis of Montana Snowpack Trends - Benjamin Uhlenbruck
10:00	Integrating Cellular Percolation Fire Spread into an Existing Landscape Model - Micheal Kinsey	EAAT This: How EAAT1 Knockdown in Astrocytes Neighboring Neurons That Release Both Octopamine and Glutamate Influences Aggression in Drosophila melanogaster - Haley Shepard	Editing: The Value of Quality Content in an Online-First Industry - Megan Giddings	Using Satellite Altimetry to Measure Lake Volume Changes in the Western U.S. - Raphael Hagen
10:20	A Cost-Benefit Analysis of Outside Investment Strategies to Aid Nations in Mitigating the Risk Posed by Natural Disasters - Jared Halvorson	Using ISSR markers to study genetic diversity in whitebark pine (Pinus albicaulis) after massive mountain pine beetle-caused mortality - Clare Vergobbi	Meat for Missoula: Educating Our Youth on Sustainable Meat Production Practices - Amelia Liberatore	Detecting Regional Groundwater Discharge to the Clark Fork River - Melinda Home
10:40	Protectors of Hegemonic Masculinity: An analysis of masculinity and gun legislation - Claire Michelson	Free	Economic Impacts of Climate Change Mitigation Efforts in the State of Montana - Paul Edlund	Raspberry Pi Controlled Greenhouse - Zane Zanzig

Franke Global Leadership Initiative (GLI)
Capstone Presentation Session

These presentations feature Capstone Research from students in University of Montana's Franke Global Leadership Initiative (GLI). These Franke GLI students are in their fourth and final year of the Franke 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. Franke GLI students received access to world-class leaders and opportunities to explore society's questions either locally or around the world. Franke GLI's distinctive program brings together students from different disciplines to tackle real-world problems with diverse ideas.

Franke GLI Capstone Presentation Session 10:20 AM - 3:00 PM UC North Ballroom	
Franke GLI	
10:20	Health Safety Abroad: The University of Montana Zika Awareness Program (ZAP UM) ~ Janette Chacón, Caleb Chestnut, Madison Quammen, Kierney Ross
10:40	Bridging the Gap: Producing a play with the Congolese Refugees of Missoula ~ Rachel Dickson, Sophie Hainline, Elizabeth Koenig, Couso Morpheus, Kathleen Stone,Taylor Wyllie
11:00	Improving landowner access to effective invasive weed management methods ~ Brittan Austin, Kenley Crisp, Mariah McIntosh, Mackenzie Prichard, MaizeSmith
11:20	Managing Stress Through Mindfulness ~ Natalia Boise, Alyssa Fusco, Amelia Liberatore, Christopher Morucci, Chelsea Reichard, Zhibing Zhou
11:40	Fostering Global Citizens: Using Technology to Improve Intercultural Competence Among Study Abroad Students ~ Tessa Feemster, Megan Giddings, Annalea Kamplain, Nicole Musci, Max Smithgall, Hanna Ziegler
12:00 - 1:30 PM Break	
1:40	Climate Change: Our Adaptive Future in the Columbia and Mekong River Basins ~ Thiago Cardoso, Brandon Lowry, Lauren Swett, Hannah Tibke, Cassidy White, Alex Braun
2:00	Raising Cultural Awareness in Undergraduate Students through an Online Pen Pal Program ~ Rehana Asmi, Lindsey Buck, Madison Hinrichs, Mackenzie Lombardi, Anna Reid, Kayla Robertson, Jenny-Lin Smith
2:20	A Place to Call Home: Experiencing the refugee struggle through simulation ~ Mckennah Andrews, Emily Eaton, Erika Hidem, Kurt Secrest, Jessie Seiler, Ian Strahn
2:40	Combating Global Sex Trafficking: Addressing its Humanitarian Impact ~ Sara Stockett, Nasrin Chaudhry, Anastacia Crowe, Claire Michelson, Megan Perry, Olivia Schuler

Want to participate in the 2018 UMCUR? Make sure to visit the UMCUR Website and Like us on Facebook to keep up with current happenings.
www.umt.edu/ugresearch/umcur

Poster Session #1: 11:00 -12:00 PM
UC South Ballroom
(Listed by Poster Number)

Health & Medical Sciences			
1	Psychosocial Improvements for Stroke Survivors following an Intensive Comprehensive Aphasia Program - Jackie Cassidy	13	Patient-Reported Variables Associated with the Success of Behavioral Intervention for Patients with Chronic Cough - Laurie Slovarp
3	Transactional Communication Between Caregivers and Stroke Survivors - Katie Priest	15	Protecting Players While Protecting the Integrity of the Game in Youth Soccer - Aspen Peifer
5	Developing a cognitive training group for students and veterans with mild traumatic brain injury - Leia Chapman	17	Vocabulary and Morphological Awareness Development in Kindergarten Children - Maya Anger
7	Caregiver Education in the Context of Stroke Rehabilitation - Maria Carkeek	19	Metalinguistic Language Development and Literacy Success in Children with and without Language Impairment - Kelcie Cassidy
9	Contrasting Two Prophylactic-Dysphagia Interventions for Patients with Head and Neck Cancer Treated with Radiotherapy with or without Adjunctive Chemotherapy - Maira Ambris	21	Linguistically Based Spelling Analysis and its Relation to Early School-Age Language and Literacy Success - Morgan Williams
11	Investigating the interaction of DLC-1 and GLD-1 in regulation of gene expression - Emily Osterli	23	Respiratory Function Within a Novel Dystrophic Mice Model - Ronald Gallegos
Life Sciences			
30	Fuel Utilization in Response to Two Commercially Available Beverages During Exercise in the Heat - Keagan Shillington	36	Macroinvertebrate Food Webs of a Metal-Contaminated River: Importance of Algal Blooms - Kim Bray
32	Investigation of Membrane Curvature Dependency on Cytochrome c Binding to Cardiolipin - Ziqing Xie	38	Why did the Walleye Cross the Reservoir? Explaining Adult Walleye Use of the Missouri River Upstream of Canyon Ferry Reservoir to Toston Dam - Tanner Traxler
34	The role of the GlpD cap domain in Borrelia burgdorferi - Bethany Crouse	40	Factors Influencing Body Condition in Cabinet-Yaak Ecosystem Black Bears - Caleb Schwartzkopf
Physical Sciences			
42	How is Digital Data Transmitted Wirelessly and Used within a Control System? - Sean McChesney	46	Using Fluorescence Correlation Spectroscopy to Measure Partial Unfolding of Three Variants of Cytochrome c - Daniel Rogers
44	Using Thermal Infrared Imaging to Estimate Soil Hydraulic Parameters: A Novel Approach - Matthew Thomas		

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

Social Sciences

48	Effects of Peer Assisted Learning and Self Regulation Interventions on Mathematical Performance - Mary Burns	54	The effect of visual social stimuli on Octodon degus - Danielle Crandell
50	Assessing Written Narratives:A Comparison of Two Narrative Analysis Tools - Megan Chamberlin	57	Examination of Parent Understanding of YETI Evidence Based Practices - Kyle Dyrud
52	Institutional Mapping of Montana Water Law - Jess DellaRossa		

12:20 - 1:30 PM - Keynote Lecture: UM Professor, H. Rafael Chacón - UC Theater
"Battered and Beleaguered:Truth in theAge of Trump"
Pizza Provided in the UC Foyer

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

TIME	UC 326 Social Sciences	UC 327 Life Sciences	UC 330 Humanities
1:40	Metathesis of /ɹ/ and /ə/ as a Language Variation in American English Speech - Maree Herron	Glucocorticoids and parental effort in tree swallows (Tachycineta bicolor) - Mackenzie Prichard	Bridging the Gap Between the Scientific Community and the Public - Hanna Fay
2:00	Iggy Azalea's Dialectal Disguise: A pursuit of power through speech and privilege - Caroline Allen	How Stream Confluences Influence Aquatic Insect Species and Feeding Group Diversity - Jeremy Brooks	Just Warfare, or Genocide?: Oliver Cromwell and the Siege of Drogheda. - Lukas Dregne
2:20	Linguistic Imperialism and Volunteer English Teaching in Latin America: A Neo-colonial Practice? - Sarah Hamburg	The effect of a bait administered sylvatic plague vaccine on non-target small mammal survival - Emily Leonhardt	Resilience through Equine Assisted Learning - Alyssa Fusco
2:40	Free	Factors Influencing Mountain Lion Kill Rates - Steven Cross	Defining an Agency: Animals, Fire and the USFS - Ellen Ipsen
4:00	Hillary Rodham Clinton and Shifts in Gendered Rhetorical Style - Mackenzie Lombardi	**Visual & Performing Arts** Natural Music for Conservation - Gaven Borgias	Lügenpresse: Media skepticism in contemporary Germany - Ian Strahn
4:20	The Role of Wilderness Orientation Programs: What purpose do they serve? - Reid Hensen	The Lay of the Land: Three Years in the Bob Marshall Country - Jackson Holte	Badass Beauties: the Culture of Rebellious Femininity - Natalia Boise
4:40	Silk Adhesives for Biomedical Applications -Alexander Riffey	Free	Projections of a Better World: A Critical Reading of Elfquest's Original Quest - William C. Riley

Poster Session #2: 3:00 - 4:00 PM
UC South Ballroom
(Listed by Poster Number)

Health & Medical Sciences

2	The Effect of Two Commercially Available Beverages on Fluid Retention During Exercise in Heat - Micah Drew	16	Patterns of physical activity, sleep, and screen time in Urban American Indian children -Ashley Batistich
4	Using Auditory Evoked Potentials to Objectively Determine Backward Masking - Brittany Galvin	18	Cardiac Function in a Novel Dystrophic Mouse Model - Kathryn Tiemessen
6	Soundscape Stimuli and the Soft Sound Test - Hannah Carlson	20	Is it Hearing Loss or is it Dementia? - Emma Bozarth
8	Bed-Fall: Deriving Position from Acceleration to Develop an Accelerometer-Based Device for Clinical Health Settings - Brielle Rolle	22	Hearing Connectivity Solutions for Occupational Therapy Patients -Emma Bozarth
10	The clinical significance of the single leg hop in qualifying outcomes after ACL reconstruction: normative study - Anna Johnson	24	The influence of directions on threshold determination in audiological testing - Alison Arthun
12	Spontaneous Physical Activity In A Novel Mouse Model Of Muscular Dystrophy - Madison Mock	25	Auditory Processing in Fluency Disorders - Harley Kincheloe
14	Respiratory Function Comparison in Young D2 and D2J Mice - Shannon Ryffel		

Humanities

26	An Exploration of the Bioethical Dilemmas Associated with the Costs of End-of-Life Care -Aaron Held	29	Refugee Crisis: A Detailed Study of the United Kingdom - Kurt Secrest
28	Satirical Perspectives: A Cross-Cultural Comparison - Mariah Johnson	27	Ancient DNA Extraction from Stone Tools - Clare Super

Life Sciences

31	Characterization of the Bartonella bacilliformis Human Factor H—Binding Protein Mason Derendinger	37	Conformational Changes of Gαi1 Nucleotide Exchange Catalyzed by Ric-8A - Jake Johnston
33	Disruption of genomic imprinting and abnormal growth in hybrid mammals -Vanessa Stewart	39	Using brown trout otoliths to understand growth patterns in the Upper Clark Fork River - Martin Etchemendy
35	The E. coli Protein YbgL: A Novel DNA Repair Enzyme? - Mason Conen		

Continued Poster Session #2: 3:00 - 4:00 PM
South UC Ballroom
(Listed by poster number, left - right)

Physical Sciences

43	Nitrogen Pulses and Competition between Native and Invasive Plant Species -Nicolas Matallana	45	The Effects of Lipid Structure on Membrane Fluidity - Cynthia Janku

Social Sciences

47	The Importance of Inter-Agency Collaboration in Historical Site Management in Urban Areas -Angela Reichert	53	Fostering Resilience in Middle School Students -Kaitlin Rasor
49	Analysis of Factors Contributing to a Facebook Presence - Megan Miller	55	The Adaptation of a Culturally Relevant Arts-Based Mental Health Intervention for the People of Guyana - Christopher Morucci
51	Analysis of the Activity Areas and Cleaned Zones of Floor IIb of Housepit 54 - Nicole Musci		

Visual/ Performing Arts & Creative Writing Session 4:00 - 5:00 PM

UC 327

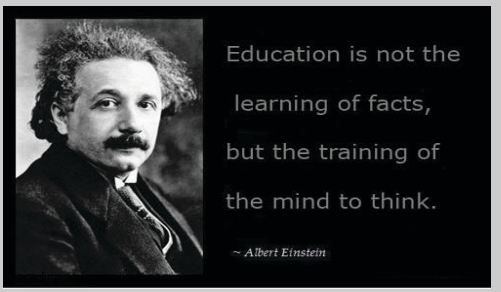
4:00	Natural Music for Conservation - Gavan Borgias	4:20	The Lay of the Land: Three Years in the Bob Marshall Country - Jackson Holte

UC 331

4:00	Choreography Conversations: Collaborating from a Distance - Carissa Lund	4:40	The Missoula Monologues - Lexi Klawitter
4:20	A Generation of Katnisses: The New Power of Female Protagonists in Young Adult Dystopian Literature - McKenzie Watterson		

UC 332

4:00	A Reflection on My Writing Process - Madison Hinrichs	4:40	Eigengrau - Jesse Rowan
4:20	Dépaysement - Makenzie Thompson		



UMCUR Oral Presenter Abstracts:
(in order of Category & Presentation Time)

UC 326 ~ Social Sciences - 9:00 am - 5:00 pm

9:20 am - Habitual Intravenous Drug Use and the Connection to Self-Medication in the Missoula Country Area Author: Meaghan Gaul Mentor: Annie Sondag

According to the National Alliance on Mental Illness (NAMI), one-third of people living with mental illness in the US also experience substance abuse. It is becoming apparent that dual diagnosis is common in our nation. The National Institute on Drug Abuse (NIDA) states that one doesn't cause the other. In some cases drug use leads to mental illness and in other cases mental illness leads to drug use.

The purpose of this study is twofold. First, to examine the relationship between mental illness and intravenous drug use as self-medication among clients visiting the non-profit, Open AID Alliance (OAA), in Missoula, MT. Second, to explore the barriers to mental health care among intravenous drug users who report mental health issues and have struggled to receive care.

This descriptive study will use a quantitative approach to data collection. Data will be collected via a Qualtrics survey containing questions inquiring about drug use and mental health self-medication. Participant recruitment will take place at OAA where individuals visiting the syringe exchange program will be invited to volunteer. Volunteers will be provided an electronic tablet upon which they can link to and complete the survey. Once submitted to the Qualtrics platform, the responses will be anonymous. Quantitative data will be analyzed descriptively and will include frequencies, means and cross-tabulation calculations. Charts and graphs will be used to display data.

The results from this study will provide staff at OAA an estimate of how many intravenous drug users accessing their services suffer from mental illness, diagnosed or undiagnosed. It also will allow OAA to evaluate and potentially address their clients' barriers to reaching out to mental health support. Hopefully, results from this study will encourage some of Missoula's mental health support systems to enhance their outreach to the intravenous drug community.

9:40 am - Vulnerable Vietnam: Climate Change in the Mekong Delta

Author: Lione Clare Mentor: Nicky Phear

My "Vulnerable Vietnam: Climate Change in the Mekong Delta" photography storytelling project is an effort to communicate the significance of climate change effects on the people and environment of the Mekong Delta in a creative and effective way. It will not only focus on the effects of climate change in the Delta, but also include current adaptation and mitigation strategies.

The visual presentation of this project is still in progress, but the research was conducted during my recent time in Vietnam as part of the "Wintersession in Vietnam" study abroad program. In Vietnam, I learned about current and projected effects of climate change on the Mekong Delta and various adaptation and mitigation strategies from field experiences and lessons at Can Tho University. The field experiences included visits to rice, aquaculture, and biogas farms, mangrove forests, and national parks and I took documentary photographs during all of these excursions.

By presenting at UMCUR and likely other locations in Missoula and Alaska, I will share the story of how climate change is affecting the Mekong Delta and the urgency needed for adaptation and mitigation. The story will also be featured on my personal website; therefore, it can be shared with a larger international audiences. Participation in the Vietnam study abroad program facilitated cross-cultural connections between my country, a large contributor to climate change, and a country contributing significantly less to the problem, but dealing with major effects. I hope to extend these connections to a larger audience, helping to inspire collective awareness and desire to sustain our planet and the livelihoods of all global citizens.

10:00 am - Integrating Cellular Percolation Fire Spread into an Existing Landscape Model
Author(s): Michael Kinsey, Greg McMann Mentor: Doug Raiford

The U.S. Forest Service uses the Simulating Patterns and Processes at Landscape Scales (SIMPPLLE) application to simulate landscape ecological processes and evaluate treatment options on National Forests in Montana, Northern Idaho, and the Dakotas. Wildfires are an influential process on the landscape; therefore, the model must accurately simulate ecological processes over long time periods. OpenSIMPPLLE, an open-source version of SIMPPLLE, contains an algorithm that spreads fire in all directions, regardless of wind and elevation, resulting in rectangular fires, which does not reflect realistic fire behavior. We integrated a more accurate cellular percolation spread algorithm developed by Keane et al. (2006) into the OpenSIMPPLLE application. The more accurate algorithm uses wind speed, wind direction, and terrain slope to compute fire spread in all directions to produce a more realistic fire shape. We extended existing file formats, updated the user interface, and implemented the new algorithm to be used alongside the existing logic. We leveraged software engineering techniques to implement new features while preserving existing functionality. Fires simulated with the new spread algorithm result in fire shapes that more closely mimic naturally-occurring wildfires. Integration of the fire spread algorithm developed by Keane et al. allows the Forest Service to make more informed management decisions for millions of acres of National Forests.

Keane, Robert E.; Holsinger, Lisa M.; Pratt, Sarah D. 2006. "Simulating historical landscape dynamics using the landscape fire succession model LANDSUM version 4.0". Gen. Tech. Rep. RMRS-GTR-171CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 9-16.

10:20 am - A Cost-Benefit Analysis of Outside Investment Strategies to Aid Nations in Mitigating the Risk Posed by Natural Disasters
Author: Jared Halvorson, Mentor: Katrina Mullan

According to the UN, natural disasters have killed 700 thousand people, injured 1.4 million people, and left 23 million people without homes since 2005. When natural disasters occur in developing nations, international organizations like the United Nations and the Red Cross have historically provided much needed aid. This type of aid occurs after the fact. Perhaps it would be better to take a more proactive approach to relief, providing tools to mitigate loss beforehand. If these outside parties invested in capital that would allow the stricken country to more adequately mitigate risk for severe weather events, would it be more cost effective than paying for clean-up afterward? More importantly, would doing so save more lives and make for a quicker economic recovery for these nations? I use panel data from several decades to test different types of capital such as human capital and physical capital, ultimately determining which type is more important in helping nations minimize their loss from natural disasters.

10:40 am - Protectors of Hegemonic Masculinity: An analysis of masculinity and gun legislation
Author: Claire Michelson Mentor: Elizabeth Hubble

In the year of 2016, 15,050 people died at the hands of firearms. In the same year there were 385 mass shootings. With so much gun violence and tragedy crossing the news screens, many citizens have become increasingly concerned over the issue of gun violence in the country. Others either deny the problem exists, or claim that their gun ownership is not a part of the problem. In wake of this, gun regulation has become an evermore-contentious debate. This research argues that there exists an underlying reason for our country's inability to pass stricter gun regulations: the threat it poses to hegemonic masculinity.

Drawing from current research, political opinion polls, and political rhetoric, this paper will demonstrate that the fundamental obstacle to pass gun control legislation has to do with upholding the culture of American masculinity. I present current evidence that establishes guns as symbols of masculinity, as well as research affirming the ownership of guns as a method of upholding such masculinity. Through analyzing current pro-gun rhetoric, as well as poll results on gun ownership and popular opinion, I show that behind the arguments in opposition to gun control, there are connections to maintaining traditional masculinity and masculine stereotypes. Furthermore, I will examine the political process to show how these attitudes influence the laws and policies that are passed (or shot down). The research concludes by calling for further research as well as education and political discussion on this topic. No matter a person's stance on gun legislation, it's important to understand the root forces at play.

