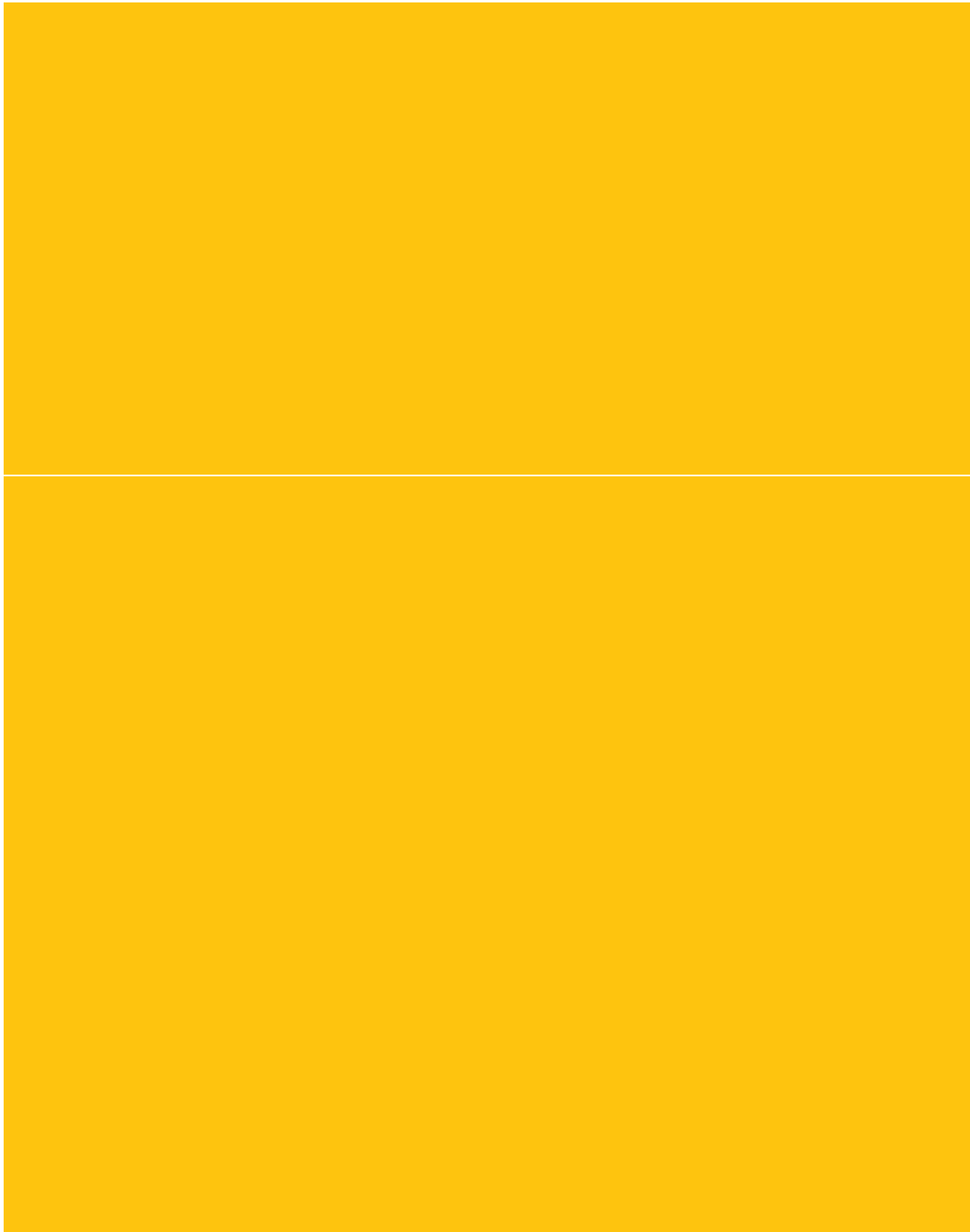


Student
Undergraduate

Research
Festival

2016



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& Posters

Introduction & Acknowledgements

“The outcome of any serious research can only be to make two questions grow where one grew before.”

Thorstein Veblen

A student—let’s say this person’s a sophomore at Carroll, one who’s only recently decided to pursue a degree in Political Science or possibly French or maybe Mathematics—shows up for her first class of the term. Having arrived early and thus well before any of her classmates, she’s surprised upon entering the room on the second floor in Simperman to find a group of people sitting in a circle engaged in a heated discussion. She worries, as anyone would under the circumstances, that perhaps she’s in the wrong place, and she furtively checks her schedule to be sure she’s where she’s supposed to be. She is. So, she takes a seat outside of the circle in one of those funky yellow chairs and decides to keep a low profile until other students arrive. Meanwhile, the group grows more animated, and she can’t help but be curious as to what these people are talking about. She listens closely, as you might when deciphering airport announcements while traveling in another country—however, she can hardly understand what they’re saying. She’s not even certain if, in fact, they’re speaking English. Still, for some reason, she’s intrigued—she’s intrigued to the point of forgetting about feeling out of place.

Time passes. She’s not sure how much. Minutes? Hours? She doesn’t know and, oddly, eventually doesn’t care. She’s become mesmerized by the discussion and, soon enough, she rolls closer and begins involuntarily to understand words and phrases and, before she knows it, entire arguments. Then, it happens. She wants in, something the group apparently understands. Chairs scoot, the circle widens, and the student joins the conversation, introducing into the scrum not another idea or argument but instead a question, her question, one that grew out of the dialogue, one she suddenly, seriously wants to try to answer.

This metaphor of the academic conversation is not my invention; it’s a conceit that’s been around in various forms just shy of forever. Yet each year, in every discipline, students enter into ongoing discussions that seldom end in answers but instead spawn still more and more questions. Some of these in fields such as Philosophy and Political Science are as old as the Greeks, and some deal with still more timeless topics, the theologians wrestling with questions concerning the origins of an unmoved mover and students of physics tackling topics tied to black holes, both sets of scholars sort of wading their way up the stream of inquiry toward some font, some hidden headwaters. Some conversations are contemporary, and thus enable students to engage with living scholars who become through collaborations colleagues, while other conversations are decades old, and yet far from stale.

All of these forays into scholarship—all of these entries into debates and dialogs—are facilitated in some significant, thoughtful way by our faculty. Our professors provide the scaffolding and necessary inroads into disciplines that makes our students’ work possible. More importantly, perhaps, our faculty empower their students by modeling inquiry and pursuing rigorous research, and by pushing and praising our students when they need one or the other form of mentoring.

In the past year, our on-campus conversation has become louder and more animated by leaps and bounds, the number of entries into this event jumping from 35 posters and 15 presentations in 2015 to 41 posters and 43 presentations this spring. This is a trend we believe will continue here at Carroll, as our faculty have fully embraced teaching practices that put students and their questions about the world around them at the forefront of an exciting, innovative approach to teaching and learning.

Today we take time out of our routines in order to celebrate those questions, these students, and their professors. We applaud our students’ bravery, creativity, diligence, and temerity, and we thank them for their courage and their shared, well-earned insights. We likewise thank their faculty mentors for making room in their respective disciplinary conversations for more voices.

We would especially like to thank the collective efforts of Dr. Brandon Sheafor, Dr. Jeannette Fregulia, Dr. Ryan Hallows, and Dr. Eric Sullivan, members of the SURF Committee and the people who made this day possible. We likewise extend our sincere thanks to Christian Frazza and our library staff for their support of these projects, to Alan Hansen and the IRB Committee for their tireless efforts to guide students through the vital but taxing IRB process, and to Ms. Maria Larson, who helped facilitate not only the IRB applications as well as the preparations that went into making this SURF event such a tremendous success.

DR. COLIN IRVINE, Vice President for Academic Affairs & Dean of the College
CATHERINE DAY, Associate Vice President of Academic Affairs

“Research is formalized curiosity. It is poking and prying with purpose.”

Zora Neal Hurston



Carroll College Research Festival Schedule

April 26, 2016

Note: The presenter's major is listed in parentheses after the presenter's name.

Session 1 Presentations, 1 to 1:45 p.m.

1A: TRINITY LOUNGE

Jasmine Phan (Biochemistry/Molecular Biology)
Field of Study: Organometallic/Organic Chemistry

**Synthesis of η^6 Chloro Arene Ruthenium
Compounds and Stereoselective Binding Study**

*Reesi Marquis (Nursing), Becca Poliquin
(Communication), Alex Poulsen (Psychology)*
Field of Study: Gender Studies

**Unapologetic: An Examination
of Feminist Theory**

Lauren Scofield (Biochemistry/Molecular Biology)
Field of Study: Globalization/Gender/
Communications

**Maternal Mortality: Causes, Progress,
and Global Strategies for Improvement**

1B: SIMPERMAN 101

Elizabeth Carlson (Mathematics)
Field of Study: Applied Mathematics

**Analyzing the Effects of Topography
on High-Altitude Balloon Descent**

Amber Graf (Psychology)
Field of Study: Social Psychology

**Outgroup Homogeneity Effect and Individuals
with Disabilities: How Contact and Knowledge
Affect Perceptions of Similarity among Those
with Intellectual and Physical Disabilities**

*Frederick Gray (Political Science, International
Relations and Theology), Victoria Hill (Biology)*
Field of Study: Theology

Heloise: the Holy Harlot

1C: SIMPERMAN 114

Inderbir Bains (Biochemistry/Molecular Biology)
Field of Study: Organic Chemistry

**The effect of η^6 -ruthenium arene complexes
as electron-withdrawing dienophile
substituents in Diels-Alder reactions**

Hunter Harridge (History)
Field of Study: Anthropology

**Confusion and Conflict: A Behavioral
Examination of the Uktuhikhalingmiut Inuit**

Melanie Vert (Sociology)
Field of Study: Psychology

**Does Race influence College Students'
Decision to Help their Peers?: The Effects of
Aversive Affect and Racism on the Decision
to Help White, Black, or Native Americans**

1D: SIMPERMAN 314

Jacob Fiocchi (Biology)
Field of Study: Philosophy

A Composite Conception of Human Rights and Its Implications for Health Care

Ryan McCauley (Accounting and Finance)
Field of Study: Finance and Economics

Check Yourself Before You Wreck Your Wealth

Taylor Rose (Nursing and Psychology)
Field of Study: Nursing and Psychology

A Comparison of Perceived Stress among Undergraduate Nursing, Education, and Engineering Students**1E: CORETTE LIBRARY SAGE ROOM**

Taylor Peck (Mathematics for Secondary Education)
Field of Study: Mathematics and History

Modeling and Analysis of Custer's Last Stand

Madison Jones (Business Administration)
Field of Study: Business/Consumer Behavior

Fair Trade Awareness

Sandra Torres (Sociology–Criminology)
Field of Study: Sociology–Criminology

Fathering From Prison: A Comparative Study on Parent Education Within the Montana Men's State Prison and the National Fatherhood Initiative**Session 2 Presentations, 2 to 2:45 p.m.****2A: TRINITY LOUNGE**

Jacob Akeret, Walter Chancy, Augustus Di Paulo, Daniel East, Chase Farrell, Katarina Goettlich, Ty Irving, Skylar Ittner, Kimberly Johnson, Kyle Jones, Natalie Kassa, William Noce-Sheldon, Alexander Piedra, Crystal Schmidt, Derek Sherlock, Joseph Stoutt—Entrepreneurship panel
Field of Study: Business/Entrepreneurship

Entrepreneurship Overview**2B: SIMPERMAN 101**

Megan Arant (Anthrozoology)
Field of Study: Anthrozoology

Persistent Behavior in Domestic Dogs (*Canis lupus familiaris*)

Juliana Forte (Psychology)
Field of Study: Philosophy

Shorty Doesn't Wanna Be a Thug: An Analysis of the Moral Responsibility of Street Gang Members

Kellea Nichols (Biochemistry/Molecular Biology)
Field of Study: Mathematics

What is Efficiency?: Mathematical Analysis of St. Peter's Physical Therapy Department Efficiency**2C: SIMPERMAN 114**

Hadley Chambers (Spanish and Psychology), Leah Henningsen (Psychology), Molly Moloney (Psychology)
Field of Study: Psychology

The Ins and Outs of Body Image: The Role of Locus of Control in Self-Perception

Ryan Armstrong (Computer Science and Mathematics)
Field of Study: Mathematics, Decision Analysis

To Be Secure or Not to Be?

Alex Kurtz (Biochemistry/Molecular Biology), Garrett Ryerson (Biology)
Field of Study: Ecology

Systematic Analysis of Mountain Lion Population Trends, Examining Environmental, Urban, and Prey Factors**2D: SIMPERMAN 314**

Tyler Zimmer (Mathematics and Chemistry)
Field of Study: Mathematics

Dulse Seaweed: Bacon of the Sea

Chloe Hendrickson (English Literature)
Field of Study: Postcolonial Studies

We Teach Anger, Sir: Examining the Politics of Emotion in Resistance Literature

Stephanie Christensen (*International Relations*)
Field of Study: International Relations

Modern Terrorism: Comparing the Online Recruitment Methods of ISIL and the Aryan Nation

2E: CORETTE LIBRARY SAGE ROOM

Jake Johnson (*Engineering Science–Engineering Mechanics*), Chris Michael (*Engineering Science and Physics*), Al Olszewski (*Engineering Science*)
Field of Study: Mathematics and Optimization

Modeling Syrian Refugees throughout Europe and the United States

Alex Polsin (*History*)
Field of Study: History

A Warrior's Nightmares

David Anderson (*Biology*), Leah Esposito (*Biology*), Ted Olenick (*Biology*)
Field of Study: Statistics

Does Price Affect Perception of Quality?

