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Conference

2018, 29th Annual JWP Conference

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Apr 21st, 8:30 AM - 9:00 AM

## Complete 2018 Program

Illinois Wesleyan University

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Center for Natural Sciences  
& The Ames Library

Saturday, April 21,

**2018**

[www.iwu.edu/jwprc](http://www.iwu.edu/jwprc)

*The conference is named for explorer and geologist John Wesley Powell, a one-armed Civil War veteran and a founder of the National Geographic Society who joined Illinois Wesleyan University's faculty in 1865. He was the first U.S. professor to use field work to teach science. In 1867 Powell took Illinois Wesleyan students to Colorado's mountains, the first expedition of its kind in the history of American higher education. Later, Powell was the first director of the Smithsonian Institution's Bureau of Ethnology.*

## THE JOHN WESLEY POWELL STUDENT RESEARCH CONFERENCE - APRIL 2018

The John Wesley Powell Research Conference Committee would like to acknowledge the contributions of several individuals.

This conference could not have been a success without the contributions of Patricia Neustel, Associate Provost's Office, in organizing many aspects of the conference and assembling and printing the program booklet.

The invaluable assistance provided by Mike Welsh and his staff at Sodexo Campus Services in setting up breakfast, luncheon and other refreshments is gratefully acknowledged.

The assistance of Information Technology Services in setting up computer equipment in all rooms along with Michael Gorman and Trey Frank for registration and website consultation is greatly appreciated.

The Undergraduate Research Advisory Committee

Stephanie Davis-Kahl, Abigail Kerr, Leah Nillas, Daniel Roberts, Tyler Schwend, and Scott Sheridan

## **THE EVOLUTION OF REVOLUTION**

All evolve: people, living things, the environment, cultures, religions, and technologies – change is a normal part of growth. Reform describes actions or process changes (typically incremental and systematic) made in order to improve something. However, when change is sudden, fundamental, often subversive or dramatic, we experience a complete shift in our conception of life, and we call it revolution. A hallmark of Western learning has often been to study forces of change, as those factors that question tradition are those that are the most significant. The Evolution of Revolution invites us to think broadly about these dramatic societal, technological, and personal changes that propel us to new ways of being, individually and as communities.



## **SCHEDULE OF EVENTS**

**Saturday, April 21, 2018**

8:30 a.m.	Continental Breakfast and Poster Setup	Atrium of CNS and State Farm Hall
9:00 a.m.	<u>Poster Session A</u> Poster Presentations – Educational Studies	Atrium of CNS State Farm Hall
10:00 a.m.	<i>Oral Presentations – Session One</i> <i>Oral Presentations – Educational Studies</i>	CNS SFH
11:00 a.m.	<i>Oral Presentations – Session Two</i> Poster Presentations – Educational Studies	CNS SFH
12:00 p.m.	Luncheon  Music Composition Performances  Keynote Address: Aleksandar Hemon	Young Main Lounge
2:00–3:00 p.m.	<u>Poster Session B</u>	Atrium of CNS
3:00 p.m.	Senior Art Show and Critique	Merwin and Wakeley Galleries

**KEYNOTE SPEAKER**

**“The Failure of Empathy”**

Aleksandar Hemon, Distinguished Writer in Residence

Columbia College, Chicago

ALEKSANDAR HEMON was born in 1964, in Sarajevo, Bosnia-Herzegovina. He came to the US as part of a month long cultural exchange program of journalists but was granted political asylum when he was unable to return to Sarajevo which was by then under siege. Hemon is the author of *The Question of Bruno*, *Nowhere Man*, *The Lazarus Project*, *Love and Obstacles*, *The Making of Zombie Wars* and a collection of auto-biographical essays, *The Book of My Lives*. He is working on his next novel, tentatively titled *The World and All That It Holds*, as well as two works of nonfiction, *How Did You Get Here?: Tales of Displacement* (oral histories) and *My Parents: An Introduction* (memoir), all forthcoming from FSG. *How Did You Get Here?* was the recipient a PEN/Jean Stein Grant for Literary Oral History in 2017.

# STUDENT PARTICIPANTS

## Oral and Poster Presentations

Zaain Ahmad	P1	Maggie Graham	P16
Annika Anderson	P2	Shannon Green	ES
Elizabeth Ayala	ES	Christopher Guetthoff	O10.3
Kiersten Bergquist	O1.3	Samridh Gupta	P25
Samantha Bidlack	P3	Carlie Haagen	P14
Nicole Bing	P4	Emma Haan	P26
Jamie Blumberg	P5	Veena Hamill	P27
Josie Blumberg	O4.3	Maria Hanna	P28
Raymond Bolton	O7.1	Emma Hanzelin	ES
Seth Borrowman	P3	Noah Haskin	P29
Zoe Bouras	O4.1, O8.1	Olivia Heffernan	O4.2
Maisy Bowden	P6	Guadalupe Hernandez	O3.2
Meghan Bowler	P7	Alexandra House	P30
Ross Burandt	P8	Alexandra Hurth	ES
James Burnell	P9	Greg James	P7
Caitlin Cadwalder	P10	Paul Johnson	O1.4
Ayrren Calhoun	O8.2	Rosemary Josenkoski	P21
Lily Chang	O7.2	Abigail Kauerauf	O2.3
Julia Chen	P11	Kelly Kaveney	ES, O6.3
Chudan Chen	P12	Hamzah Khan	P31
Minghao Chen	P13	Shin Ho Kim	P32
Panxi Chen	P13	Bailey Knowles	Music
Kyle Cook	P6	Brooke Koebele	O9.3
Jaeden Danko	P14	Jamie Kreppein	O6.1
John Davine	P15	Amanda Lack	P16
Evan Dill	P15	Linh Le	P34
Brooke Dominski	P14	Cassandra Leishman	ES
Megan Donnelly	P16	Emma Lewis	ES
Alyssa Dorning	ES	Tate Lewis	O2.1
Ronan Dorsey	P17	Erich Lieser	ES, O6.2
Victoria Drake	O1.1	Minzhao Liu	P33
Cameron Earley	ES	Sydney Longfellow	P7
Spencer Eidsmoe	P18	Shenyu Lyu	P35
Rowland Filbert	P19	Mark Macak	P36
Natalie Fletcher	ES	Keila Magafas	P10
Morgan Flynn	P20	Rachel Mavros	P26
Megan Frederick	P21	Larisa McCoy	P37
Max Garcia	P22	Claudia McGee-Morales	ES
Lilia Garcia	P21	Grace McGovern	O10.1
Alysia Gazder	P23	Jack McKermitt	P29
Madeline Gibson	P24	Brianna Miulli	O9.2
Megan Gordon	O2.2	Monica Mocogni	P53

*continued.....*

Emilee Monken	ES	Breanna Williams	O5.2
Caroline Monsen	O7.3	Abby Winters	P28

THE JOHN WESLEY POWELL STUDENT RESEARCH CONFERENCE - APRIL 2018

Natalie Moore	ES	Julie Xu	P10
Matthew Moser	P39	Muyi Yang	O8.3
Kiara Mosley	P16	Linda Zhang	O5.1
Victoria Nemchek	P26	Yuanziyi Zhang	P52
Zihan Nie	P13	Joseph Ziegel	P15
Clare O'Donnell	P16	Elise Ziegenhorn	P32
Sarah O'Rourke	ES		
Kathleen O'Shea	P40		
Weronika Pach	P41		
Alexander Palacios	P29		
Grant Park	P42		
Mansi Patel	P43		
Ria Patel	P10		
Ngan Pham	P19		
Alyssa Pisano	P25		
Teagan Potter	P44		
Anna Poulton	P45		
Stephanie Prentice	ES		
Jill Rajarathnam	P43		
Luke Roth	ES		
Michelle Roy	P3		
Kayleigh Ruffolo	P55		
Andrew Runkle	P1		
Cayley Rydzinski	O3.1		
Oscar Schmidt	P29		
Ari Scott	Music		
Sydney Seeman	ES		
Robert Shafer	P8		
Ojaswee Shrestha	P46		
Mark Siegel	P31		
Zach Silver	P47, P48		
Giovanni Solano	O5.3		
Ashley Sons	O1.2		
Savanna Steck	O10.2		
Amber Stringer	ES		
Jennifer Swanson	P49		
Ian Taylor	P20		
Shelby Thomas	ES		
Jory Vance	P1		
Niyant Vora	P19, P50, O3.3		
Matthew Wegh	ES		
Juntian Wei	O9.1		
Rachel Westerkamp	P51		
Shante Williams	P16		

THE JOHN WESLEY POWELL STUDENT RESEARCH CONFERENCE - APRIL 2018

**BA/BFA SENIOR EXHIBITION PRESENTATIONS**  
**SCHOOL OF ART**

**Saturday, April 21, 2018, 3:00 p.m., Merwin and Wakeley Galleries**

Student Presenters:

Linh Chi Bui

Joi Stack

*Refreshments will be served*

**ACKNOWLEDGEMENTS**



**MUSIC COMPOSITION STUDENT PRESENTATION**

**Saturday, April 21**

**Young Main Lounge, Memorial Student Center  
(as part of the conference luncheon program)**

*from* THERESIENSTADT  
III. Red Cross

Bailey Knowles '19

Daria Dodonova, Kaylee Braun, Ethan Schuller, Steve Hogan, violin  
Julia Hilt, viola  
Juliana Hill, Rob Reinbrecht, Daria Van De Loo, cello  
Zach Silver, double bass  
Bailey Knowles, conductor

*from* String Quartet in A Flat Major  
II. Andante Moderato/Vivace

Ari Hunter Scott '20

Daria Dodonova, Violin  
Ethan Schuller, Violin  
Steve Hogan, Viola  
Ari Scott, Cello

## **Oral Presentations 10:00-11:00 Sessions**

### **Oral Presentations – Session 1**

10:00-11:00

Center for Natural Sciences (E101)

**Nursing, Environmental Studies, & Physics**

1.1 Victoria Drake

1.2 Ashley Sons

1.3 Kiersten Bergquist

1.4 Paul Johnson

### **Oral Presentations – Session 2**

10:00-11:00

Center for Natural Sciences (E102)

**Creative Writing & Literature**

2.1 Tate Lewis

2.2 Megan Gordon

2.3 Abigail Kauerauf

### **Oral Presentations – Session 3**

10:00-11:00

Center for Natural Sciences (E103)

**Religion, Hispanic Studies, & German**

3.1 Cayley Rydzinski

3.2 Guadalupe Hernandez

3.3 Niyant Vora

**Oral Presentations – Session 4**

10:00-11:00

Center for Natural Sciences (E105)

**Political Science**

4.1 Zoe Bouras

4.2 Olivia Heffernan

4.3 Josie Blumberg

**Oral Presentations – Session 5**

10:00-11:00

Center for Natural Sciences (E106)

**Political Science & Sociology**

5.1 Linda Zhang

5.2 Breanna Williams

5.3 Giovanni Solano

**Oral Presentations 11:00-12:00 Sessions**

**Oral Presentations – Session 6**

11:00-12:00

Center for Natural Sciences (E101)

**Theater and Journalism**

6.1 Jamie Kreppein

6.2 Erich Lieser

6.3 Kelly Kaveney

**Oral Presentations – Session 7**

11:00-12:00

Center for Natural Sciences (E102)

**Economics**

7.1 Raymond Bolton

7.2 Lily Chang

7.3 Caroline Monsen

**Oral Presentations – Session 8**

11:00-12:00

Center for Natural Sciences (E103)

**Political Science**

8.1 Zoe Bouras

8.2 Ayrren Calhoun

8.3 Muyi Yang

**Oral Presentations – Session 9**

11:00-12:00

Center for Natural Sciences (E104)

**Chemistry & Biology**

9.1 Juntian Wei

9.2 Brianna Miulli

9.3 Brooke Koebele

**Oral Presentations – Session 10**

11:00-12:00

Center for Natural Sciences (E105)

**Creative Writing & Literature**

10.1 Grace McGovern

10.2 Savanna Steck

10.3 Christopher Guetthoff

Presentations are 12-15 minutes in length. If time permits, there will be a question-and-answer period for all presenters following the final presentation.

Oral Presentation O1.1

**A RANDOMIZED STUDY OF A PREFEEDING ORAL  
MOTOR THERAPY AND ITS EFFECT ON FEEDING  
EFFICIENCY IN A THAILAND NICU**

Victoria Drake and Brenda Lessen Knoll\*  
School of Nursing, Illinois Wesleyan University

Premature infants have underdeveloped oral motor musculature, coordination, and strength which impedes successful feeding and subsequent hospital discharge. With over 15 million premature infants born each year worldwide, methods to assist preterm infants improve oral muscular maturity needs to be evaluated. One standardized method is the Premature Infant Oral Motor Intervention (PIOMI). In this randomized controlled trial, the effect of the PIOMI on preterm infants' feeding efficiency on day 1, 3, and 5 of oral (per bottle) feeding was examined. Stable infants without comorbidities born between 26 and 34 weeks postmenstrual age (PMA) and admitted to an urban Thailand NICU were included. Once participants reached 31 to 33 weeks PMA, they were randomized into groups. The experimental group received the PIOMI once daily for 7 consecutive days, while the control group received routine care only. After oral feedings were initiated, the mean volume (MV) oral intake (percentage of prescribed oral feeding based on infant weight) over 2 consecutive oral feedings was calculated at day 1, 3, and 5. The infants who received the PIOMI had significantly higher MV of oral intake at all three measured feedings. The MV consumed on the first day of oral feeding was  $44.9\% \pm 7.33\%$  in the experimental group versus  $29.7\% \pm 9.55\%$  in the control ( $p < .001$ ),  $53.9\% \pm 8.01\%$  versus  $30.4\% \pm 11.07\%$  on day 3 ( $p < .001$ ), and  $61.7\% \pm 7.44\%$  versus  $34.8\% \pm 8.76$  on day 5 ( $p < .001$ ). There were also increasingly greater margins of improvement between the control and experimental groups at each of the measured feedings, showing an increasing positive benefit over time. The statistically significant positive results in Thailand are consistent with previously published studies on the PIOMI and support the PIOMI as a safe oral motor therapy that could be utilized for infants aged 31 to 34 weeks PMA to improve feeding efficiency.



Oral Presentation O1.2

## **HEALTH LITERACY AND KNOWLEDGE OF FEMALE REPRODUCTION IN MALE AND FEMALE UNDERGRADUATE STUDENTS**

Ashley Sons and Ann Eckhardt\*

School of Nursing, Illinois Wesleyan University

Adequate health literacy is essential for making informed decisions about reproductive health. Unfortunately, few studies have examined the relationship between health literacy and knowledge of female reproductive health. The purpose of this study is to examine the correlation between health literacy and knowledge of basic female reproduction, contraception, and sexually transmitted infections (STI), while also considering factors that may influence knowledge such as gender, sexual experience, and type of previous sex education. The Knowledge of the Female Body (KFB) scale, the Newest Vital Sign (NVS) health literacy tool, questions about STI prevention and questions about students' sexual history were distributed to students at a small Midwestern university. Ninety-five percent of the participants (N = 323) demonstrated adequate health literacy. NVS and KFB scores were positively correlated,  $r = .200$ ,  $p = <0.01$ . Approximately 96% of participants agreed that knowing when ovulation is most likely to occur can help to plan or prevent pregnancy, but only 71.5 % of participants correctly identified the time in the cycle when ovulation usually occurs. In addition, over 58% of participants could not identify the length of time sperm live in a woman's body. Although most students demonstrated adequate literacy, major gaps exist in the reproductive knowledge of both male and female undergraduate students. Educational programs to improve health literacy and knowledge of female reproduction are needed to prepare young people to make informed decisions about reproductive health.

Oral Presentation O1.3

**DETERMINING SOIL SCIENCE LAB PROTOCOL  
TO MEASURE SOIL FAUNA INFLUENCE ON NUTRIENT  
FLOW FROM LEAF LITTER TO SOIL**

Kiersten Bergquist and Aaron Shoults-Wilson\*  
Environmental Studies Program, Illinois Wesleyan University

Soil science is an essential part of ecosystem and agriculture health but is unfortunately not a priority in most non-science students' education. To counter this, the goal of this study was to determine the best protocol for a general education science lab that would use soil microcosms to explore nutrient cycling from leaf litter decomposition. The experimental procedure was designed to test different combinations of soil organism type, organism density, and leaf density in simple Tupperware microcosms. The best combination was defined as a combination that met the following traits: significant decrease in leaf litter mass and high nutrient flow from leaf litter to the soil. Statistical testing revealed that high densities (10-11 individuals) of pillbugs (*Armadillidium*) combined with medium (2 g) or low (1 g) leaf litter densities produced the largest change in leaf litter mass and nutrient flow into the soil. The lab protocol can be used in any general science course to teach non-science students the importance of soil health, and the relationship between soil, nutrients, and soil fauna.