1:40 pm - Metathesis of /ɹ/ and /ə/ as a Language Variation in American English Speech
Author: Maree Herron Mentor: Mizuki Miyashita

Language variation exists in all facets of human languages, and can be influenced by a number of factors, including but not limited to age, geographical location, and social class. Often, these variations can be overshadowed by an idealized language standard that prescribes how people should speak rather than how they do speak. My research project focuses specifically on the factors that make /ɹ/ and /ə/ metathesis more or less prevalent in spoken American English. I first became aware of the existence of this particular metathesis through observation of my own speech and how words that I pronounced differed from the dictionary pronunciation (as defined by the phonetic pronunciations listed on dictionary.com). I discovered that I pronounced over 50 words beginning with the letters pro and pre with the initial /ɹ/ and /ə/ metathesized. To test the prevalence of this metathesis in American English, I created three data sets each containing five different words of the above criteria. I then placed the words into sentences to mimic a more natural form of speech, and listed the lone words below the sentences. I then had 21 anonymous participants read the sentences and then the lone words below them, and I recorded if the /ɹ/ and /ə/ metathesis was present in the participants' speech. I discovered that gender had no influence on the rate of metathesis, and that age also had minimal influence. Overall, participants metathesized the the words consistently in in the test sentences, indicating that this metathesis is a feature commonly found in natural speech, and should not be perceived as a pronunciation error.

2:00 pm - Iggy Azalea's Dialectal Disguise: A pursuit of power through speech and privilege
Author: Caroline Allen Mentor: Mizuki Miyashita

White Australian hip-hop artist Iggy Azalea has been the subject of recent criticism for her use of African American English (AAE). Eberhardt and Freeman (2015) demonstrate that Iggy, a native speaker of Australian English who uses Australian English in her public speech, makes consistent and context-sensitive use of AAE throughout her entire discography. To account for this unique behavior, Eberhardt and Freeman use the theoretical notion of linguistic appropriation (Hill 2008) which describes the power imbalance evident when outgroup members (e.g. Iggy) benefit from the use of certain varieties of speech that ingroup members (e.g. speakers of AAE) are stigmatized for using. Drawing on their research, this study explores Iggy's linguistic patterns, examining them through the lens of Communication Accommodation Theory, or CAT (Giles et al. 1991). CAT explains speech adaptations made by individuals in varying contexts, particularly with regard to power dynamics and prestige in social settings. CAT argues that in any given speech interaction, individuals make choices designed to maximize, minimize, or maintain social distance between conversation participants, or interlocutors. This is achieved by communication techniques referred to as convergence and divergence. Convergence occurs when a speaker alters their speech to be more similar to that of an interlocutor. In divergence, a speaker uses a different speech variety or style than that of an interlocutor. This project expands the study of Iggy's language use by analyzing it in the theoretical framework of CAT as it interacts with linguistic appropriation. The project additionally takes into account data collected from a short survey taken by 30 UM students about their impressions of Iggy and AAE. Through an examination of Iggy's language use, I hope to not only enhance our understandings of Communication Accommodation Theory and linguistic appropriation, but by doing so, contribute to national conversations of racial justice.

2:20 pm - Linguistic Imperialism and Volunteer English Teaching in Latin America: A Neo-colonial Practice?
Author: Sarah Hamburg Mentor: Maria Bustos Fernandez

Colonial era tactics of oppression may seem obsolete, however the United States continues to exploit the same peripheral nations that it, and other world superpowers, have dominated for centuries. In Latin America, the influence of the American hegemony world penetrates every aspect of life. Unable to escape the grip of the capitalist system, Latin America has become culturally subservient to the United States, whose hegemony has, over time, led to the extinction and endangerment of hundreds of indigenous languages and cultures. Through years

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of exposure to American mass culture (i.e. television, music, media, and consumer products), and an unyielding economically dependent relationship, Latin American cultures have become increasingly assimilated with that of their colonizers. This neo-imperialistic practice is a commonly called "colonization of the mind" by indigenous rights organizers with whom I worked in Guatemala and it is my assertion that volunteer English teaching is major component of this psychological process. Latin Americans are motivated to learn the language in hopes of becoming part of the global economy, learn English to fulfill dreams of migrating north to make a better life (as seen on TV), to find a job within their own countries, or to simply communicate with tourists that visit their communities.

My research culminated in an analysis of the role of English in Latin America and a critique on American volunteer English programs. Last summer, I filmed a documentary in Guatemala and Costa Rica interviewing students, teachers, and parents, both local and foreign, about their views on learning or teaching English and whether they believed it to be a neo-imperialistic practice or a necessary part of an inevitable fate, i.e. globalization. Through personal testimonies and academic sources in the field of sociolinguistics, I have come closer to understanding the characteristics and effects of colonization on the mind and continue to contemplate whether awareness of this colonizer versus colonized dichotomy can help create a relationship that is complementary to the existing languages and cultures.

4:00 pm - Hillary Rodham Clinton and Shifts in Gendered Rhetorical Style
Author: Mackenzie Lombardi Mentor: Sarah Hayden

Hillary Rodham Clinton is arguably the most visible and controversial female political figure of our time. As First Lady, the Senator from New York, the Secretary of State, and a two-time Presidential candidate, the rhetorical space around Clinton is saturated with cultural assumptions of gender, power, and politics. In many ways Clinton is emblematic of the infamous "double bind" that all women who seek to challenge normative gendered roles must inevitably face. Much academic and cultural focus has been centered on the ways in which Hillary Rodham Clinton is a subject of gendered rhetoric. This paper, instead, builds on the vein of scholarship that examines the ways in which Clinton herself has used gendered rhetoric across her career as a candidate for public office. By examining the public addresses that Clinton has given at the beginning and end of each of her four campaigns for office, I examine how she embraces and rejects a traditionally feminine rhetorical style over time. This analysis provides insight into the ways that Clinton has adapted her rhetoric across almost two decades as a political candidate and provides clues as to the cultural tone set by Clinton for other women seeking public office. Taken holistically, shifts in Hillary Rodham Clinton's gendered rhetorical style are illustrative of both her personal struggle with the double bind, and the larger cultural understanding of women in politics.

4:20 pm - The Role of Wilderness Orientation Programs: What purpose do they serve?
Author(s): Reid Hensen, Erik Johnston, Kristian Stipe Mentor: Libby, Metcalf

Understanding the Freshman Wilderness Experience (FWE) at the University of Montana provides insight into the resilience of first-year college students. Prior research on the effects of outdoor orientation programs in student retention suggest positive outcomes from these experiences. The extant literature concerning orientation programs suggest that the successful adaptation of students, a sense of belonging, social adjustment, self-efficacy, goal orientation, and positively responding to rapidly changing circumstances are all key mediators of understanding student resilience. The present study looked specifically at resilience and self-efficacy. Students were asked to participate in a survey before and after FWE and again at the end of their first semester. A comparison group of students who only attended the standard fall orientation was also sampled at the beginning and end of the semester. Two main constructs were used in the survey; the CD-RISC Resilience Measure and a college self-efficacy measure (Gore et. al, 2005). No significant differences in resilience or self-efficacy were found over time or between the two orientation groups. This is not, however, insignificant data. Prior research demonstrates the beneficial effects of outdoor orientation programs on students and the FWE program has high regards from many of its students. The program also boasts higher retention rates than the average at UM. The question then remains, if not resilience and self-efficacy, what mediators are at work in this program? A second wave of data

collection through semi-structured interviews with students who participated in FWE three years' prior provides some insight. These data suggest that a sense of place and strong connections to social groups are two crucial parts of the program that could be leading to a stronger ability to navigate stressors. These findings are important in continuing to understand how to promote successful adaptation and navigation of first semester of freshman year.

4:40 pm - Silk Adhesives for Biomedical Applications
Author: Alexander Riffey Mentor: Monica Serban

Silk fibroin, extracted from the cocoon of the silk worm Bombyx Mori, is a versatile protein polymer that is relatively easy to process into a variety of biomaterials including solutions, foams, and films. Silk has been used for years in medical applications due to its high strength, low cost, and biocompatibility. When processed into an aqueous solution and concentrated, silk fibroin has exhibited adhesive properties making it a desirable platform for the production of tissue adhesives. Currently, tissue adhesives are used in the medical field for a variety of surgical applications, including to aid hemostasis during surgeries and, in some cases, as replacements for suture and staple methods. Surgical separation of large tissue areas often leads to complications such as seroma, a build-up of fluid in a tissue or organ, which require placement of surgical drains. Complications such as this can cause additional visits to specialists, increase the cost of procedures, and introduce further risk of adverse effects. Biocompatible, strong, and cost-effective tissue adhesives that could approximate separated tissue surfaces and accelerate healing would have a significant impact on current surgical procedures by reducing the risk of seroma-associated infections, eliminate the use of surgical drains, and speeding up healing time. Due to the adhesive properties of silk solutions, the biodegradability of silk in vivo, and the biocompatibility of silk fibroin, silk-based biomaterials are being investigated as large surface tissue adhesives for biomedical applications.

UC 327 ~ Life Sciences - 9:00 am - 5:00 pm

9:20 am - Purification and Functional Analysis of Glycerol-3-Phosphate Dehydrogenase (GlpD) from Borrelia burgdorferi
Author: Zhibing Zhou Mentor: Scott Samuels

Borrelia burgdorferi, the etiologic agent of Lyme disease, is transmitted among reservoir vertebrates by Ixodes ticks in an enzootic cycle. Naïve tick larvae acquire B. burgdorferi by feeding on infected vertebrates. Then, the larvae absorb their blood meal and molt into nymphs. B. burgdorferi reside in the tick midgut and switch from the sugar glucose, its preferable energy source, to the sugar alcohol glycerol, which is found in the tick as an antifreeze. The enzyme glycerol-3-phosphate (G3P) dehydrogenase, encoded by the gene glpD, is predicted to convert glycerol to dihydroxyacetone phosphate (DHAP), which enters the central metabolic pathway glycolysis for energy production. The B. burgdorferi GlpD has been predicted based on homology to GlpD from other bacteria, yet this has not been biochemically confirmed and the enzyme has yet to be functionally characterized. We hypothesize that GlpD from B. burgdorferi has the same structure and function as GlpD from the model bacterium Escherichia coli. I expressed recombinant Borrelia GlpD in E. coli for purification and I plan to directly assay its biochemical activity, the conversion of G3P to DHAP.

9:40 am - Responding to soil fungal communities: a look at interactions between arbuscular mycorrhizal fungi and the common yellow monkeyflower
Author: Mariah McIntosh Mentor: Lila Fishman

The obligate fungal mutualists arbuscular mycorrhizal fungi (AMF) colonize the roots approximately 80% of vascular plants, generally thought to provide mineral nutrition, pathogen protection, or drought resistance to plants in exchange for photosynthetic carbon. Because of the ecological and evolutionary significance of these interactions, much work has been done to understand this symbiosis at the community level. However, much remains to be understood about how AMF affect plant fitness on an individual level. In this study, I took advan-

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tage of the tractability of the emerging model species Mimulus guttatus, the common yellow monkeyflower, to identify genetic differences in how contrasting annual and perennial populations respond to AMF. Specifically, I tested for differences in plant dependency on AMF, and variation in local adaptation to native AMF communities. I conducted a full factorial common garden greenhouse experiment using plant, soil, and inoculum from each contrasting field site. I found no dependency on AMF in either population and no local adaptation to native AMF communities. These results suggest that there is little genetic difference in how these contrasting annual and perennial populations interact with AMF. The presence of AMF did not confer a fitness advantage to either plant type and was often associated with a fitness cost, despite differences in life history, providing evidence for a potentially antagonistic relationship between M. guttatus and AMF under certain conditions, consistent with the theory that more ruderal species are less likely to benefit from AMF.

10:00 am - EAAT This: How EAAT1 Knockdown in Astrocytes Neighboring Neurons That Release Both Octopamine and Glutamate Influences Aggression in Drosophila melanogaster
Author: Haley Shepard Mentor: Sarah Certel

How behavior and information is encoded in brain circuits and how individual neurons influence these brain circuits is a growing question in neuroscience. In the nervous system of many organisms, including humans and Drosophila, exists a subset of neurons that are capable of releasing more than one neurotransmitter, a phenomenon called co-transmission. How co-transmission may alter circuits dedicated to behavior is a challenging question. To begin to address this question we used the genetic tools available in Drosophila to alter the concentration of one of the two co-released neurotransmitters and examined possible changes in aggression.
The neurons we examined co-express octopamine (OA) and glutamate. Glutamate may be the most abundant neurotransmitter in the CNS. Therefore, it is vital that we understand how glutamate affects individual neurons, entire brain circuits, and behavior. In order to increase the amount of glutamate at the synapses of our OA-glutamate neurons, we manipulated the re-uptake of glutamate. Astrocytes surround the synapses of neurons that release glutamate and remove glutamate from the synapse through the Excitatory Amino Acid Transporter 1 (EAAT1). We obtained Drosophila stocks that, when crossed to one another, resulted in reduced levels of EAAT1, which would prevent re-uptake and result in an increase of glutamate at the synapse. We used behavioral assays to observe any differences in behavior between EAAT1 knockdown animals and control animals.
In our preliminary data, we did not observe enhanced aggression in Drosophila males as a result of EAAT1 knockdown, although this study needs to be extended to determine if higher amounts of glutamate can influence aggression. If we can better understand the role of glutamate in disorders that are connected to an increase in aggressive behavior such as dementia, schizophrenia, and traumatic brain injury, then more effective medications and interventions can be developed to treat these disorders.

10:20 am - Using ISSR markers to study genetic diversity in whitebark pine (Pinus albicaulis) after massive mountain pine beetle-caused mortality
Author: Clare Vergobbi Mentor: Diana Six

Whitebark pine (Pinus albicaulis) is a high elevation tree in serious decline.. It is experiencing high mortality due to white pine blister rust, an exotic disease, and outbreaks of the native mountain pine beetle, as well as the effects of climate change. It is unknown how this massive mortality has altered the genetic diversity of whitebark pine populations. Furthermore, large die-offs can act as strong selection events, removing individuals with lower fitness. It is possible that survivors of mountain pine beetle outbreaks have different genotypes than trees killed and may be better adapted to current and future warmer drier climates.
This project uses Inter-Simple Sequence Repeats (ISSR), a method that detects high levels of genetic polymorphism, to test two hypotheses: 1) surviving trees differ genetically from those that are killed by the beetle, and 2) the outbreak has reduced overall genetic diversity in affected stands. Needles were collected from surviving trees after a beetle outbreak and from trees just under the minimum diameter beetles attack. The smaller trees were used a surrogate for the 'general population' pre-beetle selection. DNA was extracted from the needles and screened with three ISSR primers using PCR and gel electrophoresis to analyze genetic differences between

individuals. Survivors and a few general population trees clustered distinct from other general population trees indicating distinct genetic differences among survivors and those selected by the beetles. This suggests that selection may be occurring in these populations as a result of the beetle outbreaks.
Information gained in this study will help develop a more informed approach to whitebark pine restoration and forest adaptation to climate change.

1:40 pm - Glucocorticoids and parental effort in tree swallows (Tachycineta bicolor)
Author: Mackenzie Prichard Mentor: Creagh Breuner

All vertebrates respond to stressful situations through the release of hormones called glucocorticoids (CORT). These hormones alter processes within the body to prioritize long term survival over immediate reproduction. It is hypothesized that this is helps individuals survive until conditions become more favorable for successful reproduction. Historically, stress was hypothesized to primarily to pull organisms out of reproductive life history stages when unfavorable conditions made offspring survival slim (otherwise known as the "CORT-tradeoff hypothesis"). However, recent evidence suggests that birds actively feeding nestlings show elevated CORT levels, possibly due to the increased metabolic demands of parenthood. This relationship has been named the "CORT-adaptation hypothesis". This research tested these two conflicting associations between parental effort and stress hormones to further understand the complex relationship between stress and reproduction. During the summer of 2016 I collected blood samples to examine the levels of CORT in female tree swallows (Tachycineta bicolor) in the Seeley-Swan valley of Montana. To measure parental effort, I observed and recorded various parental behaviors including time incubating, feeding rates, and nestling growth. I compared relationships between these measurements to help explain the relationship between reproduction and CORT.

2:00 pm - How Stream Confluences Influence Aquatic Insect Species and Feeding Group Diversity
Author(s): Jeremy Brooks Mentor: Lisa Eby

Aquatic communities, species that live and interact with each other, each have a unique composition and function (i.e collection of decomposers, predators, and grazers). Broad ecological theory provides a variety of models that can predict communities and their functions across riverscapes. For example, the River Continuum Concept (RCC) explains general shifts in stream communities and their function along longitudinal (upstream to downstream) gradients, but it fails to consider the more narrow effects of tributaries and confluences. Conversely, dendritic stream networks theory helps explain the potential role of river confluences and how they connect communities, but fails to explain general longitudinal shifts in communities. This discontinuity between models begs for a way to integrate the role of confluences (dendritic theory) into a broader landscape model (RCC).
I hypothesized that river confluences would have a different influence on community diversity and function than expected under the RCC. To explore this, I sampled aquatic insects at tributaries along a watershed to test predictions that stream confluences would (1) increase insect diversity (number of species), (2) abruptly change specific species abundance, and (3) change the overall community function through increasing and decreasing insect functional feeding groups. I collected aquatic insects in two watersheds in the Beartooth-Absaroka Wilderness, sampling above and below four stream confluences in each watershed. Aquatic insect samples were identified to genus level and given a functional feeding group score. I will examine pairwise upstream/downstream differences with and without intervening confluences to compare community diversity, composition, and functional diversity. Streams ecosystems are often ranked as one of the most imperiled ecosystems in the world. Developing aquatic community theories and models as we work to restore these ecosystems is important in understanding how pristine aquatic ecosystems should function.

2:20 pm- The effect of a bait administered sylvatic plague vaccine on non-target small mammal survival
Author: Emily Leonhardt Mentor: Angela Luis

An ongoing study on the Charles M. Russell Wildlife Refuge (CMR) is testing the efficacy of a bait-administered sylvatic plague vaccine. This entails distributing vaccine and placebo baits within paired prairie dog colonies. On the CMR, the target species for this vaccine is the black-tailed prairie dog (Cynomys ludovicianus),

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an important prey species for the endangered black-footed ferret (Mustela nigripes). For my senior thesis project, I am collaborating with the sylvatic plague vaccine project by examining whether there is a difference in monthly survival between non-target small mammal populations living on prairie dog colonies treated with vaccine baits and those on colonies treated with placebo baits. Non-target small mammal species on my field sites include deer mice (Peromyscus maniculatus), and northern grasshopper mice (Onychomys leucogaster). My field work consisted of trapping on three sites comprised of paired vaccine and placebo plots (6 total plots) during the summer of 2016. Trapping sessions were between three and four days with approximately 4 weeks between sessions, and were repeated for four or five months. To estimate apparent survival, I have used a robust design, multi-state model to analyze capture histories in program MARK. During the field trial stage of the sylvatic plague vaccine, it is important to determine how vaccine bait application affects both target and non-target species within and around prairie dog colonies before widespread application is undertaken. Reducing plague infection among prairie dogs and other rodents may thereby reduce transmission to species such as the endangered black-footed ferret, domestic animals, and humans.

2:40 pm - Factors Influencing Mountain Lion Kill Rates
Author: Steven Cross Mentor: Mark Hebblewhite

Kill rate, defined as the number of prey killed per predator per unit time, is a key component to understanding predator-prey dynamics. A multitude of factors may affect kill rates, including, variation in age, sex, weight, or presence of offspring of either predator or prey species (intraspecific variation) and events such as the theft of a kill made by another animal (kleptoparasitism). These factors may influence the time a predator spends locating prey (search time) and the pursuing, killing, and consumption of prey (handling time). The sum of search time and handling time may be measured as the time between a subsequent kill, a metric I will use to make inferences on what affects mountain lion (Puma concolor) kill rates. Utilizing kill data obtained from GPS-collared mountain lions of Colorado, Wyoming, and Patagonia, I plan to investigate the impacts of: 1) mountain lion sex, 2) mountain lion age, 3) accompaniment of offspring with mountain lion females, 4) prey weight, and 5) the presence of bears (habitual kleptoparasites) throughout study periods. Applying these factors, I aim to find the most parsimonious and biologically sound statistical model, best describing sources of variation in time between kills for mountain lions. Further knowledge on this subject may be useful for the management of mountain lions, as well as more elusive or less studied felids, in which mountain lion behavior maybe analogous and thus a useful proxy.