Session 3 Posters, 3 to 4 p.m. Campus Center upper level

Courtney Geary (*Health Sciences*)
Field of Study: Epidemiology

Acute Flaccid Myelitis

Colby Henry (*Biochemistry/Molecular Biology*)
Field of Study: Molecular Biology

Analysis of *FBP1* gene expression in UV light-exposed *Tetrahymena thermophila* cultures

Dillon Boelman (*Psychology and Anthrozoology*), Michael Donnelly (*Psychology*), Kathryn Goins (*Psychology*), Sarah Leonhardt (*Psychology*), Hannah Roberts (*Psychology*)
Field of Study: Psychology

Attachment and Emotions in Canines

Taylor Hanser (*Nursing*), Bridgette Oberweiser (*Nursing*), Madison Wall (*Nursing*)
Field of Study: Nursing

Birth Positions: A Literary Review of Maternal Outcomes Related to Various Birthing Positions

Kayla Bayer (*Civil Engineering*), Carissa Yedica (*Civil Engineering*)
Field of Study: Civil Engineering

Blue Cloud Home Owner's Association: Drainage Assessment and Re-design

Alexa Daskalos (*Nursing*), Christina Gordon (*Nursing*)
Field of Study: Nursing

Cancer and Aromatherapy

Hanna Dotson (*Biology*)
Field of Study: Biology—Infectious Disease Ecology

Comparison of Capture Methods and Infection Rates for the Tick, *Dermacentor andersoni*, in Montana

Claire Hooper (*Psychology*)
Field of Study: Psychology

A Comparison of the Effects of a Human Sexuality Course on Students' Sexual Attitudes, Behavior, and Knowledge at a Private, Catholic Liberal Arts College and a Public Liberal Arts College

Kerri McInnis (*Biochemistry/Molecular Biology*), Kendall Patch (*Biology for Secondary Education*)
Field of Study: Molecular Biology

The Effect of Exposure to UV Light on Rad51 Expression in *Tetrahymena thermophila*

Katie Bouchard (*Nursing*), Mariah Carlson (*Nursing*), Kailin Taylor (*Nursing*)
Field of Study: Nursing

Effects of ADHD Treatment on School Performance

Conner Kane (*Biology*), Jasmine Phan (*Biochemistry/Molecular Biology*)
Field of Study: Biology

Effects of Fatty Acids from Avocados on Expression of the HMG1 Gene in *Tetrahymena thermophila*

Tessa Littlefield (Health Sciences)
Field of Study: Public Health

Effects of Indoor Tanning on Risk of Developing Skin Cancer: Physical and Psychological Factors

Jasmine Phan (Biochemistry/Molecular Biology)
Field of Study: Biochemistry

Effects of Lignin on the Growth and Cellulolytic Activity of *Acidothermus Cellulolyticus* and *Streptomyces* sp., two thermophilic candidates for cellulosic bioenergy production

Istvan Feldman (Psychology)
Field of Study: Psychology

Effects of Positive Encouragement on Exam Scores

Lauren Cain (Nursing), Brianna Olson (Nursing), Linnea Zier (Nursing)
Field of Study: Obstetrics

Effects of Sexual Assault on Pregnancy and Delivery

Tim Brunson (Biochemistry/Molecular Biology/Computer Science), Rachel Lefstad (Biology/Biology for Secondary Education)
Field of Study: Biology

The Effects of Warming Temperatures on Rad51 in *Tetrahymena thermophila*

Kevin Gardner (Biology), Ian Lorang (Biology)
Field of Study: Molecular Biology

Environmental Effects on the ATP1 gene in *Tetrahymena thermophila*

John Brothers (Biochemistry/Molecular Biology), Alexis Gerry (Biology), Lauren Scofield (Biochemistry/Molecular Biology)
Field of Study: Biology

Exploring the Effects of Environmental Temperature on CDC-7 Expression in *T. thermophila*.

Elisabeth Miller (Biology)
Field of Study: English Literature

Feminine Romanticism in Mary Shelley's *Frankenstein*

Ellena Kling, Terrence McClement, Rachel Mohr, Renae Ockford and Kathryn Zing
Field of Study: Nursing

Use of oxygen therapy during acute myocardial infarction

Samantha Bastida-Hall (Nursing), Matija McLaughlin (Nursing)
Field of Study: Nursing Practice

Help-seeking attitudes of women during childbearing years

Maggie Bailey (Nursing), Jesse Naert (Nursing)
Field of Study: Nursing

Herbal Remedies: An Alternative to Pharmaceutical Migraine Treatment

Jessica Denboer (Nursing), Natalie Johnston (Nursing)
Field of Study: Nursing—Women's Health

Hypnotherapy as Pain Management during Childbirth

Gabriella Luchini (Nursing), Savanna Sigl (Nursing), Theresa Torres (Nursing)
Field of Study: Nursing

In hospitalized patients who report pain, how does administration of spiritual care versus no spiritual care affect pain level?

Greer Davis, Kara Fuhringer, Holly Galen, Peter Kuzmack, J.T. Linder, Travis Mahoney, Ryan McCauley, Carlee Norbeck, Mark Stiffler, Tyler Thayer—Business Department; Accounting/Finance
Field of Study: Accounting

Integrated Reporting: People, Planet, and Profit

Dmitry Shulga (Chemistry)
Field of Study: Chemistry

Investigating Kinetics of a Reaction by Instrumental Methods

Jesica Bauer (Mathematics)
Field of Study: Mathematics

Keeping Up on Inventory: Stocking the Helena Food Share

Sarah Ladd (Health Sciences)
Field of Study: Health Sciences

Microbial Community Characterization in an Arsenic Contaminated Watershed

Carly Colligan (Nursing), Brynja Schick (Nursing)
Field of Study: Nursing

**New Treatment for Breast Cancer:
Keep Your Hair and Be Aware**

*Alexa Armbruster (Nursing),
Maggie Panasuk (Nursing)*
Field of Study: Nursing

**Plan B: An Alternative to SSRI
Treatment of Depression**

*Elaina Ausbrooks (Nursing), Kendra Branch
(Nursing), Ximena Mendieta (Nursing)*
Field of Study: Nursing—Postpartum Depression

**Postpartum Depression and the
Maternal Child Bonding Experience**

Laura Combs (Nursing), Morgen Kiff (Nursing)
Field of Study: Postpartum Health

Postpartum Depression: A Secret Battle

Katelyn Friedt (Biology), Jake Gilbertson (Biology)
Field of Study: Statistics—Psychology/Biology

**The Relationship Between Related and
Unrelated Words in Memory Conversion**

Leah Esposito (Biology)
Field of Study: Molecular Biology

**The Role of Dctn2 and Dync1li1
in the Trafficking of GluR2-
containing AMPA Receptors**

Stephen Schmidt (Chemistry)
Field of Study: Chemistry

Sodium in Saddle Soap

Erin Hanson (Chemistry/Biology)
Field of Study: Organic Chemistry

Stereoselective Synthesis of [CpRu*(η^6 -arene)]*X*
Complexes from Air-stable Ruthenium Sources**

Kurt Parker (Biology)
Field of Study: Health Sciences

**Studies of Antibiotic Resistance in an
Arsenic Contaminated Watershed**

Olivia Duletski (Chemistry)
Field of Study: Chemistry

**Synthesis and Characterization of (*E*)-
1,3,3-trimethyl-2-(2-(thiophen-2-yl)vinyl)-
3*H*-indol-1-ium iodide for the Potential
Application in Solar Energy Storage**

Dain Adams (Chemistry)
Field of Study: Chemistry

**Synthesis of Quantum Dots using
Cadmium and Selenium**

Dallas Vanluchene (Health Sciences)
Field of Study: Health Sciences/Microbiology

**The Tracking of *Yersinia Pestis* using Multi-
Locus Variable Tandem Repeat Analysis**

*Tanner Gustavsen (Biochemistry/Molecular
Biology), Molly Maloney (Biology)*
Field of Study: Biology

**UV light exposure and *Tetrahymena*
thermophila: the expression of
PHR2 & MSH2 genes**

Sigma Beta Delta Award Ceremony 3 to 4 p.m.

CORETTE LIBRARY SAGE ROOM; BUSINESS DEPARTMENT

Session 4 Presentations, 4 to 4:45 p.m.

4A: TRINITY LOUNGE

Tyler Zimmer (Math and Chemistry)
Field of Study: Mathematics

Cortisol in Pika Hair

Connor Smith (Biology)
Field of Study: Philosophy

Exercising Power as a Care-Giver: An Argument for Virtue in Childcare

Ian Lorang (Biology)
Field of Study: Biochemistry

Isolation and Characterization of a Bacteriophage

4B: SIMPERMAN 101

Ben Jensen (Mathematics)
Field of Study: Mathematics

Searching for Lost Targets using Bayesian Search Patterns

Ellen Barta (Psychology), Lauren Scofield (Biochemistry/Molecular Biology)
Field of Study: Sociology/Gender Studies

How a Catholic Institution is Addressing Sexual Assault

Jenifer Johnson (Anthrozoology), Karlee Kent (Nursing), Traci Lyndes (Nursing)
Field of Study: Elementary Statistics

Can You Taste without the Sense of Smell?

4C: SIMPERMAN 114

Travis Knoll (Civil Engineering)
Field of Study: Globalization/Communication/Gender

The Globalization of Basketball

Kelly Rostratter (Public Health and Spanish)
Field of Study: Art

Eugenia Balcells: Activism through Art

Alex Chopyak (Mathematics for Secondary Education)
Field of Study: Mathematics Education

Confidence Intervals in a High School Statistics Class

4D: SIMPERMAN 314

Madeline Duval (History, Political Science and Social Studies for Secondary Education)
Field of Study: History

Let Us Not Forget Anita Hill

Jared McCauley (Political Science and International Relations)
Field of Study: International Relations

The Global Economy and Latin America: How Foreign Direct Investment Has Affected Income Inequality in the Region

Dempsey Rogers (Physics and Mathematics)
Field of Study: Physics and Mathematics

2D Numerical Simulation of MHD Instabilities for Nuclear Fusion Energy

4E: CORETTE LIBRARY SAGE ROOM

Jonathan McCarthy (Political Science and International Relations)
Field of Study: Political Science

Household Gun Ownership, President Obama's Approval ratings, and Partisanship in Lewis and Clark County

Nicholas Lumetta (Mathematics and Physics)
Field of Study: Mathematics

An Exploration of Computational Fluid Flow and the Navier Stokes Equations

Erin Hanson (Chemistry and Biology)
Field of Study: Anthropology/Archaeology

Paleoclimate Reconstruction: An Isotope Analysis of Prehistoric Snail Shells

Abstracts



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Session 1 Presentations, 1 to 1:45 p.m.

• 1A: TRINITY LOUNGE

Jasmine Phan (Biochemistry/Molecular Biology)
Field of Study: Organometallic/Organic Chemistry

Synthesis of η^6 Chloro Arene Ruthenium Compounds and Stereoselective Binding Study

Planar chiral (η^6 -arene)Cr(CO)₃ and ferrocene based complexes have demonstrated some use as chiral ligands in enantioselective metal catalysis. Enantioselective transition metal-catalyzed reactions have incredible value in synthesis. It has recently been suggested by Amouri and coworkers that η^6 -ruthenium chloroarene compounds may serve as a synthetic stepping stone to similar complex chiral ligands due to the chlorine substituent's propensity to undergo nucleophilic aromatic substitution with a wide variety of nucleophiles. These researchers used a precedent set by Uemura and coworkers to prepare highly enantioenriched samples of an η^6 -ruthenium complex derived from an ortho-chlorobenzyl alcohol. This compound was converted to an η^6 -ruthenium ortho-phosphinobenzyl alcohol and subsequently bound in a monodentate fashion to a gold(I) metal center through the phosphine, but was not used for catalysis. In the current study, we plan to study the stereoselectivity resulting from η^6 -complexation of ortho-chloro *a*-substituted benzyl amines. The resulting complexes could serve as valuable synthetic intermediate for construction of planar chiral ortho-phosphino *a*-substituted benzyl amine η^6 -ruthenium complexes similar to those used with related chromium tricarbonyl and ferrocene systems. Currently, 1-chloro-2-(1-propylaminoethyl)-benzene has been synthesized and isolated pure. The associated η^6 -ruthenium complex has been synthesized, mostly purified, and studies are underway to characterize this compound by X-ray crystallography. Synthesis of another η^6 -ruthenium complex using a more synthetically useful para-methoxyphenylamine is also ongoing.

Reesi Marquis (Nursing), Becca Poliquin (Communication), Alex Poulsen (Psychology)
Field of Study: Gender Studies

Unapologetic: An Examination of Feminist Theory

Combining three different feminist perspectives, our panel considers feminist theory and analyzes the impact this movement has on individuals. Beginning with the oppression of females, we discuss how stereotypes of women create a "second sex" that fills women with self-doubt and leads to lack of self-esteem. This second-class status has prompted women to rise up and fight for equality. We explore the catalyst for a feminist transition and the duties women hold once they shift their schema in a gender-equal direction. Finally, we dissect the individual nature of feminist theory and how it allows for the plurality and diversity needed to encompass all and create change. These different perspectives combine to explain feminist theory through our eyes and give a voice to millennial views about feminism.

Lauren Scofield (Biochemistry/Molecular Biology)
Field of Study: Globalization/Gender/Communications

Maternal Mortality: Causes, Progress, and Global Strategies for Improvement

International maternal health care is a serious global issue demanding attention to the problems faced by pregnant women, as well as to the progress that has been made. The rate of maternal mortality varies across the world because of differences in development, but the health-related causes of these mortalities

have been found to be fairly consistent. Progress has been made in decreasing global maternal mortality rates, largely due to the increase in communication technology. For example, the expansion of mobile phone use and internet access worldwide has enhanced and complemented the provision of quality health care in many rural areas of developing countries. This research analyzes effective methods for decreasing the maternal mortality rate globally and concludes that increased education and technology could be the answer to the problem.

• 1B: SIMPERMAN 101

Elizabeth Carlson (Mathematics)

Field of Study: Applied Mathematics

Analyzing the Effects of Topography on High-Altitude Balloon Descent

High-altitude balloons are often used to collect data from the atmosphere, and it is imperative to know where the payload will land in order to recover scientific equipment intact. Building on an experimentally-based prediction model for high-altitude ballooning developed by this student, this project works to incorporate the effects of Montana's mountainous topography on a wind profile calculated via a numerical solution to the Reynolds Averaged Navier-Stokes equations. The trajectory of the balloon and its payload are tracked through the wind field and over the mountainous terrain using Newtonian physics.

Amber Graf (Psychology)

Field of Study: Social Psychology

Outgroup Homogeneity Effect and Individuals with Disabilities: How Contact and Knowledge Affect Perceptions of Similarity among Those with Intellectual and Physical Disabilities

Our research examines how contact, attitudes and knowledge influence the outgroup homogeneity effect—the perception that outgroup members (i.e., those with disabilities) are similar to one another while ingroup members (i.e., those without disabilities) are diverse. We examined how similar individuals with physical and intellectual disabilities are perceived to be on warmth (e.g., friendliness, humor) and competence (e.g., intelligence, independence) traits. Warmth and competence traits were selected as the stereotype content model (Fiske et al., 2002) found that people perceive individuals with disabilities to be high in warmth traits but low in competence traits. Participants indicated the extent to which those with physical, intellectual, or no disabilities are similar on a variety of warmth and competence personality traits and reported their knowledge, attitudes, and contact with individuals with intellectual or physical disabilities. Our results demonstrated that compared to people without disabilities, those with physical and intellectual disabilities are perceived to have greater homogeneity in warmth but not competence characteristics. Furthermore, contact with individuals with intellectual or physical disabilities was a predictor of less perceived homogeneity in those with disabilities. This study provides valuable insight into how contact and greater knowledge about disabilities can lead to positive attitudes, lesser stigmatization, and perceptions of diversity among various disability groups.