Oral Presentation O1.4

## **ACOUSTIC HOLOGRAPHY: EXPERIMENTS WITH ACOUSTIC DIFFRACTION**

Paul Johnson and Gabriel Spalding\*  
Physics Department, Illinois Wesleyan University

A hologram is a method of using the diffraction patterns created by phase-shifted interacting waves to store data in higher dimensions than the source. This research looks at patterns formed by diffraction patterns of longitudinal sound waves at ultrasonic frequencies. Using various arrays designed through CAD connected to ultrasonic transducers, different holographic patterns were created and tested in terms of shape and pressure. These holograms were designed using an iterative algorithm to rely solely on phase informations in order to preserve amplitude. Using these patterns levitation of small objects became a possibility, and interactions between holographic trapping patterns and various fluid systems were explored in attempts at finding soliton formation. Currently there are theories as to finding solitons that will continue to be tested over coming months.



Oral Presentation O2.1

## **MY FATHER'S DEATH**

Tate Lewis and Michael Theune\*  
English Department, Illinois Wesleyan University

My father, James Arlo Lewis, died October 30, 2016 from a lifelong battle of multiple liver diseases; hepatitis c, cirrhosis, and, most recently, liver cancer. A distinguishing problem with death is the living's lack of preparation to effectively and sufficiently find an outlet to the many stages of grief and constant battle between progress and deterioration. Thankfully, I was enrolled in my first poetry class at the time of his death. Currently, I am writing with the determination to create and publish a project book of poetry that not only focuses the reader's eye on the ugliness of a futile struggle against death but also my discoveries of him within and apart from fatherhood. His death functions more than an artistic landfill of inspiration for me to pull ideas from. It creates an opportunity for me to explore our estranged relationship, also teaching me how to unearth bits of myself in my work. I am challenged to look critically at the decisions he made throughout my childhood and find peace within my decisions to proceed living without him now, all the while continuing to learn about Jim the individual, not Jim the father.

Oral Presentation O2.2

**SEEKING REVENGE OR SIMPLY BALANCING ACCOUNTS:  
A STUDY OF APPLYING DOUBLE-ENTRY ACCOUNTING  
THEORY TO LITERATURE**

Megan Gordon and Joanne Diaz\*  
English Department, Illinois Wesleyan University

Accounting and literature are often thought to be of two completely separate worlds: accounting is comprised of numeric facts and figures while literature transforms words and phrases through literary devices. I intend to demonstrate how these two areas of study can be fused together by exploring plots with a revenge element through an accounting perspective, specifically focusing of the theory of double entry accounting. In my study, I analyze three stories already related to business and banking: *The Merchant of Venice* by William Shakespeare, *Bartleby the Scrivener* by Herman Melville, and *Christie Malry's Double Entry* by B.S. Johnson. These stories are not typically categorized as revenge in genre, but I argue that it is plausible and respectable to value these tales as having a clear theme of revenge.

Oral Presentation O2.3

**TO CLAIM ONE’S SOUL: “THE SHERIFF’S CHILDREN”  
AND THE STRUGGLE FOR FREEDOM**

Abigail Kauerauf and Molly Robey\*  
English Department, Illinois Wesleyan University

The interest for this paper resides in the antagonism between forging a new sense of freedom for black Southerners and preserving the white South and after the Civil War, as evidenced in Charles Chesnutt’s 1898 short story, “The Sheriff’s Children.” The paper addresses the distinctive views of the same concept, “freedom,” among white and black people post-Civil War. The matter of freedom is complicated by the fact that the man in charge of determining such freedom, the Sheriff, is morally and professionally conflicted about what exactly constitutes such a freedom. The family dynamics presented in the short story serve as Charles Chesnutt’s critique of the farce of freedom for black people. My project is structured to first examine the struggle of African-Americans post-Civil War as documented by Frederick Douglass, whose words are then juxtaposed with the writings of conservative Southerner E. W. Gilliam and then applied to the character of Tom. I then return to the words of E. W. Gilliam and Daniel Chamberlain as I discuss the fears of white Southerners. Finally, I speak about the similarities between the conflicted sheriff and the opinions of many leaders of the Reconstruction Era.



Oral Presentation O3.1

## **SHAMANISM TO SHAMANIC: CHANGING THE WAY WE TALK ABOUT ALTERED STATES OF CONSCIOUSNESS**

Cayley Rydzinski and Carole Myscofski\*  
Religion Department, Illinois Wesleyan University

The term *shamanism* has become an umbrella term to describe any religion, typically an indigenous tradition, which incorporates altered states of consciousness (ASC) into its practice. This is a major departure from the original use of the term, which was used to describe the practices of specific indigenous tribes in Siberia and was itself a translation of the term these tribes used to identify specific practitioners. In the past fifty years, a new form of shamanism, neo-shamanism, has rapidly gained popularity in both the United States and in Europe and is frequently found within the Neo-Pagan movement. Through a critical analysis of the structure and beliefs of traditional shamanism and neo-shamanism, as well as the academic approaches taken when studying shamanism, this research argues that a change in terminology is needed to talk about ASC and to reflect the changing conditions in which the term *shamanism* is applied. This presentation is a part of Cayley Rydzinski's honors research project.



Oral Presentation O3.2

**CREATING A LANGUAGE BRIDGE FOR SPANISH  
SPEAKERS WITH LIMITED ENGLISH LANGUAGE SKILLS**

Guadalupe Hernandez and Carolyn Nadeau\*  
Hispanic Studies Department, Illinois Wesleyan University

For my SPAN 397 internship in fall 2017, I worked in the interpretation office at Western Avenue Community Center in Bloomington, IL for those Spanish speakers with limited English language skills. I have been able to see the necessity of having someone that knows English present during different appointments like medical, counseling, court, therapy, and during other scenarios. The focus of my talk will be an analysis of how a language barrier impacts an individual in various areas of his/her life like health, education, and legal issues.

Oral Presentation O3.3

**Science, Mental Illness, And Ethics In  
Friedrich Dürrenmatt's *The Physicists***

Niyant Vora and Jamie Zelechowski \* and Marina Balina\*  
German Studies Program, Illinois Wesleyan University

In 1962, as Cold War tensions approached their peak, Friedrich Dürrenmatt, a Swiss playwright, published his play *The Physicists*. Two of the most important topics in *The Physicists* are mental illness and ethical responsibility of scientists. Dürrenmatt's three main characters: Möbius (a genius), Einstein (a Russian spy), and Newton (an American spy) are all physicists who appropriate the status of mentally ill in order to hide from society inside the Les Cerisiers Sanatorium. Their status as mentally ill acts as a cover up that reveals their different reasons for adapting that status—from Möbius attempt to escape the politics of the time, to Einstein and Newton engaging in those same politics. Using their status as mentally ill, the three men are able to convince society at large to leave them alone—while also avoiding any legal complications via an insanity defense. By having his characters act mentally ill, I argue that Dürrenmatt provides his characters with the “freedom” to choose not to participate in the new destructive processes promoted in post-World War II era societies. I further argue that Dürrenmatt challenges his audience to question their presumptions about mental illness, while also making them question the ethics behind allowing scientific discoveries to be revealed—particularly ones capable of mass destruction, if put in the wrong hands.

Oral Presentation O4.1

**DOM PERIGNON V. MILLER LITE: EXPLAINING ANTI-ELITE ATTITUDES IN INDIVIDUALS IN EUROPE**

Zoe Bouras and Kathleen Montgomery\*

Political Science Department, Illinois Wesleyan University

Globally, as right-wing populism has gained a stronger footing, so have the ideas that right-wing populists support. Developed democracies are exhibiting high levels of political distrust and anti-elite sentiment, which poses a serious threat to the health of democracy and existing political systems. Despite the system-level trends that contribute to anti-elitism, there remain variations in individual anti-elite sentiment. Two broad schools of thought suggest explanations. One school suggests that the way an individual perceives and responds to their economic situation leads to anti-elite sentiment, the other contends that anti-elite sentiment has risen as a reactionary undercurrent to the “silent revolution” of the last half of the 20<sup>th</sup> Century. Using Round 7 of the European Social Survey (ESS), this research investigates a third approach which brings together insights of the cultural and economic explanations, the “left-behind” hypothesis, which finds that those who perceive themselves as “left-behind” by economic and cultural trends express stronger anti-elite sentiments than even the poorest “losers of globalization,” or the most traditionally conservative.

Oral Presentation O4.2

## **THE ROLE OF SOCIAL INTEGRATION AND ANTI-IMMIGRATION ATTITUDES IN MOTIVATING SUPPORT FOR BREXIT**

Olivia Heffernan and Kathleen Montgomery\*  
Political Science Department, Illinois Wesleyan University

Right-wing populism has experienced a surge in popularity among advanced democracies around the world. The success of right-wing populism has changed the course of history for the United Kingdom, which will become the first state to ever leave the European Union due to the success of Brexit. Recent research has identified several potential grievances that have motivated support for right-wing populism. The first theory points to the economic grievances that result from the economic displacement that accompanies modernization. The second theory emphasizes cultural grievances, with those that feel their traditional values have been challenged and displaced taking part in a “cultural backlash.” The declinism theory states that populism is a result of people viewing society as declining, whether that be socially, culturally, or economically. The fourth and final theory states that those who lack social recognition and respect are the most likely to feel “left behind” and support right-wing populism. This analysis will focus on the “left behind” theory which accounts for educational and class differences that past theories have not been able to explain. We hypothesize that those who feel they are no longer respected or recognized in society are the most likely to support Brexit. Using an OLS regression, we find that those who perceive themselves to be part of a lower social class, feel they are not treated with respect, and maintain anti-immigration attitudes are more likely to support Brexit.





Oral Presentation O4.3

**THE ROLE OF CIVIL SOCIETY NETWORKS IN  
PEACEBUILDING: THE SALAH CONSORTIUM  
IN AFGHANISTAN**

Josie Blumberg and William Munro\*

Environmental Studies Program, Illinois Wesleyan University

This research uses network analysis to show how examining the structure of a network provides insights into the impact of networks of civil society organizations on the field of peacebuilding. The research builds off of current theories of coordination and the benefits of network formation for individual organizations. The theory of how networks engage in field building is used to show how networks of organizations can improve an entire sector in which the member organizations are working. Afghanistan is used as a case study because it has been engaged in peacebuilding for over fifteen years, has a highly developed civil society that has formed informal and formal networks, and is characterized by a high level of international engagement. The network of local actors that is analyzed is the Salah Consortium, which comprises five civil society organizations. The research acknowledges challenges to the influence of the network and examines the peacebuilding environment in which the network is working by conducting interviews with individuals with experience working in the development sector as a whole in Afghanistan, as well as with the national Afghanistan Peace and Reconciliation Program. The history and characteristics of the formation of the network are examined to determine the focus of the five civil society organizations on peacebuilding after network formation in relation to peacebuilding at the national level. This allows for an analysis of what networks of grassroots organizations working within the field of peacebuilding have been able to achieve on the national level.

Oral Presentation O5.1

## **POPULIST ATTITUDES AMONG YOUTH IN EUROPE**

Linda Zhang and Kathleen Montgomery\*

Political Science Department, Illinois Wesleyan University

Scholars worry that the rise of populist radical right (PRR) parties in Europe and North America poses a threat to liberal democracy. It is unclear, however, if the recent success of these parties is a short-term phenomenon or part of a broader electoral realignment and cultural shift. In order to answer that question it is necessary to look at young voters and those in the pipeline who will begin voting in coming years. This paper seeks to establish the relationship between youth and populist attitudes in the three core aspects of right-wing populist ideology: populism, nativism and authoritarianism. Analyses are drawn from 15 European countries gathered from the MYPLACE dataset, which surveyed young people aged 15 to 24 years old (N=16,935). The first part of the analysis focuses on youth political attitudes in three areas of populism and finds that youth in Europe have strong anti-establishment (populist) attitudes, mixed feelings towards nativism and a significant level of anti-authoritarianism. The second part of the analysis focuses on why some youth express nativist attitudes. Findings suggest that young people who identify as Christian, express higher levels of cynicism about politics, and those come from families with lower education levels are also more likely than others to hold nativist views.

Oral Presentation O5.2

**THROUGH THE DIGITAL LOOKING GLASS:  
THE FRAMING OF BLACK LIVES ON SOCIAL MEDIA**

Breanna Williams and Meghan Burke\*  
Sociology Department, Illinois Wesleyan University

Organizations such as #BlackLivesMatter, partly through the use of social media, have helped to increase public awareness about the value of Black lives in a society that has a complex relationship with people of color. However, research suggests that social media can also desensitize users when they repeatedly encounter violent imagery. Given the wave of police brutality cases and increased sharing of other cases that include images of black deaths, I designed a survey, sent to students at Illinois Wesleyan University, to examine how social media influences racial attitudes. Results suggest that social media does in fact play a role in shaping how users view the victim, reflecting the ways that society generally treats African Americans.



Oral Presentation O5.3

**RACE AND FILM: HOW BLACK PANTHER IS A  
CELEBRATION OF BLACKNESS AND PAN-AFRICANISM**

Giovanni Solano and Joanne Diaz\*  
English Department, Illinois Wesleyan University

Film has a long history of poor representation of black people, often sidelining them or relying on hurtful stereotypes. Black Panther is a major motion picture that features a predominantly black cast that tells a nuanced story about Africans and African-Americans. A majority of critics from the New York Times, The New Yorker, and Rolling Stone agree that the film draws on the politics of Malcolm X and Martin Luther King Jr. as well as identity and the African diaspora. However, while the assessment is correct, the critics do not go far enough in their analysis of the film and its characters. Through close readings of the film and interviews with Ryan Coogler, co-writer and director, I will deepen existing critical analysis to show how Black Panther embraces pan-Africanism, visually, aurally, and politically.

Oral Presentation O6.1

**RESIST CAPITULATING: PSYCHOLOGY OF SEMIOTICS IN  
ILLINOIS WESLEYAN'S *RHINOCEROS***

Jamie Kreppein and Joanne Diaz\*  
English Department, Illinois Wesleyan University

Illinois Wesleyan's production of *Rhinoceros* transported Eugene Ionesco's words, originally inspired by the rise of fascism in early 20th century France and Romania, right into Bloomington-Normal and the Trump era, complete with "Make America Great Again" caps. As an audience member, I observed my fellow spectators and found the audience to be split into two camps—those who found the overt semiotics to be effective and powerful, and those who felt the production didn't allow them to make their own connections. This study is an examination of the theory of theatre semiotics, engaging with scholars such as Saussure, Alter, and Fortier, as well as an exploration into the question of artistic license. I analyze both the production concept and audience reactions of past and future *Rhinoceros* productions, comparing the effectiveness of overt and subtle semiotics onstage, in order to figure out how to best engage audience members in political conversation through theatre.



Oral Presentation O6.2

**CAN YOU SPOT THE DIFFERENCE?  
HOW BARSTOOL SPORTS IS REWRITING  
THE RULES OF JOURNALISM**

Erich Lieser and Joanne Diaz\*  
English Department, Illinois Wesleyan University

All written publications have the same goal: gain and maintain readers. Without daily readers, bills do not get paid. From the ivory towers of the Boston Globe all the way to the grungy offices of Barstool Sports, cash is still king. While conventional journalism is being called into question by new online blogs, Barstool Sports is creating and stealing large shares of the market with techniques that Boston Globe columnists Dan Shaughnessy and Bob Ryan have used for the past thirty years. Writing as a fan and utilizing popular culture is not new. Barstool is pushing the limits farther with every article. My study focuses on how The Boston Globe and Barstool Sports cover key championship events from 2015 to 2018. In doing so, I will show how and why Barstool Sports' use of shticks, clichés, and 'bro culture', has come to re-shape readers' expectations of what constitutes sports journalism in the digital age.

Oral Presentation O6.3

**LET HER BE A PART OF THE NARRATIVE:  
ELIZA HAMILTON'S ROLE IN HAMILTON THE MUSICAL**

Kelly Kaveney and Joanne Diaz\*  
English Department, Illinois Wesleyan University

In today's society, it is difficult not to hear about the hit Broadway musical, *Hamilton*. While a variety of critics and spectators of the show recognize the strength and fascinating qualities of characters such as Alexander Hamilton and Aaron Burr, very few acknowledge the immense strength represented by Eliza, the accomplished wife of Alexander. Although many find her character to be dull, uneventful, and often not seen as anything more than "good," Elizabeth Schuyler Hamilton demonstrates immense character development and accomplishes a tremendous amount throughout her lifetime in addition to embodying the domesticity of women of her era. In researching Eliza's character in *Hamilton*, I have looked into the historical figure's portrayal in Ron Chernow's biography, *Alexander Hamilton*, am comparing Eliza's accomplishments to the expectations of the women of her time period, I am analyzing Eliza's lyrics in the musical, and I am looking further into how Eliza is represented in other plays and historical fiction novels and comparing that to how she is represented in *Hamilton*.