UC 330 ~ Humanities - 9:00 am - 5:00 pm

9:20 am - Wild Places and A Thing Called Gender. Does This Social Construction Inform How We Work and Play Outside?A Qualitative Narrative of Working in the White Mountain National Forest
Author: Eliza Hazen Mentor: Elizabeth Hubble

The purpose of this paper is to explore a connection between gender and wilderness in a very specific setting, the White Mountain National Forest. Twenty women employees of the Appalachian Mountain Club working for the High Mountain Huts as well as the Professional Trail Crew were interviewed. Five men employees were also interviewed to provide alternative prospective and context. Through these in-person and remote qualitative interviews, I gained insight into the gender-based challenges for women working in the wilderness. The interviews I conducted revealed common themes related to gender, including the role of micro-aggressions; confronting stereotypes about women's strength; and development of skill sets to cope and excel in a wilderness setting. Because of the experience of working in stereotypically masculine fields, these many of women have increased their awareness of gender-based issues in and out of the mountains. It was important to me to investigate a connection specifically in mountains while working and recreating, because this setting is vital to my character but also because these wild spaces will be threated by climate change in future generations.

9:40 am - The Earthship and A Livable Future
Author: Katy Hopkins Mentor: Nicky Phear

Conceived through many years of trial and error by architect Michael Reynolds, the Earthship is a home which uses natural phenomena and what I would call biomimicry to create a residence that requires no added heating or cooling, no input of electricity, creates no sewage waste, and captures its own water. These off-the grid homes continue to evolve to provide everything needed to survive as a human being. Built using tires, earth, aluminum cans, glass bottles, and comparatively minimal conventional construction materials, they have a tiny ecological footprint compared to traditional homes. Reynolds used these materials because "they are indigenous to every populated place on Earth." He sees the Earthship concept as a way to use the things that modern society would otherwise throw away. In this way, much less goes to waste, and much less is perceived as waste. In the current climate, it has become clear we may not continue living as we have grown accustomed; we must adapt to the new world we are creating through the continued emission of CO2 and other greenhouse gasses into our atmosphere. The Earthship is a tangible solution to many of the problems posed by climate change. Earthships grant their residents food-security, protection from temperature rise and other weather events, and a certain degree self-reliance. My overall plan with this project was to learn how to build one, which is much of my thesis, but I mostly wanted to prepare for this summer, when I will begin construction of my own Earthship in my hometown of Pocatello, ID.

10:00 am - Editing: The Value of Quality Content in an Online-First Industry
Author: Megan Giddings Mentor: Denise Dowling

As the journalism industry shifts away from the traditional print newspaper model and toward a faster-paced, online standard, the commitment to editing content is steadily diminishing. This research project aims to examine the current state of editing within this industry and to determine whether this reduced emphasis on revision and correction is detrimental to news organizations and similar journalistic publications. Through an investigative assessment of recent studies, relevant publications and materials, and interviews with industry professionals, I attempt to define the editorial profession and what it means to be a "good editor." I also observe employment trends and assess alternative options, such as outsourcing and editing software, and I explore existing frameworks for the cultivation of editors within organizations and how this development could be improved. Most importantly, I examine factors influencing credibility and reader perceptions of quality. Inquiries into these dynamics suggest that readers place greater value on edited content, and accordingly, are more willing to pay for that content. In an era in which media organizations are struggling to find an effective way to generate revenue after the demise of print advertising, this judgement and willingness to pay for value should be noted as a crucial consideration when updating publication structures and standards.

10:20 am - Meat for Missoula: Educating Our Youth on Sustainable Meat Production Practices
Author(s): Amelia Liberatore, Mentor: Jason Mandala HumanitiesOral Presentation

In autumn 2016, a controversy arose when a student group, Advocates for Animals, took up a campaign against three meat pigs at the PEAS Farm due to strong views about animal consumption. Pigs serve as a central piece of food source education to hundreds of Missoula children who visit the farm every year. Unfortunately, the controversy overshadowed the educational purpose of exposing children to sustainable meat production practices. Moreover, access to the PEAS Farm and good food education is not available to all local children. I wondered whether education was accessible elsewhere. Unfortunately, child-appropriate, culturally relevant food literature is scarce. In my research, I read and critiqued dozens of children's books on food and farming. However, much of the literature is outdated, inaccurate, or dull. In response, I have written and illustrated a children's book that provides accurate and relevant information with engaging illustrations. This book could reach an audience that cannot visit the PEAS Farm or access other sustainable food education resources. Offering this kind of information to children allows for important discussion of where food comes from and what kind of food we want in our community.

10:40 am - Economic Impacts of Climate Change Mitigation Efforts in the State of Montana
Author: Paul Edlund Mentor: Peter Mcdonough

In 2017, several sources of the state of Montana's economy are susceptible to climate change; those industries include tourism, agriculture, hunting, and logging. In recent years, numerous political figures, national governments, and grassroots organizations have called for extreme methods of climate change mitigation for the entire global community. In response, communities, countries, and individuals have responded and changed their habits and policies to begin mitigating climate change. We analyzed peer reviewed articles, government documents, and interviews from Montana economy experts. From those results, we were able to discern the approximate amount of money associated with Montana industries at risk from the impacts of climate change- creating an economic impact analysis (EIA). This number was added to the estimated profit from industries associated with greenhouse gases, or those the industries that would persist if no climate change mitigation was addressed. I compared these numbers with the estimated cost of extreme climate change mitigation in Montana added to the potential money saved from protecting the at-risk Montana industries. By means of secondary research and a synthesizing of the conclusions of credible economists, local energy experts, technology scientists, and climate scientists, this paper hypothesizes that extreme climate change mitigation methods in Montana would have no direct impact impact on the quality of Montana's environment, and would actually decrease the total economic profit of the state of Montana and its inhabitants. However, further research must be completed to understand the community health benefits of local climate change mitigation efforts.

1:40 pm - Bridging the Gap Between the Scientific Community and the Public
Author: Hannah Fay Mentor: Brock Tessman

There is an increasing dichotomy between the scientific community and the public caused by the inability of scientists to communicate well with the public and the public's inability to discern accurate, peer-reviewed science from 'pop science', click-bait, and 'alternative facts'. This allows for the creation of harmful policies based on opinion rather than empirical fact, the misunderstanding of healthcare, and distrust of science- all of which are detrimental to individuals and society.
I am approaching this problem on two different fronts. My startup company, Tran·sci·lator, aims to decrease this polarity by being a free-access online science communication platform with a fact-checking component and a simple education model that explains trending science in a clear, concise manner that doesn't require a PhD to understand. The focus of the site is effective communication through curation of existing content and we hope to reach a wide range of people across the country and the world. My more intimate project is the brand-new non-profit, the Missoula Interdisciplinary Science League (MISL). MISL is working to promote the use and celebration of science and critical thinking in the Missoula community and encourage active engagement and interest in local science. Our community events are geared towards non-scientists and scientists alike and we aim to work with all disciplines of science, including the social sciences, and other science-oriented organizations in town to narrow the gap within our own community.

2:00 pm - Just Warfare, or Genocide?: Oliver Cromwell and the Siege of Drogheda.
Author: Lukas Dregne Mentor: John Eglin

Oliver Cromwell has always been a subject of fierce debate since his death on September 3, 1658. The most notorious stain blotting his reputation occurred during the conquest of Ireland by forces of the English Parliament under his command. This essay will concentrate on Cromwell and his New Model Army's siege at Drogheda, the most brutal of all the military confrontations which transpired during the settlement. From the time Cromwell's body was exhumed and mutilated in 1661, up unto the present day, the way in which he is remembered has changed significantly. While some position Cromwell as just one of many key actors in a wider drama, others assert that his savagery cannot be excused as just merely reflecting the bloody and unprincipled nature of war in that country. The siege of Drogheda provides a glimpse into the severity of that savagery. Cromwell undoubtedly killed thousands, and adversely impacted countless more, but it is not clear if his actions which occurred amid a time of war departed from or exceeded the accepted laws, practices, and norms of the day. Drogheda's siege,

which began in August 1649, was Cromwell's first major, and most infamous, action in Ireland. He was by this time the new lord lieutenant of Ireland and arrived between August 15-23, in a fleet of over 130 ships, bringing with him a large artillery train, a full treasury, and well- disciplined regiments. The invasion was a long-delayed response to the Irish revolt which occurred in Ulster in 1641, though the defenders and victims of Drogheda were not the Irish responsible for the attacks on English and Scottish settlers years earlier. It is the siege which remains with Oliver Cromwell to this day.

2:20 pm - Resilience through Equine Assisted Learning
Author: Alyssa Fusco Mentor: Erin Saldin

Professionals in equine assisted learning fields share their stories and personal narratives to highlight the importance of horses in reflection, growth, and resilience. As a field of therapy and teaching, it is an experience not enough people utilize. These stories capture emotional journeys to enlighten a broader community about the impact of the programs. Equine assisted learning falls into a unique category because the horses act as silent partners and reflections of our souls. In an open and safe environment, people can explore challenges, passions, and sensations with the horses because these animals acutely read the nonverbal cues we send them. Capturing stories of different equine assisted learning programs in Montana and Colorado help show a need for a stronger focus on well-being and mental health. These programs work with veterans, after school programs, people with learning disabilities and depression and people of all ages. They highlight the importance of meeting the individual where he or she are at in life. More equine assisted learning programs implemented in communities would provide people with better resources to pursue a more objective mindfulness, connection, and resilience.

2:40 pm - Defining an Agency: Animals, Fire and the USFS
Author: Ellen Ipsen Mentor: Jonathan Hall

Today, the United States Forest Service has established itself as an enduring authority on federal lands management. However, in 1905 when the federal government established the agency, its fate was far from secure. Prior to 1905, people living in the West had unchecked access to public land resources and many disapproved of an expansion of federal power. It was the issue of forest fire fighting that gained public support for the agency, and animals, in large part, helped them succeed. Horses and mules were used for transportation, scouting missions and trail building before adequate technology existed. Every ranger was required to own a horse and these animals provided uniformity and respectability to the rangers who were at times disrespected. Additionally, rangers sent carrier pigeons to quickly communicate the location of fires. These animals helped fight forest fires when success for the agency was crucial. As technology gradually proved these domesticated animals obsolete, animals were used in a new method. The Forest Service used the public's love of animals to gain lasting support for their agency and engage the public in preventing fires themselves, as evidenced by the use of Bambi and Smokey Bear. Throughout the first fifty years of the USFS, the role of animals shifted from an active fighting role to a prevention and educational strategy for the public. Using various American newspapers, periodicals and government documents, I demonstrate that animals played a key role in the USFS' efficiency, visibility, professionalization, and public engagement and increased respect for the agency in order to create a lasting reputable agency that we still have today.

4:00 pm - Lügenpresse: Media skepticism in contemporary Germany
Author: Ian Strahn Mentor: Henriette Lowisch

In what is sometimes referred to as the post-truth era, the performance of the news media in conveying accurate information is under increased scrutiny. Media skepticism is on the rise in many democratic countries, and in German-speaking regions, this phenomenon coalesces around the term Lügenpresse, meaning lying press. Coined more than a century ago, the term today is closely tied to the Syrian refugee crisis and a surge of right-wing populism. Through research based on a series of in-depth interviews conducted in Berlin, as well as a review of news articles and media criticism literature, I will examine how the term Lügenpresse, has been used in the past, and why its resurgence is significant in Germany today. A hermeneutic analysis of historical and contemporary sources will serve as a means to understand the attitudes that contribute to media skepticism.

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I will also evaluate the German news media's response to the criticism leveled at them by significant parts of the population. Ultimately, I hope to provide a more thorough understanding of the attitudes underpinning this dangerous trend and to provide potential solutions to alleviate media skepticism in Germany and abroad.

4:20 pm - Badass Beauties: the Culture of Rebellious Femininity
Author(s): Natalia Boise, Philippe Diaz Mentor: Liz Ametsbichler

This project is an explorative multi-media essay aimed at capturing diverse individual expressions of femininity. It was conceptualized out of frustration and also admiration. I saw many beautiful women I admire struggle with beauty norms and standards and the constraints of the modern conceptualization of femininity. Some of the universals of womanhood--menstruation, public hair, aging-- have come to be seen as entirely unfeminine, and many of the women around me were beginning to challenge that. These women's experiences, my own education, our discussions, and my personal struggles as a woman trying to establish my own identity in a world that often marginalizes women's voices, identities, and abilities inspired me to explore diverse conceptualizations of femininity. I wanted to let women's identities be seen and heard. I worked to capture these insecurities, confidences, struggles, and personal experiences with femininity through amateur photography, combined with the women's own words, artwork, and poetry, to reimagine the feminine. By creating a space for these identities to be celebrated, we challenge traditional notions of femininity and the stigmas around female sexuality, natural beauty, and individual and non-traditional expressions of femininity to be more inclusive of diverse, unique feminine identities. The project has developed through its own creative process as I have worked with these women. It has evolved as an expression of these women's personal experiences with their femininity independent of my artistic vision. It has become a way for women to explore their femininities for themselves, to empower them in their insecurities, and to celebrate their unique identities as women. Their stories are worth sharing, and my project has become

4:40 pm - Projections of a Better World: A Critical Reading of Elfquest's Original Quest
Author: William C. Riley, Mentor: Katie Kane Humanities

Beginning on the pages of Fantasy Quarterly in 1978, Elfquest, "is the longest-running, independent fantasy series, with more than 15 million comics, graphic novels, and other publications in print."[1] Beyond its long history, it also has the distinction of being the first fantasy comic created, written, and illustrated by a woman, an impressive feat considering the androcentric nature of both the comic book industry and its readership.
There is little in the way of critical scholarship on this series, despite its nearly four-decade history. This paper fills this glaring absence of academic treatment by investigating the many layers of queer metafictional content. In this specific sense, Elfquest's queerness develops from its creation, its treatment of the fantasy genre, and through the fictitious cult and lives of the titular elves. As an artifact, both as a collection of art and text, marks it as a production of a specific cultural time. As such, each of these queerings query the existing hegemonies through metafictional commentary. The aim of this paper, then, is to explore this commentary through a close reading of the text and visuals of the first story arc: "The Original Quest." [1] http://elfquest.com/eq/

UC 331 ~ Physical Sciences - 9:00 - 11:00 am

9:40 am - Analysis of Montana Snowpack Trends
Author: Benjamin Uhlenbruck Mentor: Nicky Phear

The annual storage of water in the form of snow is crucial to Montana's ecosystem and economy. Agriculture depends on the steady release of water during drier months, and many species rely on winter snowpack for protection. Studies by P.W. Mote (2003, 2005) have shown a declining snowpack in the Pacific Northwest due to increasing winter temperatures region wide. These studies are no longer up to date, and focus more regionally than Montana alone. The Natural Resource Conservation Service (NRCS) uses SNOTEL sites to monitor mountain snowpack in the western United States. The data from these sites is available on the NRCS website. I have analyzed these data from the 90 SNOTEL sites in Montana for changes in Snow Water Equivalent (SWE) and temperature, to analyze how climatic changes, particularly in the last 10 years, have effected Montana snowpack.

10:00 am - Using Satellite Altimetry to Measure Lake Volume Changes in the Western U.S.
Author: Raphael Hagen Mentor: Joel Harper

Monitoring changes in lake volumes globally in the Western U.S is essential for understanding the hydrologic response to climate change and for predicting the physical and ecological response to vanishing water resources. Unfortunately, the monitoring of lakes in many areas of the world is limited by local resources, so that fluctuations in volumes over time are poorly known. This makes managing water resources difficult. In this study, we test the viability of using space-based LIDAR altimetry data as a tool to measure changes in lake elevation which is then used to calculate changes in volume over time. The study concentrates on the Western U.S., where there are relatively long records of lake levels to test the methodology. By coupling LIDAR elevation measurements from the ICESat satellite with bathymetry curves, lake volumes can be calculated. To test the robustness of ICESat elevation measurements over water, we used two hydrologically distinct test lakes (Lake Tahoe and Great Salt Lake) which have in-situ daily elevation measurements from USGS gauging stations. Once this proof of concept was confirmed and the associated uncertainty determined, we applied this method to Lake Abert, Pyramid Lake and Walker Lake. This study affirms that using ICESat LIDAR altimetry data is a viable option to estimate the volumes unmonitored lakes. As more satellite altimetry missions come online, long term space-based monitoring of lakes will become increasingly feasible, which will help improve our understanding of global water resources in a rapidly changing climate.

10:20 am - Detecting Regional Groundwater Discharge to the Clark Fork River
Author: Melinda Horne Mentor: W. Payton Gardner

This study applied the use of environmental tracers to constrain the quantity of groundwater discharge along a 22 km reach of the Clark Fork River as it runs through Missoula, MT. The primary environmental tracer used was Radon-222 (222Rn), a radioactive isotope in the uranium decay series that is absorbed by water from subsurface media, and is thus a sensitive indicator of groundwater discharge. Dissolved 222Rn samples were taken at 2 km intervals along a reach extending from confluence of the Clark Fork and the Blackfoot River near Bonner, MT, and extending across the Missoula Valley to the confluence with the Bitterroot River. Groundwater samples were also taken from wells near Rattlesnake Creek, which represent 222Rn baseline concentrations in the Missoula aquifer. The results were compared to data in the literature from previous studies. All samples were analyzed for dissolved radon concentration using a spectral alpha-decay detector. Observed 222Rn concentrations in the stream and groundwater were then used to quantify the groundwater discharge using a stream transport model which includes groundwater discharge. 222Rn concentration was observed to increase to 553 mBq/L just downstream of the confluence of the Blackfoot and Clark Fork, drop below detection limits through most of the Missoula Valley, and rise to 995 mBq/L at Kelly Island just before the confluence with the Bitterroot. Estimated discharge values ranged from 10 m3/day/m near the Blackfoot to 40 m3/day/m around the Bitterroot. Groundwater discharge from unconfined aquifers to adjacent streams is an important factor in watershed resiliency to climate change and can vary dramatically along the river due to unseen changes in subsurface properties. Our results provide spatially distributed estimated of the contribution of groundwater to base-flow conditions of the Clark Fork River as it passes through the Missoula Valley.

10:40 am - Raspberry Pi Controlled Greenhouse
Author: Zane Zanzig Mentor: Steve Shen

Being born and raised in Missoula I have always enjoyed the outdoors. From a very young age I was taught how to care for plants. This project will help people be able to grow plants even if they do not have a green thumb. I decided to mix my love of plants with my knowledge of electronics. For my research project I am making a computer automated greenhouse using a raspberry pi and a few different sensors and actuators. The project is to have a raspberry pi monitor and control temperature, humidity, and soil moisture levels. I believe there is a lot of potential for this device. It will help the people that want to have a garden, but still want a week vacation in the middle of summer. This project might even help the idea of growing plants on other planets besides ours. I think this experiment will speed up the research of plant physiology. We could do more experiments on what factors

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contribute to the alkaloid production of plant. This project is still a work in progress, but I will have a small exhibit to show how my control system will work. This project will be relatively inexpensive. The equipment for this experiment cost roughly $200.00. I hope this project will innovate how we produce our crops in the future.

UMCUR Frank GLI Presenter Abstracts:
(in order of Presentation Time)

10:20 am - Health Safety Abroad: The University of Montana Zika Awareness Program (ZAP UM)
Presenters: Janette Chacón, Caleb Chestnut, Madison Quammen, Kierney Ross Mentor: Gilbert Quintero

Massive technological advances have made it easier than ever to connect with opportunities abroad and study in countries outside of the United States. An increase in students studying abroad has obliged institutions to provide increasing preparation and protection for those leaving the country. In several regions, vector-borne diseases are of chief concern. The Zika virus is a mosquito-borne disease that had a particularly devastating impact during the summer of 2016. Implications of a Zika infection can include: flu-like symptoms, joint and muscle aches, rashes, and, more seriously, a birth defect called microcephaly and an autoimmune disorder known as Guillain-Barre Syndrome. The Zika Awareness Program at University of Montana (ZAP UM) is assisting UM students who are traveling abroad to regions where the Centers for Disease Control and Prevention has implemented a Zika-related travel warning. Fifty students from the University of Montana traveled to these countries during the 2015-2016 academic year, all of which were in Latin America. Consequently, ZAP UM will focus on this part of the world. ZAP UM will prevent contraction of Zika for students traveling in these countries, which will subsequently protect the rest of the community once the students return to the U.S. We will start this cycle of protection and education through the distribution of "ZapPaks" and helpful brochures. The most effective way to prevent the spread of disease is through education, so informational brochures will be provided to students in the ZapPaks. These brochures will describe the harms of Zika as well as practical prevention strategies that can be carried out with the use of ZapPak supplies. Along with the informational brochure, each ZapPak will contain a bed net, bug spray for both clothes and skin, water treatment tablets, and condoms. ZAP UM will distribute these packs in collaboration with Curry Health Center during the 2017-2018 academic year.