Frederick Gray (Political Science, International Relations and Theology), Victoria Hill (Biology)

Field of Study: Theology

Heloise: the Holy Harlot

Heloise Argenteuil, most famous for her association with medieval logician Peter Abelard, expresses deep regret at her monastic situation. Her desire to not marry Abelard appears as a reflection of her love for intellectual freedom. This tension between submission and freedom makes Heloise an interesting figure for political, gender, and theological analysis. This paper undertakes an exploration of Heloise's

thought, asking if it reflects a form of feminism, instructive to contemporary theory and practice. We posit that her philosophy and theology take seriously the role of women in society and explore how it interacts with modern day feminism and the contemporary Catholic Church.

• 1C: SIMPERMAN 114

Inderbir Bains (Biochemistry/Molecular Biology)

Field of Study: Organic Chemistry

The effect of η^6 -ruthenium arene complexes as electron-withdrawing dienophile substituents in Diels-Alder reactions

η^6 -Ruthenium arene complexes have proven to be valuable intermediates in organic synthesis due to the metal's ability to act as an electron-withdrawing group (EWG), making reactions such as nucleophilic aromatic substitution and deprotonation of benzylic and aromatic positions very facile. These complexes are also able to impart stereoselectivity by blocking incoming electrophiles/nucleophiles from one face of the aromatic ring due to steric hindrance created by the metal-ligand environment. Despite being a known EWG, there has been very little research investigating these complexes ability to modulate reactivity of alkenes pendent to the complexed arene. In particular, only one example has been reported using an η^6 -ruthenium arene complex as an accelerating group for a Diels-Alder (DA) reaction, which is known to be facilitated by electron-withdrawing dienophile substituents when reacted with an electron rich diene. Herein, we report our initial findings into using the electron-withdrawing (η^5 -cyclopentadienyl) Ru^+ ($CpRu^+$) metal fragment as a potential mediator for DA reactions. Currently, we have successfully synthesized a model dienophile substrate, $[CpRu(\eta^6-(ethyl\ trans-cinnamate))]PF_6$ and observed evidence from a crude 1H NMR spectrum that the complex undergoes a DA reaction with 2,3-dimethyl-1,3-butadiene.

Hunter Harridge (History)

Field of Study: Anthropology

Confusion and Conflict: A Behavioral Examination of the Uktuhikhalingmiut Inuit

Between 1955 and 1970 the Uktuhikhalingmiut Inuit or Uktu of the northern Canadian Arctic abandoned their nomadic hunter/gather subsistence lifestyle which had persisted for thousands of years. During this fifteen year period, the entire Uktu Inuit group made the quick unpleasant transition to sedentary living in government settlements. They had enjoyed self subsistence living on their traditional land, but could not resist western goods that eventually drew them into the settlements. The quickness of this change left the Uktu little time to adapt and perhaps little need to. The government welfare provided in settlements made self subsistence living obsolete. This caused behavioral changes amongst the ever shrinking number of stubborn holdouts who remained reliant on the land for survival by choice. Practices that had been beneficial to the Uktu in the past were suddenly no longer adaptable or necessary. Western influences led to new behaviors that had never been exhibited before. These changes were the cause of confusion and frustration amongst the Uktu and ultimately led to an end of their way of life.

Melanie Vert (Sociology)

Field of Study: Psychology

Does Race influence College Students' Decision to Help their Peers?: The Effects of Aversive Affect and Racism on the Decision to Help White, Black, or Native Americans

This study investigates discrimination toward helping victims of different races in emergency situations. Aversive racism theory states that those who are uncomfortable in situations with out-group members will self-report non-prejudiced attitudes but still avoid encounters with another race, a form of discrimination.

Consistent with this theory, we predict that participants' aversive affect, not racism, will predict helping Whites more than Blacks or American Indians in emergencies. Further, using Latane and Darley's (1970) five steps of helping model, we predict that the victim's race will influence participants' helping decision. Specifically we predict that White participants, especially those higher in racist beliefs, will be more likely to take responsibility for helping in-group vs. out-group victims. Participants completed racism measures then, at a later time, read passages written by White, Black, or American Indian students describing difficulties they were experiencing in college. Participants provided written advice, reported their feelings toward the situation, and answered questions following the five steps of helping model. Aversive affect did not predict discrimination in the decision to provide help to Black and White victims. Rather, contrary to our predictions, White participants higher in racist beliefs were more likely to take responsibility for Black vs. White victims. This may be explained by previous research using aversive racism theory that found Liberals to be more likely to overcompensate in helping scenarios, leading to a high likelihood of helping out-group over in-group members. We are currently conducting follow-up studies to assess qualitative advice, political affiliations, and impacts of priming on participants. Implications include understanding how feelings influence helping decisions in real interracial helping situations like natural disasters where helping is urgent.

• 1D: SIMPERMAN 314

Jacob Fiocchi (Biology)

Field of Study: Philosophy

A Composite Conception of Human Rights and Its Implications for Health Care

The idea of human rights is one that carries great importance in global relations, ethical discussions, and conflict resolution. As such, it is important that human rights be described by a concept that is grounded in reason, functionally useful, and morally defensible. Many concepts exist regarding human rights, but none has fully achieved all of these aspects simultaneously. In this paper, I examine some of the existing conceptions of human rights and shed light on how they function well and where they may have failures. Following this exercise, I will suggest a conception of human rights that is a composite of existing theories. This composite conception will draw from a combination of the natural law and utilitarian theories. I will then offer a thought experiment to attempt to show that, under this conception, basic health care ought to be considered a human right.

Ryan McCauley (Accounting and Finance)

Field of Study: Finance and Economics

Check Yourself Before You Wreck Your Wealth

The Efficient Markets Hypothesis (EMH) has been financial dogma since the 1970s. With varying levels of predicted efficiency, the EMH can be categorized into three forms: weak, semi-strong, and strong. Two defining characteristics of the EMH are that securities prices are accurate reflections of all available information, and above-average returns cannot be maintained without taking above-average risks. Essentially, this hypothesis maintains that investors cannot "beat the market." While focusing on the weak form of market efficiency in the U.S. stock market, I investigate the effects that the business cycle and investor psychology may have on the EMH. The purpose of this research is to analyze market efficiency during expansions and recessions of the business cycle by investigating investor expectations with the Capital Asset Pricing Model (CAPM). Special interest is placed on the recent trend of quantitative analysts, or quants, and the issues involved with modeling complex financial instruments and human interaction.

Taylor Rose (Nursing and Psychology)
Field of Study: Nursing and Psychology

A Comparison of Perceived Stress among Undergraduate Nursing, Education, and Engineering Students

The physiological and psychological effects of stress can be detrimental to the health and well-being of a college student. The study examined the perceived stress levels of nursing students and compare them to the perceived stress levels of engineering and education students. This quantitative study consisted of approximately 76 students between the ages of 18–39 attending Carroll College and enrolled in 300-level courses in the nursing, education, and engineering programs (39 nursing students, 21 education, and 16 engineering). The study consisted of 16 male and 60 female participants of all different races. The Perceived Stress Scale-10 was utilized to measure the students perceived stress levels. Results from the study were shown to be statistically significant ($p < 0.05$), with nursing students found to have higher perceived stress levels than education and engineering students. Suggestions for future research would include examining the effect on nursing students' perceived stress levels after the implementation of stress reducing strategies within the nursing program.

• 1E: CORETTE LIBRARY SAGE ROOM

Taylor Peck (Mathematics for Secondary Education)
Field of Study: Mathematics and History

Modeling and Analysis of Custer's Last Stand

This project aims to model the Battle of the Little Big Horn with a differential equation model called the Lanchester Battle Equations. Primary sources were collected and evaluated to determine a conclusive portrayal of the battle on June 26, 1876, in order to generate the most accurate model. Additionally, the strengths and weaknesses of Lanchester Equations, used to predict casualties of ancient and small modern battles, were analyzed from previous works. Finally, this project aims to manipulate the most accurate model of the Battle of the Little Big Horn to estimate how alternative decisions made during the battle would have resulted in different outcomes for the Native American and American soldiers.

Madison Jones (Business Administration)
Field of Study: Business/Consumer Behavior

Fair Trade Awareness

Carroll College was awarded a small grant from Catholic Relief Services to conduct research on the awareness of Fair Trade in the Helena Community. The grant states, "Carroll College will raise awareness about and promote fair trade practices throughout its campus and the surrounding community of Helena, MT, by introducing fair trade in its core curriculum, assessing the local knowledge about fair trade practices through student-run research, and offering fair trade-focused campus events along with public events in the partnership with local Catholic parishes. The goal will be to encourage consumer choices that are consistent with the Catholic Church's longstanding support of the dignity of work and just wages by producing and distributing a reference guide about businesses that sell fair trade products in Helena." It was determined that surveying individuals from three distinct populations would provide an accurate representation of the level of awareness. The three groups are; students attending Carroll College, members of two local Catholic parishes, and randomly selected citizens of Helena. A survey was developed that measures individual attitudes and awareness of Fair Trade. Anonymous surveys were administered on a volunteer basis in various Carroll theology classes, during Carroll College Fair Trade Fridays, after mass at two Catholic parishes in Helena, and intercept surveys given out to downtown Helena shoppers. An analysis of the surveys and secondary data from the Helena community and empirical journals will help to determine the level of awareness and acceptance of Fair Trade in

the Helena community. Results will be used to make recommendations to retailers who sell Fair Trade products in the Helena community on how to increase awareness and sales of Fair Trade products.

Sandra Torres (Sociology–Criminology)
Field of Study: Sociology–Criminology

Fathering From Prison: A Comparative Study on Parent Education Within the Montana Men’s State Prison and the National Fatherhood Initiative

Despite a decrease in crime rates and an increase of state efforts to cut back prison populations, the United States leads the industrialized world with the highest imprisonment rates (Austin and Erwin, 2001; Hartney 2006). Though reasons of incarceration vary, many inmates share the experience of parenthood behind bars. With over half of the incarcerated population claiming guardianship over a minor in the U.S. today, the issue of familial relationships has emerged as a central point of study in recidivism and crime prevention research (Glaze & Maruschak 2010). Out of 1.5 million male prisoners under the jurisdiction of state and federal correctional institutions in 2009, over half had contact with one or more of their children before their imprisonment (West and Sabol, 2010). However, efforts to retain father-child relationships in correctional institutions across the US are failing. The most successful parenting programs emerged from the National Fatherhood Initiative (NFI); However, these programs are only standard in 25 states. Montana is not among them. Through observation and survey research, this study compares the effectiveness of the Nurturing Parent Program currently taught at the Montana State Prison against the success of nationally-recognized programs through the NFI. Findings indicate that, while inmates at MSP who complete the program express a change in self-esteem, parenting methods, and increased contact with their children, they are not receiving comparable parenting education. They are left without the necessary tools to continue this self-improvement after incarceration. Implications of these findings are discussed with the intention of determining if MSP would benefit from a change in their parenting education. Changes could reduce recidivism rates as well as help incarcerated parents maintain legal guardianship of their children post-incarceration.

Session 2 Presentations, 2 to 2:45 p.m.

• 2A: TRINITY LOUNGE

Jacob Ackeret, Walter Chancy, Augustus Di Paulo, Daniel East, Chase Farrell, Katarina Goettlich, Ty Irving, Skylar Ittner, Kimberly Johnson, Kyle Jones, Natalie Kassa, William Noce-Sheldon, Alexander Piedra, Crystal Schmidt, Derek Sherlock, Joseph Stoutt—Entrepreneurship panel
Field of Study: Business/Entrepreneurship

Entrepreneurship Overview

Spring 2016 Carroll College offered a one credit course in Entrepreneurship. John McCarvel (previous CEO of Crocs), Annette Ryerson and Julia Mull (Business Faculty) have been mentoring the students throughout the semester on their entrepreneurial ideas. The course has generated seven new product/service ideas that are currently at different stages of the new product development process. The students are multi-disciplinary and their ideas come from a range of industries. The panel presentation will give each of the teams time to discuss their ideas, obstacles during various stages in the process, plans for the future and learning outcomes.

• 2B: SIMPERMAN 101

Megan Arant (Anthrozoology)
Field of Study: Anthrozoology

Persistent Behavior in Domestic Dogs (*Canis lupus familiaris*)

Behavioral persistence is the continuation of responding without reward. It is important to look at persistence behavior in domestic working dogs so people can better partner with them. In particular, working dogs often have to learn to work under conditions involving little or no reinforcement. To make training more effective for these working dogs, it is important to understand the factors that influence the persistence. Researching persistence also has an application with pet dogs, in order to better understand why some behaviors persist without reinforcement. The presence of stress is also a factor that could affect persistence of behavior. To look at the role of stress, cortisol levels were taken from our participants. We investigated persistence in seven domestic dogs in a foster situation longitudinally. Previous research investigated the differences in persistence of owned dogs compared to shelter dogs. They found that the dogs that were owned were more persistent than dogs in a shelter setting. The goal of the current study is to measure whether we can determine how persistence changes from the time when the dogs were in the shelter, and likely in a state of stress, to six months after dogs are adopted and have adjusted to life in a home. Dogs were trained to touch the experimenter's hand, contingent upon which a treat would be delivered. After twenty trials on alternating hands were completed, the behavior was put on extinction. No further reinforcers were delivered. We recorded how many times the dog continued to touch the hand, as a measure of persistence. Each dog was tested once a month for six months. We analyzed how the dogs changed in their level of persistence over the six months.

Juliana Forte (Psychology)
Field of Study: Philosophy

Shorty Doesn't Wanna Be a Thug: An Analysis of the Moral Responsibility of Street Gang Members

Street gangs are criminal groups that are considered to be resistant to prevention tactics. I believe this resistance is a result of the assumption that individual members of street gangs possess moral responsibility for their criminal actions. This assumption is rooted in the acceptance of theory of moral responsibility described by Harry G. Frankfurt in his essay *Alternate Possibilities and Moral Responsibility*. I will argue that despite Frankfurt's claims in this essay, freedom of action should be required for moral responsibility. In his essay *Freedom of the Will and the Concept of a Person*, Frankfurt describes how a person can be determined in their actions but still morally responsible for said actions because of their freedom to have wanted or not wanted to act. I will maintain that the environmental factors that cause gang activity to have effects on a member's ability to want to act otherwise. I will conclude that the determination of gang members' ability to want removes gang members from moral responsibility. Additionally, I will suggest that my rejection indicates street gang prevention tactics should focus on community-based models.

