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John Wesley Powell Student Research  
Conference

2019, 30th Annual JWP Conference

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Apr 13th, 8:30 AM - 9:00 AM

## Complete 2019 Program

Illinois Wesleyan University

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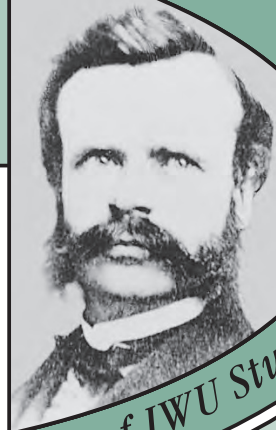
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THE THIRTIETH ANNUAL

Illinois Wesleyan University  
John Wesley Powell



2019

STUDENT  
RESEARCH CONFERENCE



To Recognize the Research Projects & Creative Endeavors of IWU Students



Saturday, April 13,

2019

[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.*

Thirtieth Annual

John Wesley Powell  
Student Research Conference



Saturday, April 13, 2019

8:30 a.m. – 4:00 p.m.

*Official Program*



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## Acknowledgements

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 Amy Jo Caulkins, Associate Provost's Office, in organizing many aspects of the conference and assembling and printing the program booklet.

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

The assistance of Information Technology Services, Trey Short and Ray Martinez, in setting up computer equipment in all rooms along with Michael Gorman and Kate Browne for registration and website consultation is greatly appreciated.

The photography and videography coverage by Jason Reblando.

The Undergraduate Research Advisory Committee:

Stephanie Davis-Kahl and Tyler Schwend (chairs), Emily Kelahan, William Munro, Carolyn Nadeau, Gabe Spalding and Lynda Duke (ex officio)

## Annual Intellectual Theme

*All participants that feel their work fits with the theme will be designated with the logo below.*



### **Changing Climates**

As we assess our natural and social environments in 2018, we are finding ourselves in the midst of any number of “changing climates”—all with significant implications for humanity and the world around us. At the same time that we investigate the changing climates around us, we also can—and must—engage in the active project of changing climates.

<https://www.iwu.edu/annual-theme/2018/>

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# Schedule of Events

Saturday, April 13, 2019

| <b>Time</b>                    | <b>Event</b>  | <b>Location</b>                   |
|--------------------------------|---|-----------------------------------|
| <b>8:30 a.m. – 9:00 a.m.</b>   | Continental Breakfast and Poster Setup                          | Atrium of CNS and State Farm Hall |
| <b>9:00 a.m. – 10:00 a.m.</b>  | Poster Session A (Odd Numbered)                                 | Atrium of CNS                     |
|                                | Poster Presentations – Educational Studies                      | State Farm Hall                   |
| <b>10:00 a.m. – 11:00 a.m.</b> | Oral Presentations – Sessions 1-6                               | CNS                               |
|                                | Oral Presentations – Educational Studies                        | SFH                               |
| <b>11:00 a.m. – 12:00 p.m.</b> | Oral Presentations – Sessions 7-12                              | CNS                               |
|                                | Poster Presentations – Educational Studies                      | SFH                               |
| <b>12:00 p.m. – 2:00 p.m.</b>  | Luncheon (for conference participants,<br>parents and advisors) | Young Main Lounge                 |
|                                | Music Composition Performances                                  |                                   |
|                                | Keynote Address: Renée Scheltema                                |                                   |
| <b>2:00 p.m. – 3:00 p.m.</b>   | Poster Session B (Even Numbered)                                | Atrium of CNS                     |
| <b>3:00 p.m. – 4:00 p.m.</b>   | Senior Art Show and Critique                                    | Merwin and Wakeley Galleries      |

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## Keynote Speaker

### “Normal is Over”

**Renée Scheltema**, Documentary Filmmaker and Sustainability Expert

After her degree in Criminology at Leiden University, she studied at the University of California in Berkeley, USA. Her main subjects: TV-Journalism and Photo-Journalism.

For 35 years Renée has worked for Dutch television as a Director, Producer and Camera-person. Some of her documentaries, like “Hush, A Portrait of Tracy Payne”, “Seven Days in Burma”, “The Death Penalty”, “Portrait of A Zen Couple”, and “The Bus” were selected at International Film Festivals. “Nicolaas Pierson: A Conversation” (in Dutch), “Happy in Zimbabwe?” Portrait of a Tibetan lama visiting NGO’s in Zimbabwe (in English), and “Rob Nairn” (in English). Many documentaries were co-productions with Dutch TV and Non-governmental organizations like Amnesty, UNDP, UNESCO, SNV, focusing on social issues.

Her art series “Canvas Extreme” consists of 7 x 28’ minute portraits of contemporary cutting-edge artists in South Africa, shot during the first years of the Mandela era. The series was sold to TV stations in France, Spain, Mexico, Switzerland and the Netherlands.

She finished her award-winning documentary feature called “Something Unknown Is Doing We Don’t Know What” in 2009, investigating the Science behind Psychic Experiences, featuring top scientists in the US. [www.SomethingUnknown.com](http://www.SomethingUnknown.com)

And after 4 years as a One-Woman-Crew, Renée completed “Normal Is Over”, an award-winning feature documentary connecting the dots: A look at the financial and economic paradigm underlying our planetary problems, while offering various SOLUTIONS. (2016, 103 min). The film is about humanity’s wisest response to climate change, species extinction, resource depletion, income inequality and the connection between these issues. <https://NormalisOver.org>

Renée set up The Making of The Future Foundation. Its mission is to create meaningful change for a regenerative planet; to connect “money to nature” by inspiring people to build a “new normal” for the health of our planet.

As a professional photographer, Renée has worked for Magazines and Newspapers in Holland, the US, and South Africa. She was a member of Gamma Liaison in New York, now called Getty Images.



# Student Participants

## Art, Music, Poster and Oral Presentations

Presentation Key:

O – Oral Presentation                      Example: O1.3 = Session 1, 3<sup>rd</sup> in order

P – Poster Presentation                    Example: P12 = Poster number 12

| Name                 | Order   |
|----------------------|---------|
| Emmett Agting        | P3      |
| Philip Andrango      | P31     |
| Brent Baughan        | O9.1    |
| Josephina Blumberg   | O5.1    |
| Seth Borrowman       | P9      |
| Kaylee Braun         | P19     |
| Mary Breeden         | O7.2    |
| Kevin Butler         | O2.3    |
| Adam Cady            | O4.1    |
| Vanessa Chapa        | P8      |
| Julia Chen           | O1.1    |
| Lisa Cheng           | O7.3    |
| Brandon Chopp        | O6.1    |
| Amy Clapp            | O2.1    |
| Jillian Cole         | P37     |
| Kyle Cook            | P45     |
| Andrew Coop          | O2.2    |
| Matthew Crosse       | P12     |
| Ann Crumbaugh        | O5.2    |
| Emma Dalton          | ES P3.5 |
| Mark Dezell          | O12.4   |
| Ivy Do               | P12     |
| Maeghan Eaker        | P8      |
| Emily Erdmann        | O1.2    |
| Charles Franz        | O6.2    |
| Mitchell Galgan      | Music   |
| Lilia Garcia         | P2      |
| Zhijia Geng          | P17     |
| Ellie Giannakopoulos | ES O2.4 |
| Macey Grant          | Art     |
| Richard Guingrich    | P18     |

|                      |                     |
|----------------------|---------------------|
| Katelyn Hailey       | O12.3               |
| Kathryn Halford      | O8.1                |
| Noah Haskin          | P11, P26            |
| Lixuan (Lucy) He     | Art                 |
| William Heidenreich  | ES O2.3, O12.2      |
| Quinn Higginbotham   | P1                  |
| Tao (Paul) Jin       | P27, P29, P38       |
| Maribeth Johnson     | ES O2.2             |
| Paul Johnson         | P33                 |
| Rosemary Josenkoski  | P4                  |
| Abigail Kauerauf     | O4.3, O10.1         |
| Brooke Koebele       | P4                  |
| Linh Le              | ES O2.1             |
| Payton Letko         | O8.2                |
| Yutong Li            | P23                 |
| Minzhao Liu          | P27, P29, P38       |
| Ziyan Liu            | P36, O3.1           |
| David Nico Lopez     | P27, P28, P29, O3.1 |
| Heidi (Trang) Luu    | O3.2                |
| Shenyu (Cooper) Lyu  | P5, O11.1           |
| Maksymilian Malec    | P35                 |
| Rachel Maurer        | P7                  |
| Meghán McGarrity     | ES P3.1             |
| Kate McHugh          | P42                 |
| Jack McKermitt       | P11                 |
| Michael Messer       | ES P3.4             |
| Nicholas Milcik      | P28                 |
| Michael Modaff       | O3.1                |
| Catherine Mojsiewicz | ES P1.7             |
| Jennifer Murphy      | ES P1.6             |
| Andrew Neeley        | O12.1               |
| Chaepther Negro      | O1.3                |