10:40 am -Bridging the Gap: Producing a play with the Congolese Refugees of Missoula
Presenters: Rachel Dickson, Sophie Hainline, Elizabeth Koenig,Couso Morpheus, Kathleen Stone, Taylor Wyllie Mentor: Tobin Miller Shearer

In today's global culture amid the increasingly contentious debate about immigration, the topic of refugees is particularly relevant. Through our research, we came to understand the refugee experience and xenophobic responses to it. Our main takeaway was that storytelling is one of the most effective means to create understanding between refugees and host communities. Our project will examine the refugee experience in the context of xenophobia and increase understanding via storytelling. Successful examples of storytelling have taken place through art shows, plays, and public school education. Our group aims to help Missoula's Congolese families put on a play about their experience. While the families wrote the play and will star in it, our group will be in charge of logistics, marketing, fundraising and communications. This play will show Missoula, as well as Montana's larger community, what the refugees experienced before coming to Missoula. Scenes from the play include living in a refugee camp, dealing with death and disease, encountering strict law enforcement at every step, and passing through a series of interrogations before coming to Missoula. We hope this play will bring mutual understanding to Missoulians and Montanans. We hope to have politicians in the audience, so if they find an increased understanding they can enact policy that will help refugees globally.

11:00 am - Improving landowner access to effective invasive weed management methods
Presenters: Brittan Austin, Kenley Crisp, Mariah McIntosh, Mackenzie Prichard, Maize Smith Mentor: Rob Smith

Invasive plants threaten native biodiversity, degrade range and agricultural land, and have the potential to cost billions of dollars annually. Despite plentiful scientific information and resources on this topic, landowners and managers often fail to manage weeds effectively. Successful weed management requires proactive and effective action relevant to particular weed species and environmental conditions, and persistence over time. We have created an easy-to-use web tool designed specifically for private landowners that integrates environmental conditions input by users (including, but not limited to, weed species and coverage, and desired management outcome) and current scientific information in order to recommend best practices for custom weed management. The goal of our tool is to facilitate successful management actions by connecting motivated landowners to the appropriate and most effective methods and resources. We plan to promote the use of this tool among landowners in and around the Missoula Valley in order to ensure that the resources available to control and prevent weed infestations are accessible to those who need them.

11:20 am - Managing Stress Through Mindfulness
Presenters: Natalia Boise, Alyssa Fusco, Amelia Liberatore, Christopher Morucci, Chelsea Reichard, Zhibing Zhou Mentor: Abhishek Chatterjee

The University of Montana consists of a large campus community of students who experience many different stressors. The limited avenues for stress outlet resources available on and off campus often cause these stresses to build up for students. Research has shown that unremitted stress leads to increased levels of illness, cuts years off people's lives, and decreases happiness. Resources to relieve stress should be a priority on every campus because students who are left untreated are more likely to drop out of college or become a danger to themselves or others. The support at UM for stress reduction should include readily available resources for on-campus students, exchange students, satellite students, and those students studying abroad. The framework of mindfulness practices encompasses a more universal approach than other stress management techniques with a large variety of options for a diverse population. Mindfulness, a moment to moment awareness process, can be anything a person wants to be to suit his or her needs. A mindfulness-based stress reduction program will be introduced on campus through the utilization of a multi-modal intervention approach. Thus, to reach a large population, mindfulness practices will be led by residence assistants for incoming freshman and international students getting used to a new community; a Moodle shell with mindfulness curriculum and resources will be made available online for all students and faculty; the UM student group Mindfulness Matters will be available on campus for students seeking additional time to practice mindfulness; Curry Health Center will offer more services with the help of professionals; and to involve the community, there will be a summer camp available through SoftLanding Missoula for refugee children. Mindfulness practices are beneficial in managing stress and when students are better equipped to manage stress they have better wellbeing and mental health.

11:40 am - Fostering Global Citizens: Using Technology to Improve Intercultural Competence Among Students
Presenters: Megan Allen, Tessa Feemster, Megan Giddings, Annalea Kamplain, Nicole Musci, Max Smithgall, Hanna Ziegler Mentor: Johan Eriksson

The UMontana app is one of the current marketing strategies that the University of Montana is using to make information more easily accessible to students. Our team designed a tile for the UMontana app that would provide specific local information about UM's twenty-one partner universities. This information will be used to help UM and international students better prepare for their study abroad experiences at these host universities. Our research shows that students studying abroad struggle to gain intercultural competence during their experience because of factors like culture shock, language barriers, or sociocultural differences. The goal of this project is to increase the intercultural competence of UM students and international students coming to study at UM so that students can spend less time adjusting to their host university, and more time enjoying their study abroad expe-

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rience and becoming competent global citizens. This app tile will answer practical questions like Where can I find feminine hygiene products? and What is the best bank to use in my host city? but also culturally specific questions like What are some important social customs? and What are the attitudes towards gender identity? The app is populated with survey information gathered from students that have already completed their study abroad experiences, but the page is now self-sustaining with a social media platform embedded in the tile. As students complete their experiences abroad, they can add their input into the tile, filling in the gaps from another student's answers, and even posting pictures of their trip. Eventually, the project will expand to encompass more than the partner universities. With the help of the Global Engagement and Information Technology offices, this project became a reality.

Franke GLI Sessions Continued - 1:40 pm - 3:00 pm

1:40 pm - Climate Change: Our Adaptive Future in the Columbia and Mekong River Basins
Presenters: Thiago Cardoso, Brandon Lowry, Lauren Swett, Hannah Tibke, Cassidy White, Alex Braun
Mentor: Sara Rinfret

From the semi-arid cities and ranches of western Montana to the tropical villages and rice farms of southern Vietnam, the threat of climate change is imminent. Temperatures are rising, precipitation patterns are changing, and the resulting effects on the world's river systems are both drastic and unprecedented. Rivers are the arteries of the nations, sending water, the most basic building block for life, flowing across continents and providing for nature and society alike. Food, habitat, recreation, transportation, economics, and more all stem from the liquid resource rivers supply. Every environment has evolved around the ebb and flow of water resources and entire civilizations have been constructed in sync with the pulse of a river.

Here in Missoula, we know all too well the role a river plays in a city's culture and a mountain's calm. As the Clark Fork River winds through our valley and enters the greater Columbia River Basin, it fills the pockets, bellies, and weekends of many. Climate change, however, poses a threat to both the human and ecological components of rivers worldwide, including the Clark Fork. To better understand the dangers of climate change and its impacts on river systems, our paper uses the Columbia River Basin in the U.S. and Canada and the Mekong River Basin in Indochina as case studies. Both are large, transboundary rivers with mountainous headwaters and a complex cultural, ecological, and economic interconnectedness. In our attempt to discover the influence of a changing climate on the policy, livelihoods, and environments in transboundary river basins, we will conduct interviews in each region and analyze answers to determine commonalities.

Findings will be made accessible via an online story map and will be discussed amongst stakeholders in the Liberal Arts Building's high tech classroom.

2:00 pm - Raising Cultural Awareness in Undergraduate Students through an Online Pen Pal Program
Presenters: Rehana Asmi, Lindsey Buck, Madison Hinrichs, Mackenzie Lombardi, Anna Reid, Kayla Robertson, Jenny-Lin Smith Mentor: Cassandra Hemphill

With society becoming increasingly global, it is more imperative than ever that students develop cultural awareness and cross-cultural communication skills. However, studies have found a lack of cultural communication in the United States (Matthews & Thakkar, 2012), especially within states such as Montana, which has a population that is 89 percent Caucasian, where students' opportunities to develop these abilities are much more limited. This research project focused on the creation of an international pen pal program to assess whether letter exchanges between individuals from different cultural backgrounds could increase cultural awareness and cross-cultural communication skills in college students. Participants for this study were randomly assigned into an experimental group and a control group using wait-list control group methodology. Both groups completed an online pre-test, with the students in the experimental group going on to complete a three-week correspondence with an international student through an online Moodle platform. After three weeks both the control and experimental

groups completed a post-test, which evaluated whether the program had any effect on students' cultural awareness. In order to allow both groups an opportunity to participate in the program, after the post-test was completed the initial control group then completed their own three-week correspondence with international students. Results of the pre-test and post-test will be analyzed and shared with the course instructor. If the intervention is effective, the instructor will consider incorporating the assignment into the course curriculum.

2:20 pm - A Place to Call Home: Experiencing the refugee struggle through simulation
Presenters: Mckennah Andrews, Emily Eaton, Erika Hidem, Kurt Secrest, Jessie Seiler, Ian Strahn
Mentor: Stephen Yoshimura

Unprecedented in history, there are more refugees today than ever before, impacting countries around the globe. The purpose of this project is to create awareness and educate the general public about refugee experiences of resettlement. Through an interactive, walkthrough simulation, participants will be taught about the graphical, political, educational, interpersonal and bureaucratic hurdles faced by refugees seeking to resettle far from a hostile home. The simulation is composed of three stages that each represent a transition within the resettlement process: transportation, camp life, and the interview/vetting stage. To gauge the effectiveness of this campaign, our team will conduct survey-based research on participants' attitudes towards refugees before and after the simulation through a number of statistically significant research questions.

This project seeks to develop empathy for refugees within a population through a basis of mutual understanding and, albeit simulated, experience. Additionally, the project aims to counteract negative attitudes held throughout communities by administering information about refugee resettlement processes. As a consequence, our project will provide attendees from teenagers to adults with new and accurate information about a process that they may not fully comprehend. Ultimately, this interactive simulation will strive toward building strong, welcoming communities by emphasizing that every person deserves to have a place to call home.

2:40 pm - Combating Global Sex Trafficking: Addressing its Humanitarian Impact
Presenters: Sara Stockett, Nasrin Chaudhry, Anastacia Crowe, Claire Michelson, Megan Perry, Olivia Schuler
Mentor: Ramona Grey

This research project intends to make an impact on what the FBI has deemed the "third-largest criminal enterprise in the world"—human sex trafficking. Alarmed by the prevalence of these crimes in just Montana, our group was inspired to dig deeper into the causes of sex trafficking and its most vulnerable victims.

By researching current legislation, meeting with local stakeholders, and contacting and partnering with several NGOs, we have found that many of the laws necessary to protect these victims are already in place. This research project, therefore, focuses on finding and addressing the largest gaps and needs of already established resources for these victims locally and internationally.

Our research suggests that the greatest issues lie not in legislation but rather in the lack of enforcement of anti-trafficking laws. Important sublayers of our research uncovered the history of sex trafficking, which impacts cultural beliefs/stigmas that have led to corruption. This conclusion led our group to arrive at two different plans to impact sex trafficking in Montana and abroad, specifically Cambodia and India. First, we aim to educate Missoula's public through the arts. To achieve this, we are working with members of the University of Montana's theater department and other volunteers to give light to the complexities of sex trafficking through acting and storytelling. Second, we intend to make existing resources more accessible to these victims. By speaking with stakeholders like attorneys and law enforcement, we will identify the most prevalent nationalities of victims and create posters and cards with appropriate translations for established resources. To ensure the accessibility of these materials, we will partner with the Department of Justice or an NGO. Our ultimate hope is to have a tangible impact, both in Montana and globally, for the fight against modern slavery.

UMCUR Poster Presenter Abstracts:
(in order of Poster Number & Category)

Health & Human Sciences Poster Session #1 - 11:00 - Noon

Poster #1 - Psychosocial Improvements for Stroke Survivors following an Intensive Comprehensive Aphasia Program
Author(s): Jackie Cassidy, Sheila Murphy Mentor: Catherine Off

Intensive comprehensive aphasia programs (ICAPs) are community rehabilitation programs designed to improve the speech, language, cognition, and psychosocial well-being of stroke survivors and their caregivers. In contrast to standard care, ICAPs provide up to six hours of treatment per day for up to five consecutive weeks. This intensive treatment provides up to 120 hours of therapy in half the amount of time that is reported in standard care. The ICAP treatment model is new, with approximately 12-15 ICAPS existing worldwide. The literature base for this innovative delivery model is just beginning to emerge.
The objective of this study is to assess psychosocial outcomes for stroke survivors participating in the University of Montana's ICAP (UM ICAP). Based upon preliminary results and the ICAP literature, we expect improvements in the psychosocial well-being (e.g., communicative participation, depression) of our patients.
This study evaluated four cohorts of patients with aphasia who participated in UM ICAPs. Quantitative behavioral outcome measures will be reported for patients from fall 2014-summer 2016 (n=27).
The UM ICAP includes 4-5 weeks of individual and group speech-language therapy sessions, weekly support group and educational meetings, recreational outings, home programming, and technological training to support communication. Data will be analyzed from the following psychosocial outcome measures: Geriatric Depression Scale (GDS), Assessment of Living with Aphasia (ALA), and the Communicative Effectiveness Index (CETI). Preliminary analysis indicates that patients demonstrate reduced depression (per GDS) and increased communicative participation (per ALA, CETI). Analysis is currently in progress.
This study is multifaceted, investigating the impact of two domains of psychosocial well-being in patients with aphasia. The clinical implications of this study are significant. The efficacy demonstrated using these measures of psychosocial well-being suggests that this service delivery model (ICAP) can provide consistent and positive outcomes spanning impairment and participation domains in a relatively low-cost setting.

Poster #3 - Transactional Communication Between Caregivers and Stroke Survivors
Author(s): Katie Priest, Haley McMahon Mentor: Catherine Off

Communication breakdowns between a person with aphasia (PWA) and their caregiver can have significant negative influences on their daily lives. Transactional communication, broadly defined as an exchange of messages or language between a sender and a receiver, is often impaired during conversations between caregivers and a PWA. Research indicates that improving transactional communication between the PWA and caregiver can also improve impaired communication as well as the psychosocial well-being between the PWA and caregiver.
The purpose of this project is to analyze previously collected transactional communication samples obtained from prompted conversations between PWAs and caregivers who participated in an innovative stroke rehabilitation program called an intensive comprehensive aphasia program (ICAP) designed to improve the speech, language, cognition, and psychosocial well-being of PWA. The ICAP service delivery model provides up to 120 hours of therapy in half the amount of time that is reported in standard care. The ICAP treatment model is new, with approximately 12-15 ICAPS existing worldwide, one of which was developed at the University of Montana. Eight PWA-caregiver dyads participated in transactional communication samples before and after an ICAP during the summer of 2016. These 16 video-recorded samples will be transcribed, coded for positive and negative communication behaviors, and analyzed using qualitative methodology to evaluate the efficacy of this ICAP and its effects on transactional communication between PWAs and caregivers. Samples are currently being transcribed and coded and preliminary qualitative data will be reported for approximately 3-5 participating dyads. Increased education and

communicative training for caregivers and PWAs leads to increased communicative success, a better overall understanding of aphasia, and increased confidence in communication. This ICAP has the potential to decrease stress seen in these interactions and thus increase confidence and psychosocial well-being in PWAs and caregivers.

Poster #5 - Developing a cognitive training group for students and veterans with mild traumatic brain injury
Author: Leia Chapman Mentor: Catherine Off

Patients who sustain a traumatic brain injury (TBI) experience chronic impairments of attention that can be devastating to participating in their daily lives. With 5.3 million Americans suffering from long-term effects of their injury, cognitive-communication therapy and rehabilitation following a TBI is vital for successful daily functioning in educational, vocational, and recreational contexts. Sustained attention is the ability to concentrate on a task for an extended period of time without being distracted. Sustained attention is required for many daily tasks, such as: participating in conversations, focusing during school, concentrating while driving, or reading a book. Sustained attention is commonly supported in therapy by training and implementing the use of compensatory strategies. Compensatory strategies include assistive technology, mnemonics, environmental placement (e.g., sitting at the front of class, moving away from distractions), prioritized check-lists, and external reminders (e.g., phone reminders, planners, notes).
This project will examine an innovative community-based group treatment service delivery model developed to provide academic and vocational support for individuals with mild traumatic brain injury. This program included a 1.5 hour group session that met weekly for five consecutive weeks and was lead by a graduate student clinician and supervised by a licensed speech-language pathologist. Each weekly group session focused on a different module as follows: (1) eliminating external distractions, (2) interpersonal communication, (3) assistive technology, (4) memory and planning, and (5) advocating for themselves. A qualitative reflection of this program will be reported. Preliminary evaluation of this program focus on the graduate student and supervisor reflections, and an assessment of the content delivered in the weekly modules. These initial impressions will provide proof of concept for future educational groups and efficacy studies.

Poster #7 - Caregiver Education in the Context of Stroke Rehabilitation
Author: Maria Carkeek Mentor: Catherine Off

Aphasia is a language disorder that impacts speaking, listening, reading, and writing, caused by damage to the language centers of the brain. Caregivers of persons with aphasia suffer from psychosocial issues (e.g., sadness, depression, anger, confusion, loneliness, guilt, stress, anxiety, and isolation). Caregivers also experience financial burdens, physical, and lifestyle changes. To improve psychosocial well-being and quality of life, caregivers need education, counseling, support of family members and other caregivers during this unexpected life change. Holistic stroke rehabilitation programs such as intensive comprehensive aphasia programs (ICAPs) are beginning to include aspects of caregiver education and counseling. The purpose of this project is to investigate the impact that a weekly caregiver education group has on caregiver well-being and quality of life.
Caregivers (n=8) participated in a one-hour weekly education group during the four-week summer 2016 ICAP at the University of Montana. The weekly caregiver education groups included the following four modules: (1) introductions and goal setting; (2) aphasia and neuroplasticity; (3) communication strategies for communicating with PWA; and (4) evidence-based resources, caregiver rights, and involving and educating family. Weekly probes assessed caregivers' progress during the education group. Each Likert-scale probe consisted of 10 questions that caregivers answered using a rating scale as follows: 1-not useful at all, 2-somewhat useful, 3-moderately useful, 4-mostly useful, and 5-very useful. Caregivers were also given the opportunity to comment freely about ideas and feedback pertaining to the education group. These weekly probes will be quantitavely and qualitatively analyzed to determine the importance of the caregiver education group that occurred during the summer 2016 ICAP. Preliminary data suggests that education groups are beneficial to caregivers of persons with aphasia. Data from this study will be used to further develop caregiver education components of the UM ICAP.

Continued

Poster #9 - Contrasting Two Prophylactic-Dysphagia Interventions for Patients with Head and Neck Cancer Treated with Radiotherapy with or without Adjunctive Chemotherapy
Author: Maira Ambris Mentor: Laurie Slovarp

Patients with head and neck cancer (HNC) have a high risk of developing dysphagia resulting from chemoradiation (CRT) or radiation-therapy (RT) treatment. Dysphagia reduces the quality of life (QOL) of these patients through psychosocial factors, reduction of effective swallowing, damage to the swallowing mechanism, and swallowing pain. The purpose of this investigation is to examine the effectiveness of two types of prophylactic swallowing exercises (PSE) in preventing dysphagia in patients with HNC who are receiving RT/CRT to reduce negative effects.
18 patients were selected based on the requirements of having a diagnosis of stage III or IV squamous cell carcinoma in the head or neck treated with RT, and no previous radiation treatment for head and neck cancer. Patients were at least 18 years old and capable to make medical decisions under cognitive, mental, and legal circumstances.
Patients participated in an initial swallow assessment with either Modified Barium Swallow (MBS) or Fiberoptic Endoscopic Evaluation of Swallowing (FEES). Patients who met the criteria were randomly assigned to either a combination of indirect and direct swallowing exercises group (C-PSE) or indirect swallowing group (ID-PSE). The C-PSE group was prescribed the Mendelsohn Maneuver, Effortful Swallow, Masako, and Shaker exercises to be completed three times per day during RT/CRT. The ID-PSE group was prescribed a tongue-based retraction exercise, lingual range of motion (ROM), jaw ROM, Shaker exercise, and pharyngeal squeeze, three times per day during RT/CRT. At data collection intervals, swallowing function and QOL related to swallowing were measured with a nutrition and pain questionnaire, the FOIS, EAT-20, and MDADI questionnaires.
Results indicate patients with HNC participating in PSE show significant improvement over patients who do not receive prophylactic swallowing treatment. Both PSE groups demonstrate similar findings to those of similar studies, providing support of PSE interventions for patients in this population.