Kellea Nichols (Biochemistry/Molecular Biology)
Field of Study: Mathematics

What is Efficiency?: Mathematical Analysis of St. Peter's Physical Therapy Department Efficiency

This research project looked into the efficiency of the physical therapy department of St. Peter's Hospital. By analyzing the current schedule, we were able to do a statistical analysis on each of the workers' schedules. From here, we looked into how patients influence the worker's efficiency by either going over or under the allotted appointment time. Using this data, we determined optimal efficiencies and provided recommendations to the clinic.

• 2C: SIMPERMAN 114

Hadley Chambers (Spanish and Psychology), Leah Henningsen (Psychology), Molly Maloney (Psychology)
Field of Study: Psychology

The Ins and Outs of Body Image: The Role of Locus of Control in Self-Perception

This research examined the effects of locus of control on body image satisfaction. In an experiment, undergraduate participants (108 women) responded anonymously to several scales (*Rotter's Locus of Control Scale*, *Body Image Scale*, *Body-Esteem Scale*). In contrast to the hypothesis, females with an external locus of control reported a higher body image satisfaction in comparison to participants with an internal locus of control. According to specific scales, individuals with an external locus of control scored lower on the *Body-Esteem Scale*, but scored higher on the *Body Image Silhouette Scale* and *Rotter's Locus of control scale*. As a result, individuals with an internal locus of control may be more vulnerable to engaging in eating disorder behaviors and internalization of the thin ideal due to a lower body image satisfaction (Adame & Johnson, 1989). This study attempts to extend information and awareness about the correlation between body image and locus of control.

Ryan Armstrong (Computer Science and Mathematics)
Field of Study: Decision Analysis

To Be Secure or Not to Be?

This presentation uses decision analysis and a framework to assess the risk and cost of a hypothetical college/university's information technology (IT) security infrastructure. By making mathematically valid assumptions of risks, costs, and benefits, the framework will tell the college/university what technologies and policies to adopt to protect against the type of attacks most threatening to them, all with consideration to total cost to implement and maintain the security infrastructure. The presentation will also discuss how the framework could be applied to any organization.

Alex Kurtz (Biochemistry/Molecular Biology), Garrett Ryerson (Biology)
Field of Study: Ecology

Systematic Analysis of Mountain Lion Population Trends, Examining Environmental, Urban, and Prey Factors

This research project looks at mountain lion (*Puma concolor*) density within the greater Helena area. The bulk of the research will focus on mountain lion population density in relation to the effects of proximity to urbanization, as well as prey density within the sample area, in order to accurately predict the true population. This project will take place along the Mount Helena Ridge Trail, covering a distance of approximately 4 miles. Print and scat tracking, as well as potential camera trapping, will be employed to determine a base lion population. A scaling system will be incorporated to rank relative distances from trailheads, roads, and housing to create an urban index for comparison with the lion population data. Given previous research indicating preference of densely treed areas as habitat, further characterization of mountain lion density through a canopy cover survey will be utilize a point-quarter system to map the environment throughout the sample area. Furthermore, randomized, one-meter samples will be collected along the path at varying distances to create a prey population index. Each of these indices, along with the actual mountain lion population data will be put together to create a metric measuring the effects of an urban zone and prey population density on the frequency of lion visits to the area. We expect to see a decrease in mountain lion density within areas of lower prey density and closer proximity to human population.

• 2D: SIMPERMAN 314

Tyler Zimmer (Math and Chemistry)
Field of Study: Mathematics

Dulse Seaweed: Bacon of the Sea

Bacon has been a staple of the American food market for centuries. The problem with it, however, is that it is not widely considered to be outright healthy. Bacon as a red meat is naturally high in fat, 2.9g per 7g serving. However, scientists have recently discovered a new strain of algae called dulse that has no fat, less sodium, and almost as much protein as bacon. With regional droughts becoming increasingly severe and sea levels rising with the melting of the polar ice caps; dulse is a great alternative to conventional agriculture seeing as there is a decreasing amount of farmable land and an increasing amount of sea water. We have researched the affects introducing dulse would have on the Pacific Ocean environments we are specifically examining for dulse farming. The following ecological effects were also noted: decreased concentration of aqueous heavy metals, a symbiotic relationship with existing species, and decreased ammonia concentrations in the ocean.

Chloe Hendrickson (*English Literature*)
Field of Study: Postcolonial Studies

We Teach Anger, Sir: Examining the Politics of Emotion in Resistance Literature

This paper analyzes the effectiveness of decolonial critique in two contemporary works of resistance literature: *Curfewed Nights* by Kashmiri author Basharat Peer and “We Teach Life, Sir” by Canadian-Palestinian spoken word artist, Rafeef Ziadah. This paper first identifies each work as a form of “resistance literature” (Barbara Harlow) by situating them within their specific political and historical contexts. This paper will then explain how each work tries to invoke the audience by forcing readers and viewers to acknowledge colonial oppression and resist existing power structures. This paper specifically focuses on the medium the authors have chosen and analyzes their effectiveness in moving the audience. First, both Peer’s memoir and Ziadah’s spoken word performance deploy the autobiographical form to produce decolonial knowledge about the lived experiences of occupied Kashmiri and Palestinian communities respectively. Both of these texts enact the aesthetics and politics of resistance literature. Second, this paper argues that Ziadah’s chosen medium—the spoken word performance—is more effective at pushing the audience to act because of the embodied performance of the artist. This embodied performance allows the artist to emphasize specific lines with body movements and with tone of voice, and in turn articulate her anger. I contend that Ziadah’s spoken-word performance—specifically, her use of her voice and body—creates a sense of affective urgency that is lacking in the delivery of Peer’s written text. In comparison to Ziadah’s charged performance, Peer’s written text is relatively quieter. I draw upon Audrey Lorde’s influential essay, “The Uses of Anger,” to argue that Ziadah’s performance of anger becomes a powerful tool of decolonial resistance.

Stephanie Christensen (*International Relations*)
Field of Study: International Relations

Modern Terrorism: Comparing the Online Recruitment Methods of ISIL and the Aryan Nation

In today’s world, terrorist organizations increasingly take advantage of the Internet for recruitment. In particular social media sites such as Facebook, YouTube, and Twitter are used as a means to disseminate terrorist propaganda and recruit new members. My research focuses on the various motivations individuals have for joining terrorist organizations, the factors that make them more susceptible to recruitment, and the role of social media in this process. While there is no distinct “terrorist profile,” certain attributes increase the vulnerability of individuals to recruitment, suggesting that terrorist recruiters would use similar imagery to target these potential recruits. In this paper, I compared the recruitment methods of ISIL, a terrorist group with self-professed religious motivations, and the Aryan Nation, a white supremacist hate group. By evaluating the recruitment techniques of a religiously motivated terrorist organization in contrast to a racially motivated terrorist organization, I was able to examine whether terrorist organizations with distinctly different motivations target similar/dissimilar individuals for recruitment. I conducted my research using content analysis and by modifying a coding scheme created by David G. Winter. I manually scored ISIL and the Aryan Nation’s propaganda for Power Imagery, Achievement Imagery, Affiliation/Intimacy Imagery, and Religious Reference. I scored a random selection of newsletters/magazines/books, Twitter feeds, and YouTube videos. My findings indicated that Power Imagery was most widely used by the both ISIL and the Aryan Nation across the propaganda mediums, followed respectively by Affiliation/Intimacy Imagery, and Achievement Imagery. ISIL used Religious Reference more than the Aryan Nation, which can be accounted for by their religious motivational ideology.

• 2E: CORETTE LIBRARY SAGE ROOM

Jake Johnson (Engineering Science–Engineering Mechanics), Chris Michael (Engineering Science and Physics), Al Olszewski (Engineering Science)

Field of Study: Mathematics and Optimization

Modeling Syrian Refugees throughout Europe and the United States

A massive surge of refugees to safe haven countries in Europe and parts of Asia has put immediate pressure on refugee integration policies. The crux of the matter—the dignity of the human person—has too often been left behind and forgotten while politicians debate how best to handle them. The attention needed is immediate and profound. We provide a resolution that can be implemented tomorrow. While our paper discusses policy using objective and quantifiable data, it more importantly outlines a distribution and travel plan for refugees and migrants. It's equitable, based on objective and quantifiable data, and can minimize the costs that the EU now faces. We determine the specific factors which enable and inhibit the safe and efficient movement of refugees, it outlines travel routes throughout EU states, determines a countries carrying capacity for refugees, analyzes its feasibility, determines the minimum cost, scales the experiment a factor of 10, and analyzes the sensitivity and robustness. Our paper is an analyses on a plan of action. An Analytic Hierarchy Process provides weights for a distribution key that evaluates GDP per capita, population density, and unemployment rate. These scores detail how suitable a country is to support refugees and assigns a maximum refugee limit. To distribute the influx of refugees from the six travel routes to the EU countries we needed a consistent measure of distance. We therefore compiled geographical centroidal centers of each country and used a Simplex Linear Program to minimize the travel costs from each country. Our model provides a realistic solution to the Syrian Refugee Crisis.

Alex Polsin (History)

Field of Study: History

A Warrior's Nightmares

This research addresses the details of Alexander the Great's life illustrating the changes in his behavior toward his soldiers and people over the course of his military campaigns. Careful consideration of Alexander's actions suggests that he may have had suffered from PTSD.

David Anderson (Biology), Leah Esposito (Biology), Ted Olenick (Biology)

Field of Study: Statistics

Does Price Affect Perception of Quality?

Our study aims to find if an individual perceives a better quality of a product based solely on its listed price. The null hypothesis for this experiment was that there is no variance in perceived quality between the control and the experimental groups. Two pairs of the same headphones were disguised using duct tape. Sixty Carroll College students were randomly selected and surveyed at both the cube and the library, and were asked to rate the quality of the headphones. The experimental group was comprised of 30 randomly assigned students. They were told that one of the headphone sets was priced at 15 dollars while the other was 5 dollars. The control group was also comprised of 30 randomly assigned students. These students were told that the headphones were the same price of 10 dollars. The individuals listened to the Friends theme song on each headphone set for 30 seconds. They were then asked to rate the headphones quality on a scale of 1–10. The differences were taken from both the control group and the experimental group and put into a paired-t test. A p-value, 0.006179, was obtained from this, indicating there was a significant difference between knowing the price and not, when compared to an alpha value of .05. A 95% confidence interval was also performed and found to be [-2.0532,-0.2601]. Since the obtained p-value was smaller than our alpha value and zero is not included inside the confidence interval, we can reject the null hypothesis. We can then say that Carroll College student perceived higher priced headphones to have superior quality simply because of price.

Session 3

Posters, 3 to 4 p.m. CAMPUS CENTER UPPER LEVEL

Courtney Geary (Health Sciences)

Field of Study: Epidemiology

Acute Flaccid Myelitis

Acute Flaccid Myelitis (AFM) is a subset of Acute Flaccid Paralysis (AFP) thought to be caused by viruses such as polio and non-polio enterovirus, West Nile virus, herpesvirus and adenoviruses. AFM causes acute limb paralysis, facial weakness, and serious cases cause respiratory failure. AFM is not currently a reportable disease in any US state, which means there is no baseline to determine the prevalence of the disease. Healthcare professionals may be unaware of what signs and symptoms to look for during examinations. From August 2014 to July 2015, an outbreak of AFM occurred in 120 children within 34 states resulting in the majority being hospitalized. However, no data were collected in Montana to determine prevalence. The objective of this research was to retrospectively investigate illnesses in MT that displayed symptoms of, but were not previously diagnosed as, virus induced AFM. Results will be used to 1) to determine the seriousness of AFM in MT, 2) to determine prevalence, and 3) to investigate the requirements to make AFM a reportable disease to the National Notifiable Diseases Surveillance System (NNDSS). Data were gathered through the MT Department of Health and Human Services by searching health data bases for reported signs and symptoms of case patients with AFM. Once collected, data were compiled and results showed several possible cases of AFM found in previous patients that were not reported to the local health department. Although measures of prevalence and disease severity are still under investigation, the results from this research suggest that AFM should become a reportable disease to NNDSS so that it can be better characterized and prevented in the future.

Colby Henry (Biochemistry/Molecular Biology)

Field of Study: Molecular Biology

Analysis of FBP1 gene expression in UV light-exposed *Tetrahymena thermophila* cultures

In this study, we exposed *Tetrahymena thermophila* to an acute treatment of UV light and examined expression of the FBP1 gene. The FBP1 gene encodes Fructose-1,6-biphosphatase which plays an important role in the process of gluconeogenesis. We hypothesized that exposure of *Tetrahymena* to UV light would cause an upregulation in DNA repair enzymes, thereby causing these cells to require higher levels of glucose. The higher demand for glucose would then result in the upregulation of gluconeogenesis and FBP1. Following acute exposure to UV light, the expression of FBP1 was analyzed using reverse transcription and quantitative PCR. We predicted that the levels of FBP1 would be upregulated following acute UV light treatment.

Dillon Boelman (Psychology and Anthrozoology), Michael Donnelly (Psychology), Kathryn Goins (Psychology), Sarah Leonhardt (Psychology), Hannah Roberts (Psychology)

Field of Study: Psychology

Attachment and Emotions in Canines

Previous research supported the existence of a strong bond between owners and their dogs (Topal et al., 1998). Additionally, one study found evidence of dogs showing empathetic concern by responding to their crying owners and strangers (Custance & Mayer, 2012). To supplement previous work, we specifically hypothesized that dogs would prioritize their owner through approach when both the owner

and stranger were simultaneously crying. To study our hypothesis, four conditions: (1) owner crying/stranger humming (2) owner humming/stranger crying (3) owner humming/stranger humming, and (4) owner crying/stranger crying were presented to the canines. Dogs were familiarized with the room, exposed to baseline talking, and subjected to each experimental condition based on counter balanced measures. Dogs' priority of owner vs. stranger was measured in different levels of approach to either the owner or stranger. Our results did not significantly support our hypothesis. However, results indicated a significant interaction between person and vocals. In that, dogs prioritized their crying owner over a humming stranger. Additionally, dogs were more likely to approach owners when both subjects were crying than when both subjects were humming and were significantly more likely to approach their owners when both subjects were crying compared to the stranger crying/owner humming condition. Our results strengthened previous research regarding the human-animal bond which supports the use of dogs as effective service animals.