Oral Presentation O7.1

## **THE VALUE OF GREEN CERTIFICATION ON SINGLE-FAMILY HOUSES IN THE CHICAGOLAND AREA**

Raymond Bolton and Ilaria Ossella-Durbal\*  
Economics Department, Illinois Wesleyan University

In the United States, residential buildings alone account for 33% of energy consumption. Rising concerns about environmental impacts due to human consumption, as well as health concerns related to pollution have caused there to be a higher demand for environmentally conscious houses. Homebuilders have responded by providing green certifications for houses, attesting to a building's efficiency in various aspects, such as site design and energy and water consumption. Using Multiple Listing Services real estate data on zero- to five-year-old houses sold between 2010 and 2017 in the Chicagoland area, this study examines whether there is a price premium associated with green certification, and whether different types of certification garner different premiums. Based on a hedonic pricing model, ordinary least squares regression reveals that a house that qualifies for green certification has a selling price that is 9.49% higher than a comparable house without certification, which translates to a dollar amount of about \$45,000 for this dataset.



Oral Presentation O7.2

**EXPLORING THE CONTRIBUTING FACTORS TO LABOR  
MARKET ASSIMILATION OUTCOMES ACROSS REFUGEE  
GROUPS IN THE UNITED STATES**

Lily Chang and Eric Jensen\*

Economics Department, Illinois Wesleyan University

Upon arrival in the United States, refugees suffer from a substantial disadvantage in the US labor market when compared to economic immigrants and natives. However, over time, labor market assimilation occurs for refugees as their employment outcomes improve, but the degrees and rates of assimilation vary greatly among refugee groups. This paper aims to analyze why some refugee groups perform worse than others in the US labor market when human capital differences have been accounted for. This paper has two foci; firstly, it looks at how the quality of source country human capital and its transferability to the host country labor market impact the labor market performance among refugee groups. The second focus broadens the scope to identify non-human capital factors that affect wage gaps between refugees and non-refugee immigrants with similar backgrounds. Using the 1980, 1990, and 2000 US decennial census data and the 2001-2015 American Community Survey data, I conducted both descriptive statistics and ordinary least squares regression analyses to compare labor market outcomes of refugees from Vietnam, Cambodia, Afghanistan, Romania, Russia and other USSR states, Laos, Iraq, and Somalia.



Oral Presentation O7.3

## **INTERGENERATIONAL MOBILITY OF COLLEGE STUDENTS: DOES THE TYPE OF INSTITUTION MATTER?**

Caroline Monsen and Eric Jensen\*

Economics Department, Illinois Wesleyan University

Intergenerational mobility is defined as the difference in social and economic standing between generations of the same family. Since the 2000's, researchers have become more interested in college students and how the institutions they attend may affect their future earnings. We examine intergenerational mobility of college students based on their initial endowment coupled with the value added from each college. Do well-prepared high school students automatically enjoy higher future earnings, or does the college that they attend enhance their human capital, and thus future earnings? The data comes from the Integrated Postsecondary Education Data System (IPEDS) and Raj Chetty's Equality of Opportunity Project, based upon data from over 30 million current and former college students. The merged data characterizes colleges with variables such as mean income of graduated students and the total instructional expenditure per student. Such research allows intergenerational mobility to be measured by both concrete quantifiable variables and intangible variables.

Oral Presentation O8.1

## **WHY THE RIGHT? EXPLAINING VOTE CHOICE IN RURAL AMERICA**

Zoe Bouras and Greg Shaw\*

Political Science Department, Illinois Wesleyan University

Typically, scholars think about vote choice as a decision based on economic interests; conventional wisdom would suggest that individuals base their vote choice on their perceptions of their economic status in relation to the general economy. In reality, however, this model of pocket book voting does not fit the vote-choice patterns of many rural Americans. As such, this research seeks to identify indicators of vote choice within rural American populations. Using American National Election Study (ANES) data from the 2016 Time Series, national-level trends were established, evidencing a gap in both attitudes and vote choice for rural, white, voting Americans. Following the “left behind” theory popularized by Hochschild, an ethnographic study of the rural village of Arthur, Illinois, was conducted to understand the way individuals think about politics, economics, and voting. This study finds that instead of economic interests being paramount, many rural Americans view their economic standing as just one piece of the puzzle; There are other issues that play a role in vote choice including perceptions of cultural declinism, partisanship, and feelings of political resentment.

Oral Presentation O8.2

## **THE UNDERGROUND: RACIAL DISCOURSE IN RUSSIA**

Ayrren Calhoun and William Munro\* and Marina Balina\*  
International Studies Program, Illinois Wesleyan University

Russian cultural ideology on civilization, race, and “Russianness”, are the foundation for which racism against Africans in Russian society. The construction of race in Russia is deeply rooted in ethnic and racial conflict(s) and the creation of the “Other” applied to those that did not fit within ethnic perimeters. Racism in Russia against Afro-Russians can be correlated to the developed tangible consequences Afro-Russians experience everyday. The means the ways in which racism is acted out can be understood through four lens: historical, children’s literature, the arts, and the creation and application of laws. Currently, Afro-Russians battle constant structural biases and violence particularly different from other Russian minorities such as Jews, Romas, and Chechens. In this paper, connections will be made between current racial violence and tension in the Russian Federation and to the long historical imprint of racism against those of African descent residing in Russia. This paper will challenge that a particular discrimination and racism is experienced by Afro-Russians in Russia is due to the intellectual tradition of understanding African peoples as sub-par humans functioning in an uncivilized society.

Oral Presentation O8.3

## **SEXUAL VIOLENCE AND THE STATE IN ARMED CONFLICT**

Muyi Yang and William Munro\*

Political Science Department, Illinois Wesleyan University

Sexual violence against male victims in armed conflict has drawn less attention compared to that against females. Some current scholar works try to attribute the occurrence of such violence to the perpetrator's desire of asserting their own authority of masculinity. However, claiming that sexual violence against males is perpetrated only to assert personal masculinity fails to explain the attempt of the individual perpetrator to use sexual violence to emasculate a community of the enemy during the war. With analyses of cases from ICTY testimonies, this essay argues that it is the state that embodies the hegemonic, normative masculinity envisioned and also aspired to by the individuals, thus becoming the principal that demands the defense and expansion of this hegemonic masculine authority during the armed conflict. Consequentially, individuals within that state become the subordinate agents tasked with implementing the state's demand. Failing to recognize the state's important involvement in contributing the occurrence of sexual violence leads to insufficient understanding of both the occurrence of sexual violence against males, as well as the reluctance, if not utter denial, from the victim's state to seek reparation on such issue.



Oral Presentation O9.1

**RUST FLOWERS AND ZINC OXIDE URCHINS: SYNTHESIS  
AND SEM IMAGING OF METAL OXIDES IN THE  
UNDERGRADUATE CHEMISTRY LABORATORY**

Juntian Wei and Rebecca Roesner\*  
Chemistry Department, Illinois Wesleyan University

With the goal of bringing electron microscopy into the undergraduate chemistry laboratory curriculum, a series of structurally interesting metal oxide microparticles were prepared through hydrothermal synthesis and characterized using scanning electron microscopy (SEM). Iron (III) oxide (hematite) particles with flower-like morphology were synthesized either in a stainless steel pressure vessel using a conventional oven or prepared in glass vessels using a laboratory microwave oven. Centrifugation was found to be a cost effective alternative to microfiltration for isolation of the particles. Zinc oxide and bismuth oxide particles with distinctive morphologies were also prepared and studied using SEM. The experimental results demonstrated that particle morphology is highly dependent on additives in the reaction mixture that influence crystallization. In addition to the synthesis and characterization, the dissolution of the hematite microparticles was evaluated at pH=6.0 for possible application in *Rotifera* feeding studies.

Oral Presentation O9.2

**THE BORDER OF SALT AND HEALTH:  
AN ASSESSMENT OF THE IMPACTED HEALTH OF  
SOLAR SALT FARMERS IN KANGAGANI, PEMBA**

Brianna Miulli and William Jaeckle\*  
Biology Department, Illinois Wesleyan University

Solar salt farming (SSF) utilizes the evaporative power of the sun to extract table salt from sea water. SSF farmers are subjected to constant bright sunlight and hot brine containing sharp salt crystals on which they walk. Despite the intense nature of the work, there have been no occupational health and safety studies conducted about SSF in Pemba, Tanzania. This study was conducted in the community of Kangagani, Pemba, the site of the first salt farm on the island of Pemba in 1991. Of the 62 SSF farmers in Kangagani, 20 were interviewed about their health changes since they started collecting salt. 71.4% of the interviewed farmers reported dermatological afflictions (e.g., ulcers, scars, pain), 62.5% reported visual degeneration, along with body pain and headaches. These ailments can be combated through protective gear and occupational health education. However, most salt farm owners do not provide the gear for the workers; 15% of farmers reported owning protective boots and 5% reported owning sunglasses. In collaboration with Care and Share, a local NGO, current efforts are underway to secure funding to provide education and protective gear to salt farmers across Pemba Island and other SSF areas.

Oral Presentation O9.3

**DETERMINATION OF HOST RANGE VARIATION  
BETWEEN HIGHLY RELATED MEMBERS OF A NOVEL  
CLUSTER OF *RHODOBACTER CAPSULATUS*  
BACTERIOPHAGES**

Brooke Koebele and Richard Alvey\*  
Biology Department, Illinois Wesleyan University

Bacteriophages, viruses that infect bacteria, have been studied for more than a century, but recent advances in sequencing technologies allow for a renaissance in our understanding of the composition, function, and evolution of these remarkable biological entities. Studies in the 1970s on bacteriophages that infect the purple, nonsulfur, alphaproteobacterium *Rhodobacter capsulatus* revealed abundant and diverse populations. Their molecular composition and evolutionary relationships remained unclear, however, without genomic sequencing. Now there are more than 20 isolated *R. capsulatus* bacteriophages that have been isolated by IWU students, and based on DNA sequence similarities, these phages fall into four distinct clusters, groups of bacteriophages that share 50% of their genomic sequence. An additional three sequenced phages in the IWU collection remain unclustered as singletons. All together these phages reveal hundreds of uncharacterized genes. We present evidence that some of these uncharacterized genes play a role in host range expansion. Specifically, it was observed that although the RcC cluster phages RcDormio and RcOceanus exhibited a high degree sequence similarity, RcDormio is capable of infecting *R. capsulatus* host strains YW1 and B10 while RcOceanus is only capable of infecting YW1. Comparison of the genomes of these phages revealed several regions that are present in RcDormio, but absent from RcOceanus. To test the requirement of these genes for host-range expansion in this cluster, genetic recombination experiments were performed using both phage genomes and the *R. capsulatus* host. This methodology may lead to an increased understanding of the functions of a broad range of uncharacterized phage genes. Further, these novel *R. capsulatus* phages have served as a platform for the development of methods for genetic experimentation, and allowed for a greater understanding of their functioning and evolution.



Oral Presentation O10.1

## **I PULL THE TRIGGER AND LILIES FLY OUT**

Grace McGovern and Joanne Diaz\*  
English Department, Illinois Wesleyan University

As a queer woman, the world is often not a place I feel I can live in authentically and without barriers. From the day I came out to my parents, there has always been an implication that I need to “sanitize” myself, to not be “too gay.” As I began to explore my poetics more in college, I kept finding myself attracted to this idea of identification, and of explicating and exploring the hardships I have gone through because of my identity. This project is that exploration of what it means to “be,” and an attempt to create something beautiful out of that pain. The poems here deal heavily with adolescence, sexuality, and pain in a multitude of forms, and are all inherently and intentionally creating a body of queer poetics. Through this project, I am looking myself in the eye, understanding and processing my trials, and painting them across the page. Poetry is the vehicle I use to transform those demons into art, and through which I can begin to reclaim this self that has for so long not been mine to claim.



Oral Presentation O10.2

**THE ARCHITECTURE BEHIND A STORY: A LOOK AT THE  
INTERACTION BETWEEN WORLDBUILDING AND  
CHARACTER TO CREATE A DYNAMIC PLOT**

Savanna Steck and Michael Theune\*  
English Department, Illinois Wesleyan University

Aspiring writers are taught from the onset what plot is and what it is supposed to accomplish in a novel. It is a device used to arrange events in a novel to create meaning within a fictional world, which writers then use to form a complex narrative. My project explores my process for building a fantasy world, in published fiction and my own creative writing, which interacts with the characters in the novel to create a dynamic plot. When constructing a novel, the world the novel exists in plays an integral role in shaping the plot. Such things as laws that govern the world, the constraints of magic, or even the characters' backstories set up the framework for the fictional world. But it is the characters' interaction and reactions to the elements of the fictional world that creates dynamic situations that form the plot of the novel.

Oral Presentation O10.3

**ORIGINS OF EMPIRE: THE LASTING INFLUENCE  
OF ANCIENT ECOLOGICAL BEHAVIORS  
IN ROMAN MYTHOLOGY**

Christopher Guetthoff and Joanne Diaz\*  
English Department, Illinois Wesleyan University

Greek and Roman mythology is generally thought to showcase the ways humanity has thought and felt about the ancient world they inhabited. In his work, Robin Lane Fox, an English ancient historian at the University of Oxford, explores the natural places that have inspired and continue to grow as mythological sites. However, I am conducting research on the attitudes towards nature that these myths represent and how they influence present behaviors. By closely reading the myths of Ovid's *Metamorphoses*, I examine the opposing forces of fear, and desire to conquer that the ancients had towards the natural world around them. I connect this tradition to historical examples from American history to demonstrate how the pervasive influence of these attitudes continue to shape our culture. My scholarly paper is critical in expanding our understanding about our own culture and its tendency towards ecological exploitation. By considering the legacy of these behaviors, this paper attempts to establish both that humanity's number one priority is, and always has been, civilization of the natural world as well as the pitfalls of such a system.



**POSTER SESSION A**

**9:00 - 10:00 a.m.**

Odd-Numbered Posters

**POSTER SESSION B**

**2:00 – 3:00 p.m.**

Even-Numbered Posters

**EDUCATIONAL STUDIES ORAL AND POSTER  
PRESENTATIONS - ES**

State Farm Hall

Note: Student's name is underlined, faculty advisor designated with \*

During each poster session the author will be present to discuss her or his research with conference attendees, and answer questions.

Please remove your posters from CNS Atrium by 3:30 p.m.

Poster Presentation P1

## **BACTERIOPHAGES HOTPOCKET AND RCBAKA: TWO PEAS IN A POD**

Zaain Ahmad, Andrew Runkle, Jory Vance and Richard Alvey\*  
Biology Department, Illinois Wesleyan University

Bacteriophages are viruses that infect bacteria and replicate within them. Clustering phages, based on similar characteristics, is how phages are grouped together. Phages of the same cluster cannot infect the lysogens made by other phages in that respective cluster. Phage clustering graphs represent similarities in DNA function. Samples were collected from creek and pond water within Northern and Central Illinois, respectively. Isolated phages were initially characterized through immunity tests, lysogen experimentation, and Transmission Electron Microscopy (TEM) analysis. DNA was extracted and phage genomes were sequenced. The genomes were annotated using DNA Master, and Pecaan. Protein functions were confirmed by using HHpred, Phamerator, Glimmer, and Genemark, comparatively. Using the aforementioned programs, these phage protein functions were compared to further relate them. Two bacteriophages, Hotpocket and RcBaka, were isolated using *Rhodobacter capsulatus* as a host. Experimentation with both of the phage lysogens led us to believe that they belonged to the same cluster but were not the same phage. Genomic sequencing, Immunity hosting, and TEMs confirmed that these two phages are C cluster phages. RcBaka and Hotpocket contained similar DNA to the cluster C phages which provided further evidence of a shared cluster. There are now five phages within Cluster C. Comparing Hotpocket to RcBaka contributes to a greater understanding of the cluster C bacteriophages. The completed genome annotations of Hotpocket and RcBaka were sent to GenBank that stores annotated phage genomes. Further study of bacteriophages provides useful information about how phages and viruses replicate in the environment and can also help lead a fight against viral diseases such as HIV.