Poster #11 - Investigating the interaction of DLC-1 and GLD-1 in regulation of gene expression.
Author: Emily Osterli Mentor: Ekaterina Voronina

The regulation of RNA-binding protein (RBP) activity in cells is a central question in gene expression studies. One important RBP is GLD-1; this particular protein prompts the germ cell switch from mitotic proliferation to differentiation thus acting as a tumor suppressor. Previous research in our lab identified a small protein, DLC-1, as a cofactor of an RBP FBF-2. We hypothesized that DLC-1 may also promote the RNA regulatory function of GLD-1 because DLC-1 interacts with many cellular proteins. Caenorhabditis elegans (C. elegans) is the model organism that we use to investigate this interaction because many of the proteins present in C. elegans are also present in humans. This protein conservation allows us to utilize the benefits of studying C. elegans, such as cost efficiency and quick results, while being able to maintain human relevance. We tested our hypothesis on several strains of C. elegans that express fluorescent reporter proteins under control of GLD-1. These reporters are normally repressed by GLD-1 during differentiation. When we knockdown DLC-1 we can see how it affects the reporter's repression. Fluorescence microscopy revealed that the genetic knockdown of DLC-1 resulted in derepression of a subset of the reporters during differentiation. Our hypothesis that DLC-1 promotes GLD-1 functions is supported by the derepression of the reporters when DLC-1 is knocked down because loss of DLC-1 results in loss of GLD-1 function. Identifying this relationship between DLC-1 and GLD-1 is important for understanding stem cell balance. When the stem cell balance between mitotic proliferation and differentiation is altered, it can result in serious consequences such as unchecked cell proliferation, tumor formations, infertility, and cancer. Understanding the mechanism(s) by which DLC-1 promotes GLD-1 would be extremely relevant to advancing our understanding of certain human diseases like cancer.

Poster #13 - Patient-Reported Variables Associated with the Success of Behavioral Intervention for Patients with Chronic Cough
Author(s): Emma Bozarth, Sarah Popp, Maira Ambris Mentor: Laurie Slovarp

Chronic cough is a common condition that persists for more than eight weeks and accounts for millions of visits to physicians each year. Approximately 10-20% of patients with chronic cough do not respond to medical treatment. These patients, said to have refractory chronic cough (RCC), often respond to behavioral cough suppression therapy (BCST), provided by a speech-language pathologist (SLP). The purpose of this study was to determine if common factors exist that distinguish patients with RCC, who benefit from BCST from those who don't benefit from BCST. The long-term goal of this research is to create a screening tool that physicians can use to identify candidates for BCST.
Forty three adults referred for BCST completed an enrollment survey at the beginning of therapy. The survey consisted of 52-items pertaining to cough onset factors, cough symptoms, and personality traits. Participants also completed the Leicester Cough Questionnaire (LCQ), a validated measurement for assessing cough-related quality of life. A follow- up survey with similar questions regarding their cough status and changes in treatment was administered 3-4 weeks after beginning BCST. Thirty participants were satisfied following BCST (BCST-S); 13 were not satisfied (BCST-NS). There were significant differences between the two groups on: cough productivity, tight-throat feeling, symptoms of reflux, and stress as a cough trigger. Additionally patients in the BCST-S group described themselves as significantly more anxious and stressed than the patients in the BCST-NS group. The LCQ confirmed a significant improvement in the BCST-S group, but not the BCST-NS group.
The study indicates potential to create a valid screening tool that would assist with the identification of candidates for BCST. Such a tool could save considerable time and money for patients with RCC.

Poster #15 - Protecting Players While Protecting the Integrity of the Game in Youth Soccer
Author: Aspen Peifer Mentor: Thomas Rau

Youth sports have been under severe scrutiny lately for the neurological damage coming to light after years of repeated head impact players endure. US Soccer has created somewhat controversial concussion regulations and protocols in the last couple of years to combat this criticism- such as not allowing players under the age of eleven to head the ball. Many coaches, however, believe these regulations could impair the game of soccer and the abilities of the players themselves. As a human biological sciences major as well as having played soccer the last seventeen years, my project is centered around coalescing current research on the dangers of heading in youth soccer with various coaches' opinions of how certain regulations can endanger the integrity of a game 2.65 billion people take part in worldwide. I have created an editorial piece that examines the coaches' perspectives on how to better maintain the beauty of the game while creating a safe playing environment. To carry out this project I interviewed coaches of all playing levels ranging from coaching players five years of age to the professional level. I then asked scholars with diverse medical backgrounds their opinions on the new Return to Play Protocol. Using these sources as well as the most current research I hope to discover how to best combat the neurological impact soccer can have on current and future players. I have created an article that is easy to understand for people of all educational backgrounds to educate parents, coaches and players while also stimulating dialogue on the issue and possible solutions. This research can be used for further insight into how to integrate science into the beautiful game of soccer and create a safe, educated, and fun playing environment for all to enjoy.

Poster #17 - Vocabulary and Morphological Awareness Development in Kindergarten Children
Author(s): Maya Anger, Kelcie Cassidy, Morgan Williams, Cheska Deitsch, Sarah Moen Mentor: Julie Wolter

Purpose. The purpose of this small feasibility study is to provide data to inform the use of a experimenter-developed task, the Morphological Awareness Semantics Task to examine the vocabulary concepturalizations in kindergarten children's development of morphological (word meaning) in a child-friendly paradigm. Significance. Morphological awareness refers to the smallest linguistic unit of meaning where base words and affixes come together to form new meaning (teach to teacher has a new meaning).

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There is now good evidence that children rely on morphemes when developing vocabulary and reading (Carlisle & Stone, 2005; Deacon, Whalen, & Kirby, 2011; Wolter, Wood, D'Zatko, 2009). Children's conceptualizations of morphological representations have rarely been tested which is the aim of the current study. Methods. Kindergarten children listened to sentences that contained word pairs varying in their meaning relatedness and were asked to judge its silliness on a simple rating scale. For example, students were asked to determine whether sentences are "silly" or "make sense" by pointing along a scale of colored smiley faces - given sentences like "If you sing, then you are a singer." (makes sense); and "You use spin to make spinach." (silly).Word pairs in the sentences varied in their vocabulary relatedness on a continuum from highly related in morphology and meaning(e.g., bold-boldly), moderately related in morphology and meaning (e.g., late-lately) low related in morphology and meaning (e.g., hard-hardly), related in form or letters only (spin-spinach), and related in semantics or meaning only (e.g. bake-cook). Results. Researchers are currently examining children's responses to sentences based on the level of vocabulary relatedness. In addition, an examininations of feasbility, reliability, and sensitivity of the MAST is to be conducted to determine how well this task captured variations in morphological processing in kindergarten children. These results will be discussed and associated clinical implications will be presented.

Poster #19 - Metalinguistic Language Development and Literacy Success in Children with and without Language Impairment

Author(s): Kelcie Cassidy, Maya Anger, Morgan Williams, Cheska Deitsch, Sarah Moen, Mentor: Julie Wolter

Purpose. This study explores how the development of meaning (morphology), spelling patterns (orthography), and sound patterns (phonology) are related to literacy success in young elementary school children with and without language impairment. Significance. Young school-age children with language impairment (LI) are at risk for experiencing a literacy deficit (Catts, Adlof, Hogan & Weismer, 2005). The basic foundational language skills required to read and write are also those required to understand and produce spoken language. Phonological awareness is one language skill that is highly predictive of literacy success (Catts, Fey, Zhang, & Tomblin, 2001), however, it is not the only skill that affects reading and writing development. Recently, the language abilities of orthographic knowledge and morphological awareness were found related to literacy success in children with and without LI (e.g., Wolter & Apel, 2010; Wolter, Wood, & D'zatko, 2009). Orthographic knowledge refers to the ability to actively store and access complete letter patterns/representations of written words in memory. Morphological awareness can be defined as the conscious awareness of the meaningful units of words (e.g., base word / suffix). Thus, this research sought to determine whether these skills uniquely influence reading and spelling abilities in elementary children with and without LI and whether differences exist between these groups of children. Methodology. Children in kindergarten and 1st-grade with and without LI completed measures of phonological, morphological, and orthographic awareness as well as a battery of reading and writing tests. Statistical analyses revealed the children with LI performed significantly different than those with typical language on orthographic knowledge or morphological awareness measures. In addition, phonological awareness, orthographic knowledge, and morphological awareness appeared to be related to reading and spelling in both groups of children. Future research and clinical implications will be discussed.

Poster #21 - Linguistically Based Spelling Analysis and its Relation to Early School-Age Language and Literacy Success

Author(s): Morgan Williams, Cheska Deitsch, Sarah Moen, Maya Anger, Kelcie Cassidy Mentor: Julie Wolter

Purpose. The purpose of this study was to 1) examine the sensitivity of a linguistically based spelling analysis compared to an all-or-none traditional scoring system when determining spelling ability, and 2) determine how these scoring systems relate to young school-age children's language and reading success. Significance. Spelling is a language and linguistically-based skill (Apel & Masterson, 2001; Bear, Invernizzi, Templeton, & Johnston, 2004; Ehri, 2000; Henderson, 1990; Moats, 2009; Treiman, Cassar, & Zukowski, 1994). The awareness of sounds in words (phonological awareness), knowledge of the spelling patterns in words (orthographic knowledge), understanding of relationships among base words and their inflectional and derivational forms (morphological awareness), all influence not only spelling acquisition but also vocabulary, reading decoding, reading

comprehension, and writing development (Berninger, Abbott, Abbott, Graham, & Richards, 2002; Bourassa & Treiman, 2001; Graham & Harris, 2005). Thus assessment practices that consider all linguistic foundational areas may be more sensitive to overall literacy abilities. Methods. First grade children completed an age-level dictated spelling test and a battery of language and literacy measures. Spelling results were scored according to a linguistically based method (Wolter, 2015) and a traditional all-or-none didactic scoring system. These task results were then examined for sensitivity, range of performance, and correlated to language and literacy performance. It is hypothesized that the linguistic analysis will be more sensitive to children's range of developing performance and thus be more closely related to and indicative of language and literacy success. Results, future research directions and clinical implications will be discussed.

Poster #23 - Respiratory Function Within a Novel Dystrophic Mice Model
Author(s): Ronald Gallegos, Tiffany Quindry, Josh Selsby Mentor: John Quindry

Purpose: Duchene Muscular Dystrophy (DMD) is a genetic disease resulting in progressive heart and skeletal muscle degeneration. The disease is characterized by inadequate dystrophin content in muscle cells. With no known cure, it's essential to discover a medical intervention for DMD pathology. This research group explored variations of a nutritional based therapy as a potential treatment to DMD pathology, including respiratory dysfunction. Early results suggest that dietary quercetin supplementation may improve respiratory function but strategies for maximizing quercetin efficacy are needed. In this investigation respiratory function was examined following a new dietary approach of nicotinamide riboside(NR)+quercetin(Q).
Methods: The University of Montana Institutional Animal Care and Use Committee approved animal use. Respiratory function was examined in a novel strain of dystrophin deficient (D2) mice and control mice (D2J) using a buxco whole body plethysmography device. Mice received a 12-minute Buxco chamber acclimation period followed by 8-minutes of respiratory data collection. Experimental conditions included control, Q, NR, and Q+NR enrichment. Baseline measurement at 4-months were compared to 6-months of age - following 2 months of treatment. Variables assessed were: respiratory rate, tidal volume, minute ventilation, inspiratory time, expiratory time, and relaxation time(Tr) between breaths. ANOVA with repeated measures were performed to determine mouse strain, time, and treatment relationships. Significant difference between variables was set at $p = \leq 0.05$, a priori.
Results: Data analyses presented significant time-dependent differences for all variables, indicating age-dependent changes in respiratory function. Analyses of relaxation time reveal a significant strain difference in relaxation time, with D2 dystrophic mice having longer mean Tr times($p=0.000$). No other significant differences were observed in either strain or treatment groups over the 6-month mark.
Conclusion: In conclusion, other than dystrophic mice having longer mean Tr times, all mice exhibit similar age-dependent changes in respiratory function with no other strain or treatment relationships present.

Life Sciences Poster Session #1 - 11:00 - Noon

Poster #30 - Fuel Utilization in Response to Two Commercially Available Beverages During Exercise in the Heat
Author(s): Keagan Shillington, Manuel Montero, Michael Schleh, Brent Ruby Mentor: Charles Dumke

INTRODUCTION: Wildland firefighters (WLFF) use sports drinks to retain fluid, and provide electrolytes and carbohydrates during long duration exercise in the heat. PURPOSE: The purpose of this study is to compare two commercially available beverages, DD (60.9 mM Na+, 3.4% CHO) vs G (18.4 mM Na+, 5.9% CHO) on their ability to affect fat and carbohydrate metabolism during submaximal exercise in the heat. METHODS: Ten aerobically fit males (22.5± 3.9 yrs, 82.2± 10.1 kg, 53.9± 5.9 ml•kg-1•min-1 VO2 max) completed two 90-minute heat stress trials (39° C, 30% RH) walking at 50% VO2 max followed by a 30-minute rest period. Respiratory gases were collected mid (45 min) and post-exercise (90 min). At 45 minutes, subjects consumed either G or DD with

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volume equivalent to 150% of the weight lost. Blood glucose was measured pre- and post-exercise, and post-trial. RESULTS: Ventilation (VE) did not differ between G and DD (72.1 ± 8.4 vs. 69.4 ± 7.5 L•min-1; p=0.5). Oxygen consumption (VO2) was not different between trials (2.4 ± 0.1 vs. 2.4 ± 0.2 L·min-1; p=0.3). Carbohydrate oxidation was not significantly different between the beverages (2.1 ± 0.2 vs. 1.8 ± 0.2 g·min-1; p=0.2) for G vs. DD respectively. However, significant differences in fat oxidation and respiratory exchange ratio (RER) were found (0.38 ± 0.03 vs. 0.47 ± 0.05 g·min-1; p=0.049, and 0.89 ± 0.02 vs. 0.87 ± 0.01; p=0.04) in GG vs. DD respectively. Blood glucose was significantly greater post-trial in G vs. DD (116.0 ± 5.7 vs. 103.1 ± 3.9 mg·dL-1; p=0.01).
CONCLUSION: Following the consumption of a bolus of G (5.9% CHO) resulted in increased RER and reduced fat oxidation compared to a bolus of DD (3.4% CHO). Blood glucose was greater following ingestion of G. These data may prove critical for WLFF during work in the field.

Poster #32 - Investigation of Membrane Curvature Dependency on Cytochrome c Binding to Cardiolipin
Author(s): Ziqing Xie Mentor: Bruce Bowler

Cytochrome c (Cyt c), an efficient electron transport protein in cellular respiration, is recently found to take part in initiating apoptosis (programmed cell death) through first oxidizing a lipid called cardiolipin, and then dissociating from the inner membrane of mitochondria to trigger the apoptosis cascade. Cardiolipin has four hydrocarbon chains and a negatively charged head group which can interact with anionic site A on Cyt c that contains positively charged lysine amino acids. It is believed that the electrostatic interactions between anionic site A and CL on the inner membrane of a mitochondria lead to protein binding and partial unfolding. In this experiment, we isolate anionic site A, and use cardiolipin liposomes to trap Cyt c as a mimic of the concave curvature of the cristae of the mitochondrial inner membrane. Circular dichroism spectroscopy is used to monitor the amount of trapped Cyt c. By comparing to previous similar studies, we can find out whether Cyt c plays a role in binding to cardiolipin in response to lipid curvature.

Poster #34 - The role of the GlpD cap domain in Borrelia burgdorferi
Author: Bethany Crouse Mentor: Scott Samuels

Borrelia burgdorferi, the bacterium that causes Lyme disease, is transmitted between vertebrate hosts by a tick vector in an enzootic cycle. While in a mammal, B. burgdorferi uses the sugar glucose from the blood of its host as a source of carbon for glycolysis, a metabolic pathway that converts the glucose into energy. While in the tick, however, there is a period of time when the blood meal is consumed and a different source of carbon needs to be utilized. A set of genes called the glp operon allows B. burgdorferi to use the sugar alcohol glycerol as a carbon source during this time of nutrient stress. The third gene in the operon, encoding glycerol-3-phosphate dehydrogenase, is the gateway between using glycerol as a carbon source for energy or shuttling it into a different metabolic pathway for membrane synthesis. Crystal structures of GlpD from Escherichia coli reveal two parts: a catalytic, membrane-associated domain and a small soluble "cap" domain. Preliminary data on the RNA landscape of the glp operon suggest that the cap domain in B. burgdorferi is produced independently and made as a separate protein from the entire GlpD. I hypothesized that the cap domain has a regulatory function. I have accomplished my goal of purifying the cap domain from B. burgdorferi GlpD to near homogeneity and now plan to assay its ability to bind to different molecules in order to assess its function in B. burgdorferi. Additionally, I will test the conditions under which the bacterium synthesizes this independent cap domain, and eventually I will attempt to crystalize the cap domain in order to determine its structure.

Poster #36 - Macroinvertebrate Food Webs of a Metal-Contaminated River: Importance of Algal Blooms
Author(s): Kim Bray, Marc Peipoch, Jessica Jenne Mentor: H. Maurice Valett

River food webs associated with summer blooms of filamentous green algae have previously illustrated that the number of trophic levels successfully predicts the relative importance of bottom-up and top-down influences. Unidentified causes for significantly lower trout abundance in Reach C of the metal-contaminated Upper Clark Fork River (UCFR, 20-30 fish/km), compared to upstream reaches (200-300 fish/km) and nearby rivers (600 –

3,000 fish/km) in Montana, USA, are of concern to restoration practitioners. Metal contamination of floodplain sediments throughout the UCFR reflect its mining history, but Reach C, without significant metal pollution but with the greatest algal growth, displays the lowest trout abundance. Low abundance of top predators is concordant with HSS-Fretwell prediction that an odd number of trophic levels will result in nutrient-limited algal productivity. Nitrogen-limiting conditions are repeatedly observed during summer time in the UCFR (3) and nitrogen-fixing cyanobacteria (i.e., Nostoc sp.) become abundant by late-summer. Assessment of food web structure (i.e., trophic levels and relations) is necessary before considering other restoration practices to recover trout abundance in the UCFR. Benthic macroinvertebrate abundance data (greatest abundances of 14.4% Chironomidae, 29.3 % Baetis, and 8.74% inermis), insect body burdens for multiple metals (Cu, As, Zn, Pb, Cd), and stable isotope composition (13C and 15N) were used in a Bayesian stable isotope mixing model approach to discern the trophic structure in Reach C. Additionally, these results were linked to trout consumers through fish stomach analysis.

Poster #38 - Why did the Walleye Cross the Reservoir? Explaining Adult Walleye Use of the Missouri River Upstream of Canyon Ferry Reservoir to Toston Dam
Author: Tanner Traxler Mentor: Lisa Eby

Over the last decade, walleye (Sander vitreus) have been increasingly using the Missouri River upstream of Canyon Ferry Reservoir to Toston Dam, and Montana Fish, Wildlife, and Parks wants to understand why these walleye are moving upstream and how it could impact the existing fish community in the river. To understand if this expansion of habitat could be associated with spawning and/or foraging, we examined the composition and distribution of juvenile fish in the area. Specifically, the presence of juvenile walleye would indicate that adult walleye were using the river to spawn and/or if there were abundant prey fish available then adults might be increasingly using the river to feed. To ensure a representative data set, we divided the 23-mile-long stretch of river into three sampling sections. In each section, juvenile fish were sampled using beach seines and mini-fyke nets across pool, riffle, run, and backwater habitats. Each section was sampled twice during the summer of 2016, once in late July or early August and again in mid-August. We captured 26,510 fish, with yellow perch (Perca flavescens), white sucker (Catostomus catostomus) and longnose dace (Rhinichthys cataractae) being the most common species captured. Only 16 of these fish were juvenile walleye, all coming from sampling locations at the interface of the river floodplain and the reservoir; no juvenile walleye were found in the river upstream of this interface. Based on these results, it appears that walleye did not use the river to spawn. However high densities of yellow perch, one of the walleye's favorite prey items, suggests that adult walleye are using this stretch of river to feed. Additionally, classification and regression tree results of habitat associations indicate that perch occurred in habitat with characteristics preferred by walleye, suggesting that walleye may impact the perch population the most in the future.