Taylor Hanser (Nursing), Bridgette Oberweiser (Nursing), Madison Wall (Nursing)
Field of Study: Nursing

Birthing Positions: A Literary Review of Maternal Outcomes Related to Various Birthing Positions

Historically, birthing in an upright position was once common practice. Today it appears that the majority of women within Western cultures give birth in a semi-recumbent (lithotomy) position (Priddis, Dahlen, & Schmied, 2012). The lithotomy position is when a patient is lying supine, with the legs separated and raised into stirrups. This position is the most well known position for childbirth; however, research has shown that the lithotomy position can have adverse effects, including hip dislocation or fracture, peroneal nerve damage, and an increase risk for deep vein thrombosis (DVT), which is the formation of a blood clot in association with inflammation in the deep veins (Lemone, Burke, Bauldoff, & Gubrud, p. 65, 2015). The purpose of this Evidenced Based Practice Brief is to determine if there exist negative maternal outcomes related to various birthing positions, focusing primarily on the effectiveness of the lithotomy position versus the upright position. This brief will also address the question of whether practitioners choose a particular birthing position based on his or her own convenience, or if the decision is based on the safety of the mother. The results will be used during the implementation phase of the nursing process, as nurses are the primary caregivers during this stage of labor and delivery in assisting the mother to give birth.

Kayla Bayer (Civil Engineering), Carissa Yedica (Civil Engineering)
Field of Study: Civil Engineering

Blue Cloud Home Owner's Association: Drainage Assessment and Re-design

In Montana, the rapid temperature shifts and extreme seasons cause difficulties for the structural integrity of many roadways and associated drainage systems. This civil engineering research project addressed the difficulties associated with Montana weather and roadway and drainage systems at the Blue Cloud subdivision, located approximately 5 miles south of Helena. A member of the Blue Cloud Home Owner's Association presented their drainage issues to the Carroll College Student Chapter of the American Society of Civil Engineers (ASCE). The HOA sought out student members of ASCE to survey the poor drainage areas, model flows with computer software, and provide an alternative along with a cost evaluation for the proposed changes. The culverts under three of the Blue Cloud subdivision's main roadways were icing up, decreasing the capability of the culverts to pass the flow of water and causing large amounts of spring runoff to overtake the roadway. After such an event, the roadways would wash out in some areas and flood in others. After site investigations, flow evaluations, and associated research, we developed a preferred alternative. The desired alternative included installing larger culverts under each roadway that could appropriately handle the fluctuating flow, despite the seasonal ice buildup. After visiting the site with a professional cost estimator, we were also able to provide a cost estimate for the

Blue Cloud community, as they will have to pay for the project through their monthly dues. Ideally, the new conveyance structures will be implemented by a company contracted out by the HOA. The scope of this project was to provide a financially feasible alternative for the Blue Cloud community.

Alexa Daskalos (Nursing), Christina Gordon (Nursing)

Field of Study: Nursing

Cancer and Aromatherapy

In cancer patients receiving conventional cancer treatment, how does use of Aromatherapy compared to no Aromatherapy affect wellbeing during hospitalization? Aromatherapy has been used as method to increase health of patients in many natural medicine modalities such as naturopathy. Due to intense negative side effects of conventional cancer treatments such as chemotherapy and radiation, many patients experience high levels of pain, anxiety and depression decreasing their quality of life. According to recent studies, “depression is two to three times more common in patients with cancer than the general population” (Walker, Holm Hansen, Martin, Symeonides, Ramessur, Murray, Sharpe, 2014). Pain is another relevant issue for cancer patients. “A recent meta-analysis reports that 64% of patients with advanced stage disease or metastatic cancer will experience pain.” Not only do they experience pain, but approximately 40% of patients are undertreated for their pain (Deandrea, Montanari, Moja, Apolone, 2008). The purpose of this Evidenced Based Practice Brief is to determine if Aromatherapy is an accepted intervention in nursing care for pain and anxiety reduction in hospitalized cancer patients. Aromatherapy could be used by nurses in the implementation phase of the nursing process. Wellbeing will be defined as the cancer patients pain level, and presence of anxiety and depression.

Hanna Dotson (Biology)

Field of Study: Biology—Infectious Disease Ecology

Comparison of Capture Methods and Infection Rates for the Tick, *Dermacentor andersoni*, in Montana

Montana is home to the tick *Dermacentor andersoni* which serves as a vector for Colorado tick fever. Symptoms begin three to six days after the tick bite and include sudden fever, weakness, and muscle aches. The importance of studying ticks in the field is to improve capture rates for the purpose of testing infection rate and/or infection rate variability. To determine the most effective way to capture ticks, four separate capturing methods were assembled in two tick prevalent locations. These methods include AAAP pheromones, CO₂, drag netting, and AAAP in combination with CO₂. I hypothesized that the combination of AAAP and CO₂ would yield the best capture results. My findings indicate that drag net sampling and CO₂ alone were the best tick attractants which could be due to pheromone amounts high enough to repel ticks rather than attract them. I implemented a mark-recapture study using fluorescent powder to measure population density at sample sites and I hypothesized that CO₂ and pheromones combined would be the best estimate. The CO₂ and drag netting had similar efficacy, whereas the pheromones attracted no ticks throughout all trials. I developed an RT-PCR protocol to detect the presence of Colorado tick fever in *D. andersoni* and hypothesized that infection rates would be within the range of 10-25%. The results of the RT-PCR are currently pending and will be analyzed upon completion.

Claire Hooper (Psychology)

Field of Study: Psychology

A Comparison of the Effects of a Human Sexuality Course on Students' Sexual Attitudes, Behavior, and Knowledge at a Private, Catholic Liberal Arts College and a Public Liberal Arts College

This study investigated the effects of two Human Sexuality courses, one taught at a small, private, Catholic, liberal arts college in the Western U.S. and the other at a large, public, liberal arts college in

the Eastern U.S., on students' attitudes, behaviors, and knowledge through pre- and post- assessment measures. The researchers hypothesized that the course would increase knowledge of key issues on human sexuality, as well as participants' attitudes and behaviors as they pertain to their own and others' sexuality. Specifically, the researchers hypothesized that participants would demonstrate increased awareness of and tolerance for diverse sexual behaviors, lifestyles, and values; enhanced relational and sexual communication skills; and greater insight into one's own past/present/future sexuality. The researchers anticipated that the greatest influence of the course would occur for those students who received either no prior sex education or abstinence only education, compared with those students who received prior comprehensive sex education. While other studies have investigated the effects of Human Sexuality courses on college students' sexual attitudes (e.g., Pettijohn & Dunlap, 2010), this was the first study of its kind to compare the knowledge, sexual attitude and behavior outcomes of such a course between private and public liberal arts colleges.

Kerri McInnis (Biochemistry/Molecular Biology), Kendall Patch (Biology for Secondary Education)
Field of Study: Molecular Biology

The Effect of Exposure to UV Light on Rad51 Expression in *Tetrahymena thermophila*

In this experiment, we attempted to answer the question: Does exposure to UV light affect expression of the Rad51 gene in *Tetrahymena thermophila*? It was hypothesized that the expression of Rad51 would increase proportionately to the exposure of UV light. The Rad51 protein is fundamental in the repair of double-stranded DNA breaks in eukaryotes, specifically during the process of homologous recombination. In order to test this hypothesis, *Tetrahymena* were randomly assigned to either a control group, which was cultured under ideal conditions, or a treatment group, which was exposed to UV light. Previous experiments have suggested that *T. thermophila* prosper most in environments out of direct light and at room temperature. The experimental group was exposed to incremental periods of UV light over the course of 26 hours. Immediately following the culturing and exposure, RNA extraction, reverse transcription, and gene-specific PCR (including gel electrophoresis and q-PCR) was conducted on the samples from both the control and treatment groups. Because UV light would likely cause DNA damage and Rad51 plays a role in the repair of such damage, it was predicted that the Rad51 gene would be up-regulated in those organisms exposed to UV light.

Katie Bouchard (Nursing), Mariah Carlson (Nursing), Kailin Taylor (Nursing)
Field of Study: Nursing

Effects of ADHD Treatment on School Performance

For children ages 4–17 diagnosed with ADHD, how does prescription medication therapy compare to combined medication and behavioral therapy affect grades in school within one year of starting treatment? As of 2011, 11% of children ages 4–17 that have been diagnosed with ADHD (U.S. Department of Health & Human Services, 2016) and that number is expected to increase in the coming years. In 2010, 90% of children with ADHD were treated by medications, behavioral therapy, or a combination of the two. Of those treated, 43% received medications alone, 13% received behavioral therapy alone, and 31% were treated with medication and behavioral therapy. Medication treatment is the most common treatment for ADHD, while combined medication and behavioral therapy is the current treatment recommendation. (U.S. Department of Health & Human Services, 2016) Children diagnosed with ADHD “do worse on objective measures of achievement such as grades, group tests, and individual achievement tests” (U.S. Department of Health & Human Services, 2016). According to the Center for Disease Control (CDC), 80–90% of children with ADHD are significantly behind in school by age 12 to 13. The purpose of this Evidenced Based Practice Brief is to focus on the implementation phase of the nursing process and determine which intervention for ADHD has the most positive effect on school grades. The results may be used for educational purposes with parents, teachers, and healthcare providers.

Conner Kane (Biology), Jasmine Phan (Biochemistry/Molecular Biology)

Field of Study: Biology

Effects of Fatty Acids from Avocados on Expression of the HMG1 Gene in *Tetrahymena thermophila*

The enzyme 3-Hydroxy-3-Methyl-Glutaryl-CoA Reductase (HMG) HMG catalyzes the rate-limiting step in the biosynthesis of cholesterol and is a common drug target for cholesterol reduction. Previous studies in rats have shown that avocado oil reduces cholesterol levels. We were interested in determining whether the 'healthy' fatty acids in avocado oil would have an effect on the expression of HMG. In this study, *Tetrahymena thermophila* were treated with avocado oil to determine the effect of fatty acids on expression of the HMG1 gene that encodes HMG. Expression of HMG1 was monitored using reverse transcription and quantitative PCR. We predicted that expression of HMG1 would be down regulated in *Tetrahymena* cultures that were treated with avocado oil.

Tessa Littlefield (Health Sciences)

Field of Study: Public Health

Effects of Indoor Tanning on Risk of Developing Skin Cancer: Physical and Psychological Factors

The objective of this study was to review relevant peer-reviewed articles regarding the development of skin cancer and other psychological factors in relation to indoor tanning. The review aimed to determine if the risk of developing skin cancer increased with amount of indoor tanning use while also specifying the psychological factors that account for increased indoor tanning usage. Searches conducted through PubMed and CINAHL databases provided the supporting literature related for this topic. Other relevant review articles were obtained through Google Scholar. Of the ten articles reviewed, it was found that frequent indoor tanning increases risk of developing skin cancer later in life. In addition, it was found that indoor tanning is positively associated with other high-risk activities, and can be classified as an addictive behavior. Due to the fact that indoor tanning has been shown to increase risk of developing skin cancer, indoor tanning facilities should be required to implement more regulations regarding frequency and duration of use. Awareness should be promoted regarding risks of indoor tanning, particularly to adolescents, who appear to be at elevated risk due to social pressures.

Jasmine Phan (Biochemistry/Molecular Biology)

Field of Study: Biochemistry

Effects of Lignin on the Growth and Cellulolytic Activity of *Acidothermus Cellulolyticus* and *Streptomyces* sp., two thermophilic candidates for cellulosic bioenergy production

Two thermophilic bacteria, *Acidothermus cellulolyticus* and *Streptomyces* sp., both secrete cellulolytic enzymes. Thus, they could possibly serve as two sources of these enzymes in future cellulosic biomass degradation processes. Because lignin, a component of plant cell walls, has known toxicity, the effect of this compound on the growth and production as well as activity of cellulase enzymes was studied. *A. cellulolyticus* was unable to thrive in 0.05% lignin, but displayed an inhibited growth pattern in 0.01% lignin and still reached a comparable optical density. *Streptomyces* sp. after beginning stages of growth showed only slightly decreased total growth in the presence of 0.01% and 0.05% lignin. Significant differences in growth between the control and the lignin-containing cultures of *Streptomyces* sp. were only observed in the "clumping" stages of the bacteria in the first 48 hours. No conclusions about the cellulase activity for *Streptomyces* sp. could be drawn. In *A. cellulolyticus*, relative cellulase activity increased during the first 3-4 days before leveling out. Surprisingly, the total amount of glucose released by enzymes from an *A. cellulolyticus* culture containing 0.01% lignin didn't differ dramatically from a culture without lignin despite the differences in growth. Ferulic acid, syringic acid, and vanillic acid showed far superior inhibitory effects on the cellulase enzymes from *A. cellulolyticus* at 1 mM compared with vanillin at 1 mM and Lignin at 0.1%.

Istvan Feldman (Psychology)

Field of Study: Psychology

Effects of Positive Encouragement on Exam Scores

Positive encouragement has been shown to reveal increased positive outcomes on exam scores. Our study explores this concept through positive and neutral emails with 89 participants. Positive exam scores were not correlated with higher the positive emails. Study hours were increased with our neutral email group.

Lauren Cain (Nursing), Brianna Olson (Nursing), Linnea Zier (Nursing)

Field of Study: Obstetrics

Effects of Sexual Assault on Pregnancy and Delivery

How do women with history of sexual assault perceive their experience during pregnancy and delivery compared to those who have not been sexually assaulted?

In 2012, there were 346,830 women who were raped, and 17,342 pregnancies that resulted from these rapes in the U.S. Victims of sexual assault are more likely to suffer from depression, PTSD, alcohol abuse, drug abuse, and to contemplate suicide (Who are the Victims, 2016). Certain situations during pregnancy and delivery, such as invasive procedures, exams, or pain can trigger the woman unexpectedly and remind them of the abusive event (Allemann, 2014). An exploration on the effects that sexual assault could have on women during pregnancy could improve nursing care of this patient population. This study falls under assessment in the nursing process. Nurses need to be aware of the psychological impact sexual assault could have on a woman and the traumatic memories childbirth can bring back. The goal is to evaluate the nursing care given to women who go through these experiences and to improve their perception of pregnancy and delivery.

Tim Brunson (Biochemistry/Molecular Biology/Computer Science),

Rachel Lefstad (Biology/Biology for Secondary Education)

Field of Study: Biology

The Effects of Warming Temperatures on Rad51 in *Tetrahymena thermophila*

Our experiment explored whether raised temperatures affected expression of the Rad51-like gene in *Tetrahymena thermophila*. Our hypothesis was that raised temperatures would result in a decrease in expression of the Rad51-like gene. The protein product of this gene functions in double stranded DNA repair. We chose this experiment to see if the rising average temperatures around the world would effect expression of genes involved in DNA repair. Our test samples were kept in a growth medium at 37°C while our control samples were kept in a growth medium at 24°C. Afterwards, the transcribed mRNA was reverse transcribed into DNA and primers were used to amplify the Rad51-like gene. Quantitative PCR was then used to analyze the expression of the Rad51-like gene. Our prediction was that higher temperatures would decrease the expression of the Rad51-like gene.