Poster Presentation P2

**CAPABILITIES AND LIMITATIONS OF AUTOMATED  
PRESSURE COOKERS FOR STERILIZATION**

Annika Anderson and David Bollivar\*  
Biology Department, Illinois Wesleyan University

Previously, it has been demonstrated that pressure cookers have the capability to sterilize laboratory and medical materials to the same standard as medically approved autoclaves. The question is whether widely sold automated pressure cookers, also known as InstantPots, can do the same. A 12-quart, Gourma brand InstantPot was used to test this question. Chemical indicator strips, designed to test maximum pressure and temperatures of autoclaves, were used during each InstantPot pressure cook cycle. Additionally, *Escherichia coli* cultures and heat-resistant bacterial spore samples were used to test the effectiveness of sterilization. A variety of run times and water levels were tested throughout. The chemical indicator tests suggest that the InstantPot can effectively sterilize its contents under certain settings. Furthermore, there was no evidence of *E. coli* growth after the pressure cook cycle. However, there was still growth of spores after pressure cooking, indicating that the pot does not reach the necessary temperature and pressure to kill some heat-resistant life. For this reason an InstantPot is not an adequate replacement of an autoclave in the medical field, but may have value in microbiology classrooms where autoclaves are not accessible or affordable.

Poster Presentation P3

**ABUNDANCE AND HABITAT PREFERENCES OF BOBCATS  
(*LYNX RUFUS*) IN CENTRAL ILLINOIS**

Samantha Bidlack, Seth Borrowman, Michelle Roy and Given Harper\*  
Biology Department, Illinois Wesleyan University

The Bobcat is a medium-sized felid that prefers brushy and wooded sites bordering agricultural land with abundant rabbit and rodent populations. Beginning in 2016, the state of Illinois allowed Bobcats to be hunted and trapped, including in several counties of central Illinois. However, no recent studies have been conducted to determine their abundance in this area. This study seeks to estimate Bobcat abundance and habitat preferences in areas along the Mackinaw River in McLean, Woodford, and Tazewell Counties, Illinois. Motion activated camera traps and scent and visual attractants were placed in areas of possible habitat from October, 2017 to present. To date, no Bobcats have been photographed during 300 trap days (one trap day = a 24-hour period in which a camera records photographs), although Bobcat tracks and scat have recently been found in Tazewell County. However, we have photographed 10 mammal and 10 bird species, several of which are prey of Bobcats.

Poster Presentation P4

## **ERROR PROCESSING IN SPEEDED RESPONSE TASKS: EXPERTISE DIFFERENCES IN COGNITIVE CONTROL**

Nicole Bing and Jason Themanson\*

Psychology Department, Illinois Wesleyan University

In speeded response tasks, the time between external stimuli and the time to react is both minimal and relatively fixed. In accordance with speed-accuracy tradeoff (SAT) theories, reaction time (RT) is often slower after error in order to improve accuracy, which produces post-error slowing. However, in speeded response tasks, typical post-error slowing patterns may not occur. We examined two neural indices of self-regulatory cognitive control, the feedback-related negativity (FRN) and the P300, to identify whether time constraints disrupted the normal processing of performance errors and the refinement of behavior during task execution through cognitive control processes in accord with one's intended goals and whether this disruption may differ based on individuals' levels of expertise in the task. Participants (n=59) were divided into two categories based on skill acquisition: experts or novices. Each participant completed a video speeded response task assessing neural activity during a series of thrown pitches were either balls or strikes. Each pitch was followed by feedback on the accuracy of the participant's choice. Results indicated a larger P300 following correct feedback for experts' neural activity. This evidence suggests that experts contain a greater degree of attentional allocation towards correct feedback from the speeded response task, possibly to learn a more accurate working representation of the strike zone. Further, results indicated that the FRN was larger after incorrect feedback for experts suggesting their low expectancy towards an error. These results demonstrate the nature of neural activity during a speeded response task, and responses to feedback, can influence overall performance and post-error performance. Implications and uses for this research include the importance of level of expertise in related tasks and a greater understanding of individual self-regulatory cognitive control for maximum overall performance.



Poster Presentation P5

## **DOES THE PRESENCE OF THE MARINE ZOOPLANKTON *BRACHIONUS PLICATILIS* INFLUENCE BACTERIOPHAGE ABUNDANCE?**

Jamie Blumberg and William Jaeckle\*  
Biology Department, Illinois Wesleyan University

Bacteriophages (phages) are the most abundant organisms on Earth and exist in concentrations exceeding  $10^7$  phage/mL in aquatic environments (Clokier *et al.*, 2011). Though abiotic factors (*e.g.*, UV radiation) are mainly responsible for phage loss in these environments, consumption by single-celled protists also contributes to phage abundance. Straznikas and Jaeckle (2017) reported that the rotifer *Brachionus plicatilis* ingests phages as food, but the degree to which multicellular, filter-feeding zooplankton influence phage abundance is unknown. We investigated the effect of rotifer feeding on the concentration of phages, hypothesizing that rotifers significantly reduce the abundance of phage. Bacteriophages (Rc-Titan,  $10^8$  phage / mL in 10 mL of filtered seawater) were exposed to rotifers (10 / mL) and *Nannochloropsis* sp. (food for rotifers,  $10^6$  / mL), *Nannochloropsis* sp. alone ( $10^6$  / mL), or filtered seawater to account for all potential causes of phage loss; each treatment was replicated 3×. Every 2-3 days over a 9-day incubation, 100  $\mu$ L samples were collected from each vial and the concentration of phages in each sample measured. In all treatments, the concentration of bacteriophages decreased over the incubation period, and on day 9 there was a significant difference ( $F_{(2,6)} = 464.1$ ,  $p < 0.001$ ) in the concentration of phages among the three treatments. The concentration of phages was lowest in the rotifer + *Nannochloropsis* treatment ( $2.17 \times 10^5 \pm 5.8 \times 10^4$  phage / mL), intermediate in the *Nannochloropsis* treatment ( $1.02 \times 10^6 \pm 3.6 \times 10^4$  phage / mL) and highest in the filtered seawater treatment ( $2.65 \times 10^7 \pm 1.2 \times 10^6$  phage / mL); all treatments were significantly different from one another (Gaines Howell, post hoc test,  $p < 0.02$ ). Our preliminary results indicate that the presence of rotifers can significantly reduce the abundance of phages in aquatic environments.



Poster Presentation P6

## **THE EFFECT OF EVOLUTIONARY SOCIAL HISTORY ON SOCIAL FACILITATION IN SEVERAL NON-HUMAN ANIMAL SPECIES**

Maisy Bowden and Kyle Cook and Ellen Furlong\*  
Psychology Department, Illinois Wesleyan University

Social facilitation is the psychological phenomenon where humans tend to perform better on well-rehearsed tasks in the presence of an audience as opposed to when they are alone. However, for unfamiliar or difficult tasks, humans tend to perform worse when an audience is present. Investigations of this effect in non-human animals are limited, and it remains to be seen whether social facilitation occurs as a result of societal pressures -- for example, athlete-audience expectations -- or if social evolution has driven the development of social facilitation, i.e. to bolster group cohesion in social communities. I am exploring the latter theory: animals with an evolutionary history of complex social structures should demonstrate the social facilitation effect, whereas historically solitary species should not. To test these theories, we recruited several species with different evolutionary backgrounds (solitary: orangutans, tigers, grizzly bears; domesticated: domestic dogs; and social: New Guinea singing dogs, sea lions, seals, gorillas), and evaluated their performance on both easy and difficult tasks in the presence of no audience, a human audience, and a conspecific audience. Preliminary evidence suggests that there is an audience effect with social animals, and data analysis in non-social species is currently underway.



Poster Presentation P7

**MAKING WAVES IN PHAGE RESEARCH:  
PACIFIC'S JOURNEY THROUGH DISCOVERY,  
EXPERIMENTATION, AND CLUSTERING**

Meghan Bowler, Greg James, Sydney Longfellow, and Richard Alvey\*  
Biology Department, Illinois Wesleyan University

Phages are a class of viruses that specialize in the infection of bacterial cells. The purpose of the research is to locate and discover new phages to gain a better understanding of the vastly unknown area of microbiology. We began our research by first hunting for phages. They were amplified using sample enrichment, had their DNA extracted, then had their genome sequenced. In order to group the phages into clusters of known type, we utilized tests such as: transmission electron microscopy (TEM), lysogen testing, and host range testing. Our research focused on the isolation and sequencing of a cluster D phage known as Pacific. Pacific was isolated from a small creek in Mahomet, IL. TEM analysis revealed Pacific's structure and determined that it is a *Siphoviridae* (DNA filled capsid with a long, noncontractile, thin tail, which is often flexible). Then we used lysogen testing where we tested Pacific against past lysogens (bacterial cells with phage DNA incorporated into its genome) to see if it was related to any known phages. Tests showed that Pacific did have phages that were related to it because they were unable to infect Pacific's lysogen. Pacific was unique in its ability to form a lysogen that phages in the C and D cluster were unable to infect. Pacific is the first phage of its type that is able to perform this function. Lastly, we used host range testing to determine the number of hosts Pacific could infect. By annotating and publishing Pacific's genome, scientists are able to utilize it in order to better understand overall phage development and evolution.

Poster Presentation P8

**REGULATION OF NMDA THROUGH FYN AS A RESULT OF  
PULSED RADIOFREQUENCY IN AN ANIMAL MODEL  
OF NEUROPATHIC PAIN**

Ross Burandt, Robert Shafer and Joseph Williams\*  
Psychology Department, Illinois Wesleyan University

For treatment of chronic pain, many specialists perform conventional radiofrequency (RF) ablation. Although resulting in a decrease in pain, side effects are correlated with the technique. To mitigate associated effects, some physicians prefer pulsed radiofrequency (PRF). PRF therapy may result in pain reduction while preventing side effects of RF, allowing for easier and more effective subsequent treatments. This work entails a proteomic analysis using an animal model to investigate chronic neuropathic pain and PRF treatment on an electro-biochemical level. Rat proteins from the ipsilateral dorsal spinal cord (SC) were extracted, separated, quantified, and identified using liquid chromatography-tandem mass spectrometry (LC-MS/MS). Through an accepted vesiculation model and gene expression changes in Fyn, RACK1, and PTPRZ, we hypothesize that PRF alters the typical sequence of events on a molecular level associated with N-methyl-D-aspartate receptor (NMDAR) and the protein tyrosine kinase Fyn. Due to PRF treatment, NMDA receptor efficacy is decreased, as well as the potential for neuropathic pain signal propagation through a electro-biochemical pathway. Consequently, we conclude that PRF is an effective method of treatment for chronic pain management.

Poster Presentation P9

## **CHAOTIC OSCILLATOR**

James Burnell and Gabriel Spalding\* and Narendra Jaggi\*  
Physics Department, Illinois Wesleyan University

This work involves exploration of the design of a rotational oscillator that is both harmonically driven and damped. The oscillator consists of a metal disc attached to a rotating post that is positioned close enough to another magnet as to cause local eddy currents that interact with the magnet in a manner which resists movement of the system. That is, the primary damping forces are magnetic. The rotating mass also has magnets set into it that can interact with an external magnetic field supplied by Helmholtz Coils surrounding the oscillator: a harmonically driven current through the Helmholtz coils provides an external drive of oscillator motion. After finalizing construction of this system, our data gathering and analysis aims to delineate the parameter space associated with the transition into chaotic behaviors.

Poster Presentation P10

**PROTEIN-PROTEIN INTERACTIONS FOUND  
IN HETEROCYST FORMATION OF *ANABAENA SP.*  
STRAIN PCC 7120**

Caitlin Cadwalder, Keila Magafas, and Loralyn Cozy\*  
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*Anabaena sp.* strain PCC 7120 is a cyanobacterium that grows in multicellular filaments. Under nitrogen- limiting conditions, *Anabaena* is capable of forming heterocysts which are differentiated, specialized cells that fix nitrogen for the rest of the cells in the filament. Previous research has shown that HetP is involved in the cessation of the cell cycle and in the formation of heterocysts. However, protein-protein interactions between MinC, MinD, MinE, Ftsz and HetP, have not been previously studied in *Anabaena*. These interactions can be studied using the bacterial adenylate cyclase two-hybrid system (BACTH). The underlying principle of the BACTH system is the nature of adenylate cyclase found in *E.coli*. Adenylate cyclase, a protein that produces cAMP can be split into two components, a T25kD half and T18kD half. To assess protein interactions, different respective genes of interest were cloned, in frame, into plasmids containing one of the adenylate cyclase components. This allowed the protein of interest and the complex component to be translated as a fusion protein. These plasmids also contained resistance genes to ampicillin and kanamycin, allowing for the selection of these plasmids in the same cell. When interactions occur between two proteins of interest, the two components of adenylate cyclase come together and produce cAMP. As cAMP levels rise in the cell, cAMP binds to the catabolite activator protein (CAP), a transcription factor, and activates it. When CAP is activated, it binds to the lac operon, resulting in the transcription of  $\beta$ -galactosidase. The production of  $\beta$ -galactosidase was analyzed on antibiotic selective plates containing X-Gal, a compound that turns colonies of *E.coli* blue if  $\beta$ -galactosidase is present. Using this system, each possible combination of the proteins of interest was assessed by the degree of “blueness” seen on the plates. The degree of “blueness” was compared directly to a positive control, DivIVA, a strain known to create the interaction between the adenylate cyclase halves, and a negative control, which consisted only of empty vectors that did not produce any interaction. Taken together, this revealed the protein-protein interactions within the heterocyst of *Anabaena sp.* strain PCC 7120.

Poster Presentation P11

## **NEWLY DISCOVERED PHAGE *XUPER*: SINGLE READY TO MINGLE WITH *RHODOBACTER CAPSULATUS***

Julia Chen, Ria Patel, Julie Xu and Richard Alvey\*  
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Bacteriophages, viruses that infect and replicate in bacteria, are the most abundant biological entities in the biosphere. Despite their prevalence, the evolutionary relationships between these viruses as well as the functions of many phage genes remain unknown. This is largely due to the fact that only a relatively small number of bacteriophages have been isolated compared to the estimated  $10^{31}$  phage particles that exist in the world. The goal of this study was to characterize and genomically analyze a new phage in order to learn more about its unique features, as well as explore the vastly diverse evolutionary relationships of these viruses. In our investigation, we isolated *Xuper* from an environmental water sample using the bacterial host *Rhodobacter capsulatus*. A series of experiments were performed, including host range testing, lysogen/immunity testing, transmission electron microscopy, and DNA sequencing. Through this analysis, *Xuper* was found to have features not found in previously characterized *R. capsulatus* phages, including an unusual morphology, numerous tRNAs in its genome, and the largest genome of all *R. capsulatus* phages isolated thus far. Based on the distinctive morphology and genome, we concluded that *Xuper* is a singleton (exclusive member of its own cluster). These findings help to provide a greater understanding of the genetic diversity and complex nature of these seemingly simple biological entities.

Poster Presentation P12

## THE SPECTRUM PROBLEM FOR DIGRAPHS OF ORDER 4 AND SIZE 6

Chudan Chen<sup>1</sup>, Toni Dubczuk<sup>2</sup>, Emma Holdaway<sup>3</sup>, Desiree Masters<sup>4</sup>,  
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In graph theory, graph decomposition is a typical problem. An H-decomposition of G is also called a (G,H)-design, where G and H are graphs. A complete digraph,  $K_n^*$ , can be obtained by adding one repeated edge to each edge of  $K_n$ , which denotes complete graph with n vertices. The spectrum for a digraph H is the set of all n for which a  $(K_n^*, H)$ -design exists. Now, let D be any directed digraph obtained by orienting the edges of a paw graph with two double edges. The *paw graph* consists of a triangle with a pendant edge attached to one of the three vertices. From the spectra of *paw*, we found 18 possibilities of such D. Our goal is to settle the spectrum for such D. For 12 of the 18 possibilities, we establish necessary and sufficient conditions on n for the existence of a  $(K_n^*, D)$ -design. Partial results are given for the remaining 6 possibilities of D.



Poster Presentation P13

## **GIRARD-WARING IDENTITIES AND THEIR APPLICATIONS**

Minghao Chen, Panxi Chen, Zihan Nie and Tian-Xiao He\*  
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Our research project is about application of recursive sequences in the construction of a class of combinatorial identities called Girard-Waring identities. This type of identities is derived from recursive sequences, which is the motivation and the guiding light of our path to deeper understanding of mathematics. A sequence constructed from a recursive relation is called recursive sequence, which starts from a few initial quantities to generate a sequence of quantities by using a simple relationship in modeling some real world problems or mathematical problems. As a natural math model of those problems, recursive sequences are an important tool widely used in Combinatorics and Graph Theory, Number Theory, Fractal, Cryptography, etc. Many identities in elementary mathematics and other advanced mathematics come from the Girard-Waring identities. We connected the generating function of a linear recursive sequence and its explicit expression to give an efficient method to construct Girard-Waring type identities. We also used the method in the study of some construction problems such as summation formulas, Hagen-Rothe type identities, etc. In addition, some applications of those summation formulas and identities are discussed.