| Name               | Order          |
|--------------------|----------------|
| Victoria Nemchek   | P25            |
| Anjali Nimavat     | P3             |
| Katie North        | P22, P39       |
| Alexis Obert       | ES P3.2, O4.2  |
| Kaitlyn O'Brien    | ES P1.3, O10.3 |
| Nathalie Orozco    | P30            |
| Lorren Pack        | O7.1           |
| Alexander Palacios | P11            |
| David Park         | P24            |
| Ria Patel          | O1.1           |
| Manish Pathuri     | P15            |
| Jinyu Peng         | ES P3.3        |
| Binh Phan          | P39            |
| Taylor Plantan     | O9.3           |
| Danielle Ponsot    | O8.3           |
| Teagan Potter      | O5.3           |
| Anna Poulton       | O11.2          |
| Nicolina Purpura   | O3.3           |
| Jackson Rapala     | P13            |
| Robert Reichert    | P18            |
| Michelle Rekowski  | O9.2           |
| Jonathan Rink      | P6             |
| Olivia Ruff        | ES P3.6        |
| Richa Sapkota      | P32            |
| Oscar Schmidt      | P11            |

|                  |            |
|------------------|------------|
| Mark Siegel      | P34        |
| Kylie Spiegel    | P3         |
| Ellen Stumph     | P46        |
| Xiaoyu Tang      | ES P1.5    |
| Katharine Teykl  | O6.3       |
| Rachel Tomazin   | P43        |
| Saralexis Torres | P8         |
| Katie Vogler     | P12        |
| Niyant Vora      | P41, O10.2 |
| Chaoqiuyu Wang   | P16        |
| Patrick Ward     | O11.3      |
| Lane Warren      | P15        |
| Ning Wei         | ES P1.2    |
| Grant Werner     | P44        |
| Minji Will       | Music      |
| Jacob Williams   | P21        |
| Saylor Williams  | P13        |
| Emily Wilkes     | Art        |
| Luke Witteveen   | ES P1.4    |
| Julie Xu         | O1.1       |
| Lauren Yep       | P17        |
| Shiyi Yuan       | P32        |
| Lauren Zanoni    | ES P1.1    |
| Ruihan Zhang     | P22, P39   |
| Elise Ziegenhorn | P14        |
| Samantha Ziomek  | P10        |

## Presentations Organized by Area of Study

| Area                 | Name                | Project Title  |
|----------------------|---------------------|--|
| <b>Anthropology</b>  | Chaepther Negro     | Rice Terrace Degradation in Ifugao: Causation and Cultural Preservation Through Community-Based Solutions  |
| <b>School of Art</b> | Macy Grant          | Seniort Art Show   |
|                      | Lixuan (Lucy) He    | Seniort Art Show   |
|                      | Emily Wilkes        | Seniort Art Show   |
| <b>Biology</b>       | Emmett Agting       | Bacteriophage Zahn: Making Waves as a Singleton  |
|                      | Seth Borrowman      | Ingestion and assimilation of dissolved organic matter by feeding larvae of the families Chaetopteridae, Magelonidae, Polygordiidae, Sabellariidae, and Spionida (Annelida) and the Sipuncula. |
|                      | Vanessa Chapa       | Harboring Hartney: Making a Splash in Cluster B  |
|                      | Julia Chen          | A Novel Bacteriophage Capable of Jumping Between Marine and Freshwater Hosts   |
|                      | Matthew Crosse      | Sucha Journey: The Path to Isolating, Purifying, Characterizing, and Annotating Sucha the Phage  |
|                      | Ivy Do              | Sucha Journey: The Path to Isolating, Purifying, Characterizing, and Annotating Sucha the Phage  |
|                      | Maeghan Eaker       | Harboring Hartney: Making a Splash in Cluster B  |
|                      | Emily Erdmann       | Elbi and Stepo: Two Novel Cyanobacteriophages that Infect the Filamentous, Heterocyst-Forming Cyanobacterium Anabaena  |
|                      | Lilia Garcia        | Backyard Heroes: Soil Bacteria Fighting Antibiotic Resistance  |
|                      | Noah Haskin         | Relative Abundance and Habitat Associations of American Badgers ( <i>Taxidea taxus</i> ) and Plains Pocket Gophers ( <i>Geomys bursarius</i> ) in McLean County, Illinois                      |
|                      | Quinn Higginbotham  | Assimilation of Bacteriophages by Marine Invertebrate Larvae (Annelida, Echinodermata, and Mollusca)   |
|                      | Rosemary Josenkoski | Determination of Host Range Variation between Highly Related Members of a Novel Cluster of <i>Rhodobacter capsulatus</i> Bacteriophages  |
|                      | Brooke Koebele      | Determination of Host Range Variation between Highly Related Members of a Novel Cluster of <i>Rhodobacter capsulatus</i> Bacteriophages  |
|                      | Shenyu (Cooper) Lyu | A New Species of <i>Pristimantis</i> (Amphibia: Anura: Strabomantidae) From the Puna of Northern Peru  |
|                      | Shenyu (Cooper) Lyu | Drinking with Your Kidney: Seawater Ingestion by Starfish Larvae Through the Hydropore   |
|                      | Rachel Maurer       | Elsker: A New Bacteriophage to Combat Antibiotic Resistant Enterobacter  |
|                      | Jack McKermitt      | Relative Abundance and Habitat Associations of American Badgers ( <i>Taxidea taxus</i> ) and Plains Pocket Gophers ( <i>Geomys bursarius</i> ) in McLean County, Illinois                      |

|                     |   |
|---------------------|---|
| Anjali Nimavat      | Bacteriophage Zahn: Making Waves as a Singleton   |
| Alexander Palacios  | Relative Abundance and Habitat Associations of American Badgers ( <i>Taxidea taxus</i> ) and Plains Pocket Gophers ( <i>Geomys bursarius</i> ) in McLean County, Illinois |
| Ria Patel           | A Novel Bacteriophage Capable of Jumping Between Marine and Freshwater Hosts  |
| Manish Pathuri      | Wrangling Warren: A Phage Discovery   |
| Anna Poulton        | A New Terrestrial-Breeding Frog (Strabomantidae: <i>Pristimantis</i> ) From Northern Peru   |
| Jackson Rapala      | The Discovery Of <i>Rhodobacter capsulatus</i> Phage Kemmy through Isolation and Genomic Analysis   |
| Jonathan Rink       | Effects of Phase Polarity and Charge Balance of Spinal Cord Stimulation on Behavior and Gene Expression in a Rat Model of Neuropathic Pain                                |
| Oscar Schmidt       | Relative Abundance and Habitat Associations of American Badgers ( <i>Taxidea taxus</i> ) and Plains Pocket Gophers ( <i>Geomys bursarius</i> ) in McLean County, Illinois |
| Kylie Spiegel       | Bacteriophage Zahn: Making Waves as a Singleton   |
| Saralexis Torres    | Harboring Hartney: Making a Splash in Cluster B   |
| Katie Vogler        | Sucha Journey: The Path to Isolating, Purifying, Characterizing, and Annotating Sucha the Phage   |
| Lane Warren         | Wrangling Warren: A Phage Discovery   |
| Saylor Williams     | The Discovery Of <i>Rhodobacter capsulatus</i> Phage Kemmy through Isolation and Genomic Analysis   |
| Julie Xu            | A Novel Bacteriophage Capable of Jumping Between Marine and Freshwater Hosts  |
| Elise Ziegenhorn    | Thyroid Hormone Accelerates Pericorneal Nerve Ring Formation and Leads to Precocious Corneal Innervation  |
| Samantha Ziomek     | Investigation of the shared and divergent anatomical features of fishes from the superorder Characoidei   |
| <b>Business/DTE</b> |   |
| Ziyan Liu           | Analyzing the Mobile App Industry and the Market of Internet Memes with its Application   |
| David Nico Lopez    | Analyzing the Mobile App Industry and the Market of Internet Memes with its Application   |
| Michael Modaff      | Analyzing the Mobile App Industry and the Market of Internet Memes with its Application   |
| <b>Chemistry</b>    |   |
| Zhijia Geng         | Bismuth(III) bromide catalyzed 1,4-addition of indoles to chalcones   |
| Richard Guingrich   | Bismuth(III) bromide catalyzed Michael addition of allyltrimethylsilanes to $\alpha,\beta$ -unsaturated ketones   |
| Noah Haskin         | Bismuth(III) triflate catalyzed synthesis of substituted hexahydroimidazo[1, 2-a]pyridines  |
| Robert Reichert     | Bismuth(III) bromide catalyzed Michael addition of allyltrimethylsilanes to $\alpha,\beta$ -unsaturated ketones   |
| Chaoqiuyu Wang      | An Exploration of the Antioxidative Effect of Common Spices in Black Tea  |
| Lauren Yep          | Bismuth(III) bromide catalyzed 1,4-addition of indoles to chalcones   |