Kevin Gardner (Biology), Ian Lorang (Biology)

Field of Study: Molecular Biology

Environmental Effects on the ATP1 gene in *Tetrahymena thermophila*

In this study, we investigated the effect of temperature on expression of the ATP1 gene in the organism *Tetrahymena thermophila*. We hypothesized that expression of the ATP1 gene would increase as we increased temperature. ATP1 is a highly conserved gene in *Tetrahymena* that codes for the alpha subunit of ATP Synthase, an enzyme that generates the energy molecule ATP. We decided to use heat treatment based on studies performed on ATP1 in Alaskan Cod showing increased expression in response to

increased temperatures. We used reverse transcription and quantitative PCR to analyze expression of ATP1 in our heat-treated *Tetrahymena* cultures. We predicted that ATP1 expression would be up regulated as temperature increased.

John Brothers (Biochemistry/Molecular Biology), Alexis Gerry (Biology),

Lauren Scofield (Biochemistry/Molecular Biology)

Field of Study: Biology

Exploring the Effects of Environmental Temperature on CDC-7 Expression in *T. thermophila*

Tetrahymena thermophila are unicellular eukaryotes with a remarkably large genome: over 27,000 genes. One important aspect of studying the *Tetrahymena* genome is identifying and understanding what factors influence gene expression. This study examined the effects of temperature on *Tetrahymena* expression of CDC-7, a cell division control gene. We subjected *Tetrahymena* populations to increased temperature and hypothesized such treatments would induce cell division and increase CDC-7 expression. Gene expression levels were measured via quantitative PCR analysis after an acute heat treatment.

Elisabeth Miller (Biology)

Field of Study: English Literature

Feminine Romanticism in Mary Shelley's *Frankenstein*

The Romantic ideologies as we know them today were established by the "High Romantics." The leaders in the movement include literary figures such as Lord Byron, Wordsworth, and Keats. They produced work reflecting the values of "masculine" Romanticism, a form that revered unrestrained emotion, the sublime, and the independent creative genius. Mary Shelley, along with other female writers, also expressed the ideals of Romanticism, but their writings exhibited an alternate ideological form called "feminine" Romanticism. In her famous novel, *Frankenstein*, Mary Shelley critiques masculine Romanticism and advocates the feminist position. She reveals the superiority of domesticity over isolation, subtle beauty of nature over the extreme forces of the sublime, and moderation over excessive passion.

Ellena Kling, Terrence McClement, Rachel Mohr (Nursing),

Rena Ockford (Nursing), Kathryn Zink (Nursing)

Field of Study: Nursing

Use of oxygen therapy during acute myocardial infarction

Does induction of labor vs. no-induction increase cesarean section rate in woman with normal risk term gestation pregnancies.

"Nearly two-thirds of all labor inductions in the United States were performed without definitive medical induction" (Jou, Kozhimannil, Johnson, & Sakala, 2015). Labor induction, "Is the use of medication or other methods to bring on (induce) labor"(2000 Induction Ceremony, 2001). Oxytocin is deemed the most commonly used induction agent worldwide (Alfirevic et al., 2009). As nurses who care for mothers in the antepartum, intrapartum, and postpartum periods, our goal is to be able to provide relevant education on the risks of induction, specifically the outcome of cesarean section. There are also increased risks that come with having a cesarean section which include, "Increased bleeding, infection, bladder or bowel injury, reactions to medications, blood clots, death, possible injury to the baby" (The Nemours Foundation, 2016). Following cesarean sections women are encouraged to refrain from strenuous activity such as strenuous chores, lifting of anything heavy, and extended amounts of standing (Obstetricians and Gynecology Associates of Hampton, 2015). This evidenced based practice brief seeks to find evidence that can be used in the planning phase of the nursing process by creating an outcome for expectant mothers to give themselves alternative methods to stimulate the labor process and the knowledge about risk so they will be less inclined to opt for induction of labor.

Samantha Bastida-Hall (Nursing), Matija McLaughlin (Nursing)
Field of Study: Nursing Practice

Help-seeking attitudes of women during childbearing years

In women of childbearing years, how does screening for violence versus no screening influence the help-seeking attitude of women. This topic relates to the nursing process, specifically the assessment portion. Researching this question may help to bring awareness to the topic of sexual violence. In a study performed on 2099 women in 2009 and 2010, “the prevalence of emotional abuse, physical violence and sexual violence in the previous 6 months was 31%, 19%, and 7% respectively.” (Montgomery et al., 2015). One of the more common forms of sexual violence is referred to as intimate partner violence, which can be abbreviated to IPV. IPV and other forms of sexual violence does not only affect a woman on a physical or mental level, it can also lead to “a prolonged stress response that leads to chronic health problems.” (Dutton, James, Langhorne, & Kelly, 2015). The type of violence being referred to in this paper is violence against women. According to the World Health Organization website, this is classified as “any act of gender-based violence that results in, or is likely to result in, physical, sexual or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private.” In the context of this paper, “childbearing years” refers to adolescent girls who have been through menarche to women who have begun menopause. Lastly, screening tools can be utilized by a healthcare provider in an assessment of their patient, to help narrow the questions used to identify violence against a woman.

Maggie Bailey (Nursing), Jesse Naert (Nursing)
Field of Study: Nursing

Herbal Remedies: An Alternative to Pharmaceutical Migraine Treatment

In patients in the United States with migraine type headaches, how does alternative herbal therapy compared to prescription pain medication affect pain management?

Migraine type headaches are a prevalent medical condition among the US population. The pain caused by migraines can be debilitating and have a significant negative impact on an individual's life. Migraines affect about 10% of the population; 75% of which are women. (Nussbaum, 1996). Migraines are usually accompanied by symptoms including anorexia, nausea, vomiting, photophobia, phonophobia, and malaise. In order to treat migraines, many patients turn to medication. Mild migraines can be treated with analgesics such as acetaminophen, codeine, or NSAIDs in combination with antiemetics for nausea. Moderate migraines may require the use of opiates. Patients may also use prophylactic treatment such as beta-adrenergic blockers or calcium channel blockers to prevent the pain. However, patients may choose to turn to herbal therapy in order to relieve their pain. There is evidence that suggests the effectiveness of the herbs feverfew and butterbur in the treatment of migraines (Rios, 2004). One of the major lactones in feverfew, parthenolide, is thought to have an anti-inflammatory effect that blocks the transcription of inflammatory proteins. Feverfew extracts also block platelet aggregation. On the other hand, butterbur contains strong vasodilative substances called petasin and isopetasin. These substances have been shown to inhibit leukotriene synthesis and reduce inflammation (Rios, 2004). This evidenced based practice brief seeks to answer whether alternative herbal therapy does have positive effects on pain management and thus could potentially be recommended as a nursing intervention treatment option for patients with migraines.

Jessica Denboer (Nursing), Natalie Johnston (Nursing)
Field of Study: Nursing—Women's Health

Hypnotherapy as Pain Management during Childbirth

How do pregnant women using hypnotherapy perceive pain during childbirth? Pain is a unique experience. As nurses, it is important to offer a variety options, both pharmacological and non-pharmacological, to

treat patients' pain during the birthing process. It is common for women to experience some level of pain during labor, and every woman should have the power to choose how she controls that pain. In one study, the majority of women who participated in hypnotherapy found it beneficial during labor and reported feeling calm, confident and empowered by the therapy (Finlayson, 2015). Hypnosis is an altered state of consciousness characterized by receptivity to suggestion that can be used therapeutically to help control pain, anxiety and other physiologic function. Hypnotherapy is typically learned and practiced during pregnancy and implemented during labor (Werner et al, 2013). Approximately 90-95% of the population can be hypnotized (Tuschhoff, 2014). The purpose of this Evidenced Based Practice Brief is to examine the evidence regarding the effects of hypnosis for pain relief during labor. The results of this brief may potentially be used during the planning phase of the nursing process for antenatal education.

Gabriella Luchini (Nursing), Savanna Sigl (Nursing), Theresa Torres (Nursing)
Field of Study: Nursing

In hospitalized patients who report pain, how does administration of spiritual care versus no spiritual care affect pain level?

In hospitalized patients who report pain, how does administration of spiritual care versus no spiritual care affect pain level? The holistic approach to patient care was adopted from Florence Nightingale's example and seeks to recognize the whole person. The holistic approach acknowledges the dimensions of the patient including: the mind, body, spirit, environment, social relations, cultural background etc. Spiritual care has been known to help patients embrace pain and suffering associated with their illness. A study done by Jeff Levin in 2001 found, "Participation in worship and prayer benefits health through the physiologic effects of positive emotions". The purpose of this research is to discover how widely holistic care is being used and how frequently the hospitalized patient's spirituality is cared for, as well as to assess how acknowledging a patient's spirituality while they are in the hospital impacts their perception of pain. The results of this brief will be used in the implementation component of the nursing process. Through implementation nurses "carry out the plan of care". Nurses play a primary role in patient outcomes through the interventions they perform, both pharmacological and non-pharmacological. By acknowledging that patients are spiritual beings nurses practice holistic care.

Greer Davis, Kara Fuhringer, Holly Galen, Peter Kuzmack, J.T. Linder, Travis Mahoney, Ryan McCauley, Carlee Norbeck, Mark Stiffler, Tyler Thayer—Business Department, Accounting/Finance
Field of Study: Accounting

Integrated Reporting: People, Planet, and Profit

Corporate decision making and annual reporting has historically focused on impacts to financial capital. However, business decisions impact other forms of capital such as human capital and the natural environment. Integrated Reporting <IR> is an innovative reporting framework that presents a holistic picture of a business by combining impacts on social, environmental, and financial capital into a single report. <IR> evidences how value is created or destroyed for all stakeholders not just providers of financial capital. Financial markets in South Africa and Denmark require <IR> (Clayton, Rogerson, & Ramped, 2015) and the Sustainability Accounting Standards Board (SASB) is currently developing standards for use in the U.S. financial markets (Schooley & English, 2015). This research was an exploratory study of <IR> that summarized and critically examined the literature in academic journals, professional publications, standard setting body documents, and Pope Francis' encyclicals on the environment and social justice. The outcome of this research was the creation of the Center for Integrated Reporting Research (CIRR) at Carroll College which will serve as the foundation for future undergraduate student research on <IR>.

Dmitry Shulga (Chemistry)

Field of Study: Chemistry

Investigating Kinetics of a Reaction by Instrumental Methods

The goal of this research is to develop methods of carrying out epoxidation reactions by replacing metal catalysts with organic ones for economic and environmental purposes. One way of forming epoxides involves making peroxide compounds as reaction intermediates. The peroxide formation from organocatalyst, 2,2,2-trifluoroacetophenone (TFAP), has been observed by H1 and F19 NMR spectroscopy when reacted with aqueous hydrogen peroxide. The epoxidation reaction has been duplicated from literature using cyclohexene and the observed peroxide intermediate. Progress is now being made on acquiring the thermodynamic parameters from peroxide formation and kinetics from the overall epoxidation reaction.

Jesica Bauer (Mathematics)

Field of Study: Mathematics

Keeping Up on Inventory: Stocking the Helena Food Share

The Helena Food Share (HFS) provides food for over 1,500 families in the Helena Community. Using historical data provided by the HFS, we were able to create a simulation that would predict future consumption of each food item at the food share. With this simulation, we were able to create a mathematical model which tested various reorder amounts and thresholds that would minimize the cost to the HFS as well as helping keep inventory on the shelves. This model was implemented into an inventory alert system, which is currently being utilized at the Helena Food Share as of December 2015.

Sarah Ladd (Health Sciences)

Field of Study: Health Sciences

Microbial Community Characterization in an Arsenic Contaminated Watershed

Helena gets over 50% of its drinking water from Tenmile creek. With a rich mining history, over 100 abandoned hard-rock mines have introduced arsenic into this aquatic ecosystem. The presence of arsenic may contribute to a change in bacteria community composition and co-select for antibiotic resistance. The objective of this research was to detect changes in overall microbial diversity in response to arsenic concentrations. Sediment grabs were collected from ten different sites; three controls (<10 mg/kg As), three mid-level arsenic concentrations (100-200 mg/kg As), and four high-level arsenic concentrations (250-6000 mg/kg As). Sediment from each site was plated on different media containing As III and As V. Bacterial colonies were picked from plates and identified using 16S gene sequencing (Macrogen USA, Rockville, MD), then compared to GenBank Database using NCBI BLAST. The community DNA was also extracted directly from sediments using a Power Soil Kit MoBio (Carlsbad, CA) and Next Generation Sequencing was performed at the University of Colorado Health Sciences Center (Lozupone Lab). Culturable species from each site were identified from 16S colony pick sequencing. The sequencing showed that *Cyanobacteria streptophyta* and *Proteobacteria acidiphilium* species were dominant in mid-level and high-level arsenic environments, and *Cyanobacteria tramenophiles* was a dominant species in the control environments. The Next Generation Sequencing showed a shift in high arsenic environments and high arsenic levels explained around 60% of the community differences. Arsenic caused a community change in diversity, as arsenic increased diversity in bacterial genera decreased.

Carly Colligan (Nursing), Brynja Schick (Nursing)
Field of Study: Nursing

New Treatment for Breast Cancer: Keep Your Hair and Be Aware

In women with breast cancer, how does the scalp cooling treatment compared to no scalp cooling treatment affect hair loss within chemotherapy? Scalp cooling treatment works by “inducing vasoconstriction and reduction of metabolism to reduced blood flow to the hair follicles during the peak period of peak plasma concentration of chemotherapy agent being administered” (Roe, 2014, pg. S6).

In this evidence based practice brief, the PICOT question will be explored because “approximately 1.2 million people will receive a diagnosis of breast cancer each year. Breast cancer continues to be the most diagnosed cancer of all women both within the U.S. and worldwide” (Gregg, 2009). These women may lose their sense of control and feminine self-image. Loss of hair is a marker of an illness, so if this scalp cooling treatment works, then this could potentially help many women with their body image and sense of self-esteem. When one researcher conducted a trial on scalp cooling treatment, they found that “49% of the women who used the scalp cooling treatment rated their hair loss as moderate, little, or not at all, as compared with the 4% in non-scalp cooling treatment” (Lemieux, 2012, pg. 682). The goal of this evidence based practice brief is to provide information and awareness of the new scalp cooling treatment and its effects on hair loss during chemotherapy.