Poster Presentation P14

## **FROM PREVAILING TO PECULIAR, PHAGE EVOLUTION AND DIVERSITY AT ITS FINEST**

Jaeden Danko, Brooke Dominski, Carlie Haagen and Richard Alvey\*  
Biology Department, Illinois Wesleyan University

In the field of microbiology, bacteriophages, viruses that infect bacteria, are becoming an extensive subject of study. The purpose of this research was to isolate and discover unknown phages from the environment to compare them to known phages in order to understand their evolution and diversity. After isolating these phages from soil and water samples, we then examined and analyzed them in the laboratory. One *Mycobacterium smegmatis* (Ms) phage from a soil sample and two *Rhodobacter capsulatus* (Rc) phages from water samples were discovered. A variety of tests were conducted to study these phages such as examining morphology, host range testing, lysogen testing, PCR tests, and ultimately DNA sequencing. Our bioinformatic analysis and experimental data revealed that Doddsville (an Ms phage) is a relatively common B1 phage with a large head and long tail. The data also showed that SchuylerLagoon and Bellator (Rc phages) both had a smaller head and no tail, which is unique to the phages known. They are thought to be a type of singleton that have a single-stranded genome. With our analysis of Doddsville, Bellator, and SchuylerLagoon, we have contributed to the research in understanding phage diversity and viruses as a whole in the scientific community.

Poster Presentation P15

## **ELECTRON DETECTION: DESIGN AND CONSTRUCTION**

John Davine, Evan Dill, Joseph Ziegel and Bruno deHarak\*  
Physics Department, Illinois Wesleyan University

Electrons, miniscule negatively charged elementary particles, are vital in both day to day life and in countless experiments across all STEM disciplines. In our experiment, we are studying what happens to an electron when scattered off of an atom in the presence of a laser field. Being able to detect individual electrons is essential to the experiment. To accomplish this we make use of a channel-electron multiplier (CEM). The addition of wire meshes held at two different voltages allows us to limit detection to those electrons having a particular energy. The use of our CEM requires a circuit powering the CEM while also carrying the signal from detected electrons to an amplifier, allowing the data to be output and processed via computer. This circuit, involving an AC coupler and a preamp, need not be unique to our setup. In fact, it is robust and can be used for any CEM system involved in detection of low voltage signals.

Poster Presentation P16

## **ADVISING AT IWU: FINDINGS FROM FOCUS-GROUP DISCUSSIONS**

Megan Donnelly, Maggie Graham, Amanda Lack, Kiara Mosley, Clare  
O'Donnell, Shante Williams and Amanda Vicary\*  
Psychology Department, Illinois Wesleyan University

Advising is an important component to students' satisfaction and success. In an effort to better understand students' perceptions of advising at Illinois Wesleyan University, six focus groups were conducted. The groups consisted of randomly selected sophomores, juniors, and seniors. Analyses of the sessions revealed five main themes: the level of desire for personal relationships with advisors, importance of advisors' knowledge of gen-ed requirements, importance of advisors' knowledge of minor requirements, importance of student preparedness for advising sessions, and the structure of the advising process. Although overall satisfaction with advising was high, by making slight adjustments to current policy and offering guidance to advisors on how to best support students, we believe that the path can be paved for an even more satisfactory, collaborative relationship between students and advisors.

Poster Presentation P17

**COMPLETION AND TESTING OF AN INSTRUMENT FOR  
INVESTIGATING THE TERAHERTZ OPTICAL  
PROPERTIES OF COOLED SAMPLES**

Ronan Dorsey and Thushara Perera\*

Physics Department, Illinois Wesleyan University

Astronomers use terahertz light frequencies to study distant cosmic objects of interest. These objects are often shrouded in vast fields of cosmic dust. We aim to learn about the optical properties of this dust to eventually aid in these observations. The opacity and emissivity of cosmic dust analogs will be studied at terahertz light frequencies and temperatures ranging from 4-30 kelvin. The system (designed and constructed at IWU) includes a dewar/cryocooler for reaching low temperatures, a bolometer to measure light intensities, a black body light source for generating light and a Fourier Transform Spectrometer for breaking the light into its component frequencies. The system was fully built in the spring of 2018 and will be tested in April 2018. This poster presentation will cover the experimental setup and the preliminary results from the “first light” cooldown.

Poster Presentation P18

## **QUANTIFICATION OF THE ANTIOXIDANT ACTIVITY OF WINE POLYPHENOLS**

Spencer Eidsmoe and Manori Perera\*

Chemistry Department, Illinois Wesleyan University

Many of the primary and secondary metabolites produced by plants are polyphenols. When consumed, these polyphenols have been shown to offer many health benefits. These polyphenols are often called antioxidants and are especially abundant in natural products such as tea and wine. While we have studied both beverages, this work focuses on the polyphenols commonly found in wine. This study utilizes differential pulse voltammetry (DPV) and the ABTS system to elucidate how the radical scavenging ability of wine polyphenols correlate to the number of polyphenols in solution. The ability of polyphenols to function as antioxidants depends heavily on the pH of the solution. As wine is aged, several biotic and abiotic factors increase the pH from around 3.5 to 4.0, depending on the length of storage. Our current work quantifies how these aging related changes in pH effect the ability of polyphenols to scavenge radicals. Since we have previously studied tea, we also plan to compare tea to wine to elucidate would be a more effective source of antioxidants.

Poster Presentation P19

**CHARACTERIZATION OF DEFECTS BROUGHT ONTO  
CORNEAL DEVELOPMENT BY THE  
GLUTAMINE ANALOG DON**

Rowland Filbert, Ngan Pham, Niyant Vora and Tyler Schwend\*  
Biology Department, Illinois Wesleyan University

The cornea is the most densely innervated tissue on the body's surface. The acquisition of nerves by the cornea during embryonic development is highly regulated. Past work in the lab suggests that the movement of nerves into and through the cornea may be influenced by the dense extracellular matrix of the cornea, comprised of long unbranched sugars called glycosaminoglycans (GAGs). Intriguingly, work published nearly 40 years ago found that exposure of chick embryos to DON (6-Diazo-5-oxo-L-norleucine), a glutamine analog that disrupts GAG synthesis in the cornea, leads to negative effects on cornea development. Here, we carry out a detailed characterization of corneal and extra-corneal deficits brought on by exposure to DON. Herein, our findings show that DON negatively influences development of eye structures, resulting in smaller eyes with abnormal corneal innervation and fewer scleral ossicles (bones formed around the cornea).

Poster Presentation P20

**COMPARISON OF CLEARANCE RATES BETWEEN TWO  
ROTIFER SPECIES (*ASPLANCHNA PRIODONTA* AND  
*CONOCHILUS UNICORNIS*) BASED ON PARTICLE  
CHARACTERISTICS**

Morgan Flynn, Ian Taylor and William Jaeckle\*  
Biology Department, Illinois Wesleyan University

Rotifers are microscopic, aquatic invertebrates which use two bands of cilia, collectively the corona, to concentrate and capture particulate foods. The manner in which rotifers use the corona to capture food and the size of food ingested can differ markedly among species. We compared the ability of colonial (*Conochilus unicornis*) and solitary (*Asplanchna priodonta*) rotifers to clear polystyrene beads (0.75  $\mu\text{m}$ ) and fluorescently-labeled bacteria (*Roseobacter* sp., 1.23  $\mu\text{m}$ ) from water ( $\mu\text{L}$  / hour). For *C. unicornis*, at a concentration of  $5 \times 10^5$  particles / mL, the average clearance rate of polystyrene beads ( $2.73 \pm 4.71 \times 10^{-3}$   $\mu\text{L}$  / hour, mean  $\pm$  SE) was significantly larger ( $F(1,5) = 10,308$ ,  $p = 1.76 \times 10^{-9}$ ) than that of bacteria ( $8.16 \times 10^{-3} \pm 1.4 \times 10^{-3}$   $\mu\text{L}$  / hour). Similarly, when incubated with  $1 \times 10^6$  particles / mL, the average clearance rate of polystyrene beads ( $3.35 \times 10^{-2} \pm 6.18 \times 10^{-3}$   $\mu\text{L}$  / hour) by *A. priodonta* was significantly greater ( $F(1,9) = 77.48$ ,  $p = 1 \times 10^{-5}$ ) than fluorescently-labeled bacteria ( $3.23 \times 10^{-3} \pm 2.40 \times 10^{-4}$   $\mu\text{L}$  / hour). The average clearance rate of polystyrene beads at  $5 \times 10^5$  particles / mL for *C. unicornis* was significantly larger ( $F(1,39) = 913.7$ ,  $p = 1.18 \times 10^{-28}$ ) than the average clearance rate for *A. priodonta*, suggesting that the two species feed on particles of different size.



Poster Presentation P21

## CONQUERING CONSTELLA: A JOURNEY OF PHAGE DISCOVERY

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Biology Department, Illinois Wesleyan University

Bacteriophages, viruses that infect bacteria, are among the most abundant biological entities on Earth, with an estimated  $10^{31}$  bacteriophages in existence today. Although numerous, bacteriophages have traditionally been difficult to isolate, study, and categorize. As members of the SEA-PHAGES program, we attempted to find unique phages, extract their DNA, and characterize their genomes. Bacteriophages can be isolated from soil environments, so we began by collecting soil samples from multiple diverse locations in an attempt to find a greater variety of phages. Once a phage was found, we then worked on understanding how unique this particular phage was by comparing it to other phages, both those discovered our class as well as those with sequenced genomes. The comparison between phages was done via methods that included immunity testing, polymerase chain reaction testing, and transmission electron microscopy. To definitively group the phages into a cluster, we then sent them to the University of Pittsburgh for genomic testing. Once clustered, we used DNA annotation technology, including the programs DNAMaster and PECAAN. The name of the *Mycobacterium smegmatis* phage we chose to study was named Constella, and was isolated by Julie Xu in Bloomington, IL. Based on hypotheses from the experimental methods and the DNA sequencing, Constella was clustered as a J phage. J phages are quite rare, accounting for about 2% of all phages discovered thus far, or 34 members out of the roughly 1575 sequenced *Mycobacterium* phages. Based on the experiments conducted, Constella was found to be similar to Squint, a J phage isolated by last year's class, as well as to potential J phages that were isolated this year. By analyzing the genome of Constella, we are able to add useful information to the bacteriophage database, thus assisting other researchers studying bacteriophages similar to Constella.

Poster Presentation P22

## ***RHODOBACTER CAPSULATUS* BACTERIOPHAGE ISOLATION, DNA EXTRACTION, AND DNA SEQUENCING**

Max Garcia and David Bollivar\*

Biology Department, Illinois Wesleyan University

Ten million trillion trillion bacteriophages inhabit the earth and survive by targeting bacteria. Bacteriophages are viruses that infect bacteria. Although there are large numbers of bacteriophages, only a subset of these will infect a particular species of bacteria. When trying to discover new phages, selecting a host bacterium affects what bacteriophages can be isolated. The YW1 strain of *Rhodobacter capsulatus* was chosen as the host for this experiment because this bacterial species has different methods for metabolism and is used as a model organism to study processes such as as bacterial photosynthesis. Water samples were taken from a sewage treatment plant in Bloomington Illinois and mixed with host cells. Areas of phage infection, called plaques, were found. Plaques are formed because once the virus enters the cell it ultimately will cause the death of the bacterial cell. Different strains of the bacterium *R.capsulatus* were tested to demonstrate if the isolated phages were similar in what hosts they infect. The plaques were also used to extract DNA of the phages to allow for DNA sequencing and characterization of the phage genome. Discovering novel phages is the main focus for this research and was eventually achieved through isolating phages, extracting phage DNA, and conducting host range tests that demonstrate the different strains of *Rhodobacter capsulatus* that are infected by the phage.

Poster Presentation P23

**COMPARISON OF MUSCLE DEVELOPMENT IN  
*MOENKHAUSIA SANCTAEFILOMENAE* AND *DANIO RERIO***

Alysia Gazder and Brian Walter\*

Biology Department, Illinois Wesleyan University

Previous research has shown that larval redeye tetra *Moenkhausia sanctaefilomenae* have large craniofacial skeletons compared to equivalent zebrafish *Danio rerio*. In order to understand the further development of the craniofacial region, the development of the craniofacial musculature in both species were examined at different stages using whole mount immunohistochemistry. In addition, Alcian blue staining was used to observe their craniofacial cartilage to better understand the anatomy and identify the individual muscles. Unexpectedly, the muscle development was found to be more robust and intense in three day old *D. rerio* compared to equivalent *M. sanctaefilomenae* specimens. Differences were also observed in regard to the temporal and spatial patterns of muscle formation between the two species. Owing to their larger craniofacial skeletons, it was expected that *M. sanctaefilomenae* would likewise exhibit larger muscle corresponding with their large skeleton development. However, it was seen that the muscle development does not seem to coincide with the skeletal development.

Poster Presentation P24

**THE EFFECTS OF GENDER NORMS ON HIV CONTRACTION AND  
TREATMENT IN THE HISPANIC-AMERICAN POPULATION**

Madeline Gibson and Carolyn Nadeau\*

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Human immunodeficiency virus (HIV) has received significant attention in recent years due to the stigma of having the disease and the potentially fatal prognosis. Though the virus does not discriminate between groups of people in a biological manner, certain ethnic groups in the United States suffer from higher rates of transmission and lower rates of treatment. Among these groups is the Hispanic population, which accounts for 25% of HIV cases despite comprising only 17% of the US population. HIV is transmitted through contact with blood or sexual contact with infected persons. Cultural beliefs of the Hispanic population, such as *machismo* and *marianismo*, affect sexual behavior, which in turn negatively influences the rate of HIV contraction and transmission. Here, a new method for HIV education centered around the positive reinforcement of cultural beliefs is proposed, which could potentially lower the rate of HIV contraction and increase the rate of treatment in the Hispanic population.

Poster Presentation P25

**STOP HERE, NOW GO: SEEKING INSIGHT INTO THE  
COORDINATED MOVEMENTS OF NERVES DURING  
CORNEA INNERVATION**

Samridh Gupta, Alyssa Pisano, and Tyler Schwend\*  
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The cornea is one of the most densely innervated tissues on the body's surface. The embryonic cornea acquires its nerves through a highly regulated series of events. Early, nerves are inhibited from entering the cornea, instead forming a ring around the circumference of cornea. Later, nerves simultaneously extend from the ring and enter each quadrant of the cornea evenly. Here, we seek to understand the basis for the switch that allows nerves to grow into the cornea after being previously repelled. Past studies have found that nerve repulsion is mediated by the chemorepellant Semaphorin3A, which is secreted from the lens into the cornea. Because Semaphorin3A secretion continues from the lens as the cornea is acquiring nerves, we hypothesize that Semaphorin3A may over time become physically restricted from entering the cornea. To test this, we are generating transgenic chicken embryos that express stably within their lens cells a fluorescently-tagged Semaphorin3A protein. This will allow the movement of Semaphorin3A from the lens to be tracked over the stages of corneal innervation.

Poster Presentation P26

## **EXERCISE AMELIORATES THE EFFECTS OF POST-STROKE COMPENSATORY TRAINING IN A MOUSE MODEL**

Emma Haan, Rachel Mavros, Victoria Nemchek and Abigail Kerr\*  
Psychology Department, Illinois Wesleyan University

Stroke is a leading cause of disability worldwide. However, current rehabilitative therapies are insufficient in restoring pre-injury function. Previous research suggests that compensatory over-reliance on the less-impaired limb limits the recovery potential of the impaired limb. The current study utilized a mouse model of stroke to investigate the impact of aerobic exercise on the negative effects of compensatory limb training. Mice were trained preoperatively to establish skilled reaching behavior. Mice then received a unilateral ischemic stroke of the sensorimotor cortex. After lesion, reaching performance was assessed. Mice were divided into three groups: compensatory limb training (CLT), exercise and compensatory limb training (Ex-CLT), and control. CLT mice trained their less-impaired limb, Ex-CLT mice had access to running wheels and compensatory training. Subjects' impaired limb was then assessed. Results indicate that aerobic exercise ameliorates the negative effects of compensatory limb training and permits functional recovery of the impaired limb when paired with focused training of the less-impaired limb. Therefore, aerobic activity may be an effective adjunctive therapy that extends the recovery potential of the impaired limb.