|                            |                      |   |
|----------------------------|----------------------|---|
| <b>Economics</b>           | Heidi (Trang) Luu    | International migration and FDI: Can migrant networks foster homeward investments?                |
| <b>Educational Studies</b> | Kevin Butler         | A Brief Review of Research on Forms of Instruction  |
|                            | Emma Dalton          | Brain Breaks in the Elementary Classroom  |
|                            | Ellie Giannakopoulos | Engaging in Student Choice  |
|                            | William Heidenreich  | The Effectiveness of Differentiated Instruction in a Multi-modal Summative Assessment             |
|                            | Maribeth Johnson     | Teacher Participation in Professional Development and its Contribution to School Improvement      |
|                            | Linh Le              | Learning About Love: Healthy Relationship Education and Program Outcomes in Adolescents           |
|                            | Meghán McGarrity     | Flex on this! Flexible seating in the classroom   |
|                            | Michael Messer       | 1:1 Technology Integration  |
|                            | Catherine Mojsiewicz | Reader's Theater and Its Effects on Students  |
|                            | Jennifer Murphy      | Positive Relationships in the Classroom   |
|                            | Alexis Obert         | Engaging Behavior: Standards-Based Grading in the Secondary ELA Classroom                         |
|                            | Kaitlyn O'Brien      | A Noteworthy Study: Music in the Spanish Classroom  |
|                            | Jinyu Peng           | English language learning and teaching  |
|                            | Olivia Ruff          | Disciplinary Literacy: Providing Students with the Literacy Tools to Succeed Across Disciplines   |
|                            | Xiaoyu Tang          | No More Tragedies: Adolescent Suicide Facts and Prevention  |
|                            | Ning Wei             | The Power of Arts: Contribution of Arts-based Education on Children's Learning in the Early Years |
|                            | Luke Witteveen       | Points vs. Mastery: The Effects of Standards Based Grading  |
|                            | Lauren Zanon         | Fostering Engagement Through Inquiry-Based Learning   |
| <b>English</b>             | Adam Cady            | La Batalla de Ideas Continua: The Revolutionary Writings of Jose Martí                            |
|                            | Mark Dezell          | Sudden Identity Crisis  |
|                            | Katelyn Hailey       | Losing God to Find Equality: Feminist Essays and the Departure from Religion                      |
|                            | Kathryn Halford      | Unreadable Texts and Digital Literature: Searching for Meaning in House of Leaves                 |
|                            | William Heidenreich  | An Audience of two: Kurt Vonnegut and the Textual Portrayals of his Greatest Influences           |
|                            | Abigail Kauerauf     | Clear but Bone-Cracking Cold: Nature, Danger, and Noir in Winter's Bone and Wind River            |
|                            | Payton Letko         | The Strong Shojo: Hayao Miyazaki's Feminist Characters in Cultural Context                        |

|  |                    |   |
|--|--------------------|---|
|  | Alexis Obert       | Picturing Death: Death and Grief in Children's Picture Books  |
|  | Danielle Ponsot    | Centrifuge: Balancing Priorities in Out of Orbit  |
| <b>Environmental Studies</b>           | Jacob Williams     | Estimating Stream Flow from Rainfall Runoff as a Tool for Predicting Variability in Freshwater Mussel Surveys   |
| <b>German Studies</b>                  | Abigail Kauerauf   | Neither Heroes nor Traitors: Babylon Berlin and the Experiment of the Weimar Republic   |
|  | Niyant Vora        | Words, Thoughts, and Mental Illness   |
| <b>Greek and Roman Studies</b>         | Brent Baughan      | Gender Identity and Hegemony in Roman Society   |
|  | Michelle Rekowski  | The Essential Outcasts: Infames in the Roman Empire   |
| <b>Hispanic Studies</b>                | Kaitlyn O'Brien    | Consecuencias del Sistema (Societal Consequences)   |
|  | Nathalie Orozco    | Suicide Rates in Hispanic Female Adolescents  |
| <b>History</b>                         | Brandon Chopp      | Absolutely Free? Frank Zappa's Musical Assault on American Conformity, 1966-1968  |
|  | Nicolina Purpura   | The Truth Behind the Disability   |
| <b>International Studies</b>           | Josephina Blumberg | Women monitoring women: Participatory monitoring and evaluation of women's empowerment organizations funded by private-sector and international aid donors in post-conflict countries |
|  | Ann Crumbaugh      | Fueling the Brewery, Feeding the Poor: Cassava Commercialization and Food Insecurity in Rural Zambia  |
|  | Teagan Potter      | The Divergence Between Disability and Literature in Latin America: Examining the Lack of Disability Representation in Children's Literature in an Othered and Stigmatized World       |
| <b>Literature and Cultural Studies</b> | Taylor Plantan     | Karolina Pavlova: From the 19th Century Literary Salon to the Literary Canon  |
| <b>Mathematics</b>                     | Yutong Li          | Nowhere-zero group irregular labelings of graphs  |
|  | Patrick Ward       | Multidecompositions of Complete Directed Graphs into Directed Graph Pairs   |
| <b>School of Music</b>                 | Charles Franz      | I Need a Camera: Wico's Yankee Hotel Foxtrot and the American Folk Music Tradition  |
|  | Mitchell Galgan    | Solar Chips, A Work for Solo Double Bass  |
|  | Minji Will         | Mono no aware   |

|                                  |                   |  |
|----------------------------------|-------------------|--|
|                                  | Katharine Teykl   | Horses, Gunshots, and Saloons: The Portrayal of the American West in Libby Larsen's Songs from Letters   |
| <b>Neuroscience Program</b>      | Kaylee Braun      | The Effects of Spinal Cord Stimulation on Physical and Social Pain   |
|                                  | Victoria Nemchek  | The Effects of Intermittent Training on Recovery of Fine Motor Control and Synaptic Plasticity in a Mouse Model                                  |
|                                  | David Park        | The Effect of Spinal Cord Stimulation For Chronic Pain Treatment   |
| <b>School of Nursing</b>         | Amy Clapp         | Effects of Weighted Blankets on College Students' Anxiety  |
|                                  | Andrew Coop       | Nursing Students' Knowledge of Alcohol-Interactive Medications   |
| <b>Physics &amp; Engineering</b> | Philip Andrango   | Engineering with DNA   |
|                                  | Tao (Paul) Jin    | Scanning Single Photon Detector Implementation of Quantum "Ghost Imaging"  |
|                                  | Tao (Paul) Jin    | A Computational Approach to Analysing the Magnetization of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice                  |
|                                  | Tao (Paul) Jin    | A Computational Approach to the Analysis of Magnetoresistance Signatures of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice |
|                                  | Paul Johnson      | Generating Ultrasonic Acoustic Holograms with Circular Arrays  |
|                                  | Minzhao Liu       | Scanning Single Photon Detector Implementation of Quantum "Ghost Imaging"  |
|                                  | Minzhao Liu       | A Computational Approach to Analysing the Magnetization of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice                  |
|                                  | Minzhao Liu       | A Computational Approach to the Analysis of Magnetoresistance Signatures of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice |
|                                  | Ziyan Liu         | Optical Fourier Analysis Using a DMD   |
|                                  | David Nico Lopez  | A Computational Approach to Analysing the Magnetization of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice                  |
|                                  | David Nico Lopez  | A Computational Approach to the Analysis of Magnetoresistance Signatures of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice |
|                                  | David Nico Lopez  | Mathematical Models and Computer Simulations of Telomere Shortening  |
|                                  | Maksymilian Malec | A Pedagogical Look at Kirkwood Gaps  |
|                                  | Nicholas Milcik   | Mathematical Models and Computer Simulations of Telomere Shortening  |
|                                  | Katie North       | Accuracy and Precision of a Custom Instrument that Studies Cosmic Analog Dusts   |
|                                  | Katie North       | Terahertz absorption spectra of silicate cosmic analog dusts using a novel spectrometer  |