Alexa Armbruster (Nursing), Maggie Panasuk (Nursing)
Field of Study: Nursing

Plan B: An Alternative to SSRI Treatment of Depression

Within one year of beginning treatment, does Vitamin B1, B6, B9, and B12 supplements, compared to SSRI prescriptions, affect the reported symptom improvement of depression in adults ages 18–65 in the United States?

“In 2014, an estimated 15.7 million adults aged 18 or older in the United State had at least one major depressive episode in the past year” (National Institute of Mental Health, 2015). “From 1988–1994 through 2005–2008, the rate of antidepressant use in the United States among all ages increased nearly 400%” (Pratt, L.A., Brody, D.J., Gu, Q., 2011). In 2010, antidepressants were the second most commonly prescribed medications[...]. About 254 million prescriptions were written, resulting in nearly \$10 billion in cost” (Insel, 2011). Life-threatening adverse effects of SSRIs include Neuroleptic Malignant syndrome, Serotonin syndrome, and suicidal thoughts. Common side effects include dizziness, drowsiness, fatigue, headache, insomnia, nausea, diarrhea, dry mouth, sexual dysfunction, sweating, anxiety, and tremors (Van Leeuwen, 2015). “Placebo effects have increased markedly over the past two decades in trials of psychiatric medications [...] these medications appear to have a relatively small effect in patients broadly classified as having depression” (Insel, 2011). However, in patients with more “severe clinical conditions, they appear to be essential for remission” (Insel, 2011). The purpose of this Evidenced Based Practice brief is to see if evidence supports alternative methods to SSRI treatment, specifically B vitamins, in order to treat depression. If so, this option may have less adverse effects and be more cost effective than prescription SSRIs. Answering this question will help nurses in the implementation phase of the nursing process educate patients with a diagnosis of depression about treatment options.

Elaina Ausbrooks (Nursing), Kendra Branch (Nursing), Ximena Mendieta (Nursing)
Field of Study: Nursing—Postpartum Depression

Postpartum Depression and the Maternal Child Bonding Experience

How Do Mothers with a Postpartum Depression Diagnosis Perceive the Maternal Child Bonding Experience During the Last Six Months of Pregnancy and the First Six Months Postpartum?

Postpartum depression may occur anywhere from soon after delivering to about a year later (American Psychological Association 2016). According to the American Psychological Association, up to 1 in 7 women experience post partum depression. The exact cause is unknown but it is related to: hormone levels, changes in the body from pregnancy and delivery, changes in work and social relationships, having less time and freedom, lack of sleep, and worries about the ability to be a good mother.

Maternal-child bonding is a crucial experience for a mother and her newborn child (American Psychological Association, 2016). It allows for appropriate attachment and positive social relationships. Maternal-child bonding can consist of activities such as: holding their babies, having skin to skin contact, rocking them gently, making eye contact, singing and talking to them, and nursing. Postpartum depression, a common postpartum mental illness, is shown to negatively affect this process (American Psychological Association, 2016). This Evidenced Based Practice Brief's purpose is to investigate the potential effects of postpartum depression on the maternal-child bonding experience so that education may be provided to nurses who care for this population to improve the bonding experience.

Laura Combs (Nursing), Morgen Kiff (Nursing)
Field of Study: Postpartum Health

Postpartum Depression: A Secret Battle

In first-time pregnant women, how does the nurse verbalizing postpartum depression (PPD) screening questions directly to the mother as compared to the patient filling out a paper or electric form with the screening questions influence the diagnosis of women with PPD over the time span of the birth of the baby to one year after the birth?

In the news, stories surface of mothers who kill their children or commit other unmentionable acts, and have been improperly labeled as the product of postpartum depression (PPD). Lowdermilk, Perry, and Cashion (2012) state, "PPD [postpartum depression] is an intense and pervasive sadness with severe and labile mood swings and is more serious and persistent than postpartum blues" (p. 768). PPD screening is a way of surveying the patient to detect symptoms that indicate whether or not the mother is possibly experiencing postpartum depression. PPD is the highest reported complication of childbirth (Thurgood et al., 2009.) Still, only 15% of mothers seek help for PPD due to shame or fear (Thurgood et al., 2009). The purpose of this Evidenced-Based Practice Brief is to determine if more mothers will be diagnosed with PPD and potentially receive therapeutic treatment if they were screened face to face as opposed to filling out questionnaires. The results could be used in the implementation phase of the nursing process to aid in the diagnosis of PPD and to educate this patient population.

Katelyn Friedt (Biology), Jake Gilbertson (Biology)
Field of Study: Statistics—Psychology/Biology

The Relationship Between Related and Unrelated Words in Memory Conversion

Typically, the average person has a short-term memory that lasts between 15 to 30 seconds and can hold about 7 pieces of information. After this time, the information is either forgotten or transferred to long-term memory. Is a group of related items easier to convert to long-term memory than unrelated items? This study provides information on memory transfer. Subjects were Carroll College students, and they were randomly divided into two groups of 30. Those participants put into the control group

had 10 unrelated words read to them while those in the experimental group were read 10 related words (all animals). Participants were then asked to repeat the words back to us after answering three predetermined questions. These questions were “What did you have for dinner last night?” “Where did you go on your last vacation?” and “What are your three favorite movies?” The questions were asked to distract the subjects from the list of words read to them before they recited the words back to us. The amount of correctly remembered words was recorded and analyzed. The mean number of correctly recited words for the control group was 4.46, and the mean number of correctly recited words for the experimental group was 5.46. With a p-value of 0.003954 we found that related words are indeed easier to transfer to long-term memory than unrelated words.

Leah Esposito (Biology)

Field of Study: Molecular Biology

The Role of Dctn2 and Dync1li1 in the Trafficking of GluR2-containing AMPA Receptors

The aim of this project was to determine the role that Dctn2 and Dync1li1 play in the trafficking of GluR2- containing AMPA receptors. AMPA receptors are protein complexes present in neuronal cells of the brain that play a key role in varying the excitability of neurons and are important components of cognitive function. Dctn2 and Dync1li1 are subunits of the motor protein Dynein which transports cargo throughout a cell. I hypothesized that Dctn2 and Dync1li1 play a role in the trafficking of GluR2 subunits in neurons. To test this hypothesis, I used molecular cloning and cell culture techniques to generate the constructs and neuronal cells required to study the interaction between GluR2 and Dctn2/Dync1li1.

Stephen Schmidt (Chemistry)

Field of Study: Chemistry

Sodium in Saddle Soap

Sodium in saddle soap is a potential cause of premature wear and tear in leather saddles. This suggests a possible way to extend the life of the leather, having numerous benefits to this potential modification. In this work, the concentrations of sodium in saddle soap were measured with Inductively Coupled Plasma (ICP). All saddle soaps tested dissolved in toluene, and two variations of an organic-aqueous liquid-liquid extraction and statistical analyses were performed on the data. Two brands of saddle soap showed sodium and one brand showed significant levels of sodium. These studies suggest some brands of saddle soap may shorten the lifespan of leather saddles compared to others.

Erin Hanson (Chemistry/Biology)

Field of Study: Organic Chemistry

Stereoselective Synthesis of [Cp* $\text{Ru}(\eta^6\text{arene})\text{X}]$ Complexes from Air-stable Ruthenium Sources

Ruthenium sandwich complexes are useful tools for stereoselective addition to arene compounds. Using a [RuCp*($\eta^6\text{-arene}$)]⁺ sandwich complex we were able to observe stereoselective additions to benzyl alcohol.

Kurt Parker (Biology)
Field of Study: Health Sciences

Studies of Antibiotic Resistance in an Arsenic Contaminated Watershed

Water from abandoned mine adits, that is high in metals such as arsenic, flows into the Upper Tenmile Creek, which supplies Helena with most of its public water supply. These metal rich environments can cause co-selection in bacteria for heavy metal and antibiotic resistance genes (ARGs). These genes can then be passed on to pathogenic bacteria. The presence of various tetracycline resistance and arsenic resistance genes in sediment bacterial biofilms from Upper Tenmile Creek was assessed using PCR. The total bacterial community in each sample was also assessed through DNA extraction from sediment samples and Next Generation Sequencing of the 16S gene. The culturable bacterial community was also assessed by plating sediment samples and sequencing the 16S gene from selected colonies. Additionally, bacteria were selected from sediments by plating on media with tetracycline and arsenic to select for bacteria with arsenic and tetracycline resistance genes. The results showed amplification of the Tet O gene and Tet W gene that both encode for tetracycline resistance. The total community assessment also showed that the diversity of bacteria in heavy metal rich environments was less than in areas with lower levels of heavy metal contamination. In conclusion, amplification of the Tet O and Tet W genes show that ribosomal protection proteins from tetracycline may be present in the bacterial community of the heavy metal rich sites. Additionally, because there is less diversity in heavy metal rich environments, this shows that there may be selection for certain species of bacteria in those harsh conditions.

Olivia Duletski (Chemistry)
Field of Study: Chemistry

Synthesis and Characterization of (E)-1,3,3-trimethyl-2-(2-(thiophen-2-yl)vinyl)-3H-indol-1-ium iodide for the Potential Application in Solar Energy Storage

Cyanine dyes have been known for their photochemical and electronic properties. A novel cyanine dye derivative was created for the quantification of the molecule's chemical and electrochemical redox properties. The dyes were synthesized through a reflux reaction of thiophene-2-carbaldehyde and 1,2,3,3-tetramethyl-3H-indolium iodide. The synthesized conjugated monomer was confirmed to be (E)-1,3,3-trimethyl-2-(2-(thiophen-2-yl)vinyl)-3H-indol-1-ium iodide via ¹H-NMR analysis. After a series of purifications, the yield of the dye product was calculated to be 66%. The synthesized molecule will act as a precursor in an oxidative dimerization reaction for the potential application in solar cells.

Dain Adams (Chemistry)
Field of Study: Chemistry

Synthesis of Quantum Dots using Cadmium and Selenium

Quantum dots are nanoscale crystals composed of a semiconducting material. Once synthesized, these quantum dots can then be used in a variety of ways, one of which being in the creation of solar panels. Due to the nanoscale nature of these quantum dots they are subject to quantum mechanics and can be fine-tuned for specific needs by controlling the size of the nanocrystal. Using a procedure from a source paper we explored our ability to control size-selectivity of these nanocrystals.

Dallas Vanluchene (Health Sciences)
Field of Study: Health Sciences/Microbiology

The Tracking of *Yersinia Pestis* using Multi-Locus Variable Tandem Repeat Analysis

Flea-borne zoonotic diseases including plague are present in the United States, specifically in the Four-Corners region. *Yersinia pestis*, the etiologic agent of plague, is present in rodent populations and their fleas, from which humans can become infected. Although *Yersinia pestis* causes large numbers of

rodent die-offs and occasionally human infections over large geographical areas, there may be biological and geological barriers that separate plague epizootic activity. The objective of this study was to use multi-locus variable number of tandem repeat analysis (MLVA) to determine the population structure of *Y. pestis* during a human plague outbreak in the Four-Corners region during the 1980s. Although the outbreak pattern appeared widespread, we hypothesize that multiple locally maintained bacteria arising simultaneously were the cause rather than one outbreak strain that spread across the landscape. A set of *Y. pestis* isolates that were collected during the outbreak were analyzed using MLVA. Minimum spanning trees were used to evaluate the population structure based off of variable number of tandem repeat (VNTR) markers and the date of disease onset. Minimum-spanning trees based on date of onset may show that bacterial DNA fingerprints are similar from the cases whose onset dates were close together, and that the emergence of multiple outbreak strains cause seemingly widespread outbreaks. This analysis may also show that bacterial population structures vary more when the dates of onset within different cases are far away from each other.

Tanner Gustavsen (Biochemistry/Molecular Biology), Molly Moloney (Biology)
Field of Study: Biology

UV light exposure and *Tetrahymena thermophila*: the expression of PHR2 & MSH2 genes

The genes MSH2 (mismatch repair) and PHR2 (photolyase repair) both function in the repair of DNA in *Tetrahymena thermophila*. It was hypothesized that when *Tetrahymena* cultures are exposed to UV light, increased expression will occur in both the PHR2 and MSH2 genes in response to the damage incurred. UV light has been known to cause the formation of pyrimidine dimers and other disruptions in DNA. Through two rounds of experimentation, the acute impact of UV light exposure was monitored. The cultures underwent RNA extraction, reverse transcription, and quantitative PCR analysis. We predicted that UV exposure would result in the increased expression of both PHR2 and MSH2.

Session 4

Presentations, 4 to 4:45 p.m.

• 4A: TRINITY LOUNGE

Tyler Zimmer (Math and Chemistry)

Field of Study: Mathematics

Cortisol in Pika Hair

In this report an HPLC method is proposed that identifies and quantifies cortisol from powdered hair. Also, extraction methods are presented that lead to sufficient enough cortisol that a UV-Vis spectrometer may detect it.

Connor Smith (Biology)

Field of Study: Philosophy

Exercising Power as a Care-Giver: An Argument for Virtue in Childcare

This paper will set forth an argument for the ethical course of action for adults when dealing with moral issues regarding the children in their care. I will begin by setting the context for this argument by defining how a child differs from an adult and how the traditional western normative ethical model of consequentialism is inadequate for dealing with situations involving children due to the potential inherent in childhood. Although a more modern Rawlsian ethical framework provides a better model than consequentialism, I will show how this framework is still ultimately inadequate. I will then set forth my argument that exercising the virtue of “temperance of power” when engaging in childcare is the best model for prescribing the correct course of action as it accurately represents the relationship between child and adult. I will show that this thesis is firmly rooted in the intellectual traditions of feminist ethics and the virtue ethics of MacIntyre and Aristotle. I will conclude by working through cases of interactions between children and adult to show how this thesis would work to explain the morality of the ideal course of action in these scenarios.

Ian Lorang (Biology)

Field of Study: Biochemistry

Isolation and Characterization of a Bacteriophage

It has been suggested by research that bacteriophages are the most abundant genetic entities on the planet. Few phages have been isolated, which provides this study a chance to collect and describe a novel phage from Northwest Montana where a phage has never been isolated. The phage was named the Flathead Lake Monster (FLM) and is a novel phage based on results from the study. FLM had abnormally small plaque diameters and an unusually long tail. Compared to literature on other isolated phage's tail lengths, the FLM has the longest tail ever isolated using *M. smegmatis* as a host. This led to the investigation of a correlation between plaque diameter and phage tail length. Comparisons within our lab confirmed that there is a correlation. An additional question of this study was to see if the length of the gene *tape measure*, which is highly conserved in all isolated phages, correlates with phage tail length. Genome analysis of the phage will help to answer that question for the FLM and possibly reveal genes that are unique.