Poster #40 - Factors Influencing Body Condition in Cabinet-Yaak Ecosystem Black Bears
Author: Caleb Schwartzkopf Mentor: Angela Luis

Grizzly bears (Ursus arctos) are a species on recovery. This holds true for the bears in the Cabinet-Yaak ecosystem, whose low reproductive rates make recovery especially difficult for this species. These rates are effected by body condition, which has been found to predict reproductive success, both for grizzly and black bears (Ursus americanus).

So what is it that effects body condition in bears? We sought to answer this question by using research collected from black bears in this region. We considered several different variables, which included: vegetation and berry production, hunter harvest estimates, winter temperatures, age, and body metrics (i.e. weight, girth, shoulder height, etc.). We used multiple linear regression and Akaike information criterion (AIC) to analyze our data. Preliminary results of this study indicate that during the first half of the summer, body fat percentage of a bear is most strongly related to body metrics, such as weight. This changes for the second half of their year, in which current year vegetation production becomes more important. These results indicate that during the first half of the year, the energy consumed is put towards growth (for young bears) and building lean body mass. The second

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half of the year is more crucial for building fat reserves. It is during this time of year that bears enter into hyperphagia, a state of prodigious eating where they prepare for hibernation.
This analysis could be very useful in helping managers determine which food factors they should target to aid in the recovery of bears in this area. It also will help identify energy utilization throughout the year, as well as what body metrics show the strongest relationship to fat production.

Physical Sciences Poster Session #1 - 11:00 - Noon

Poster #42 - How is Digital Data Transmitted Wirelessly and Used within a Control System?
Author: Sean McChesney Mentor: Steve Shen

Wireless communications has become the dominant force within the communications field. Investigation into the inner workings of wireless technology and how information can be encoded, transmitted, decoded and processed across vast distances is a pivotal area of research worldwide. With this in mind, I researched and developed a wireless communications system using the most widely used form of modulation, Binary Phase Shift Keying (BPSK), and a control system to parse the intelligence. I first built the modulator system which encodes binary information within a carrier signal and was then sent out an antennae as electromagnetic waves. These waves are then received by another antennae connected to a demodulator circuit, for signal stability and demodulation. The second system built was the parallel to serial binary data converter, which creates the binary wave form sent to the modulator input. Followed by the demodulator circuit, which removes the carrier from the intelligence signal. The demodulator is connected to a serial to parallel converter circuit which parses out the data stream into a four bit parallel code. The parsed bits are used as input by a control system to perform various actions. In this case, to control the actions of two motors and the power on/power off functionality. Once the system was complete, I began testing its ability to obtain weak or scrambled signals, showing the advantages of Phase Shift Keying compared to Frequency Shift Keying and Amplitude Shift Keying. The tests show how PSK is superior, compared to the other keying methods, when sending data in areas with high densities of electromagnetic frequencies (EMF) because changes to the amplitude and frequency of a traveling signal can easily be easily distorted; where the phase of a wireless signal is least affected by various mediums and conditions.

Poster #44 - Using Thermal Infrared Imaging to Estimate Soil Hydraulic Parameters: A Novel Approach
Author: Matthew Thomas Mentor: Payton Gardner

In this study, skin temperature measured with a thermal infrared (TIR) camera was used to estimate soil hydraulic parameters. These physical properties, which control how soils transport and retain water, are notoriously difficult to measure in the field due to the extreme spatial variability of their values. Laboratory experiments were set up to record surface skin temperature response in a clean soil column using a TIR camera after an artificial wetting event. An array of thermocouples, a net radiometer, heat flux sensor and weather station were used to constrain the TIR data and the energy budget during the experiment. The soil column surface was then wetted with a known amount of water over a controlled time period and the thermal response recorded at five minute intervals over the course of 18 hours. Soil hydraulic parameters were then estimated by fitting a water-energy conservation model (ECH2O) to the observed data using a Marqhart-Levenberg least squares minimization method. This inversion of ECH2O was able to estimate soil air entry pressure, soil porosity, and the Brooks-Corey pore size distribution parameter with a relatively high degree of precision. The estimated parameters were compared to several sets of known values based on soil textural classification. Most of the estimates were within the range of standard published values. These results show that soil hydraulic parameter estimation based on TIR skin temperature data could prove to be a fast and useful new tool to characterize the distribution and spatial heterogeneity in soil hydraulic properties at the field scale.

Poster #46 - Using Fluorescence Correlation Spectroscopy to Measure Partial Unfolding of Three Variants of Cytochrome c
Author(s): Daniel Rogers, Margaret Elmer-Dixon, Harmen Steele Mentor: Bruce Bowler

The protein Cytochrome c (Cytc) has been known to be a regulatory on/off switch for apoptosis, or programmed cell death, when unfolded. Using Guanidine HCl (GuHCl) of different concentrations to denature 3 variants of Zinc Cytc (ZnCytc), the unfolding of this protein can be measured. Measuring is performed through different methods such as single- and dual-focus Fluorescence Correlation Spectroscopy (FCS) and Circular Dichroism (CD). FCS is used to measure the change in lifetime of the protein to determine if the protein has unfolded. The change in lifetime is a characterization of partially unfolded proteins. Data are recorded and analyzed through several different Matlab codes to fully understand the folding code of the protein

Social Sciences Poster Session #1 - 11:00 - Noon

Poster #48 - Effects of Peer Assisted Learning and Self Regulation Interventions on Mathematical Performance
Author: Mary Burns Mentor: Jingjing Sun

Mathematical literacy, or numeracy, is an essential skill in today's society. Numeracy allows individuals to develop problem solving skills, analyze information, and reason effectively. Unfortunately, many students struggle with mathematical concepts, especially relating to real world problems. During my time spent student teaching in a fourth grade classroom, I witnessed these difficulties specifically in the areas of understanding time and metric conversions. Both of these skills are crucial for basic mathematical literacy, growth, and everyday skills as an adult. The purpose of this study is to measure the effectiveness of peer assisted learning and self regulation interventions on mathematical performance in the areas of elapsed time and unit conversions. I began the study with a pretest of student understanding, identifying three students with little to no understanding of elapsed time and unit conversions. With these three students, I then modeled how to effectively collaborate with peers and use self regulation techniques. Over a four week period, students were provided time to work on elapsed time and conversion problems using the two intervention techniques. Students were provided with six different intervention times to collaborate with peers and use self regulation techniques. Students will be provided with a posttest (identical to pretest) to show growth in understanding, illustrating the effectiveness of these two intervention techniques. The results from this data could be used to better equip teachers with tools and interventions to address subject areas of difficulty in mathematics, and ideally move away from the use of sole direct instruction in the subject of mathematics.

Poster #50 - Assessing Written Narratives: A Comparison of Two Narrative Analysis Tools
Author(s): Megan Chamberlin, Michelle Tatko, Savanah Lovitt, Marissa McElligott Mentor: Ginger Collins

Purpose: The purpose of this study is to compare two different narrative analysis rubrics currently available to determine the a) amount of time needed to analyze a typical narrative produced by an elementary student, b) difficulty level of interpreting analysis procedure of each rubric, and c) unique information yielded from each analysis procedure. Narrative skills are crucial for academic development. Difficulties with narrative skills could indicate language learning disorders. Because narrative skills play a large role in academic success, researchers suggest that SLPs incorporate narrative analysis into routine clinical practice.
Methods: Fifty-eight written samples were collected from elementary aged students. All students were prompted to write a narrative essay in response to being given a picture prompt. Each sample will be analyzed using the Index of Narrative Complexity (INC) and the Narrative Scoring Scheme (NSS). Use of the INC and NSS will be compared for speed and ease of use. Additionally, researchers will determine the independent strengths of each narrative analysis procedure.

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Originality: Language sample analysis is under-utilized when assessing elementary school- age children's language abilities, although it is considered a best practice. School-based speech-language pathologists (SLPs) argue that the following barriers discourage them from analyzing narratives: analysis is too time-consuming, they don't feel that they possess adequate training and experience to perform analyses, and they are often unaware that established analysis protocols exist

Significance: Results from this study will provide preliminary data concerning the time commitment involved, the ease of use and what unique information can be yielded by the use of each rubric. The goal of this study is to address the validity of the perceived barriers. Should either or both of these rubrics prove to be quick and easy to use, this study may result in more.

Poster #52 - Institutional Mapping of Montana Water Law
Author: Jess DellaRossa Mentor: Brian Chaffin

Today, hydrologists are able to model water use in Montana, including the effects of changes in crop type or irrigation methods often driven by economics on surface water availability. It is extremely difficult, however, to integrate legal constraints on water use into these hydro-economic models. Over 90% of water diverted from streams or pumped from the ground in Montana is used for irrigated agriculture. Climate change is altering precipitation patterns around Montana, altering the timing and distribution of water available for irrigation. This combined with generally over-appropriated surface water sources—those that have more legal water claims than can be satisfied in most years—is creating potential for future conflict between agriculture and other social and ecological demands for water. This is precisely why hydrologic modelers need to integrate legal and institutional data into predictive models to better understand how integrating hydrologic, legal, and social systems function. This research aims to satisfy this need through a 3-step approach to integrate legal constraints into a hydro-economic model of Montana. First, I characterized institutional barriers and limitations to water use in the state of Montana. Next, through the mentorship of a water policy scientist, I created a scale from "legally constrained" to "legally unconstrained" water use to classify water basins across Montana. A third step to this research will include interviews with legal water experts across the state to determine if the constructed scale resembles water use realities on-the-ground. The expected result from this research is to create a geospatial dataset of institutional limitations to agricultural water use that can be integrated into a quantitative hydro-economic model for Montana.

Poster #54 - The effect of visual social stimuli on Octodon degus
Author: Danielle Crandell Mentor: Nathan Insel

Most vertebrates have evolved to recognize potential predators, prey, and social partners, but very little is known about how the brain detects and responds to such agents. One difficulty is experimentally controlling for cues that might signal agency, particularly in experimental models such as mice, which depend heavily on olfaction. We sought to test whether a more visual rodent, the diurnal, Chilean degu, would be differentially attracted or averse to social compared with non-social visual stimuli. Degus were placed in a chamber containing four, 3D printed objects made from white polylactic acid (PLA). Two objects were shaped as quadruped animals, a lion and modified rabbit, with a black dot marking eyes and nose. The other two objects were the same but with the features "scrambled": facial features were smoothed, body parts and black dots were placed at random locations around the object, and the objects themselves were placed horizontally rather than upright. Degus showed a small but significant preference for some objects over others (one-way anova of percent time spent in each quadrant, $F(3,96) = 2.7$, p

Poster #57 - Examination of Parent Understanding of YETI Evidence Based Practices
Author(s): Kyle Dyrud Mentor: Anisa Goforth

Autism Spectrum Disorder (ASD) is defined as "persistent deficits in social communication and social interaction across multiple contexts…" (American Psychiatric Association, 2013). The most effective treatment to teaching children with ASD is using evidence based practices (EBP's), which are….this includes the best

available research in the field along with practitioners personal experiences of what is most effective (Stoltenberg & Pace, 2008). Youth Engagement Through Intervention (YETI) is a group-based treatment that integrates EBP's in practices and strategies to enhance social skills for children with ASD. In a previous study, parents whose children participated in YETI were surveyed post treatment and it was found that they have a limited understanding of EBP's and were unsure as to how to implement EBP's within the home (Shindorf, 2016). Studies show parent training has been found more effective than parent education as training implements specific strategies to be applied in practice by parents whereas education only provides basic information about the topic (Bearss et al,. 2015). Thus, further research is needed to understand how best to prepare parents in using EBPs in the home setting. There were two primary goals of this study: 1) to examine parent's understanding of EBP's using existing data collected from Shindorf, 2016 and 2) based on these data, propose a parent program in which parents would be trained in using EBP's for their child with ASD in the home setting. In the study conducted by Shindorf data was collected using self-report surveys from the parents whose children were enrolled in YETI. These surveys explored barriers to treatment for these specific children engaged in YETI. Through this study we hope YETI will be more beneficial with parents being able to continue the implementation of EBP's in the home.

Health & Human Sciences Poster Session #2 - 3:00 - 4:00 pm

Poster #2 – The Effect of Two Commercially Available Beverages on Fluid Retention During Exercise in Heat
Author(s): Micah Drew, Thane Thompson Mentor: Charles Dumke

Occupational athletes such as wildland firefighters (WLFF) endure extreme conditions leading to high levels of fluid loss. During wildfire suppression, it is vital to maintain hydration to sustain exercise in high temperatures. PURPOSE: The purpose of this study was to compare two commercially available beverages (DD [60.9 mM Na+ 3.4% CHO] vs G [18.4 mM Na+, 5.9% CHO]) on hydration maintenance during submaximal exercise in the heat. METHODS: Ten aerobically fit males (22.5±3.9 yrs, 82.2±10.1 kg, 53.9±5.9ml.kg.min-1 VO_2 max) completed two 90-minute heat stress trials (39 C, 30% RH) working at 50% VO_2 max followed by 30 minutes of rest in a heat chamber. Halfway through each trial, 150% of sweat rate was replaced with a randomly ordered beverage (G or DD). Subjects wore standard WLFF Nomex uniforms.Rating of perceived exertion (RPE) and heart rate (HR) were recorded every fifteen minutes. Blood samples were obtained pre-and post-exercise and post-trial to measure changes in hemoglobin (mg.dL-1) and plasma volume (%). Sweat rate was calculated by change in nude body weight. Data was analyzed using analysis of variance (ANOVA). RESULTS: There was a significant effect of time on HR following exercise (142.5±6.3 at 15 min, vs 175.4±4.7 b.min-1 at 90 min.

Poster #4 - Using Auditory Evoked Potentials to Objectively Determine Backward Masking
Author(s): Brittany Galvin, Allie Cope Mentor: Al Yonovitz

Backward Masking (BM) functions have been shown to relate to age, lead toxicity and are differentiated in children with language disorders. A number of studies have been accomplished that support BM related to auditory processing deficits. This has been shown in both an animal model and human studies. This study investigated if Evoked Potentials (EP) could be utilized to obtain BM functions. A tonal stimulus, followed by an inter-stimulus interval (ISI) and a noise masker was the EP stimulus. All were studied individually in the appropriate temporal alignment. ISI's of various durations (2, 4 And 8 msec) were used to derive the BM function for middle and late auditory evoked potentials. This study randomly presented four different stimulus conditions, 1) tone alone, 2) noise alone, 3) tone and noise, and 4) silence as a control. With a long inter-trial interval (1 sec) and high sample rate (31500 Hz) EP's were obtained for 1800 trials. The stimuli were pure-tones (1000 Hz, 10 msec. duration with a Blackman function and noise bursts of varying intensity. Comparison was made between the behavioral and electrophysiological task. The amount of BM increased as the ISI became smaller. This study will validates the use of EP's in a derived method that will arithmetically combine the stimulus conditions to observe the differential electrophysiological responses and neurologic loci of evoked potentials during the BM effect.

Poster #6 - Soundscape Stimuli and the Soft Sound Test
Author: Hannah Carlson Mentor: Al Yonovitz

Soft sounds create an in-depth experience of a person's everyday environment; however, soft sounds are not currently being tested in a hearing test by audiologists. Elder adults are at a disadvantage hearing soft sounds compared to their younger counterparts even without a hearing loss. The purpose of the proposed study is to design a test of audition that will assess the audibility of soft sounds that are part of the acoustic milieu. Findings from this study may have a clinical application to identify everyday soft sounds relating to adjusting and writing hearing aid prescriptions. Currently, auditory threshold expectations are defined differently for children and adults. A child is expected to have hearing at or below 15 dB HL for all frequencies tested to be considered normal hearing, while an adult should be able to detect sounds at or below 25 dB HL. Soft sounds are typically below 25 dB HL. Hearing at 15 dB HL is not only important for language acquisition and communication, but for overall quality of life as well. Soundscapes are a relatively new technology that are used in the field of architectural acoustics. They are sound exemplars that are constructed with high quality sound recordings overlaid in a specific fashion to create a virtual auditory experience. Identification responses will be obtained to ten Soundscape themes with embedded target sounds. Six embedded sounds will be presented at low levels for each of the ten ambient (Soundscape) themes. There are two forms of the test each with three embedded sounds for each Soundscape. Subject responses will allow the adjustment of hearing aids to improve the audibility of soft sounds. It is expected that hearing these embedded soft sounds within the Soundscape may help alleviate some of these hearing problems and in turn increase their quality of life.

Poster #8 - Bed-Fall: Deriving Position from Acceleration to Develop an Accelerometer-Based Device for Clinical Health Settings
Author(s): Brielle Rolle, Ashlin Staso, Nathan Deming, Shaun Philip, Casey Shifflett, Alan Reardon
Mentor: Matt Bundle

PURPOSE: We tested an accelerometer-based instrument designed to detect and distinguish human movement patterns that precede falls. The goal of the device is to prevent falls by alerting medical personnel prior to a fall. Bed-fall can be attributed to factors including compromised cognitive state, physical limitations, or muscular imbalance which impairs normal biomechanics, and is a common occurrence within the amputee and geriatric populations. 60% of nursing home residents fall each year, half of these patients experiencing multiple falling episodes (1). Injury and illness associated with falls take a substantial economic toll on our society. In the year 2000, costs associated with fatal and non-fatal falls totaled $19.2 billion in the United States, including costs for hospitalization, emergency department visits, and outpatient treatment (2).
METHODS: Our subject population consisted of healthy young adults ages 18-25, and geriatric individuals living in assisted-living homes. Subjects were marked at anatomical landmarks with reflective indicators. They were filmed rising from a standard-height hospital bed with a high-speed motion capture system at a rate of 1000 hz. Two separate cameras were used, filming from different perspectives. The movement data was analyzed to obtain the 3D locations of the joint markers using the technique of Hedrick et al (3). We simultaneously obtained and analyzed movement patterns of the healthy young subjects.

Poster #10 - The clinical significance of the single leg hop in qualifying outcomes after ACL reconstruction: normative study
Author(s): Anna Johnson, Daniel Dettman Mentor: Ryan Mizner

Background: The single leg hop for distance (SLHD) is the most common functional performance test utilized to determine readiness for sports participation after surgical reconstruction of the anterior cruciate ligament (ACL) in the knee. The ability of hop distance to discern sport readiness is questionable as nearly all athletes will eventually score within normal variance and no difference in hop distance exists between those who do or do not return to sport.
Hypothesis: The quality of hop landing will serve as a more discerning metric of athlete recovery than the distance hoppedwhen compared to their non-surgical limb or healthy norms.

Methods: Ten athletes (5 women) with no prior knee injuriesserved as normative group for 10 matched athletes (5 women) with unilateral ACL reconstruction (19 mo post-operatively). An 8 video camera motion capture system with force plates determined the maximum distance hopped and peak joint angles and torques during landing. Independent t-tests and paired t-tests assessed group differences and the effect size (Cohen's d) was used to the magnitude of the differences.
Results: Distance hopped by the operated limb did not differ from the non-operated limb or the healthy group(operative=1.36±0.26m, non-operative=1.36±0.26m,Healthy=1.63±0.31m, $p \geq 0.17$, $d=0.89$). Conversely, the operated limb had substantially less peak knee extensor torque during hop landing compared to both the non-operated and health group (operative=1.99±0.19, non-operative=2.83±0.31, Healthy=2.88±0.31, $p \leq 0.003$, $d=3.36$).
Conclusions: Our measure of the quality of hop landing was more discerning of recovery after ACL reconstruction compared to the long-standing tradition of using the distance hopped to determine success.