|                               |                |   |
|-------------------------------|----------------|---|
|                               | Binh Phan      | Terahertz absorption spectra of silicate cosmic analog dusts using a novel spectrometer   |
|                               | Richa Sapkota  | Exploration of Devices for Tailoring Laser Light  |
|                               | Mark Siegel    | Machine Vision applied to the Micro World   |
|                               | Shiyi Yuan     | Exploration of Devices for Tailoring Laser Light  |
|                               | Riuhan Zhang   | Accuracy and Precision of a Custom Instrument that Studies Cosmic Analog Dusts  |
|                               | Riuhan Zhang   | Terahertz absorption spectra of silicate cosmic analog dusts using a novel spectrometer   |
| <b>Political Science</b>      | Lorren Pack    | Rape Myth Effects on Juror Decisions in Deliberations of Rape Cases: How Rape Myths Affect Jury Deliberations                                 |
| <b>Psychology</b>             | Jillian Cole   | Altered Paw Pain Thresholds due to Different Spinal Cord Stimulation Parameters   |
|                               | Kyle Cook      | The effects of observing aggression and affiliation on domestic dog behavior  |
|                               | Kate McHugh    | Sherlock Bones: Deductive Reasoning in Dogs?  |
|                               | Ellen Stumph   | This or that?: Object individuation in domesticated dogs ( <i>Canis familiaris</i> )  |
|                               | Rachel Tomazin | Task Specificity & Functional Outcome: What is best for Post-Stroke Rehabilitation?   |
|                               | Niyant Vora    | On the Nature of Synesthesia: A Learned Association or Something More?  |
|                               | Grant Werner   | The appeal of crime podcasts  |
| <b>Sociology</b>              | Mary Breeden   | LGBTQIA+ Campus Climate at a Small Liberal Arts University: An Exploratory Study with the Aim of Improving the Environment for Queer Students |
|                               | Lisa Cheng     | Social Movements: Analyzing Factors Affecting Movement Participation among College Students   |
| <b>School of Theatre Arts</b> | Andrew Neeley  | Comedy, Kardashians, and Capitalism: The Effect of Ladyish  |



## School of Art

### BA/BFA Senior Exhibition Presentations

3:00 p.m. Merwin and Wakeley Galleries

Student Presenters:

Macey Grant

Emily Wilkes

Lixuan (Lucy) He

Refreshments will be served.

## Music Composition Student Presentations

### Young Main Lounge, Memorial Student Center

(as part of the conference luncheon program)

Solar Chips

Mitchell Galgan '19

- i. Whole Grain Zesty Tomato Chips
- ii. It's the 17<sup>th</sup> hole, and I'm chipping for Octuple Bogey
- iii. Craig, he likes chips. a lot. it tore his family apart.

Mitchell Galgan, bass

Mono no Aware

Minji Will '19

Minji Will, voice, guitar  
Daria Dodonova, Isabella Lu, violin  
Bailey Knowles, viola  
Chaepter Negro, cello  
Mitchell Galgan, bass  
Jonah Kilma, drums

# Music Composition Student Presentations

## **Solar Chips, A Work for Solo Double Bass**

Mitchell Galgan, and David Vayo\*

School of Music, Illinois Wesleyan University

Solar Chips (2018) is a three movement work for solo double bass. The piece displays the wide expressive range of the instrument, utilizing extended techniques such as snap pizzicato, bowing underneath the bridge, and the use of tremolo to mimic TV static or white noise. The work was composed through a series of recorded improvisations, which were edited and pieced together into the final product. The titles of each movement were also improvised around the theme of “chips”. Movement I., “Whole Grain Zesty Tomato Chips”, uses odd meters and uneven phrasing to capture the bright sensation of biting into a zesty, flavored chip. Movement II., “It’s the 17<sup>th</sup> Hole, and I’m Chipping for Octuple Bogey” is a slow lament, painting a picture of what one might feel near the end of a disastrous round of golf. Lastly, movement III., “Craig, he likes chips. a lot. it tore his family apart”, tells the story of an addict, a chip addict, and the strained relationships his addiction causes. The fast tempo and jagged rhythms bring the work to a searing conclusion.

## **Mono no aware (Unblossomed)**

Minji Will and David Vayo\*

School of Music, Illinois Wesleyan University

Mono no aware (物の哀れ), translates literally to "the pathos of things." It is a Japanese term for the awareness of impermanence or fleetingness of things. A feeling of gentle sadness at their passing, and a more pronounced sadness about this state being the reality of life. This song (written for voice, electric guitar, electric bass, drumset, and string quartet), is inspired by Japanese cherry trees, and how their beautiful blossoms last about one week. It is also inspired by one of my favorite childhood books: The Giving Tree. It uses the image of a person resting against, and being understood and nourished by, a tree. In the second half of the piece, the music intensifies as the person realizes the tree itself has lost its ability to blossom—a part of it has died. This is a metaphor for relationships where one person gives so much of themselves to benefit another that they lose a part of themselves in the process.

# Oral Presentations

## Center for Natural Sciences, Rooms E101-E106

### 10:00-11:00 a.m. Sessions 1-6

#### Session 1 – Room E101

*Biology & Anthropology*

10:00 (1.1) Julia Chen, Ria Patel, Julie Xu

10:15 (1.2) Emily Erdmann

10:30 (1.3) Chaeptr Negro

#### Session 2 – Room E102

*Nursing & Educational Studies*

10:00 (2.1) Amy Clapp

10:15 (2.2) Andrew Coop

10:30 (2.3) Kevin Butler

#### Session 3 – Room E103

*Business/DTE & Economics & History*

10:00 (3.1) Ziyang Liu, David Nico Lopez, Michael Modaff

10:15 (3.2) Heidi (Trang) Luu

10:30 (3.3) Nicolina Purpura

#### Session 4 – Room E104

*English*

10:00 (4.1) Adam Cady

10:15 (4.2) Alexis Obert

10:30 (4.3) Abigail Kauerauf

#### Session 5 – Room E105

*International Studies*

10:00 (5.1) Josephina Blumberg

10:15 (5.2) Ann Crumbaugh

10:30 (5.3) Teagan Potter

#### Session 6 – Room E106

*History & Music*

10:00 (6.1) Brandon Chopp

10:15 (6.2) Charles Franz

10:30 (6.3) Katharine Teykl

### 11:00 a.m.-12:00 p.m. Sessions 7-12

#### Session 7 – Room E101

*Political Science & Sociology*

11:00 (7.1) Lorren Pack

11:15 (7.2) Mary Breeden

11:30 (7.3) Lisa Cheng

#### Session 8 – Room E102

*English*

11:00 (8.1) Kathryn Halford

11:15 (8.2) Payton Letko

11:30 (8.3) Danielle Ponsot

#### Session 9 – Room E103

*Greek and Roman Studies & Literature and Culture Studies*

11:00 (9.1) Brent Baughan

11:15 (9.2) Michelle Rekowski

11:30 (9.3) Taylor Plantan

#### Session 10 – Room E104

*German Studies & Hispanic Studies*

11:00 (10.1) Abigail Kauerauf

11:15 (10.2) Niyant Vora

11:30 (10.3) Kaitlyn O'Brien

#### Session 11 – Room E105

*Biology & Mathematics*

11:00 (11.1) Shenyu (Cooper) Lyu

11:15 (11.2) Anna Poulton

11:30 (11.3) Patrick Ward

#### Session 12 – Room E106

*School of Theatre Arts & English*

11:00 (12.1) Andrew Neeley

11:15 (12.2) William Heidenreich

11:30 (12.3) Katelyn Hailey

11:45 (12.4) Mark Dezell

Presentations are 12-15 minutes in length. There will be 15 minutes designated for a question-and-answer period for all presenters following the final presentation. Note: Student's name is underlined, faculty advisor is designated with \*

## Oral Presentation O1.1

### **A Novel Bacteriophage Capable of Jumping Between Marine and Freshwater Hosts**

Julia Chen, Ria Patel, Julie Xu and Richard Alvey\*  
Biology Department, Illinois Wesleyan University

Understanding how viruses evolve when moving from host to host is an important area of study in ecology and epidemiology. Previously, a novel bacteriophage, Xuper, was isolated and characterized using the host *Rhodobacter capsulatus*, a bacterium that lives in freshwater environments. This bacteriophage was particularly interesting due to many distinguishing features: a unique prolate capsid, a DNA genome that is the largest of any known *R. capsulatus* phage, and the fact that it has no known relatives in our collection of viral isolates. However, we recently discovered that Xuper does have a remarkable similarity to two bacteriophages that infect *Ruegeria pomeroyi*, a bacterium that lives in marine environments. In examining the ability of Xuper to also infect this alternative host, we found that although it was capable of infecting this host, it was significantly less efficient in doing so. Through sequential plating experiments, we generated Xuper mutants that were better adapted for infecting the marine host than their freshwater isolation host, and the mutations responsible for these changes were identified using DNA sequencing. These findings will help to elaborate on mechanisms of host switching, phage evolution, and may begin to help us define functions for newly discovered phage genes.