• 4B: SIMPERMAN 101

Ben Jensen (Mathematics)

Field of Study: Mathematics

Searching for Lost Targets using Bayesian Search Patterns

Finding a lost target is a battle against the clock. If the target happens to be a person, a matter of hours can mean the difference between life and death. It is of the utmost importance to find a missing person as quickly as possible with the available resources. The main goal of this project is to find the best method to locate and rescue a missing person or target in a variety of different terrains and scenarios with different numbers and types of search agents. The basic approach to developing a model to track and find a missing target is done using Bayes' theorem. This approach is based on estimating a probability distribution of where the missing target could be and then adaptively searching the highest probable areas. Then the original probability distribution is updated using observations from the search agents to reflect the area that has already been searched. After that the search agent will move in the direction of the highest probability. This method has proven to be an efficient way of finding a missing target. The focus of this research is to analyze different search agents in different types of terrain. In the model we will simulate searching for a target in a desert or in a forest. Then we analyze the effectiveness of using an aircraft or a ground search agent. From this we can develop a plan to find the missing target with the optimal efficiency.

Ellen Barta (Psychology), Lauren Scofield (Biochemistry/Molecular Biology)

Field of Study: Sociology/Gender Studies

How a Catholic Institution is Addressing Sexual Assault

In our presentation we discuss the campus climate survey that was disseminated at Carroll College during the spring of 2015. We will be expanding on our results, as well as discuss how we achieved a high participation rate, approximately forty-five percent of the student body. We suggest that this participation rate was due to the methods we utilized to present the survey to the student body, which we will further describe in our session. Carroll College has never conducted a formal survey on sexual assault and harassment until this year. As students, we worked alongside three members of the gender studies faculty, Dr. Angel, Dr. Bernardi, and Dr. Dolan, to administer the campus climate survey. Importantly, the survey results will help shape ongoing efforts to improve student safety at Carroll. We will be comparing these to national data averages and the implications this has for Carroll. We will specifically be highlighting major similarities and differences.

Jenifer Johnson (Anthrozoology), Karlee Kent (Nursing), Traci Lyndes (Nursing)

Field of Study: Elementary Statistics

Can You Taste without the Sense of Smell?

We were interested in testing to see if one's ability to smell affected their ability to taste. We chose to test the Carroll College student body with four different Jolly Rancher flavors: cherry, green apple, grape and blue raspberry. In both our control and experimental groups, we eliminated any sight bias with a blind fold. With the experimental group, we had the participants wear a swimmer's nose plug. The goal of the nose plug was to eliminate the sense of smell without relying on the subject to do so in case of bias. We then presented all four flavors of Jolly Ranchers in random order, one at a time, to the participant. If a person correctly identified the flavor, they received a point. If three out the four were correctly identified, then the participant was given a score of "yes." If the criteria was not met for a three out of four, then the participant was given a "no." Our data was compiled together in Microsoft Excel and we ran various statistical analyses. The difference between the control and treatment groups ended up being statistically significant. There was indeed a dramatic difference in a person's ability to taste without their sense of smell as compared to someone who was able to smell.

• 4C: SIMPERMAN 114

Travis Knoll (Civil Engineering)

Field of Study: Globalization/Communication/Gender

The Globalization of Basketball

The game of basketball originated in Canada about one hundred years ago. Since its humble origins, the game of basketball has grown into one of the most popular sports in the world, with the United States being recognized as one of the powerhouses of the game. For the past 30 years the globalization of basketball, through the use of new communication technologies, has helped connect people from different countries around the world.

This research examined how the NBA and the WNBA has used communication technologies to help globalize the sport of basketball. The research also discusses how the introduction of basketball in other countries has influenced the game in the United States and how the globalization of basketball has influenced socio-economic issues facing the world today.

The research concludes that the globalization of basketball, through the use of communication technologies, has impacted the economies and to some extent, gender relations in several countries.

Kelly Rostratter (Public Health and Spanish)

Field of Study: Art

Eugenia Balcells: Activism through Art

Eugenia Balcells has committed her life to using different art mediums as a platform for social media commentary. As a female, Spanish artist she breaks through norms of the art world and offers social commentary on modern gender roles. Balcells combines technology, science and emotive imagery in her art that consistently promotes for gender equality. This presentation addresses some of her most popular work, including *Boy Meets World*, *Moebius Spaces*, *Fuga*, *El Fin*, *Frecuencias* and *Homage to the Elements* to illustrate the social issues to which Balcell wants to call our attention.

Alex Chopyak (Mathematics for Secondary Education)

Field of Study: Mathematics Education

Confidence Intervals in a High School Statistics Class

In order to be a functioning member of society, it is important that a citizen understands basic statistics. One topic in particular is confidence intervals. There are confidence intervals in everyday life, no matter if you are a person in college or just a person in society. Many claims about populations rely on a sample and the statistics of confidence intervals. For example: "We believe, with 95% confidence, that 40% \pm 3% of Americans will accept [a new law by Congress]," meaning that we are 95% confident that a sample formed in this way will create a confidence interval that contains the population mean or proportion. For my thesis project, I created a lesson that can be used to help teach high school students to understand what a confidence interval is and how to use it. This lesson uses multiple strategies to help students understand how to create and interpret a confidence interval. This lesson also follows the Common Core standards for statistics that can relate to confidence intervals. The hope is that by informing high school students about how to interpret and use a confidence interval, they will be able to make sense of the statistics they will encounter on a regular basis. In my presentation, I will discuss how confidence intervals can be taught in the classroom to prepare students to be functioning members of society.

• 4D: SIMPERMAN 314

Madeline Duval (History, Political Science and Social Studies for Secondary Education)

Field of Study: History

Let Us Not Forget Anita Hill

This presentation will discuss the beginnings of Third Wave Feminism. The seemingly unorganized and individualized movement has created an atmosphere for women in which individualism is not only accepted, but also respected. Where did it all start? This presentation will argue that Anita Hill's testimony during the Clarence Thomas Senate Hearing marked the beginning of Third Wave Feminism. Hill's bravery influenced many men and women, including Rebecca Walker. Using Ms. Magazine as a platform after being moved by Hill's actions and angered by the outcome of the hearings, Walker declared, "I am the Third Wave." Walker may have given Third Wave Feminism a name, but Hill's actions started the movement.

Jared McCauley (Political Science and International Relations)

Field of Study: International Relations

The Global Economy and Latin America: How Foreign Direct Investment Has Affected Income Inequality in the Region

Globalization, defined as increased political, economic, and social interconnectedness and interdependence, characterizes much of the contemporary world. While distance has been annihilated under this international system, globalization poses many challenges, especially for developing countries with Latin America as perhaps the most unequal region in the world particularly in terms of income distribution. This research focuses on one aspect of globalization, inward flows of foreign direct investment (FDI), and how it affects Latin American income inequality. The purpose of this research is to situate the scholarly debate on the relationship between foreign direct investment and income inequality through a quantitative study of Latin American countries. I analyze inward FDI flows by economic sector and country, and income inequality levels by country from 2000–2012. Within the context of globalization, I pay special attention to the affect that the global recession had on both investment and inequality in Latin America. Additionally, I take into account educational attainment levels in each country as a potentially influential factor to each country's attractiveness to foreign investment as well as to the degree of income inequality within each country.

Dempsey Rogers (Physics and Mathematics)

Field of Study: Physics and Mathematics

2D Numerical Simulation of MHD Instabilities for Nuclear Fusion Energy

Lately the global energy consumption and population have been on the rise. With most fossil fuels being depleted and predicted to run out in the next 100 years it is time for change. With renewable energy resources only providing %10–%13 of American energy, and Nuclear Fission on hold, we need a new energy source. Nuclear Fusion, the power of stars, is the best opportunity to meet tomorrow's energy demands. Throughout this presentation we will investigate nuclear fusion in Tokamak Reactors through the Magnetohydrodynamic Equations governing the reaction. We will also study the numerical methods behind mathematically modeling such a reaction.

• 4E: CORETTE LIBRARY SAGE ROOM

Jonathan McCarthy (Political Science and International Relations)

Field of Study: Political Science

Household Gun Ownership, President Obama's Approval ratings, and Partisanship in Lewis and Clark County

Gun policy is a controversial and politically polarizing issue within the United States, particularly in light of recent events. While some researchers argue that the "gun issue" is a strong influence at the polls, others contend that these kind of social issue does not significantly influence voters. Within the context of prior research, and given the uniqueness of Montana's gun culture, this project assesses whether there is a statistically significant relationship between gun ownership and President Obama's approval ratings in Lewis and Clark County. This paper also assesses whether that relationship does or does not change based on party identification, and whether or not partisanship is a stronger influencing factor than gun ownership on President Obama's approval rating. This project statistically analyzes data collected by Carroll College in an exit poll at the time of the 2014 congressional elections. The results show that in Lewis and Clark County, within the group surveyed as a whole, there is a significant difference in approval rating of President Obama, comparing those who live in a gun-owning household and those who do not. However, when partisanship is taken into account this is not true, suggesting that partisanship is a much stronger indicator of a person's approval rating of Obama than household gun ownership. The implications of my research are consistent with the growing trend towards partisan polarization throughout the United States.

Nicholas Lumetta (Mathematics and Physics)

Field of Study: Mathematics

An Exploration of Computational Fluid Flow and the Navier Stokes Equations

In this paper, we explore fluid flow in a wind tunnel and how it is affected by obstacles of different shapes. Fluid flow models are simulated using a MATLAB code which discretizes the Navier-Stokes equations for compressible flow using a MacCormack predictor/corrector step method. The accuracy of the code can be verified by analytically solving the Hagen-Poiseuille equations for flow through a circular pipe, and comparing values to outputs from the computer model. We see a parabolic cross-section of velocity as the fluid slows down near the edges of the pipe. We then run simulations of fluids with different densities and viscosities. This allows us to explore the fluid behavior as well as the aerodynamic efficiency of different shapes placed in the pipe. We can do this by looking at the amount of lift produced by the shapes. This allows us to model real-world objects such as airplane wings and look at how different designs compare to one another.

Erin Hanson (Chemistry and Biology)

Field of Study: Anthropology/Archaeology

Paleoclimate Reconstruction: An Isotope Analysis of Prehistoric Snail Shells

Excavations at the Beaver Creek Rock Shelter and the Big Log 2 archaeological sites in the Big Belt Mountains revealed evidence of a significant drought period about 2000 years ago. To date, the excavated sites evidence a shift in pollen to drier species, a shift to higher sedimentation rates, and changes in snail and vertebrate species. Prehistoric snail shells were collected for carbon and oxygen isotope analyses.

Being that snail shells are made out of calcium carbonate, formed from the organism's surroundings, we were able to attribute changes in isotopic composition to environmental changes. Supporting evidence suggests that changes in carbon isotopes indicates a change in plant life, whereas, changes in oxygen isotopes indicates a change in temperature. Our study of these isotopic analyses supports our previous hypothesis of a large climate change nearly 2000 years ago.

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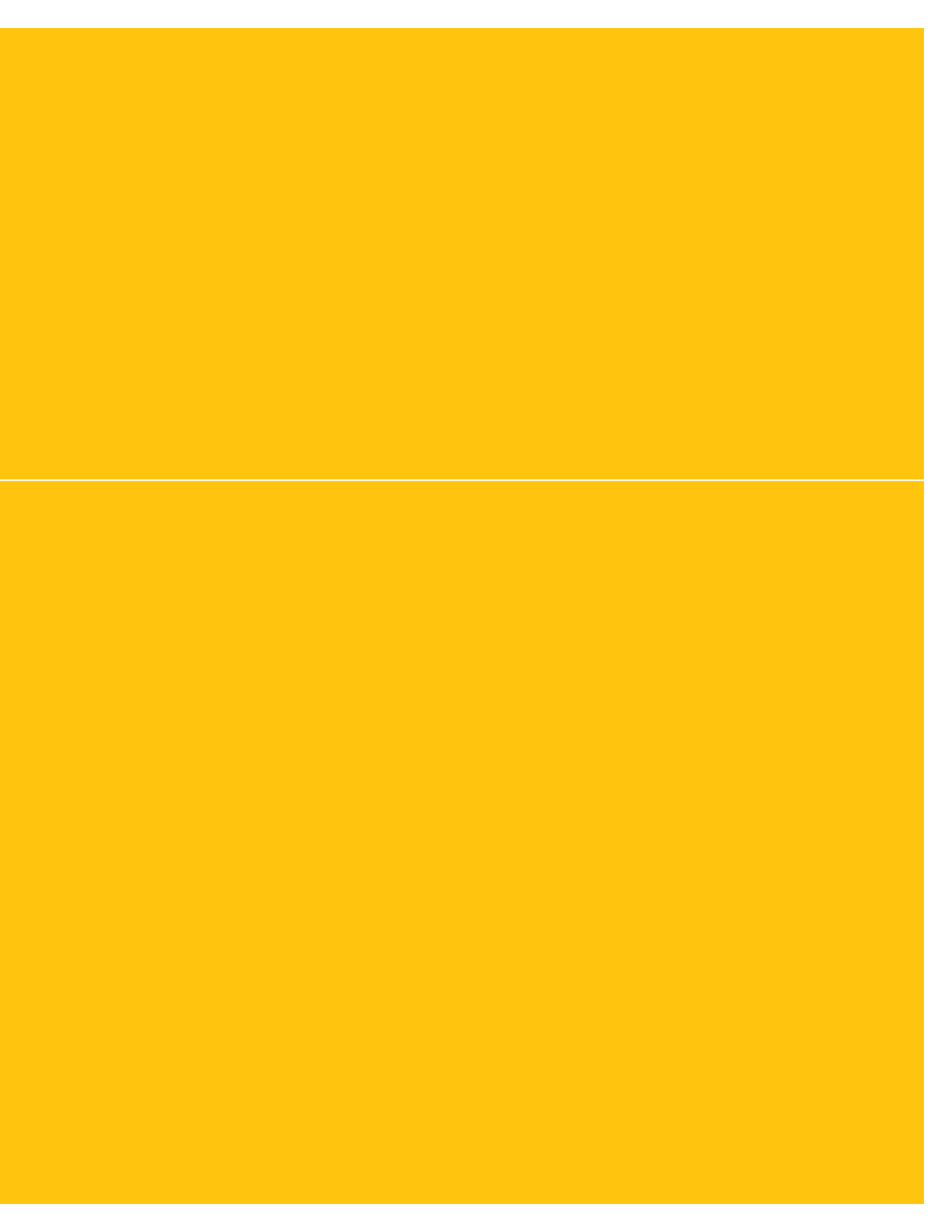
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