Poster Presentation P27

**ARE YOU LOOKING TO JUSTIFY YOUR WINE HABIT?  
A QUANTITATIVE ANALYSIS OF WINE ANTIOXIDANT  
CONTENT COMPARED TO TEA**

Veena Hamill and Manori Perera\*  
Chemistry Department, Illinois Wesleyan University

Look no further! Utilizing the radical scavenging method, the antioxidant contents of several wine types were quantified. In this method, the rates of reduction of the ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)) radical by the wine antioxidant molecules were measured. The blue ABTS radical is generated from reaction with potassium persulfate, and is a compound that absorbs light at 734 nm. The reaction between wine and the ABTS radical is monitored at this wavelength for each trial. Various standards of Trolox, an antioxidant analog of Vitamin E, was measured to develop a calibration curve. Using this calibration curve, the total phenolic content of the wine samples in ABTS radical was determined in terms of Trolox equivalent antioxidant capacity (TEAC, mmol). The wine varieties analyzed were: Cabernet Sauvignon, Merlot, Pinot Noir, Sauvignon Blanc, Pinot Grigio, and Chardonnay. These results were compared with our findings of antioxidants present in tea. Preliminary results from this study indicate that red wines, specifically Pinot Noir, have a higher TEAC than tea. Among various types of tea, white tea has the highest TEAC content.

Poster Presentation P28

## **RISK FACTORS AND PREVENTATIVE STRATEGIES FOR PEDIATRIC ASTHMA AMONG HISPANIC POPULATIONS**

Maria Hanna, Abby Winters and Carolyn Nadeau\*  
Hispanic Studies Department, Illinois Wesleyan University

Asthma is one of the most common diseases in the United States, especially among children. Children suffering from asthma may miss a significant amount of school, or the opportunity to spend time with friends, play outside, and enjoy other important parts of being a child. Currently, there is no cure for asthma, although it can be controlled with effective treatments and the appropriate preventative measures. Although the genetic component of asthma cannot be altered, other factors such as environmental conditions, socioeconomic status, and access to healthcare contribute to the predominance of asthma in Hispanic populations. Due to the high rate of these risk factors, asthma is especially prevalent in the Puerto Rican population. To reduce the incidence of asthma among Puerto Ricans, regulations should be implemented to improve living conditions and provide more education for the Hispanic community regarding the treatment and prevention of asthma.



Poster Presentation P29

**RELATIVE ABUNDANCE AND HABITAT PREFERENCES  
OF AMERICAN BADGERS AND PLAINS POCKET GOPHERS  
IN MCLEAN COUNTY, ILLINOIS**

Noah Haskin, Jack McKermitt, Alexander Palacios, Oscar Schmidt  
and Given Harper\*  
Biology Department, Illinois Wesleyan University

American Badgers (*Taxidea taxus*) and Plains Pocket Gophers (*Geomys bursarius*) are fossorial mammals whose primary habitat has historically been prairie, which now comprises <0.01% of Illinois. Populations of both species are mostly confined to strips of non-native grass between roads and agricultural fields in central Illinois. The purpose of this study was to determine their relative abundance and habitat preferences in McLean County, Illinois, as no recent studies on either species have been conducted. We conducted 150.61 km of roadside automobile surveys for both species from September through November, 2017, in 7 townships in the southern and eastern parts of the county. In total, 63 (9 clusters) Pocket Gopher mounds (0.42 mounds/km) and 27 Badger dens (0.18 dens/km) were observed. The Pocket Gopher mounds were found in the 2 eastern townships, while Badgers were found in 5 townships in both southern and eastern townships. Spring surveys for both species are currently being conducted.



Poster Presentation P30

**EEG RECORDINGS OF INDUCED NEUROPLASTICITY THROUGH  
PHYSICAL AND SOCIAL PAIN ASSESSMENT IN CHRONIC PAIN  
MANAGEMENT PATIENTS FOLLOWING SPINAL CORD  
STIMULATION MANIPULATION**

Alexandra House and Joseph Williams\*  
Psychology Department, Illinois Wesleyan University

Spinal cord stimulation (SCS), an alternative non-opioid treatment for chronic pain, is a cost-effective treatment yielding a lower morbidity rate and higher rate of success when compared to pharmaceutical drugs and corrective spinal reoperation. SCS improves patients' functional and psychological status by introducing low levels of electrical current to the dorsal portion of the spinal cord to effectively reduce individual levels of physical pain. Despite inducing a clear therapeutic effect, the underlying mechanism of the corrective therapy remains unknown. Electroencephalography (EEG) is one technique that is useful in examining the neural mechanism associated with chronic pain. The current study analyzes whether SCS treatment manipulation in chronic pain patients affects the perception of physical pain and whether these changes are reflected in EEG brain patterns, specifically EEG power in the alpha, beta, and theta ranges. In addition, previous literature has revealed a strong, positive correlation between physical pain and an individual's sensitivity to social pain. The present study analyzes social sensitivity in chronic pain patients through self-reported social pain measures and a behavioral task where individuals were instructed to imagine being accepted or rejected by potential suitors. This poster will discuss the behavioral, psychological, and electrophysiological effects of turning the spinal cord stimulator on and off. Understanding the neural mechanism underlying the SCS can improve the refinement of SCS treatment in chronic pain patients.

Poster Presentation P31

**LINEAR POSITION DETECTOR WITH HIGH BANDWIDTH**

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Position-Sensitive Detectors currently described in the literature can be divided into distinct categories: ‘Spatial Light Separation Methods’ (e.g., Quadrant Photodiodes or D-Shaped Mirrors) and ‘Electronic Signal Separation’ (e.g., so-called Position Sensitive Detectors). We argue that Spatial Light Separation Methods do not generally give true centroid positions and while Electronic Signal Separation Methods do give a linear response they come at a cost to bandwidth ( $< 100$  kHz), which limits the kinds of systems that can be studied to those where the dynamics are ‘not extreme.’ Our project focuses on creating a ‘hybrid’ kind of detector, which is both accurate and extremely fast, a linear gradient “reflective filter” coupled to two small-area (i.e., fast) photodiodes. Further, through the use of a DMD, which is an array of actuatable micro-mirrors that are highly reflective across the spectrum, such linear gradients may be multiplexed. The advantage, then, of the DMD-based approach over alternative methods of creating a linear gradient is that we can dynamically change (at 8 kHz) the gradient imposed, from horizontal to vertical, and even to radial gradients, thereby allowing “time-shared” measurements of x, y, and z motion of the centroid, where our measurement bandwidth (100 MHz or higher) is limited only by the photodiodes utilized, and not by the DMD. Anatolii Kashchuk, et al.[1] have demonstrated multiplexed high-bandwidth measurements within the context of one specific application (namely, tracking of an optically trapped bead). Our aim is to extend such methods to additional applications and further our own knowledge on the topics at hand.

1. “High-speed position and force measurements in optical tweezers,” A.V. Kashchuk, A.B. Stilgoe, T.A. Nieminen, H.H. Rubinsztein-Dunlop, Optical Trapping & Optical Micromanipulation (San Diego, Aug., 2017), Presentation 10347-44.

Poster Presentation P32

## **CAN THYROID HORMONE REGENERATE DAMAGED NERVES FOLLOWING CORNEAL INJURY?**

Shinho Kim, Elise Ziegenhorn and Tyler Schwend\*  
Biology Department, Illinois Wesleyan University

The cornea is the most densely innervated tissue on the body's surface. Corneal nerves, derived from the trigeminal ganglion, are crucial for perceiving stimulation from the external environment and maintaining hydration on the eye's surface. Unfortunately, corneal nerves can be damaged following injury or corrective surgery (LASIK). Consequently, nerves are slow to regenerate, causing discomfort and risking further eye damage. Due to the immediate need to restore corneal nerves following injury we examine thyroxine (T4), the main hormone secreted by the thyroid gland, because we and others in the field have found T4 enhances the rate of nerve growth into the cornea (innervation) during development. Herein, we examine whether both cell types (trigeminal neurons and corneal cells), or one type exclusively, is capable of responding to T4 by studying gene expression for T4 receptors in these cells. Further, we are testing whether trigeminal neurons can directly respond to T4 when isolated from the embryo and cultured *in vitro*, which would provide functional evidence that they are capable of responding to T4.

Poster Presentation P33

## **TOWARDS SPATIAL LOCALIZATION OF THE SOURCE OF HIGH-ENERGY PARTICLES IN THE NEAR-SPACE PORTION OF THE ATMOSPHERE**

Minzhao Liu and Gabriel Spalding\*

Physics Department, Illinois Wesleyan University

High-altitude balloons measurements show that the rate of detection of high-energy particles reaches a maximum at a certain altitude [1]. We want to gather data of this ‘Pfozzer maximum’ and to study the directionality of high-energy particles as altitude changes. Directionality can be studied by looking at “coincident” detection, as particles pass through multiple detectors, in either horizontal or vertical directions. We account for effect due to the sun’s location by conducting experiments at different times of day. This presentation focuses on selection, assembly, and testing of detectors and electronics required for data processing and establishing the (small) time window during which detected particles are considered as “coincident”. During prototyping, we use much less expensive LEDs as inefficient Single-Photon Avalanche Detectors (SPADs), ensuring that our more expensive detectors are safe. Final detectors consist of BC-408 doped scintillators, which emits light to be detected by a silicon photomultiplier chip (Ketek SiPM), following protocols of CosmicWatch. [2] Coincidence detection conditions are established using logic gates on a Programmable System on a Chip (PSoC), which also contains the microprocessor and memory for data logging. Initial tests include detector quenching/dead time, after-pulsing, timing resolution, jitter, *etc.*

1. Adams, A, Brauer, E, &Stroman, J , A Small Geiger Counter Array, DePauw University, Greencastle, Indiana
2. Axani, SN, Conrad, JM & Kirby, C 2017, The Desktop Muon Detector: A simple, physics-motivated machine-and electronics-shop project for university students, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Poster Presentation P34

## **TEACHING ADULT ESL LEARNERS AS COMMUNITY LEADERS**

Linh Le and Teddy Amoloza\* and Leah Nillas\*  
Educational Studies Department, Illinois Wesleyan University

During my internship at EarthRights International School in Chiang Mai, Thailand, I was introduced to new methods of teaching based on Paulo Freire's Pedagogy of the Oppressed. This approach to teaching and learning condemns conventional "banking" learning, learning that occurs one-way from teachers to students, and promotes learning that engages and transforms students into active, autonomous learners. Applying this new approach into teaching ESL adult learners, I faced challenges with the change in method. The transition from conventional methods was difficult for the students, and at times they felt unmotivated because there was no definite answer or solution given to them. I will talk more in-depth about the challenges and how I overcame them by incorporating what I learned from Freire's method and other multicultural teaching techniques. Furthermore, through working with the students, it became clear why students were motivated to choose an English program, and why English was an important tool to pursue human and environmental rights activism in their communities.

Poster Presentation P35

**A NEW SPECIES OF *PRISTIMANTIS* (AMPHIBIA: ANURA: STRABOMANTIDAE) FROM NORTHERN PERU**

Shenyu Lyu and Edgar Lehr\*

Biology Department, Illinois Wesleyan University

Frogs of the genus *Pristimantis* are most diverse in northwestern South America. They are distributed from lowland rainforest to elevations of about 4000 m in the Andes. Of the 516 species currently assigned to the genus *Pristimantis*, 138 species occur in Peru. Herein, we present a new species of *Pristimantis* from the Cajamarca Region of northern Peru. The new species is known from four male and five female specimens found in high Andean grasslands hiding in the rosette of *Puya fastuosa* (Bromeliaceae) at 3600 m above sea level. The new species is phenotypically distinguished from its congeners by having a black dorsum with sprinkled white flecks and a dark brown groin with white spots. Furthermore, it has a snout-vent length of 23.6–27.2 mm ( $n = 4$ ) in adult males and 25.6–32.8 mm ( $n = 5$ ) in adult females.

Poster Presentation P36

**EXAMINATION OF THE ROLE OF FGF SIGNALING  
DURING THE DEVELOPMENT OF THE LOWER JAW  
CARTILAGES IN *MOENKHAUSIA SANCTAEFILOMENAE***

Mark Macak and Brian Walter\*

Biology Department, Illinois Wesleyan University

The FGF signaling pathway is known to influence the formation of the craniofacial cartilages early in development. To determine if FGF signaling plays a role in regulating cell division patterns in the redeye tetra *Moenkhausia sanctaefilomenae*, we conducted pulse-chase experiments with 24-36 hpf treated specimens using the inhibitor SU5402 then chased to 100 hpf. Specimens were simultaneously treated with bromodeoxyuridine (BrdU) to label dividing cells and monitor the effects the inhibitor had on the number of labeled cells. Results showed clear reduction in cartilage from those treated with FGF inhibitor. Using immunohistochemistry, we found that the cartilages of the SU5402 treated specimens still tested positive for BrdU, indicating that FGF may not play a major role during cell division of the time frame we observed. Overall, these data suggest that FGF does not play a major role for cell division but may be influential in another aspect of cartilage development.



Poster Presentation P37

**INCREASING THE NUMBER OF HISPANIC NURSING  
STUDENTS: CORE ELEMENTS TO SUCCESSFUL  
NURSING PROGRAMS**

Larisa McCoy and Cesar Valverde\*

Hispanic Studies Department, Illinois Wesleyan University

This study analyzes the effectiveness of nursing programs that increase the recruitment and retention of Hispanic students. The research explains the increasing need for Hispanic nurses in the United States, and the barriers that prevent Hispanic students from pursuing a degree in nursing. The core elements of nursing programs that have successfully increased the number of graduate Hispanic nursing students were investigated. Based on the results of the study, possible solutions for nursing programs to decrease the disparity of Hispanic nursing students will be described.



Poster Presentation P39

## **FREE TO STAND: LIMITS OF MERITOCRACY IN SPORTS**

Matthew Moser and Joanne Diaz\*

English Department, Illinois Wesleyan University

The general populace of America views sports as a symbol of meritocracy, however when athletes of color attempt to bring this supposed level of equality to minority communities by performing non-violent and non-disruptive protests before taking the field, they are met with disdain from the general populace. By providing a close reading of numerous popular American sport movies, including *Miracle* and *Hoosiers*, I will demonstrate the origins of this socially constructed concept of an athlete and how it disproportionately hampers a minority athlete's ability to perform actions of social justice and reinforces institutionalized racism. Focusing on the recent developments surrounding Colin Kaepernick, I will bring attention to the president's support of this harmful thought process, exposing the crumbling barrier between private industry and governmental desire to quell conversations surrounding racial disparity in America. This in turn reinforces white supremacy.

Poster Presentation P40

## **EFFECTS OF DOGS' (CANIS LUPUS FAMILIARIS) ENVIRONMENT ON SOCIAL COGNITION**

Kathleen O'Shea and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

The current study explores the effects of a dog's environment, e.g., shelter vs pet, on their social cognition. Dogs' understanding of human social cues has been explained both by the domestication hypothesis and the human exposure hypothesis. The domestication hypothesis asserts that dogs' understanding of human social cues, intentions, and emotions comes from their side-by-side evolution with humans. In contrast, the human exposure hypothesis suggests that dogs' level of understanding is determined by their life experience/ontogeny with humans. Because shelter dogs have had less experience with humans, research suggests they have less social understanding of humans; on the other hand, pet dogs have had a significant amount of experience with humans and therefore may be assumed to have greater social understanding of humans. The current study takes an ontogenetic approach as it makes different predictions for each theory and there is less research in this area. Methods for the study include a self-control measure along with three social cognition measures. The self-control measure is used as a non-social control to measure for general cognitive capacity. The social cognition measures include the "Impossible Toy" test, an object-choice task, and a gaze-following task. The results of the study will help to determine which theory of dogs' social cognition better explains dogs' strong socio-cognitive abilities in understanding humans.

Poster Presentation P41

## **APPLICATIONS OF QUANTUM ENTANGLEMENT TOWARDS “GHOST” IMAGING**

Weronika Pach and Gabriel Spalding\*  
Physics Department, Illinois Wesleyan University

In this work, pairs of entangled photons are aimed at two spatially separated detectors: the path to one detector contains a physical object, while the path to the second detector does not. Yet, the second detector can be used to create an image of the object, even though none of the photons arriving at that detector have ever interacted with the object! This “ghost” imaging takes advantage of information that is shared between entangled photon pairs. This work aims to explore the underlying principles in a ghost imaging system that utilizes spontaneous parametric down-conversion (SPDC) as the source of entangled photons, with the larger goal of understanding the principles and operation of key parts of the system.