## Oral Presentation O1.2

### **Elbi and Stepo: Two Novel Cyanobacteriophages that Infect the Filamentous, Heterocyst-Forming Cyanobacterium Anabaena**

Emily Erdmann and Richard Alvey\*  
Biology Department, Illinois Wesleyan University

Cyanobacteria, a phylum of photosynthetic bacteria, play an important ecological role in aquatic environments by providing a source of fixed carbon and nitrogen that food webs rely heavily upon. Cyanophages are invisible viral parasites that infect cyanobacteria and help balance the dynamics of the cyanobacteria population. One cyanobacterium, Anabaena, is of special interest in cyanophage research due to its filamentous nature and its ability to form heterocysts, specialized nitrogen-fixing cells. A few Anabaena-infecting cyanophages were discovered and analyzed in the 1970s, but since then the field has remained understudied. Here, two novel cyanophages, Elbi and Stepo, that infect Anabaena were discovered and isolated. These two phages differ in both their morphology and plaque morphology. The double-stranded DNA genome of one of the phages was extracted, purified, and sent for sequencing. The sequence was analyzed and compared with previously published cyanophage genomes. Additionally, the infection process of both cyanophages was observed via time-lapse light microscopy. The results of this imaging suggest that cyanophage infection of Anabaena proceeds down the filament from one cell to the next and that heterocysts are resistant to either phage infection or the associated cell lysis.

### Oral Presentation O1.3



#### **Rice Terrace Degradation in Ifugao: Causation and Cultural Preservation Through Community-Based Solutions**

Chaepter Negro and Rebecca Mafazy\*

Anthropology Department, Illinois Wesleyan University

The Cordilleran rice terraces of Northern Luzon, Philippines, are a testament to Filipino ingenuity and remain an important social-ecological system within highland indigenous communities. Ifugao, one of six Cordillera Administrative Region (CAR) provinces, is best known for its expansive and World Heritage Site recognized rice terraces, and has been a popular tourist destination in the Philippines for the past twenty years. According to local rice farmers, though, the terraces in Ifugao are quickly becoming degraded, as a series of external and internal factors have placed pressure on the indigenous community. Drawing from anthropological, ecological, and historical sources, I examine the agendas of different rice terrace stakeholders and their solutions to end terrace degradation. I analyze the effects of rural out-migration, eco-tourism, and climate change to pinpoint the root cause of terrace degradation, heavily relying on the insider perspectives of indigenous Ifugao farmers. Ultimately, I create an academic space where the most important rice terrace stakeholders, the farmers, are able to express their anxieties concerning terrace degradation and propose community-based solutions.

### Oral Presentation O2.1

#### **Effects of Weighted Blankets on College Students' Anxiety**

Amy Clapp and Noël Kerr\*

School of Nursing, Illinois Wesleyan University

**Background:** College students lack resources to alleviate anxiety, which may have a negative impact on academic success and sleep. Therapies such as weighted blankets may provide relief, but information about the use of weighted blankets for students is lacking.

**Purpose:** To compare the effect of weighted versus standard blankets on anxiety, sleep, and GPA in a sample of undergraduate students.

**Conceptual framework:** Students self-identified as having anxiety. Measurements were operationalized through the Overall Anxiety Severity and Impairment Scale (OASIS).

**Methods:** A pilot study using a randomized, controlled design was conducted. Participants (N=36) identified as belonging to one of three groups: having anxiety and taking medication, having anxiety and not taking medication, and not experiencing anxiety. Participants were randomly assigned to use a weighted or standard blanket throughout the fall 2018 semester, and completed three online surveys including items about sleep and the OASIS. SPSS will be used to analyze descriptive, bivariate, and parametric statistics.

**Findings:** The findings will be completed before the JWP research conference.

**Conclusions:** The findings may provide insight into how complementary and alternative therapies could be aligned with care provided for students by university health and counseling services, and evidence-based practice in mental health nursing.

## Oral Presentation O2.2

### **Nursing Student's Knowledge of Alcohol-Interactive Medications**

Andrew Coop and Carolyn Jarvis\*, Ann Eckhardt\*, Victoria Folsie\*, Brad Sheese\*  
School of Nursing, Illinois Wesleyan University

In 2018, nearly 57% of American adults reported drinking alcohol in the past month and 41.5% also reported taking alcohol-interactive (AI) medications. Consuming alcohol and medications concurrently may result in adverse effects. The purpose of this study was to determine whether a one-hour lecture about AI medications was effective in teaching a class of undergraduate nursing students ( $N = 50$ ) at a small Midwestern university. The Jarvis Nursing Knowledge of Alcohol-Interactive Medications survey was distributed in August at the beginning of the semester and again 2 weeks post lecture. Students scored significantly higher on the posttest ( $27.47 \pm 14.18$  vs.  $37.33 \pm 16.60$ ;  $p < .02$ ). While scores increased significantly, students failed to recognize the correct medication-alcohol interaction consistently. A one-hour lecture emphasizing AI medications in the pre-licensure program enhanced students' knowledge; however, future research is needed to determine retention of AI medication knowledge.

## Oral Presentation O2.3



### **A Brief Review of Research on Forms of Instruction**

Kevin Butler and Emily Kelahan\*  
Educational Studies, Illinois Wesleyan University

In colleges of education, there is very strong support for minimally-guided instruction. This form of teaching is based around being a “guide on the side” as opposed to a “sage on the stage” – in other words, direct instruction of one’s students is seen as ineffective or even harmful, whereas instructional approaches based on encouraging students to teach themselves and construct their own knowledge with the teacher acting solely as a “facilitator” is seen as best practice. Despite the prevalence of this viewpoint amongst most education professors, there is very little evidence for its effectiveness. In fact, minimally-guided instruction can be quite harmful – it tends to widen the achievement gap between white students and students of color, and between high-income students and low-income students. It also leads to lower overall academic achievement and life success when compared with the results of directly instructing one’s students. This project summarizes the extensive research literature from the past several decades regarding which teaching strategies are most and least effective.

### Oral Presentation O3.1

#### **Analyzing the Mobile App Industry and the Market of Internet Memes with its Application**

Ziyan Liu, David Nico Lopez, Michael Modaff and Tara Gerstner\*  
Business Administration Department, Illinois Wesleyan University

Internet memes are humorous and viral content, predominantly shared by millennials and generation Z, that reflect contemporary social and political themes. They have exponentially thrived through the globalization of mobile apps and social demographic shifts. However, according to our study, although nearly all college students have participated in the creation of memes, most of them use social networks that are not specifically intended to share them. Consequently, there is an underlying difficulty in finding an ideal platform to generate, share, and enjoy this creative outlet. As a culmination of our research, we developed a centralized system for the creation and communication of internet memes. Caption\_It, is an app coded in Swift and Java that attempts to provide a unified platform for the viralization of memes, and, consequently, helps us better understand and even contribute to these social phenomena.

### Oral Presentation O3.2



#### **International migration and FDI: Can migrant networks foster homeward investments?**

Heidi (Trang) Luu and Ilaria Ossella-Durbal\*  
Economics Department, Illinois Wesleyan University

With the growing trend and magnitude of international migration, research efforts looking at the economic impact of migrants have also increased in number. They point towards several positive effects on both the destination country and origin country's economies. In line with this body of work, the influence of migrants on FDI coming from the destination countries to the origin countries cannot be overlooked, as FDI can play an essential role in the origin countries' economic development. This impact has been hypothesized to be positive in the existing literature due to migrant networks' ability to reduce information and transaction costs and break down certain investment-related barriers. Through a regression analysis on a panel dataset extending the period from 2000-2017, this paper will estimate the above relationship, focusing on how migrants in the US influence FDI coming from the US to their origin countries. The regression builds upon standard FDI determinant and gravity models, using data on foreign-born population from the US Census Bureau for 86 countries of origin and data on stocks of US FDI to those countries from the Bureau of Economic Analysis. The results of this paper will inform international efforts to collaborate on policies regarding migration and economic development.