Poster #12 - Spontaneous Physical Activity In A Novel Mouse Model Of Muscular Dystrophy
Author(s): Madison Mock, Dace Moerkerke, Tiffany Quindry, Josh Selsby Mentor: John Quindry

Muscular dystrophy (MD) is an incurable disease characterized by muscle degeneration. MD treatments require use of mouse models in preclinical studies. The DBA/2-congenic Dmdmdx ("D2") mouse is a novel dystrophic model that is largely uncharacterized physiologically.
Purpose: We examined physical activity (PA) in order to quantify the major movements of PA in a novel mouse model of MD. We examined whether 4-month old D2 mice (n=10) engage in less moderate to high intensity physical activity than age-matched controls ("D2J" mice, n= 10).
Methods: Physical activity quantification was performed by 0-1 sampling according to a species-specific activity ethnogram of walking, wall pacing, climbing, running and jumping. Activity counts were recorded by a blinded observer every 15-seconds for a 10-minute session (total of 40 observation periods). Individual activity counts were recorded and analyzed in a mouse strain-dependent fashion. An activity-scaled composite metric was also calculated whereby activity sums were scaled for walking and wall pacing(x2), climbing and running (x2.5), and jumping (x3). Scores for individual activities were similar between mouse strains for walking (7% mean group difference, p=0.120), running (61% ean group difference, p=0.145). Moreover, composite metric analyses revealed that scores were not different between mouse strains (p=0.477), suggesting no overall differences existed. In contrast, D2 mice performed 70% less climbing (p=0.049) and 44% less jumping (p=0.046) than D2J mice.
Significance: Findings from composite analysis and some activity counts reveal that D2J controls and D2 congenital dystrophic mice perform statistically similar amounts of physical activity. However, individual activity analyses indicate that D2 mice engage in less climbing and jumping than D2J healthy control mice.
Future work should examine these physical activity parameters across the lifespan as related to disease outcomes and examine potential interventions as countermeasures to MD. Supported by: Parent Project Muscular Dystrophy to JS and JQ

Poster #14 - Respiratory Function Comparison in Young D2 and D2J Mice
Author(s): Shannon Ryffel, Tiffany Quindry, Josh Selsby Mentor: John Quindry

Purpose: Duchenne Muscular Dystrophy (DMD) is an incurable disease affecting one in 2,500 boys. DMD is caused by insufficient dystrophin content, resulting in muscle function loss. Individuals are left wheelchair bound until death due to respiratory or cardiac failure. To study DMD treatments, different mouse models have been developed but lack clinical relevance, emphasizing the need for novel mouse models. The study purpose was to characterize pulmonary function in a new mouse model, the D2J (control) and D2 (dystrophin deficient). Mice were examined to quantify respiratory function at four months of age.
Methods: Mouse respiratory function was measured using whole body plethysmography (WBP). Using Buxco WBP, untreated four-month-old male D2J (n=10) and D2 (n=10) mice were placed in independent chambers. A pressure sensitive diaphragm allowed assessment of respiratory rate, tidal volume (ml), minute ventilation (ml/min), expiratory and inspiratory times (s), peak inspiratory and expiratory flows (ml/s), and relaxation time (s).

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Methods derived from Quindry et. al. were applied within a common 2-hour time frame and mice were habituated to the WBP before data collection. Specifically, mice were habituated to the chamber for 12 minutes and data collection continued for an additional 20 minutes.
Significance: The dystrophin deficient D2 mice had a higher respiration rate (p=0.035) and shorter inspiratory time (p=0.046) compared to the D2J strain. Most importantly, minute ventilation was not different between groups. No other differences existed for tidal volume, expiratory time, peak inspiratory and expiratory flows, or relaxation times. Overall, respiratory function is similar between 4-month-old dystrophic D2 and D2J mouse strains.

Poster #16 - Patterns of physical activity, sleep, and screen time in Urban American Indian children
Author(s): Ashley Batistich Mentor: Vernon Grant

Purpose: Obesity in American Indian (AI) children is a major public health concern. This is important as childhood obesity increases the risk for chronic disease. The purpose of this study is to explore physical activity (PA), sleep, screen time, and demographic (gender, age, tribal affiliation, and BMI percentile) behaviors in AI children.
Methods: A cross sectional study was conducted using a voluntary sample of AI children in the 6th – 8th grade between the ages of 11-15, attending four Missoula Middle Schools. Participants were recruited through school meetings and letters sent home to parents. BMI percentile was calculated using an established algorithm.[1] Surveys collected demographic and screen time information. PA and sleep were assessed with an Actical attached to the participant's wrist for one week. Demographic statistics were calculated for PA, sleep, screen time, and obesity. Independent two-tailed t-tests were used to compare differences between gender and differences between weekday and weekend variables.
Results: The data revealed that 41.6% of the sample was overweight/obese and children spent an average of 4.2 hours of screen time per day. In addition, children engaged in 177.8 minutes per day in moderate-to-vigorous PA (MVPA) and an average of 8.3 hours of sleep per night. Sleep data showed that girls spent more time in bed and received 30 more minutes of sleep each night compared to boys.
Conclusion: While participants engaged in almost 180 minutes of MVPA, average nightly sleep was less than the National Sleep Foundation recommendations. High amounts of weekend screen time impact PA, which raises health concerns. Further studies containing larger sample sizes are needed to further explore these patterns in AI children. [1] https://www.bcm.edu/cnrc-apps/bodycomp/bmiz2.html This BMI calculator finds BMI percentile based on date of birth, age, gender, height (m) and weight (kg).

Poster #18 - Cardiac Function in a Novel Dystrophic Mouse Model
Author(s): Josh Selsby, Kathryn Tiemessen, Aaron Held, Tiffany Quindry Mentor: John Quindry

Duchenne Muscular Dystrophy (DMD) is an X-linked genetic disease that primarily affects young males. It causes progressive weakness of the skeletal and cardiac muscles, and is eventually fatal. While there are several existing therapeutic interventions for DMD, currently there is no cure. The purpose of this study was to measure initial cardiac physiological performance in the novel D2 dystrophic mouse model. The genotype of the mouse model utilized in this study contains the same spontaneous dystrophin gene mutation that DMD patients have, while maintaining possession of the utrophin-producing gene. The unique genetic makeup of the D2 mouse is believed to more accurately reflect the physiology and histology experienced by human DMD patients.
At four months old and prior to any therapeutic intervention, the D2 mice group (n = 10) and the control group of D2J mice (n = 10) underwent technician-blinded echocardiograms while anesthetized, in order to assess the functionality of their cardiac muscle. Values acquired from these echocardiograms included cardiac output (CO), left ventricular mass (LVmass), percent ejection fraction (%EF), percent fractional shortening (%FS), and stroke volume (SV), to measure cardiac functionality levels.
When compared to the D2J mice, D2 mice did not demonstrate statistically significant differences in cardiac physiology. In future research, baseline cardiac measurements of these D2 mice can be compared to cardiac measurements from D2 mice treated in subsequent experiments, in order to evaluate the efficacy of new DMD supplementation and medication. Funded by Ryan's Quest & Parent Project Muscular Dystrophy

Poster #20 - Is it Hearing Loss or is it Dementia?
Author(s): Emma Bozarth, Emmeline Talbot Mentor: Al Yonovitz

Cognitive decline has recently been shown to be associated with hearing difficulties. Occupational therapists in Montana were canvassed via survey concerning their knowledge about best practice with patients who have hearing loss as well as best practice with patients who have dementia. With aging patients, many occupational therapists will encounter greater numbers of patients who exhibit either a hearing impairment and/or dementia. This presentation will focus on the differentiation between hearing loss and dementia. Oftentimes, patients with hearing loss and patients with dementia present with similar symptoms. For example, both those with hearing loss and those with dementia may need frequent repetition and reinstruction. Both those with hearing loss and those with dementia may exhibit signs of frustration, depression, and general social withdrawal. There may be increased isolation from family and friends. Despite similarities in signs and symptoms, it is critical that occupational therapists differentiate between hearing loss and dementia. This poster describes the similarities and differences between signs and symptoms of hearing loss and dementia. The survey reveals how occupational therapists in Montana differentiate, and what resources and referrals are used to help differentiate in order to implement best practice. Using these resources, occupational therapists can ultimately aid in promoting patients' quality of life. In addition, this poster also discusses recent research revealing links between untreated hearing loss and dementia and cognitive decline. Counseling patients with suspected hearing loss and referring for appropriate hearing evaluation and remediation may help to delay or even prevent onset of dementia.

Poster #22 - Hearing Connectivity Solutions for Occupational Therapy Patients
Author(s): Emma Bozarth, Emmeline Talbot Mentor: Al Yonovitz

With declining hearing there is a risk of losing a vital connection to the world. A transdisciplinary approach between audiologists and occupational therapists can provide wireless connectivity of hearing aids to audio products such as telephones, televisions, computers, and wireless microphones. A survey of this knowledge-base for occupational therapists in Montana has provided a view of available resources.
Depression and cognitive decline has been shown to be significantly associated with hearing difficulties. Current digital technology has advanced hearing rehabilitation dramatically and provided new opportunities for improved communication and consequent well-being of the occupational therapy patient. Wireless technology including Bluetooth products now provides a significant rehabilitative asset to those with limited mobility, dexterity and cognition. The relationship between audiologic practice and occupational therapy practice becomes an active process that is transdisciplinary. It is no longer only a matter of providing amplification for hearing deficit. It is an active process, whereby the patient is provided with connectivity options for a large array of audio devices. More importantly, audio products that hearing aid wearers want to listen to are being made with digital wireless embedded technology. Other applications include wireless connections to telephones and smartphone technology, connections to personal music devices, computers, and external microphones which greatly enhance the listening in large group environments. Concepts of connectivity, in addition to individual preferences will drive much of the new applications. Patient benefit will produce evidence when new technology is introduced and will become more commonplace. The survey has given us information on current practices for occupational therapists in Montana, providing us with knowledge of strengths and weaknesses regarding this transdisciplinary approach. Hearing aid technology and rehabilitation is no longer a matter only for audiologists, but is now a part of the occupational therapy rehabilitative and normalization process for the patient.

Poster #24 - The influence of directions on threshold determination in audiological testing
Author: Alison Arthun Mentor: Al Yonovitz

Speech Pathologists and Audiologists give verbal directions to a client by being as clear as possible for more reliable outcomes. Altering the way a clinician will give directions can alter the outcomes of testing. Client directions can be considered linguistically into categories of phonology, morphology, syntax, semantic, and pragmatic aspects of language. Each of these consider the speaking influence of what we say in different ways. This research project examines how altering the way clinicians deliver verbal directions can alter the clients response in therapy. Placing different connotations with modifications to supra-segmental features throughout the instructional

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sentences and directions to a client can change the way the client will respond to the given task. The study's focus will consider the direction one gives when explaining the procedure during an audiology air-conduction assessment. Our expectations include giving directions with a negative connotation will have a completely different outcome as to giving directions with a positive connotation. Linguistically, we also must consider prosody and intonation, and those features that have a huge impact on the way a patient would perceive what is said. It is important to understand how a certain way of speaking to a client can completely change the outcome of a test. The way someone says or explains something influences the response and outcome of the person receiving that information in a substantial manner, and proving that will impact how we can give directions within the field of speech, language and hearing.

Poster #25 - Auditory Processing in Fluency Disorders
Author: Harley Kincheloe Mentor: Al Yonovitz

One possible cause of stuttering could be related to Auditory Processing Disorders (APD). However, at the present time there are few research studies that are able to support the relationship of APD and stuttering. One suggested link between auditory dysfunction and stuttering is that the poorer auditory processing scores by stutters reflect a basic auditory deficit, which interferes with fluency because speech is monitored through auditory feedback. The first technique to study binaural masking is the Masking Level Difference (MLD). The MLD is the difference between the SoNo and the SpNo binaurally masked thresholds. For the SoNo condition noise stimuli are presented to each ear at the same noise level and under the same conditions. However, for the SpNo condition, the signal is inverted 180 degrees. Under these two stimulus conditions the SpNo condition has a better threshold compared to the SoNo. The MLD threshold is the difference of the SoNo from the SpNo conditions. The second method of testing auditory processing differences can be accomplished using Backward Masking (BM). In a BM paradigm a target signal is presented followed by a masking signal. Typically, a pure tone is presented for 20 msec, followed by a 50 msec wide-band noise masker. Greater masking, both for the MLD and the BM tasks have been observed in subjects that are known to have APD. This study compared the results of these tests on stuttering subjects to that of non-stuttering controls. Stuttering subjects and age and gender matched non-stuttering control subjects were utilized. All subjects were at least 18 years of age.

Humanitites Poster Session #2 - 3:00 - 4:00 pm

Poster #26 - An Exploration of the Bioethical Dilemmas Associated with the Costs of End-of-Life Care
Author: Aaron Held Mentor: Charles Palmer

Background: Medical Care for patients nearing the end of their lives is an extremely complicated bioethical topic. From determining what is futile care, to finding a clear and concise definition of patient death, the field of bioethics explores a huge variety of issues regarding end-of-life (EOL) care. Cost is a major issue that is discussed with reservation in bioethical literature. Purpose: This project explores the bioethical dilemmas associated specifically with the costs of EOL care. Methods: Database wide searches in Pubmed, EconLit, JSTOR, and Web of Science using the search words "End-of-Life care costs" yielded data regarding the costs of EOL care for patients, their families, and society. Special considerations, such as pediatric EOL care and physician assisted suicide, were explored using the data bases listed above as well as the current data reports from Oregon's Death with Dignity Act. Searches in Philosopher's Index, and PhilPapers using the search term "End-of-Life care" provided the bioethical framework of the project. Conclusions drawn from the economic review were integrated into the bioethical framework, yielding novel bioethical considerations for EOL care. Findings: Multiple studies have found that close to 30% of Medicare's annual spending (approximately $60 billion) is spent on the 6% of patients who die that year. Of that $60 billion, about one third is spent in the last 30 days of life. However, even consid-

ering Medicare and private insurance coverage, patient out-of-pocket costs in the last 5 years of life averaged about $39,000 and exceeded total household assets 25% of the time. This disproportionate spending elicits major bioethical concerns of futility, autonomy, and justice. Significance: This research represents one of the first bioethical analyses of EOL care focusing explicitly on cost implications. It conceivably serves as a starting point for the considerate inclusion of financial discussions in EOL decision making.

Poster #27 - Ancient DNA Extraction from Stone Tools
Author: Clare Super Mentor: Meradeth Snow

There is often debate between archeologists regarding what lithics recovered from ancient sites were used for. Ancient DNA (aDNA) analysis of such tools can begin to address if they were used to process specific species of animals. We in the Modern and Ancient DNA labs at UMT have attempted an extraction of aDNA from micro-fissures in stone tool technology from the Bridge River Excavation site in the Middle Fraser Canyon, British Columbia The site was occupied periodically from 1800 years ago to the mid-19th century (Prentiss et al. 2008). Excavation and analysis was completed by UM Professor Anna Prentiss and has been an ongoing project. The protocol to extract and amplify any aDNA locked in the cracks involves treating the tools with chemicals and sonication, as well as normal DNA amplifying and sequencing procedure (Shanks et al. 2005). While part of my project entailed perfecting the methodology for DNA extraction, the main hypothesis behind my research is: Hypothesis: The potential for extracting DNA from archaeologically recovered lithics will enable me to identify the species on which they were used.
Bridge River researchers have designated the tools as used in "food processing or tool manufacturing" (Prentiss 2014), yet our analyses could connect the tools with specific species such as elk or deer, and provide an interesting new avenue of investigation. To date, we have worked on eleven stone tools from the Bridge River site and extracted bacterial DNA from two of the samples. Though we cannot directly tie the bacterial DNA to ancient use of the tools, we intend to learn as much as we can from our results and continue to strive for a robust animal aDNA sample that will allow us to understand how these tools were utilized at the Bridge River Site.

Poster #28 - Satirical Perspectives: A Cross-Cultural Comparison
Author: Mariah Johnson Mentor: Clint Walker

This paper proposes a cross-cultural examination of the societal satire of the countries of America and Russia by way of comparison of two satiric novels. Sinclair Lewis's Babbitt satirizes the business values of capitalist America and the materialism perceived in an economic system based on the mass production and mass consumption of goods. Yurii Olesha's Envy uses Babbitt in intertextual conversation to perform a similar critique of the Soviet Russian society and values of the same time period, such as the different wings of the intelligentsia pushing for various reform programs and the Soviet ideal of transforming the world and humanity presented in much Soviet propaganda. Satiric theory provides a framework for understanding and relaying how each novel performs its parody of the respective society, while historical and sociological information concerning the development of the two nations in the time of these novels contextualize the satires in their respective societal environments. The ultimate outcome of this intertextual and cross-cultural comparison is an understanding of what issues each culture considers worrisome in its socioeconomic climate, as well as an understanding of how social critique is performed in both nations through the similarities and differences of each author's techniques elucidating how each nation handles its satire. The sociological framework in which these works are contextualized also demonstrates the relevance of the concerns of each author to their respective nations today and the importance of continued societal critique as a way to bring to the attention of the general populace recurring trends, both governmental and economical.

Poster #29 - Refugee Crisis: A Detailed Study of the United Kingdom
Author: Kurt Secrest Mentor: Kia Mehrdad

The purpose of my study was the demonstrate the vastly different attitudes that evolved in countries towards refugees settling in their country. The United Kingdoms is a special case because of the vastly different political views and demographics when you travel from the city of London to the Highlands of Scotland and everything in between. It was also meant to be a case study into the problems that the United Kingdom had when it came to the refugee crisis and how they are special for them. I studied the past relations that the United Kingdom has had with refugees with relations to accepting or rejecting them based on different concepts. I also looked at other countries in comparison with refugee crises to show the differences and similarities. I studied the different political parties and their views towards refugees to show the vast differences across the United Kingdom politically. I analyzed the different factors such as housing and education that will have a major impact upon the resettlement of refugees. The significance of this project relates to the current political changes affecting our country and how ideological differences are furthering the crisis. I hope to educate those who have not done the extensive research into this subject so an understanding of the current refugee crisis can be gained.

Life Sciences Poster Session #2 - 3:00 - 4:00 pm

Poster #31 - Characterization of the Bartonella bacilliformis Human Factor H—Binding Protein
Author: Mason Derendinger Mentor: Michael Minnick

Bartonella bacilliformis is a human bacterial pathogen and the etiological agent of Carrion's Disease. B. bacilliformis is serum resistant, allowing it to survive in the human bloodstream and persist and replicate in erythrocytes. Human Factor H is a circulating protein in human blood that is part of the complement cascade of innate immune defense. Factor H binds to self-cells and prevents auto-immunity by complement fixation. A Far-Western blot followed by mass spectrometry analysis suggests that B. bacilliformis can bind to human Factor H protein. Here, we describe the protein BB1133, an outer membrane auto-transporter, and the Factor H—binding protein identified by mass spectrometry.
By splitting the protein into two distinct domains, each domain is able to be expressed in E. coli via the Gateway cloning system and the pET_Dest42 vector. IPTG induction of the domains, followed by a Far-Western blot utilizing human Factor H as a probe, will indicate which domain of BB1133 is human Factor H—binding.

Poster #33 - Disruption of genomic imprinting and abnormal growth in hybrid mammals
Author: Vanessa Stewart Mentor: Jeff Good

Genomic imprinting is a mechanism that regulates the expression of one copy of a gene differently from the other. Disruption of genomic imprinting has been linked to growth-related disease and tumor formation in humans, as well as growth effects in hybrids between many mammal species. Here we use hybrid dwarf hamsters as a model to link the evolution of gene regulation to development in mammals. Previous work has identified growth-related genes that show abnormal imprinting in placental tissues of dwarf hamsters, and whose expression levels are significantly lower in hybrids than in either parent species. These observations have led to the hypothesis that these genes are under-expressed growth repressors, however, the underlying mechanism of this remains unknown. This study examines whether disruption of DNA methylation, a common form of imprinting, could be causing the under-expression of these genes. Regulatory regions of DNA upstream of a gene, known as promoters, tend to be activated when not methylated, and silenced when highly methylated. I have identified promoter regions of a subset of these under-expressed genes to test for differential methylation patterns between the overgrown hybrids and the parent species. I performed bisulfite sequencing on these gene regions, which allows me to quantify patterns of methylation differences between individuals. I am using these data to test the hypothesis that changes in DNA methylation underlie the disruption of gene expression in overgrown hybrids. The results will allow us to connect specific regulatory mechanisms to these striking phenotypes, giving us an

increased understanding of how the evolution of gene regulation contributes to speciation and diverse growth-related diseases in humans.