Poster Presentation P42

**THE MICROSPHERE LAYER ON THE EGGSHELLS OF  
EARED GREBES (*PODICEPS NIGRICOLLIS*) AND ITS  
IMPEDANCE OF WATER VAPOR CONDUCTANCE  
THROUGH THE EGGSHELL**

Grant Park and William Jaeckle\* and Given Harper\*  
Biology Department, Illinois Wesleyan University

Eggs of the Eared Grebe are laid on floating nests made from aquatic vegetation and may come into contact with or be partially submerged in water. Unlike eggs of most other bird species, water does not cross the eggshell of the Eared Grebe. The outermost Grebe eggshell layer contains calcium phosphate microspheres ( $0.69 \pm 0.29 \mu\text{m}$ ; mean  $\pm$  SD;  $n=418$ ), which are hypothesized to prevent the influx of water; however, the effects of microspheres on gas conductance across eggshells are unknown. The total external pore surface area ( $\Sigma$  pore area) and eggshell thickness of 181 eggshell fragments from 3 eggs were used to estimate the gas conductance. When eggshell gas conductance rates were normalized to fragment surface area, the mean conductance across eggshell fragments with microspheres ( $5.15 \pm 5.79 \text{ mg H}_2\text{O/day-torr/mm}^2$ ) was significantly lower than those without microspheres ( $8.25 \pm 5.72 \text{ mg H}_2\text{O/day-torr/mm}^2$ ;  $t_{180} = -17.4$ ,  $p < 0.001$ ). Estimates of gas conductance through minimum pore diameters as determined via polyurethane casts ( $n=44$ ) were similar. Ongoing experiments are being conducted to determine whether the effect on gas conductance is due to the microspheres or simply the change in eggshell thickness.

Poster Presentation P43

## **CAN THYROID HORMONE ENHANCE CORNEAL NERVE REGENERATION FOLLOWING LASIK?**

Mansi Patel, Jill Rajarathnam and Tyler Schwend\*  
Biology Department, Illinois Wesleyan University

The cornea, the outermost tissue of the eye, harbors the most nerves of any tissue on the body's surface. These nerves are vital to maintaining eye health and vision. However, corneal nerves are often damaged after corrective eye surgeries, such as LASIK. Inexplicably, corneal nerves regenerate poorly following LASIK resulting in reduced corneal sensitivity and dry eye. Here we determine whether thyroid hormone may represent a therapy to enhance corneal nerve regeneration by studying its stimulatory effects on corneal nerve growth. We have found that thyroxine (T4), the main hormone secreted by the thyroid gland, can significantly enhance the rate of nerve growth and increase corneal nerve density when applied ectopically to developing chick embryos. We are currently studying whether T3, the metabolite of T4 and more active form of thyroid hormone, displays similar or disparate effects to T4 when applied to chick embryos.

Poster Presentation P44

**ORIGINS OF EMPIRE: THE LASTING INFLUENCE  
OF ANCIENT ECOLOGICAL BEHAVIORS  
IN ROMAN MYTHOLOGY**

Teagan Potter and Joanne Diaz\*  
English Department, Illinois Wesleyan University

When consumers think of Nestlé, they often picture the happiness and joy delicious candies and chocolates bring, but what many may not know is that Nestlé originally began as company specializing in the sale of infant formula. Additionally, as international advocate for public health, Chetley, and business ethics representative, Robinson, argue, Nestlé faced an ethical dilemma regarding the appropriateness of its advertising, specifically in Latin America, because of the persuasion techniques the company used to take advantage of misinformed consumers. Today, the problem is still at large as Nestlé continues to market their candies to poorer regions, directly adding to an obesity epidemic. Using case studies involving Nestlé and other companies, I will evaluate the ethics behind big business advertising in Latin America to reveal the larger problem of companies based in wealthier countries using the developing world for their own economic gain with little regard to the countries' wellbeing.

Poster Presentation P45

**A NEW TERRESTRIAL-BREEDING FROG  
(STRABOMANTIDAE: *PRISTIMANTIS*) FROM  
NORTHERN PERU**

Anna Poulton and Edgar Lehr\*

Biology Department, Illinois Wesleyan University

Nearly 700 species belong to Strabomantidae, a family of terrestrial-breeding, small to medium sized frogs. Of these, 516 are of the genus *Pristimantis*. A series of frogs collected during an expedition in a montane forest between 2843 and 3013 m elevation in the Region Lambayeque contained a new species of frog of the genus *Pristimantis*. This frog has female snout-vent lengths between 24.2–26.1 mm ( $n = 4$ ) and male snout-vent lengths between 17.2–18.7 mm ( $n = 2$ ), and a coloration from pale brown to dark brown. It differs from its congeners by having males without vocal slits and nuptial pads, ulnar tubercles fused to a ridge, and fingers and toes with narrowly rounded discs. The new species is most similar to *Pristimantis chimu*, from which it differs by lacking a cranial crest and tarsal tubercles. Future work will include molecular data to analyze phylogenetic relationships of this species.



Poster Presentation P46

## **ESTIMATING THE IMPACT OF LARGE HOG FARMS ON FRESHWATER MUSSEL DIVERSITY**

Ojaswee Shrestha and Aaron Shoults-Wilson\*

Environmental Studies Program, Illinois Wesleyan University

In the U.S., hog farms are mostly concentrated animal feeding operations (CAFOs), where hogs are raised in large numbers in a small area. Such farming practice concentrates waste, leading to the contamination of water resources. This has implications for the environment, human health and aquatic life. Hog farms pollute the water with contaminants like ammonia, which is harmful to aquatic species like freshwater mussels. North America has the richest diversity of freshwater mussels in the world, and about 63 species are found in Illinois itself. Hog farming practices can threaten the freshwater mussel populations, which are already declining due to anthropogenic environmental pollution. We wanted to answer the question, where would hog farms impacts on mussels be highest in a river system? We focused on the Spoon River watershed in Central Illinois as it is an extensively studied site for mussel diversity, and is an area receiving push for introduction of additional CAFOs. We used geographic information systems (GIS) technology to map out the hog farms and create a preliminary predictive model for the impact intensity of hog farms along the Spoon Rivers and its tributaries. We predict higher impacts in tributaries near hog farm operations and the middle stretch of the main Spoon River. The lower half region of the watershed is predicted to have higher hog farm impacts due to the cumulative impacts of all farms upstream of the region. Thus, if more hog farms are added, the lower region might be affected the most. Our model provides a visual representation of predicted hog farm impacts for further comparison with Spoon watershed mussel diversity data.



Poster Presentation P47

## **DOMESTIC DOGS PREFER PROSOCIAL TO ANTISOCIAL HUMANS**

Zachary Silver and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

Domestic dogs possess high aptitude for following social cues from humans, performing similarly to human infants and toddlers at understanding gestures, intentionality, and affective states, as well as other displays of social intelligence. The present study seeks to determine whether dogs, like human infants, show a preference towards actors engaging in prosocial behavior compared to those engaging in antisocial behavior. Fifty-four dogs watched as a human actor attempted to retrieve a clipboard that was out of his reach. Two additional experimenters performed one of three actions: handing the clipboard to the first experimenter (the helper), moving the clipboard farther away from the first experimenter (the hinderer), or not interacting with the clipboard in any capacity (the neutral actor). After this series of social interactions, both experimenters offered the dog a treat. We measured which experimenter the dogs first approached and accepted a treat from. Dogs preferred prosocial humans (the helper) compared to antisocial humans (the hinderer). This result suggests that preferences towards prosocial individuals may represent a component of social evolution which shaped both human and nonhuman social cognition.

Poster Presentation P48

## **NONPARAMETRIC STATISTICAL ANALYSIS IN COMPARATIVE PSYCHOLOGY RESEARCH**

Zachary Silver and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

Parametric statistics, the analytical tools most commonly used in experimental psychology, rely on a number of statistical assumptions that are not always met in psychology research. One such assumption, the assumption of normality, demands that experimental data is normally distributed such that the majority of the data clusters around the mean. Many psychology experiments involving human populations do produce normally distributed data; however, data collected from experiments involving nonhuman animals are rarely normally distributed. Small sample sizes, the use of categorical or ordinal variables, and elevated variance represent some of the many factors contributing to the non-normality in comparative psychology data sets. In such cases, an alternate set of analytical tools, nonparametric statistics, enable researchers to more accurately analyze data as these tests do not rely on the same sets of assumptions as typical parametric tests. Using these nonparametric statistical tests we reanalyzed data from published research that originally utilized parametric statistics when nonparametric tests would have been more appropriate. Nonparametric analyses revealed different results from the parametric tests reported in several notable experiments suggesting that the conclusions were subject to alternative interpretations. We suggest that researchers should become aware of the assumptions of parametric statistics and be vigilant in selecting appropriate statistical tests. Comparative psychologists in particular may benefit from adding nonparametric statistical tests to their analytical tool sets.

Poster Presentation P49

## **THE DESIGN, CREATION, AND CHARACTERIZATION OF A VACUUM SYSTEM FOR ELECTRON-ATOM SCATTERING EXPERIMENTS**

Jennifer Swanson and Bruno deHarak\*

Physics Department, Illinois Wesleyan University

We are building an apparatus to conduct electron-atom scattering experiments. It is necessary for the scattering to occur in a vacuum so that no atoms or other particles are able to interfere with the scattered electrons before they arrive at the detector. Here we provide a detailed description of the vacuum system for the apparatus. The vacuum system includes an airtight chamber in which the scattering will take place, a turbo pump and a mechanical rotary pump in order to pump the system down ( $\sim 10^{-7}$  Torr), and an ion gauge and gauge controller to measure the pressure. We also detail the interlock system used to shut down the turbo pump and pressure-sensitive equipment if the pressure within the chamber gets too high so that no equipment is damaged.

Poster Presentation P50

**IN PURSUIT OF A GOOD NIGHT'S REST. STEPS TOWARDS  
IMPROVING ELECTROENCEPHALOGRAM (EEG)  
ACCESSIBILITY AND AFFORDABILITY**

Niyant Vora and Thushara Perera\*

Physics Department, Illinois Wesleyan University

The Electroencephalogram (EEG), which is used to effectively record brain waves, has long been a key pillar of sleep research. However, sleep research has an important problem—the natural environment in which people sleep (their bedrooms), is not where sleep research is conducted. Several companies have released EEG headsets to try and address this problem, however, there are still many obstacles to home use. Such headsets are too expensive to be used by everyone and are still not effective enough to be utilized by physicians performing sleep studies. The goal of our research is to find affordable and innovative ways to improve on current EEG technology, mainly utilizing *active electrodes*. Active electrodes are a newer direction in EEG technology. They allow the brain potentials to be amplified at the electrode site, enabling better noise retransmission (and eventual reduction), while also providing more effective pick-up of bio-potentials without using conductive gel. To this end, we designed a useable EEG prototype using inexpensive circuit components, and digitized the signal from that circuit using LabVIEW. Our preliminary data indicates that not only is this affordable EEG technology viable, but that the circuit design naturally lends itself to being miniaturized into an ergonomically good electrode—our next step on this path towards affordable and accessible EEG technology.

Poster Presentation P51

## **TIME-CORRELATED SINGLE-PHOTON COUNTING**

Rachel Westerkamp and Gabriel Spalding\*  
Physics Department, Illinois Wesleyan University

In this study of quantum optics, we want to extract information associated with quantum mechanically entangled photon pairs. Measurements involved here take advantage of the fact that the photon pairs, created at the same point in space and time, will arrive “in coincidence” at detectors placed equally far from the source. Conservation of momentum also constrains the placement of these detectors. These effects, in combination, allow us to differentiate between these entangled photons and other stray photons that may reach the detectors. Initial efforts have included building a more stable laser mount, studying parametric down conversion (the process of converting the single beam into the entangled photon pairs), and establishing a small time interval for coincidence detection. For this, we explore the consequences of moving away from a Field Programmable Gate Array (FPGA) for coincidence measurements and towards the use of a Programmable System on a Chip (PSoC), which essentially combines the fast digital logic gates of an FPGA with micro-controller functionality. We are gaining hands-on experience with some highly theoretical aspects intrinsic to quantum mechanics, expanding upon laboratory setups described in Mark Beck’s recent text on quantum mechanics, as well as materials from *Exploring Quantum Physics through Hands-On Projects* by David Prutchi and Shanni R. Prutchi.

Poster Presentation P52

## **ALGEBRAIC STRUCTURE OF RIORDAN GROUPS**

Yuanziyi Zhang and Tian-Xiao He\*

Mathematics Department, Illinois Wesleyan University

We discuss the Lie group structure of Riordan groups in both finite and infinite cases. We also construct stabilizers and centralizers of Riordan groups and give their combinatorial interpretations. Particularly, stabilizers and centralizers in Appel, Associated, Bell and Stochastic subgroups are presented.

Poster Presentation P53

## **BACKLASH AGAINST FEMINISM**

Monica Mocogni and Carole Myscowski\*

Women and Gender Studies Program Department, Illinois Wesleyan University

This research examines and unpacks the underlying causes of backlash against second-wave feminism. Backlash against feminism is “one long, painful, and unrelenting campaign to thwart women’s progress” (Faludi, 454) that ebbs and flows in intensity and frequency. One theory behind the occurrence of backlash is that it is a result of the fear of losing control because a lack of control results in diminished power of privileged groups over marginalized people. People in power, such as men and white people, gain power by oppressing marginalized groups, and they hold the belief that power cannot be shared in a society. This is a cause of backlash that can be seen when examining capitalism which exploits marginalized groups in order to create monetary gains for white men. The backlash against feminism has stalled, prevented, and even reversed feminist progress because Americans have a deep-seated fear of change that would cause them to lose power.



## **EDUCATIONAL STUDIES**

### **POSTER PRESENTATIONS - SESSION 1**

**April 21, 2018, 9:00 – 10:00 am**

**SFH FOYER/SFH 101**

- 1.1 Erich Lieser
- 1.2 Stephanie Prentice
- 1.3 Emma Hanzelin
- 1.4 Alyssa Dorning
- 1.5 Kelly Kaveney
- 1.6 Alexandra Hurth
- 1.7 Claudia McGee-Morales
- 1.8 Shelby Thomas

### **ORAL PRESENTATIONS - SESSION 2**

**April 21, 2018, 10:00 – 11:00 am**

**SFH 102**

**MODERATOR: EMMA DALTON**

- 2.1 Amber Stringer
- 2.2 Cameron Earley
- 2.3 Cassie Leishman
- 2.4 Luke Roth

**POSTER PRESENTATIONS - SESSION 3**  
**April 21, 2018, 11:00 – 12:00 noon**  
**SFH FOYER/SFH 101**

- 3.1 Sarah O'Rourke
- 3.2 Eli Ayala
- 3.3 Sydney Seeman
- 3.4 Matthew Wegh
- 3.5 Shannon Green
- 3.6 Natalie Moore
- 3.7 Emilee Monken
- 3.8 Natalie Fletcher
- 3.9 Emma Lewis

Poster Presentation ES P1.1

## **STUDENT CHOICE IS LIT!**

Erich Lieser and Leah Nillas\*

Educational Studies Department, Illinois Wesleyan University

This study investigates assessments that offer student choice in a secondary English classroom. After reading a short story or novel, assessments traditionally ask students to find themes or answer a question with evidence from the text. While this system promotes close reading and writing skills, unique interpretations are not represented. In response to this, I compared the traditional process to a student choice assessment. I administered a single question literary analysis based on *The Necklace* written by Guy de Maupassant to gauge student understanding and writing skills without student choice present. After the following unit, I created a new assessment that allowed for students to choose an open-ended question with multiple correct interpretations possibilities. The second assessment was based on George Orwell's *Animal Farm*. This study looks closely at student work samples, field notes, and a review of current research. Students need practice interpreting texts individually. Without this practice, students will depend on teachers to determine the meaning and significance of literary works.

Poster Presentation ES P1.2

## **STUDENT CHOICE: HOW DOES IT RELATE TO STUDENT BEHAVIOR?**

Stephanie Prentice and Leah Nillas\*

Educational Studies Department, Illinois Wesleyan University

The purpose of this self-study research is to examine how incorporating student choice in an elementary classroom influences student behavior. *Student choice* or *student agency*, is an important concept in education because it gives students the opportunity to be empowered in their own learning. In an effort to examine the ways in which student choice directly impacted student behavior, I reflected upon my own teaching practices through field notes and lesson plans, analyzed anecdotal records, behavior logs, and the different choices students made during lessons. Findings demonstrate that student-choice leads to increased motivation levels among students, resulting in a decrease in the occurrence of problematic behavior in the classroom. Understanding how to provide student choice effectively as well as its benefits for managing student behavior is beneficial for all teachers.

Poster Presentation ES P1.3

## **TECHNOLOGY INTEGRATION IN ELEMENTARY ENGLISH LANGUAGE ARTS**

Emma Hanzelin and Leah Nillas\*

Educational Studies Department, Illinois Wesleyan University

Technology integrations in the elementary classroom are becoming more common in today's advancing society. As communication through technology evolves, it is important for teachers to adapt and provide a curriculum that promotes communication skills students will need to succeed in the future. Recent research reminds teachers that the key to successful technology integration is to "pay close attention to students' responses to the use of [information and communication technology] in teaching by balancing these with traditional teaching" (Parvin & Salam, 2015, p. 57). This self-study research focuses on the implementation of Google Docs during the writing process. It takes place in a rural, fourth-grade classroom of 29 students, who each had access to a laptop during ELA time. Personal data collected consist of field notes, anecdotal records, lessons plans, and student work samples. Combining these sources displays how technology integrations impact planning, implementation, and growth.