Oral Presentation O3.3

### **The Truth Behind the Disability**

Nicolina Purpura and Jim Matthews\*  
History Department, Illinois Wesleyan University

In our society, disabilities have always been seen as detrimental ailments that keep people from integrating themselves into what we call "normalcy." However, is the disability really as problematic as we make it out to be? In this paper, I will argue that the real problem with having a disability is the negative perception that society has toward differences. I will start out by analyzing Thérèse-Adèle Husson, a young woman in nineteenth-century France who was an independent, intelligent author who also happened to be blind. I will analyze the radical views she had pertaining to the idea that disabilities are really a social construct, and people who consider themselves as non-disabled continue to reinforce this by lowering expectations and negatively perceiving their disabled counterparts. Finally, I will argue the treatment of disabled people today is not much different from Husson's experiences; thus, Husson's views may have been ahead of her time, but as time has passed, we have failed to address those views, and we must address them to create true equality.

Oral Presentation O4.1

### ***La Batalla De Ideas Continua: The Revolutionary Writings of Jose Martí***

Adam Cady and Molly Robey\*  
English Department, Illinois Wesleyan University

A larger-than-life founding figure essential to Cubans' national identity, 19<sup>th</sup> century writer and revolutionary Jose Martí has come to occupy an enormous space in the Cuban cultural consciousness. Many contemporary scholars note, however, that the ruling communist government's propagandistic depictions of Martí as an absolute opponent of American society and imperialism—a "national hero" whose ideological legacy coincides perfectly with the leftist values of the midcentury Cuban Revolution—are ultimately reductive, simplifying what is otherwise a dense and complicated worldview. At the same time, this tendency of modern scholarship to distance Martí's legacy from that of Fidel Castro and the Revolution has had the similarly misleading effect of suggesting that Martí's body of work is not only ideologically distinct from, but actually opposed to, the values of the Communist Party of Cuba. It is my contention that Martí's writings exist as part of the same ideological progression that inspired the Cuban Revolution of the 1950s, though the writer's anti-American, anti-imperialist, anti-capitalist messaging is much less straightforward than the revolutionary government has claimed.



## Oral Presentation O4.2

### **PICTURING DEATH: DEATH AND GRIEF IN CHILDREN'S PICTURE BOOKS**

Alexis Obert and Molly Robey\*  
English Department, Illinois Wesleyan University

For my project, I am analyzing the representation of death in children's picture books. The overall argument of my project is that by tracing the history of picture books and looking at the psychology of how children cope with death, it is clear to see that using picture books to discuss death is an effective method that is beneficial to children. The first section of my paper traces the history of picture books, detailing when they first become a mainstream genre and when topics such as death began appearing in them. The second section gives context by summarizing the books that I have chosen to examine. *Ida*, always, written by Caron Levis, discusses death by using polar bears and calming artwork. *Cry, Heart, But Never Break*, written by Glenn Ringtved, imagines Death as a comforting character and uses sketch-style artwork. *Death Is Stupid*, written by Anastasia Higginbotham, talks about the messy and hurtful reality of death, using found objects to create pictures. In the third and final section of this paper, I analyze the stories and the artwork in order to discover through what means picture books are effective at conveying death appropriately.

## Oral Presentation O4.3

### **Clear but Bone-Cracking Cold: Nature, Danger, and Noir in *Winter's Bone* and *Wind River***

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

My research explores the role of environment in the rural noirs *Winter's Bone* (2006) and *Wind River* (2017). In this paper, I address the pride the protagonists feel towards their land, the reality of the oppressive forces of such lands, and how the personification of nature in these texts exemplifies noir. My argument is that Ree Dolly and Cory Lambert must respectively navigate their deceptive neighbors, their tenuous grips on their livelihoods, and survive the oppressive forces of their surroundings. Only when Ree and Cory understand their role in the natural world can they attempt to remedy their social world. I first establish my rural noir framework in order to analyze the land-locked contexts depicted in the texts and how nature further inhibits the protagonists from contentment. Then, I analyze the texts' pivotal revelations, when the protagonists realize they must surrender themselves to nature in order to survive.



#### Oral Presentation O5.1

### **Women monitoring women: Participatory monitoring and evaluation of women's empowerment organizations funded by private-sector and international aid donors in post-conflict countries**

Josephina Blumberg and William Munro\*  
International Studies, Illinois Wesleyan University

This research examines how the monitoring and evaluation (M&E) approaches of a private foundation and international donor agency shape the rhetoric and the contextual setting in which women's empowerment organizations operate. Current scholarly literature highlights the failings of women's empowerment indexes used in M & E, specifically the difficulty in achieving inclusive participation for women due to the exclusion of local stakeholders from shaping the measurable indicators and ultimate priorities. The differences in the implementation of various women's empowerment indexes has been linked to the concept of political accountability and motivations of donors. Projects financed by the Ford Foundation and USAID are selected as case studies because of the donors' instrumental role in supporting women's empowerment programs and their participation in international conferences in the 1990's, which signal a shift in focus on women's empowerment within the development sector. To understand the M&E approaches used by these donors, the research examines this shift in the 1990's in the development discourse, which stresses aid effectiveness and a need to rethink monitoring and evaluation. This allows for a comparison of the impact of the Ford Foundation's and USAID's interpretations of evaluation approaches on the language and practice of women's empowerment organizations.

#### Oral Presentation O5.2



### **Fueling the Brewery, Feeding the Poor: Cassava Commercialization and Food Insecurity in Rural Zambia**

Ann Crumbaugh and William Munro\*  
International Studies, Illinois Wesleyan University

Since the global food crisis of 2008, increased awareness of global hunger has motivated a wave of efforts to reduce hunger in developing countries. Zambia, where over 48 percent of children under the age of five are stunted, is an especially urgent case. Hunger in Zambia is a complex issue compounded by the effects of poverty and climate change. Hunger and poverty disproportionately affect rural farming communities, where more than 80 percent of people live below the poverty line. One increasingly popular model for reducing rural poverty and food insecurity is to promote smallholder participation in agricultural value chains, and to support agro-processing. In 2016 Zambia Breweries launched a project to build a commercial cassava value chain in the Luapula region in order to feed its brewing plant in Ndola, Zambia's third largest city. This research examines the implementation of that project in order to evaluate its likely effect on rural food insecurity in Luapula Province.

### Oral Presentation O5.3

#### **The Divergence Between Disability and Literature in Latin America: Examining the Lack of Disability Representation in Children's Literature in an Othered and Stigmatized World**

Teagan Potter and Scott Sheridan\*  
International Studies, Illinois Wesleyan University

This research highlights the correlation between disability and stigmatization in Latin America in a post-UN Convention on the Rights of Persons with Disabilities world. This nexus is highlighted through an interdisciplinary project combining both social sciences and the humanities by the examination of societal views, poverty, accessibility to education, Othering, and literature. How disability is handled at the educational level is a global issue, especially considering the majority of children with disabilities live in the developing world. Despite regulations presented by the UN both in its Convention and Sustainable Development Goals, governments are slow to adopt these principles into their legal framework which presents a seemingly endless cycle of prejudice and stigmatization that furthers the gap between children with disabilities and children without disabilities. While most Latin American countries agree that they should incorporate children with disabilities into their development plans, they also argue that incorporating these children is simply too expensive, and, therefore, other development goals take precedence. The lack of literature accurately representing children with disabilities in Latin America is in direct correlation to the stigmas surrounding the conditions and the oversight at the governmental level. However, research shows that the introduction of children's literature containing diverse characters, such as children with disabilities, influences young children's ability to empathize with peers who may appear to be different or who require special educational needs.

### Oral Presentation O6.1



#### **Absolutely Free? Frank Zappa's Musical Assault on American Conformity, 1966-1968**

Brandon Chopp and W. Michael Weis\*  
History Department, Illinois Wesleyan University

Throughout his career, American composer Frank Zappa (1940-1993) expounded the potency of music in regard to the medium's inherent ability to enact critical assessments of society. Zappa's music exemplified many new possibilities in popular music that have influenced generations of musicians to push the boundaries of the media format. In the context of the Counterculture of the 1960s, Zappa utilized his initial, experimental rock albums, *Freak Out!* (1966), *Absolutely Free* (1967), and *We're Only in It for the Money* (1968), with his band, The Mothers of Invention, to demonstrate his vision for the United States during the 1960s and beyond. Although Zappa critiqued the country throughout his life, he never deviated far from what he expressed so explicitly within these three albums. Zappa employed his early musical output to lambaste conformist aspects of the United States in the 1950s and the resultant society, culture, politics, and music of the following decade, as well as to propound and to exemplify his individualist ideals in order to combat elements of conformity in the nation. This work focuses on the arguably most important period of Zappa, and expands upon the existing concepts and insufficient analyses of his early music.