Poster #35 - The E. coli Protein YbgL: A Novel DNA Repair Enzyme?
Author(s): Mason Conen, Kent Sugden, Brooke Martin, Savannah Whitfield Mentor: Brooke Martin

Cr(V) is a carcinogen that oxidizes guanine aggressively to form spiroiminodihydantion (Sp) and guanidinohydantoin (Gh), both of which cause G→T transversion mutations at a high rate and contain unusual hydantoin moieties. Endonuclease VIII (nei) can recognize and excise these oxidation products from DNA and is translated as one of five protein products of the Nei operon in Escherichia coli (E. coli). However, the functions of the other four proteins remain unknown. To address this gap in knowledge, we focused on one of the four that immediately precedes nei, the ybgL protein. Previous work by our group has suggested a role for ybgL in vitro. In the current study, we attempt to characterize the role of ybgL by oxidizing a synthetic oligo with Cr(V) and reacting the oxidized oligo with ybgL in the presence of different potential cofactors. Due to the presence of hydantoin moieties within the DNA, we will model the ybgL protein to the Hydantoinase B class of enzymes, which recognize the hydantoin moiety. This study will attempt to elucidate the role of an uncharacterized protein in excising oxidation lesions caused by chromium toxicity.

Poster #37 - Conformational Changes of Gαi1 Nucleotide Exchange Catalyzed by Ric-8A
Author(s): Jake Johnston, Levi Mcclelland Mentor: Stephen Sprang

G-proteins are important in regulating several cellular processes, which when defective, have been associated with several endocrinal disorders. G-protein associated disorders arise from either a disability to initiate proper downstream signaling, a deficiency in the ability to terminate the signal, or from a reduced level of G-proteins present in the cell. Resistance to inhibitors of cholinesterase 8 (Ric-8A) is an ~60-kDa cytosolic protein that functions as a molecular chaperone for heterotrimeric G-protein α subunits in vivo, and functions as a GEF (Guanine Nucleotide Exchange Factor) in vitro. The nucleotide exchange activity of Ric-8A is poorly understood. In this study, we aim to measure the rates of conformational fluctuation undergone by Gαi1 during Ric-8A catalyzed nucleotide exchange by following signal changes in FRET (Förster Resonance Energy Transfer) using rapid mixing stopped-flow fluorescence spectroscopy. As fluorescence is distance dependent, changes in fluorescence between FRET pairs is indicative of protein conformational changes. Several constructs of Hexa I-Gαi, containing two cysteine mutations at various locations in the Ras or Helical domain, are labeled with Alexa dye pairs in this experiment. The stopped-flow enables rapid addition of Ric-8A, allowing the FRET signal to be monitored upon initiation of nucleotide exchange. A decrease in FRET is expected upon addition of Ric-8A, as a conformational change occurs increasing the distance between the two labeled domains. Understanding the conformational effects that Ric-8A has on the Gα subunit, can lead to future therapeutic treatment of G-protein associated diseases.

Poster #39 - Using brown trout otoliths to understand growth patterns in the Upper Clark Fork River
Author: Martin Etchemendy Mentor: Lisa Eby

Age structure and growth rates of fish are key characteristics of assessing the status of fish populations. For example, growth rate estimates can be used to makes inferences regarding habitat quality. Unfortunately, aging fish can be difficult as age estimates from nonlethal approaches including fin rays and scales can be biased and/or difficult to accurately read. Otoliths are calcium carbonate formations found inside a fish's head and are often used to age fish because they are easily read and unbiased. Otoliths deposit minerals continuously and develop growth rings much the same way trees do. We used otoliths to age fish and describe growth patterns in brown trout (Salmo trutta) along the Upper Clark Fork River (UCFR). Montana Fish, Wildlife and Parks (MFWP) have previously developed size at age estimates for brown trout on the UCFR using fin rays. We will compare size at age curves derived from otoliths to validate these previously derived estimates and describe the growth patterns for these fish. Brown trout were chosen because they are important to anglers. Brown trout were collected from seven different sites along the UCFR from Rock Creek to Warm Springs Creek. Otoliths were extracted from each individual fish, sanded flat to see their growth rings, then pictures and measurements were taken.

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Differences between otolith and fin ray estimates of size at age will be investigated by comparing differences in aging technique and controlling for key environmental conditions, such as temperature and flow for the years of growth. To describe growth patterns across the fish collection sites, we will compare variation in growth trajectories among individuals, sampling sites, and broad river sections (upper, mid, and lower) to explore the scale of variation and identify areas of high growth.

Physical Sciences Poster Session #2 - 3:00 - 4:00 pm

Poster #43 - Nitrogen Pulses and Competition between Native and Invasive Plant Species
Author(s): Nicolas Matallana, Mandy Slate Mentor: Ray Callaway

Variation in the timing and size of resource fluctuations can influence how plants grow, allocate biomass, and reproduce. Resources are sometimes made available in relatively continuous, reliable pulses while other times they are temporally separated and unpredictable. Native and invasive plant species are thought to respond differently to resource fluctuations, or pulses, which can influence competitive outcomes. The "Fluctuating Resource Hypothesis" predicts that resource fluctuations benefit invasive species more than native species, potentially because many invaders are highly effective at rapidly capturing resources. In a field setting, we examined the effects of varying nitrogen pulses on competition between exotic invasive and native species that are common in the intermountain prairie. We planted pairs of two native and two invasive plant species alone and in competition, and these groups of species received one of three treatments: no nitrogen at all (control), one large pulse of nitrogen (0.31 g N), or three smaller pulses equaling the total amount of nitrogen in the large pulse. The total amount of nitrogen added in the treatments was quite small in an attempt to mimic what these plants would be more likely to experience in nature. Invasives competitively suppressed natives regardless of the pulse treatment. Conversely, natives did not influence invasives and there was no effect of nitrogen addition or pulses on natives or invasives. Our results provide relatively limited insight into the impact of nitrogen pulses on plant interactions because the total amount added was low, and did not stimulate growth relative to controls. However, in that context we did not find evidence for any influence of fluctuating resources on the growth or competitive interactions of invasive or native plants.

Poster #45 - The Effects of Lipid Structure on Membrane Fluidity
Author: Cynthia Janku Mentor: J. B. Alexander (Sandy) Ross

Cellular update of molecules, including drugs, can be affected by the fluidity of the membrane. Nanoparticles have been hypothesized to alter membrane fluidity resulting in inflammation and its related clinical effects. Variations in phospholipids can alter a membranes structure and its interaction with drugs or nanoparticles. To study membrane lipid differences and dynamics, we are using nanodiscs and liposomes as model systems. Nanodiscs are a lipid bilayer surrounded by a membrane scaffold protein, which is a derivative of Apolipoprotein A1, a protein involved in the removal of cholesterol from the body. There are important unresolved questions about how the belt protein affects the fluidity of the lipid bilayer. The goal of this project is to learn more about the behavior of lipid-protein interactions and how that affects membrane fluidity. Using nanodiscs made of either DMPC, DOPC, DOPS and cardiolipin with 5% NBD labeled lipid, we can take lifetimes of the nanodiscs at distinct wavelength intervals, which in concert can yield information about the relaxation rate of the lipid bilayers. Fluorescence lifetime is the time it takes between the fluorophores being excited by light and returning to the ground state by releasing photons. Liposomes of similar lipid compositions will be used as a control model system. This study will examine the effects of length and saturation of hydrocarbon tails, temperature, and the overall charge of the lipid to study the relaxation rates of the membranes.

Social Sciences Poster Session #2 - 3:00 - 4:00 pm

Poster #47 - The Importance of Inter-Agency Collaboration in Historical Site Management in Urban Areas
Author: Angela Reichert Mentor: Ashley Kendell

The Western United States is rich in archaeological history. In urban areas there is less development over historical sites due to the increased availability of land. During the Western Expansion of the 19th century there was rapid growth in the West, including the eventual development of residential neighborhoods in larger cities. Western expansion led to construction over preexisting historical sites deemed expendable during the time period. Preplanning and coordination with educational institutions can help prevent damage of historical remains when known human burials are disturbed. Simultaneously, coordinated efforts can assist with the management of public relations during such disturbances. Missoula currently has several unmapped historical sites that were developed over. This past August of 2016 a coordinated effort between the Missoula County Sheriff's Office, the SHPO, and the University of Montana was made during a water main utility upgrade that disturbed some historical graves. There were no preplanned coordinated efforts, and jurisdiction over the disturbance caused some miscommunication and public outcry. The purpose of this poster is to present a discussion of how inter-agency collaboration can help in preplanning for future utility or digging work in and around unmarked historical sites in urban areas. With coordination and preplanning, the appropriate avenues can be taken to monitor historic sites. Preventative measures and protocols can also be put in place for future infrastructure upgrades, which can help alleviate jurisdictional issues and public relations.

Poster #49 - Analysis of Factors Contributing to a Facebook Presence
Author: Megan Miller Mentor: Craig Ravesloot

Through today's technology, online communities can help bring people with disabilities from rural areas together. There are many factors that go into building and maintaining an online community. I examined Facebook as a platform for social media and compared followers, reactions, comments, shares, and tags that occur through alternative interventions. Followers are people who have liked our page, and therefore see our posts. Reactions, comments, shares and tags occur on individual posts. The more we have of each of these, the more reach our posts get. The reach is the audience for each post. The purpose of this study was to examine how interventions like text or photo posts are associated with the growth of a Facebook community. I examined three different interventions that could further the growth of our online community. These included three different post types (text, photo or video), advertising the community page at conferences and paying for Facebook advertising. Results indicate conference presentations generate the fastest growth in followers while posts with pictures and posts with tags generate the most activity. By knowing what people like to see on social media platforms, we can understand better what to post to spread information faster and grow the online community. The results of this study provide an example of how to start an online community for nonprofit organizations and research studies.

Poster #51 - Analysis of the Activity Areas and Cleaned Zones of Floor IIb of Housepit 54
Author: Nicole Musci Mentor: Anna Prentiss

The Bridge River Archaeological Project has been active since 2003 and consists of a collaborative partnership between The Department of Anthropology at The University of Montana, and Xwisten, the Bridge River Indian Band. Since the beginning of the project numerous studies and excavations have been conducted in the Bridge River area to develop an understanding of the ancient history of the area focusing on the ancient peoples who lived there during the past 2000 years. This project involves utilizing "heavy fractions", which are rock and bone materials left over from a process that separates "light fraction" materials (such as botanicals), as well as the database for stone artifacts (lithic database) to test hypotheses about in situ activity areas versus swept or cleaned zones, focusing on small stone artifact debris (meso-debitage) and small bone remains (meso-faunal remains) obtained from floor IIb of the excavated Housepit 54 of the Bridge River Valley. This project requires analysis of

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the data obtained from past studies through the use of GIS mapping combined with research of past papers and documents on the area. Analyzing swept or cleaned zones will provide a more informed understanding of the organization of the household of Housepit 54 during the floor IIb occupation.

Poster #53 - Fostering Resilience in Middle School Students
Author(s): Kaitlin Rasor Mentor: Jacqueline Brown

Resilience is a pivotal attribute for young children to possess during their developmental journey. Research has examined the importance of resilience and how its presence can increase the likelihood of positive outcomes for youth. One key factor that has been shown to increase resilience is connection with a supportive and caring adult. The Kaleidoscope Connect Program is one of the few resilience programs that targets this specific factor and investigates how it affects functioning for at-risk youth. The goal of this research is to evaluate the effectiveness of the Kaleidoscope Connect program with sixth, seventh, and eight grade students in Western Montana, to determine whether students display significant increases in resilience and significant decreases in problem behavior following the implementation of the program. For the purpose of the current study, I will use and analyze preliminary data from self-report rating scales. These rating scales include the Resiliency Scales for Children and Adolescents (RSCA) and the BASC-3 Behavioral and Emotional Screening System (BASC-3 BESS). In addition, I will also provide effective school-based strategies to increase resilience in youth. The long-term goal of the research program is to collect extensive data throughout the course of the upcoming year, as well as examine longitudinal data. Research targeting resilience is especially significant in Montana, due to its rural composition and its consistent rank as a state with high rates of youth suicide. The current project will help school-based professionals identify problems and intervene early, to ensure that at-risk youth obtain necessary adult support.

Poster #55 - The Adaptation of a Culturally Relevant Arts-Based Mental Health Intervention for the People of Guyana
Author: Christopher Morucci Mentor: Lindsey Nichols

Many forms of educational outreach programs today are directed towards disease prevention and physical health. However, there is a troubling disparity with programs that exist to focus specifically on mental health. Mental health care and systemic intervention are an increasing necessity as the World Health Organization has declared depression the leading cause of disability worldwide. Though not the only precipitating factor, depression and other forms of mental disorder are often seen in cases of completed suicide. The South American country Guyana is of specific interest in the implementation of mental health interventions as it currently faces the highest suicide rates in the world. This proposal examines culturally relevant arts-based interventions that have been previously created and used to address HIV and AIDS in African populations. These interventions were chosen due to the specific cultural relevance of using the arts as a medium for change in South America, something that has been previously expressed through the development Theatre of the Oppressed. Adapting these models, an arts-based intervention has been developed to focus on educating members of the Guyana population on mental health and potential practices for increasing well-being. As it is a cross-cultural proposal, historical and cultural information about Guyana is reviewed to provide context for the intervention. Approaching this project with cultural humility, steps to collaborate and use this program in Guyana are of primary consideration. The main objectives of the project are to: (1) increase mental health literacy throughout Guyana, (2) encourage positive practices related to mental health and general well-being, and (3) reduce the rate of suicide amongst the Guyanese population.

UMCUR Visual & Performing Arts Abstracts:

(in order of Room & Performance Time)

UC 327

4:00 pm - Natural Music for Conservation
Presenter: Gavan Borgias Mentor:Nicky Phear

The natural environment faces many grave threats from human development and resource use, yet a great number of people seem to be willfully or truly oblivious to the slow destruction of our one home planet. This project focuses on raising awareness, both of the conservation challenges we face and of the natural beauty we stand to lose, using the medium of original music. I will present a collection of original tracks for which I have written lyrics, arranged and recorded parts, and then produced in a home music studio. There will also be a stripped-down solo live performance of one song. The tracks will have a lyrical focus on climate change and conservation, and be arranged in the form of a small band recording with guitar, keys, bass guitar, drum set, and possibly other instruments. They will also include samples of natural field recordings that I have made of bird song and other sounds I find beautiful and intriguing.
While I have majored in Wildlife Biology and Ecosystem Science & Restoration and minored in Climate Change Studies, I have always been had a great passion for, and stayed heavily involved in, music. I am a longtime multi-instrumentalist with a hobby of music production and a small home music studio setup. I have a field-recording microphone with which I enjoy recording various natural sounds and soundscapes as a hobby, and often include and sample these in various ways in my musical arrangements. It has long been a goal of mine to release recordings to the public. As both a musician and a trained conservationist, I hope to contribute in a new way toward conservation by combining my interests and reaching out to others with my work and possibly inspiring greater care for and stewardship of the natural world

4:20 pm - The Lay of the Land: Three Years in the Bob Marshall Country
Presenter: Jackson Holte Mentor: Erin Saldin

Retired outfitter Smoke Elser insists upon the utmost importance of “interpreting the land” in the outfitting business, and in my time packing and guiding I have come to appreciate the role of the interpreter in transmitting a particular landscape’s intertwining geography, ecology, and cultural history through storytelling. The Lay of the Land: Three Years in the Bob Marshall Country is intended to carry on this tradition, while adapting it to my own perspective as a young man in the social conditions of the 21st century.
The work is a compilation of narrative essays which explore the landscape and culture of the Bob Marshall Wilderness and the surrounding communities. These stories, drawn from my journals taken while working in the Bob, will remain grounded in the cultural history of the region, lending a broader perspective on my role in the story. An accompanying literature review will also analyze techniques used to create a geographical identity in Bernard DeVoto’s historical narratives and Ivan Doig’s personal narratives, then examine how those techniques may be applied in my own work to build on the lineage of Howard Copenhaver and Bud Cheff’s stories from the Bob. It is my intention for the work to imbue the reader with a sense of place and cultivate an ecological conscience based upon the life of the Crown of the Continent.

UC 331

4:00 pm - Choreography Conversations: Collaborating from a Distance
Presenter: Carissa Lund, Hannah Dahl Mentor: Nicole Bradley Browning

As a choreographer, I find my voice through dance. I look to tell stories as clearly as possible so audiences can watch my narrative. This got me thinking, is it possible for two choreographers to create a piece through conversation? Essentially a back-and-forth dialogue that will end in a piece.
For this project my partner and I will be exploring just that. How two choreographers can develop a piece through back-and-forth collaboration. Focusing on innovating methods of discussion and how that can influence our final work. This conversation element will be featured given the fact that my partner and I will be in different states while creating this work. We will use technology as means to connect at our distance and will develop the work separately until we reunite in April.

4:20 pm - A Generation of Katnisses: The New Power of Female Protagonists in Young Adult Dystopian Literature
Presenter: McKenzie Watterson Mentor: Erin Saldin

This two-part project is one of first literary critique, and then participation in literature itself. It begins with an examination of the emerging heroines within young adult dystopian literature. Considering the female protagonists of The Hunger Games, by Suzanne Collins, The Parable of the Sower, by Octavia Butler, and Divergent, by Veronica Roth, among many others of the genre, I attempt to find the commonalities that make these heroines so powerful within their worlds and poignant on the page. My research considers the changed universes and communities in which they exist, questioning how their dystopian environment grants them different agency than that of female protagonists in other literary traditions. I also examine the heroines' common sources of power and/or motivation, using feminist ethics of care as a baseline. Finally, my research attempts to outline the common attributes, both positive and negative, of these women, trying to craft a recipe of sorts for these dystopian heroines.
In the second part of the project, I participate in the tradition I examine so closely in my research; I write my own dystopian fiction, crafting a female protagonist that is informed by those I have studied. In my chapters, I will attempt to not only recreate a "Katniss", but also add my own ingredients to the character, hoping to enrich the genre with something (or someone) new.
Ultimately, my project is a careful tribute to the women redefining their role within the pages of a novel.

4:40 pm - The Missoula Monologues
Presenter: Lexi Klawitter Mentor: Brock Tessman

As a modern, local version of The Vagina Monologues by Eve Ensler, The Missoula Monologues (TMM) consists of a series of community members sharing their stories in monologue performance style. TMM intends to engage the audience's empathy through personal narrative, creating a grassroots movement for social change. As an annual event, TMM focuses on a different topic each year, depending on the relevant issues of the time and always including as diverse a group of speakers as possible. The theme of the 2017 Missoula Monologues is "Toxic Masculinity." This aims to analyze the detrimental effects of the disconnect between individuals' identities and the social stereotypes projected onto them. The variety of the speakers' perspectives will present the audience with a set of lenses through which to examine the stigmas surrounding archetypal masculinity. An emphasis on male survivors of sexual assault, a prime example of the harmful effects of toxic masculinity, will accompany the raw humanity of the monologues in the form of short excerpts presented by University of Montana students. My presentation of TMM will include the compilation of these selected pieces of researched literature, printed copies of the speakers' prepared monologues, and my own journaling about the experience.

UC 332

4:00 pm - A Reflection on My Writing Process
Presenter: Madison Hinrichs Mentor: Debra Magpie Earling

For my honors research project I investigated the techniques of established contemporary writers, took a specific look into their different ways of framing a story through the guise of recollected memory, and used their conventions and mechanisms to develop my own original work. I also studied the elements of noir, speculative, and realistic fiction, as I am primarily interested in those genres. In the process I examined my old workshop material, with revision in mind, and selected the pieces with the most potential for improvement. I then developed and polished these into two short works of fiction that I hope to submit to literary magazines for publication. I also planned out and began to work on my first novella. Through personal essay I reflected back on my writing process and what I learned from my research and examined how I might move forward with my work.

4:20 pm - Dépaysement
Presenter: Makenzie Thompson Mentor: Robert Stubblefield

A friend once explained to me a French word that does not exist in English. The word is dépaysement, which means, quite literally, to be "uncountried." To experience dépaysement is to be disoriented in a different country—something that I experienced firsthand while studying abroad in France last semester. It made me call into question both my identity and my nationality, and inspired me to draw upon some of that experience and channel it into a creative piece. My project is a novella titled Dépaysement; it is a fictional work featuring an American protagonist named Jack who is living abroad. Dépaysement explores the eternal question of identity as Jack tries to come to terms with hers: as a woman, as a foreigner, and as a person who is apart from loved ones back home. While my time in France plays a heavy role thematically in my novella, the narrative is purely imagined. Dépaysement is thus a reconciliation of memory and fiction, seeking above all to resonate with the reader and perhaps even lead them to consider their own place in the world.

4:40 - Eigengrau
Presenter: Jesse Rowan Mentor: Erin Saldin

Jorge Luis Borges once wrote that "A book is more than a verbal structure or series of verbal structures; it is the dialogue it establishes with its reader ... A book is not an isolated being: it is a relationship, an axis of innumerable relationships."