Poster Presentation ES P1.4

## **TALK IT OUT: PEER COLLABORATION IN THE WRITING PROCESS**

Alyssa Dorning and Leah Nillas\*

Educational Studies Department, Illinois Wesleyan University

This self-study explored how students working with a partner during writing activities not only affected their writing, but confidence in themselves as well. Often times, students struggle to find a topic to write about and do not have the opportunity to talk out their thoughts and ideas with a partner. Peer collaboration gives students an opportunity to do just that as well as build relationships with their peers within the classroom. During my student teaching placement, I conducted a writing unit in a third-grade classroom where students worked with a partner to discuss ideas, edit, and revise their personal narratives. In an effort to examine this topic, I reflected upon my own practice by collecting and analyzing student reflections, field notes, anecdotal records, and lesson plans. Findings found that students appreciated having a peer to support them while gaining confidence during the writing process. Allowing peer collaboration in the classroom provides students with an opportunity to practice their skills and build social relations as developing writers.

Poster Presentation ES P1.5

## **CLASSROOM MANAGEMENT: BEHAVIORISM AND STUDENT PRODUCTIVITY**

Kelly Kaveney and Leah Nillas\*

Educational Studies Department, Illinois Wesleyan University

In a high school classroom setting, classroom management is essential to running a productive classroom, as learning cannot increase if students are not on task. If there are behavior issues within the classroom it can both affect the teacher's teaching as well as other students' learning (Cameron, Connor, Morrison, & Jewkes, 2008). The efforts of managing a classroom is a process loaded with trial and error, and establishing classroom norms that result in routine behaviors and set rules. Understanding behaviorism and what particular classroom management strategies are essential to running an effective classroom so as to ensure students are utilizing class time to its highest educational potential. This research focuses on how the incorporation of classroom management strategies focused on behaviorism affects the productivity of students in the classroom, since the behavior of students in the classroom affects student learning. The data collected in the field consists of classroom video clips, field notes, and lesson plans.

Poster Presentation ES P1.6

## **SELF AWARENESS IN ELEMENTARY STUDENTS**

Alexandra Hurth and Leah Nillas\*

Educational Studies Department, Illinois Wesleyan University

Being self-aware and making smart decisions are important skills for elementary students. By teaching students to be self-aware, they are able to learn positive habits that will remain with them throughout the rest of their schooling. This study was conducted to provide teachers with practical ways to guide students to be self-aware and promote pro-social behavior within the classroom. Pro-social behavior is when a student displays voluntary actions that are intended to help or benefit another individual or group of individuals. Using slight behavior modifications to promote pro-social behavior, students were given opportunities to play a role in their learning. Data was collected in a first-grade classroom over the course of one semester. The main data sources collected were field notes, teacher observations, anecdotal records, student work, reflections, and lesson plans.



Poster Presentation ES P1.7

## **APPLYING A MULTISENSORY APPROACH TO TEACHING**

Claudia McGee-Morales and Leah Nillas\*

Educational Studies Department, Illinois Wesleyan University

This study was conducted to explore the benefits of taking a learning-style approach to elementary instruction, opposed to the traditional lecture-style approach. For this study, I observed students' growth and attitude in English Language Arts and mathematics classes with the implementation of grouping, based on learning style. Farkas (2003) found that the retention of new and more complex information significantly increased when students engaged in lessons that incorporate some aspect of learning styles. Through the analysis of field notes, student anecdotal records, student work, and feedback my students gave me on what worked best for them, I revealed the relationship between educators using a learning-style instruction approach and student success. Because students learn in vastly different ways, it is essential that teachers, "examine each individual's multidimensional characteristics to determine what is most likely to trigger each student's concentration...and cause long-term memory" (Dunn and Dunn, 1993). Moving forward, educators should be aware that teaching according to students' needs is necessary, and this study is an example of how an educator can tend to those needs.

Poster Presentation ES P1.8

## **IMPACT OF DIFFERENTIATION ON STUDENT ENGAGEMENT**

Shelby Thomas and Leah Nillas\*

Educational Studies Department, Illinois Wesleyan University

When teaching elementary students, teachers face the challenge of getting students to be authentically engaged in the content. Tomlinson (2012) argues that differentiation in the classroom can help to engage students by ensuring that content is at their level, process meets matches learning profile, and level of support is appropriate to their ability. Differentiation is a way of recognizing and teaching according to the different readiness, interest, and learning profile of students (Tomlinson,2008). This self-study sought to explore the impact of differentiation on student engagement. Lesson plans, field notes, student surveys, student work, summative and formative assessment data, and anecdotal records were collected from a second grade inclusive classroom to investigate the impact of differentiation on student motivation and engagement. Findings indicate that differentiation of process, content, support, and assessment increases the likelihood that students will enjoy the learning activity and fosters authentic engagement in students. The students responded well to this instructional strategy and demonstrated authentic engagement and intrinsic motivation.

Oral Presentation ES O2.1

## **ENGAGING STUDENTS WITH STYLE**

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Student engagement is a key factor in the middle school classroom; with many students, all of whom have different needs, it can be difficult to maintain. One of the best ways to engage students lies within the teacher's style of teaching (Everston & Weade, 1989). In this qualitative study, I discuss how various aspects of my teaching style affected student engagement in a sixth-grade mathematics classroom to determine if certain facets of my teaching style consistently fostered student engagement. In this study, student engagement was defined by students' emotional engagement, or students' reactions to classwork, school, and people and how the students' reactions influenced their work. Data was collected through lesson plans, field notes, photographs, and anecdotal records. The findings of this study are significant to the field of education because they could determine ways to maintain and enhance student engagement.



Oral Presentation ES O2.2

## **EFFICACY OF GROUP COUNSELING ON STUDENTS' SOCIAL SKILLS**

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Social skills are defined as any competence that facilitates interaction and communication with other individuals where social rules and relations are created, communicated, and changed in verbal and nonverbal ways. Factors such as family, school, or integration into social groups can affect the development of students' social skills. Through group counseling, students can not only gain a sense of community among peers, but also begin in developing important social skills that can be carried throughout adulthood. The purpose of this literature review is to provide useful insights into the role of group counseling to develop students' social skills, as well as a way to expand teacher's' knowledge around the topic of group practices and collaborative learning. After analyzing different studies on the topic, it can be concluded that group counseling can raise social competence and impact the development of students' social skills.

Oral Presentation ES O2.3

## **BRINGING HISTORY TO LIFE THROUGH THE USE OF SIMULATION IN AN AMERICAN GOVERNMENT CLASSROOM**

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The social sciences have been given a stigma in education because of concerns of monotonous teaching styles and difficulties with engaging students in the content. This study aims to identify how the use of simulation in an American Government classroom can improve student cognitive engagement and increase retention of the content. In previous studies, teachers have found the incorporation of online simulation, problem-based learning (Pagnotti and Russell, 2015), and the use of Kolb's Experiential Learning Theory (1948) in the classroom lead to an increase in student engagement and motivate students to take control of their own learning. This study was conducted in a rural high school in an American Government classroom with twenty-three juniors and five seniors. Student work samples, video clips, teacher field notes, and student reflections and surveys were content analyzed. Students participated in three simulation activities (i.e., committee work, a 2-day role-play of the House of Representatives, and an online game on the US court structure). They collaborated, problem-solved, and debated during these simulations. In today's classrooms, engaging students in the social science content can be challenging for teachers. This study aims to identify that simulations encourage students to become more invested in the content leading to higher content retention and learning outcomes.

Oral Presentation ES O2.4

**EFFECTS OF CLASSROOM ENVIRONMENTS ON ALL  
STUDENTS: AN ANALYSIS OF LITERATURE ON  
INCLUSIVE CLASSROOMS**

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Inclusion exists in the classroom when all students are able to attend their most accessible public schools in appropriate, regular-education classes, and are provided accommodations to allow them to learn, contribute and participate in all aspects of the class. In the United States, the Individuals with Disabilities Education Act of 1975 mandates that all students have the right to a free, appropriate public education in a least restrictive environment possible. Since the mid-70s, there has been a significant rise in the percentage of students served by federally supported special education programs. According to the National Center for Education Statistics, increased from 8.3% to 12.9%, and the percentage of student identified as having specific learning disabilities from 1.8% (1976-77) to 4.5% (2013-14) (Students with Disabilities, 2017). While much progress has been made regarding student with disabilities, in many cases, more can be done to provide students with higher levels of educational liberation. Inclusive classroom environments provide an immense increase in educational opportunities and success for students with disabilities, and students without disabilities. This research synthesis examines successful methods for promoting inclusion in the classroom; and discusses why inclusion is beneficial for all students. This literature review necessitates further study into the academic progress of all students when placed in an inclusive classroom environment. Additionally, more research into inclusive practices for traditionally marginalized students, not necessarily those with disabilities, would strengthen this overarching claim.

Poster Presentation ES P3.1

## **ENGAGING STUDENTS IN LEARNING STYLE BASED ACTIVITIES**

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Our world is changing every day and the educational classroom is not an exception: the way in which students learn has changed. In previous studies, researchers found that incorporating students' *learning styles* into the classroom, through the use of a *learning styles inventory* has improved student engagement as well as assessment scores (Guyen & Ozbeck, 2007; Faulk & Faulk, 2013). This study aims to identify how incorporating students' learning styles can improve student motivation, confidence, and engagement in the classroom. This study was conducted in a rural high school with a class of twenty-five students. The students engaged in activities that were matched with their learning style, as well as activities that did not match their learning style in order to measure if their participating in activities geared towards their learning style improved their score on a formative assessment. The data includes student work samples, field notes, and lesson plans. Keeping up with the diverse students' needs, this study documents the benefits of incorporating learning styles in teaching.

Poster Presentation ES P3.2

## **THE EFFECTS OF STUDENT AUTONOMY IN THE HIGH SCHOOL SETTING**

Elizabeth Ayala and Leah Nillas\*

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The high school setting is not always a place where students like to be. Studies have proven that students benefit from being given the ability to have choice and their own voice present in the classroom and overall school setting (Brooks & Young, 2011). This paper will explore how giving students a free period in high school further encourages students to want to be in school, as well as to have a sense of ownership over their education. The collection of data took place where I was student teaching: an urban high school environment that initiated a free-period program that same semester. Students gradually became more aware of how valuable their free period was, and found it to be a useful time to seek help from teachers and tutors, as well as to catch up on schoolwork. This demonstrates positive outcomes that come when giving students more freedom in school.



Poster Presentation ES P3.3

## **STUDENT CHOICE AND ALTERNATE WORK SPACES**

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Alternate work spaces are seating choices that offer other options to a desk and chair. In this study, students were allowed some choice in which work space they used because, student choice increases engagement and decreases the amount of disruptive behaviors (Lane, Royer, Messenger, Common, Ennis, & Swogger, 2015). However, student selection of their own seating has also been shown to increase off-task behaviors such as talking (Bicard, Ervin, Bicard, & Baylot-Casey, 2012). The purpose of this study is to determine how student choice impacts the effectiveness of alternative work spaces in the classroom. Fourth grade students were observed while utilizing different alternate work spaces to document the impact that these work spaces had on their emotional and behavioral engagement. The data was collected from teacher narratives and student preferences of the alternate work spaces. Results from the data show that student choice of alternate work spaces is effective in emotionally engaging the students, and only sometimes effective in engaging students behaviorally.

Poster Presentation ES P3.4

## **STUDENT CHOICE AND MOTIVATION IN THE SECONDARY ENGLISH CLASSROOM**

Matthew Wegh and Leah Nillas\*

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Motivated students are far more likely to learn, but it can be difficult when students' interests and inspirations all differ. One of the most effective ways to improve student motivation and attainment in the classroom is by giving students choice in assignments, following self-determination theory (SDT). Originally proposed by psychologists Edward Deci and Richard Ryan (1971)s, SDT suggests that students are more intrinsically motivated when their needs for autonomy, competence and relatedness are met. In this study, I gave students in a 12<sup>th</sup> grade African American Literature class choice in assignments, and kept track of the behavior of the class in daily field notes. The results should show that when students are doing activities that are more conducive to student choice, they will be more intrinsically motivated to learn.

Poster Presentation ES P3.5

## **RESTORATIVE JUSTICE CIRCLES IN THE ELEMENTARY CLASSROOM**

Shannon Green and Leah Nillas\*

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Social complications are inevitable in an elementary classroom. The way that these complications are handled can have a great effect on the classroom environment. *Restorative practices* are alternative discipline methods whose main values focus on developing good relationships while restoring a positive classroom environment (Costello, 2009). The purpose of this study is to explore how incorporating restorative practices through weekly restorative justice circles affect the classroom environment. Students were in charge of the topics that were discussed during the circle facilitation. I found that students were willing to discuss disputes even if they were directly involved in the particular conflict at hand. Incorporating restorative justice circles encouraged students to develop the confidence to identify and understand their own and their peers' feelings.

Poster Presentation ES P3.6

## **MODIFYING THE CLASSROOM FOR DIVERSE LEARNERS**

Natalie Moore and Leah Nillas\*

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Classrooms are continually becoming more diverse complete with students who have various needs. With more research being done, the structure of education in the classroom are changing. The CDC report as of 2014 was that around 5%-11% of the population shows symptoms of Attention Hyperactivity Disorder (ADHD). With more recognition of ADHD and other disabilities like it there is a need for more training of teachers to better accommodate students and make modifications to their instructional decisions. The purpose of this literature review is to enhance the knowledge of strategies in the classroom and examine what works and what may be harder to implement. The implementation of different strategies in the classroom will not only help the students with the diverse behavioral needs but may help the other students in the class as well leading to a more inclusive classroom.

Poster Presentation ES P3.7

## **TIERED ASSESSMENT: SUPPORTING AND CHALLENGING STUDENTS WHILE UTILIZING SKILLS-BASED GRADING**

Emilee Monken and Leah Nillas\*

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Creating a classroom that supports each student individually as well as the class as a whole has become increasingly difficult in recent years. Through *tiered assessment*, educators have the opportunity to alter assessments to further challenge or support students. Another implementation in many schools nationwide is standards-based grading (SBG). In SBG, students are assessed on each learning objective separately, meaning for each skill included on an assessment, students will receive an individual score. When tiered assessment is implemented alongside SBG, students have the unique opportunity to be assessed on each learning objective separately and to assess a skill based on their readiness, interest, and learning profile. During student teaching in a school that has implemented SBG, I administered tiered assessment in the Spanish classroom by providing scaffolds for struggling students in order to better target the specific learning objectives assessed in a particular assessment. This self-study includes a qualitative analysis of data (ie. field notes, lesson plans, assessment records, student work samples) and a review of current research. Understanding differentiation and the basics of tiered assessments is essential to this self study, as this topic in particular does not have an abundance of research.

Poster Presentation ES P3.8

## **MATHEMATICAL STUDENT CHOICE IN THE ELEMENTARY CLASSROOM**

Natalie Fletcher and Leah Nillas\*

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Incorporating student choice in the classroom provides opportunity for students to take responsibility of their learning (Goodman & Eren, 2013; Williams, Wallace, & Sung, 2016). By presenting students with choice in mathematics, their engagement, motivation, and understanding grow by their willingness to complete the task. Student choice must be meaningful to student's interests so that they understand the importance of their choice. Throughout this self-study, first grade students were provided choice for small group math activities. All choice included the same content varying the representation. The purpose of this research was to examine the effect that student choice can have on students' mathematical understanding. Through analysis of teacher narratives, student work, and audio recordings of personal conversations with students, students selected the hands-on choice which they were actively involved in. Student's selection of hands-on choice creates enjoyment, increasing students' desire to complete the task due to an increase in motivation and engagement of mathematical content.

Poster Presentation ES P3.9

## **MODIFIED FLEXIBLE SEATING AND ITS IMPACT ON STUDENT AUTONOMY**

Emma Lewis and Leah Nillas\*

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What is something you would never expect to hear or see in a first-grade classroom? Silence with every student working. Flexible seating classrooms gives students the autonomy to choose what kinds of learning spaces work best for them based on their personal learning style. With the implementation of flexible seating, students have “the ability to concentrate, focus, and learn effectively” (Harvey & Kenyon, 2013, p. 9). In this qualitative self-study, I explore how the use of flexible seating can provide students with a better understanding of what they personally need in order to learn best and what kind of seat in the classroom can best help them. Data was collected throughout my student teaching placement in the form of field notes, anecdotal records, student work, and lesson plans. My findings indicate that with the use of flexible seating, students are given the autonomy to make well-informed choices about themselves as learners and make changes in their behaviors that will encourage them to become better learners.





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