## Oral Presentation O6.2

### **I Need a Camera: Wilco's Yankee Hotel Foxtrot and the American Folk Music Tradition**

Charles Franz and Molly Robey\*  
School of Music, Illinois Wesleyan University

Since its tumultuous creation and release in 2001, Wilco's *Yankee Hotel Foxtrot* has been seen as a landmark album of the 2000s, appearing on numerous music publications' lists of the best albums of the decade and of all time. It is also viewed as a radical departure from the band's roots in alternative country and folk music, due to its reliance on electronics and noise, unusual instrumentation, and unconventional song structures. This essay attempts to redefine *Yankee* as a confessional folk album: one that continues a tradition apparent in the work of musicians from Robert Johnson, Hank Williams, and Townes Van Zandt, among others.. Through introspective songwriting these artists reflect the troubled times in which they are living. By detailing his personal demons on *Yankee*, guitarist and principal songwriter Jeff Tweedy shines a light on some of the ills of America in the 21st century.

## Oral Presentation O6.3

### **Horses, Gunshots, and Saloons: The Portrayal of the American West in Libby Larsen's *Songs from Letters***

Katharine Teykl and Adriana Ponce\*  
School of Music, Illinois Wesleyan University

Libby Larsen's song cycle *Songs from Letters* is based upon letters that were purported to have been written by Calamity Jane to her daughter Janey. The letters describe her travels in the American West, her relationship with "Wild" Bill Hickok, as well as her own internal struggles and regret. However, in recent years, new scholarship related to the authorship of the letters has determined that the author of the letters was not Calamity Jane, but rather a woman named Jean McCormick, the woman who presented the letters as evidence that she was the daughter of Calamity Jane and Wild Bill Hickok. The musical imagery of the American West and Calamity Jane's emotions within the song cycle creates a new interpretation of the song cycle, one that is based on McCormick's imagination of Calamity Jane's experiences and emotions. It is through these images that we see a dramatic view of the life of Calamity Jane, and how *Songs from Letters* combines the ideas of both Larsen and McCormick to create this new interpretation of the song cycle.

Oral Presentation O7.1



**Rape Myth Effects on Juror Decisions in Deliberations of Rape Cases:  
How Rape Myths Affect Jury Deliberations**

Lorren Pack and Greg Shaw\*

Political Science Department, Illinois Wesleyan University

Members of juries hold bias, whether implicitly or explicitly. This study determines that jury members do not always change their bias after deliberations, especially in rape cases, but that some may change if they are challenged. Through pre-tests, jury deliberations, and post-tests this study monitored the participants' biases in order to determine if these biases affected their behavior during the deliberation. This study found that participants tended to self-censor, suppressing their rape biases, instead of stating them explicitly to the group. However, many of the participants did change their minds on the rape myths that were involved in the case and seemed to internalize an understanding of why the myths they had endorsed earlier were wrong.

Oral Presentation O7.2



**LGBTQIA+ Campus Climate at a Small Liberal Arts University:  
An Exploratory Study with the Aim of Improving  
the Environment for Queer Students**

Mary Breeden and Meghan Burke\*

Sociology Department, Illinois Wesleyan University

Research suggests that a significant portion of LGBTQIA+ individuals report that their sexual orientation and/or gender identity play a substantial role in choosing which postsecondary institution to attend; thus, it is incumbent upon institutions for higher education to assess their respective campus climates. This project evaluates LGBTQIA+ campus climate at a small, private, Midwestern liberal arts university. Utilizing a grounded theory approach, I interviewed my queer-identified classmates – selected via a combination of strategic and snowball sampling – about their experiences on campus. Through these discussions, I gained a better understanding of queer students' experiences within the classroom, extracurricular activities, living spaces, and elsewhere throughout the institution. Findings include a divide between cisgender and transgender or nonbinary participants' perceptions of campus climate, as well as incongruence in institutional policy and students' lived experiences. The information I gleaned from these interviews was then used to suggest ways for the university to better serve its LGBTQIA+ population.

Oral Presentation O7.3



**Social Movements: Analyzing Factors Affecting Movement  
Participation among College Students**

Lisa Cheng and Meghan Burke\*

Sociology Department, Illinois Wesleyan University

As the prevalence of social justice efforts and social movements has risen in today's political climate, activist groups are always searching for more participation. Because youth participation is crucial to the functioning of social movements, the aim of the current paper is to analyze the factors affecting attitudes and perceptions of social movements among young adults. I draw on survey data collected from students at a small, Midwestern liberal arts university to analyze the factors that may influence movement participation. I find that social movements that focus on issues such as human rights, women's rights, environmental justice, and equality for marginalized groups most strongly compel student participation. In addition, students were motivated to join social movements based on their beliefs and personal experiences. Social frame theory, social identity theory, and the impact of social media inform my analysis and the implications for my findings.

Oral Presentation O8.1

**Unreadable Texts and Digital Literature: Searching for Meaning in *House of Leaves***

Kathryn Halford and Molly Robey\*

English Department, Illinois Wesleyan University

Mark Z. Danielewski's avant-garde novel *House of Leaves* occupies a liminal space in the world of the book, emphasizing the materiality of texts while also engaging in components of hypertext, or literature that exists online and uses features of the internet to work with the plot. This essay analyzes the ways in which Danielewski challenges the boundaries of the realist novel as well as how physical texts can interact with and continue through digital spaces. Using critic Natalya Bekhta's five attributes of the readability of realist novels, this essay creates a metric by which to analyze *House of Leaves* stylistic divergences. This essay, like many before it, accepts that *House of Leaves* is unique from other texts; however, it questions what, specifically, Danielewski's text is different from and how using the realist novel as a foil can allow for greater elucidation of stylistic and thematic significance within the avant-garde text.

## Oral Presentation O8.2

### **The Strong *Shojo*: Hayao Miyazaki's Feminist Characters in Cultural Context**

Payton Letko and Molly Robey\*  
English Department, Illinois Wesleyan University

Hayao Miyazaki's films often feature strong female heroines and include generations of complex female characters in diverse roles, as both heroes and villains. Throughout his career, Miyazaki has created a plethora of feminist characters in his Japanese anime films. However, scholars have claimed that Miyazaki's heroines do not live up to the role of feminists, but instead act as ecological and environmental activists. I argue that these scholars are not considering the cultural context in which the films were made and are imposing Western feminism on these characters instead of recognizing Japanese feminism. My exploration of Hayao Miyazaki's background and views of his own female characters, highlights the disparities between Western and Japanese feminisms, and my analysis of Miyazaki's female characters within their cultural context displays how these female characters are indeed feminists. I intend for this work to demonstrate the importance of considering cultural context in a globalized world.

## Oral Presentation O8.3

### **Centrifuge: Balancing Priorities in *Out of Orbit***

Danielle Ponsot and Molly Robey\*  
English Department, Illinois Wesleyan University

The play *Out of Orbit* by Jennifer Maisel shows a realistic perspective of feminism. My paper will argue that the mother, Sara, will only be truly successful when she realizes that she cannot balance her family, her career and her love life. I will begin by defining a feminist character in theater criticism thus far, which I will compare and contrast to Sara. Then I will analyze the script through the categories Style, Structure/ Timeline, Characters, Story, Theme and Conflict to prove that all elements of the play support my argument. Finally, I will write a vision statement for how I would direct this play, emphasizing the unmanageable pressure placed on women to be "perfect." In our world today, women still struggle to be as successful as men in the workplace, but this play shows that overall balance is more important than extreme success in one aspect of life.

## Oral Presentation O9.1

### **Gender Identity and Hegemony in Roman Society**

Brent Baughan and Amanda Coles\*  
Greek and Roman Studies, Illinois Wesleyan University

Roman society from the early Republican period to the Flavian Imperial dynasty (509BCE-96CE) relied on a system of complete cultural dominance of masculine actors to promote and maintain patriarchy, a process the Italian political theorist Gramsci calls hegemony. This paper argues that Roman men propagated ideal gender norms and socially ostracized men and violently punished women and intersex people for deviating from those norms, by analyzing literary and epigraphic treatments of gender from the period. Other scholars take Roman patriarchy as existing for its own sake or that it was innately part of the Roman state apparatus, while in reality it was a constructed system which required constant maintenance. Revealing the consequences of deviation within such a consistently reinforced system is a new direction for scholars of Roman society.

## Oral Presentation O9.2

### **The Essential Outcasts: *Infames* in the Roman Empire**

Michelle Rekowski and Amanda Coles\*  
Greek and Roman Studies, Illinois Wesleyan University

During the early empire (27 BCE- 200 CE) elite Romans suppressed the legal rights of *infames* due to their own insecurities about their loss of power to the emperor. *Infames* are a social group comprised of actors, gladiators, and prostitutes who were barred from certain legal privileges. Actors and gladiators performed and fought in public religious festivals in which every member of Roman society participated. Even prostitution was part of the revelry surrounding these festivals. One of the nobility's chief fears was losing bodily autonomy to omnipotent emperors. These professions were seen as forms of selling one's body which went against this need for autonomy. I use Kristeva's theory of abjection to analyze satirical works, legal documentation, and graffiti to determine the legal and social significance of the *infames'* exclusion. Kristeva argues that society regulates that which it fears, and because Romans feared losing their autonomy, they limited the actions of those who willingly relinquished it. My research into this group sheds light on the often ignored experience of the lowest members of Roman society.



Oral Presentation O9.3



**Karolina Pavlova: From the 19th Century Literary Salon to the Literary Canon**

Taylor Plantan and Marina Balina\*

Literature and Culture Studies in English Translation, Illinois Wesleyan University

Unrecognized during her time, Karolina Pavlova is known today as a fundamental predecessor to contemporary women's poetry. In the nineteenth century Russia, female poets were widely excluded from the male-dominated literary field, exclusively limited to participation in literary salons and the writing of private literary albums. Pavlova, however, broke free of this gendered framework and developed her own literary voice first by translating influential texts of German Romantic poetry. Her work in translation served as a bridge into her own creative ability, which later combined male-dominated prosaic genres, with poetry, a "permitted" female form of literary expression. Unifying these two forms of creative writing in her autofiction, *A Double Life*, Pavlova used prose as a foundation for the narrative's plot, and poetry as a means of conveying intimate emotion. Thus, Pavlova not only redefined gender restrictions for female creativity, but she also became an innovator in introducing Russian literature to new genre forms.

Oral Presentation O10.1

**Neither Heroes nor Traitors: *Babylon Berlin* and the Experiment of the Weimar Republic**

Abigail Kauerauf and Jamie Zelechowski\*

German Department, Illinois Wesleyan University

In my essay, I investigate the lives of World War I veterans Bruno Wolter and Gereon Rath, in *Babylon Berlin* (2017–). One suffers from shell shock, while the other views the war with a sense of pride that stems from nationalism for the German Empire. My argument is that Gereon and Bruno must keep their opinions towards the war secret to navigate through the Weimar Republic unsuspected. Although Gereon and Bruno represent a barrier between order and disorder as policemen (Richardson 262), the men nevertheless also represent that which the leaders of the Weimar Republic would prefer to remain hidden. I first analyze Gereon and Bruno's respective war experiences through a historical lens and describe which groups of German veterans they represent. I then investigate three episodes from the show to emphasize the political groups with which these men are also connected, and why they therefore wish to remain anonymous in the *Großstadt*.



#### Oral Presentation O10.2

### **Words, Thoughts, and Mental Illness**

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

In this paper, I examine how societal and scientific/medical perceptions of mental illnesses have changed in (West) Germany since World War II. I do so by conducting an analysis of the language used in the medical and popular discourse on mental illness during that time. Language is important, because the terminology used to define something can greatly affect one's perceptions. In the case of mental illness these perceptions greatly affected the way in which they are treated. In order to put these discussions into context, I will be focusing upon an autobiography written by a former schizophrenic cataloguing her experiences in German medical care between 1936 and 1959, and how these experiences changed since then. By looking at this information, I demonstrate that while stigma against people suffering from mental illnesses has greatly decreased in scientific perception, such stigma has only recently begun to decrease in German society.

#### Oral Presentation O10.3



### **Consecuencias del Sistema (Societal Consequences)**

Kaitlyn O'Brien and Cesar Valverde\*  
Hispanic Studies Department, Illinois Wesleyan University

This paper examines the impact of societal norms on relationships formed within families. Oftentimes, outside influences affect personal relationships. This is evident through the analysis of two short stories: *El solitario* by Horacio Quiroga (Uruguay, 1878) and *La compuerta número 12* by Baldomero Lillo (Chile, 1867). In both stories, society influences the characters, which in turn influences their relationships. By analyzing the themes and societal conflict present in both works, readers can better understand the reasons behind the conflicts and their links between society and family.

Oral Presentation O11.1

**A New Species of *Pristimantis* (Amphibia: Anura: Strabomantidae) From the Puna of Northern Peru**

Shenyu (Cooper) Lyu and Edgar Lehr\*  
Biology Department, Illinois Wesleyan University

Frogs of the genus *Pristimantis* have a high species diversity in northwestern South America. Of the 524 species currently assigned to the genus *Pristimantis*, 139 (= 26%) species occur in Peru. They are distributed from lowland rainforests to elevations of about 4000 m in the Andes. *Pristimantis* frogs are evolutionary successful because of their reproductive strategy that involves direct development without a free-swimming tadpole stage. 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. Our new species is most similar to *Pristimantis aptus*, *P. attenboroughi*, *P. seorsus*, and *P. vilcabambae*.

Oral Presentation O11.2

**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 (= SVL) between 24.2–26.1 mm (n = 4) and male SVL 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 morphologically most similar to *Pristimantis chimu*, from which it differs by lacking a cranial crest and tarsal tubercles, and genetically most similar to *P. simonsii* and *P. cryophilus*.

Oral Presentation O11.3

**Multidecompositions of Complete Directed Graphs into Directed Graph Pairs**

Patrick Ward and Daniel Roberts\*  
Mathematics Department, Illinois Wesleyan University

A directed graph is a way to encode information about directional relationships among objects. The complete directed graph on  $n$  objects is the directed graph with arrows pointing in both directions for each pair of objects. In this project we are interested in decomposing complete directed graphs into pairs of smaller directed graphs. In particular, we choose to focus on directed graphs pairs. A directed graph pair is two directed graphs that together form a smaller complete directed graph.

Oral Presentation O12.1

**Comedy, Kardashians, and Capitalism: The Effect of *Ladyish***

Andrew Neeley and Molly Robey\*  
School of Theatre Arts, Illinois Wesleyan University

In the United States it is a well-known dilemma that many theatres have issues with producing theatre that is both artistically and economically viable. In his book *The Empty Space*, Peter Brooks outlines this problem and how theatrical productions created for financial purposes fails artistically. While this theory often holds true, it ignores the reliance US theatres have on producing work that makes enough money to keep the lights on. This paper will attempt to show a solution to this problem and to explore the method of using pop culture and comedy as a tool for creating theatre that is both artistically and economically viable. As seen in the play *Ladyish* written by Chelsea Marcantel and produced at Illinois Wesleyan University in 2017, commercial theater can entertain an audience while also having an important artistic message.

## Oral Presentation O12.2

### **An Audience of two: Kurt Vonnegut and the Textual Portrayals of his Greatest Influences**

William Heidenreich and Molly Robey\*  
English Department, Illinois Wesleyan University

Reluctant to begin a career as an author, Kurt Vonnegut Jr. found the inspiration to do so from his ex-wife, Jane Cox, and sister, Alice Vonnegut. The influence of these women extended into the texts themselves; Jane and Alice being portrayed in a score of Vonnegut's novels. While some critics have argued that only Alice appears in Vonnegut's writing, others have said that only Jane surfaces as a character. I plan to discuss how both women are represented in Vonnegut's texts, using knowledge of their lives to support my argument. In conjunction with exploring the women's emergence in Vonnegut's novels, I will analyze how he transforms them into literary elements different from their "real-life" character, through hyperbole and other aspects commonly found in science-fiction literature. Moreover, I plan to explore Vonnegut's early literature, presumably inspired by Jane Cox, as well as the literature published following the death of his sister, in an attempt to see how these events are portrayed in his writing.

## Oral Presentation O12.3



### **Losing God to Find Equality: Feminist Essays and the Departure from Religion**

Katelyn Hailey and Molly Robey\*  
English Department, Illinois Wesleyan University

Feminist theory of today presents religion as a hindrance or blatant contradiction to feminism; however, religion played a foundational role in original feminist theory. By thoroughly investigating feminist writings of the past and present, this paper addresses the lack of scholarly criticism regarding religion in the feminist essay. With thorough analysis on the origins of feminist theory, as well as the transition away from religion in feminist writings, the feminist essay of the past and present can be fully understood and examined side by side. I tentatively propose the argument that the representation of early feminism's religious roots in feminist essays are generally ignored or overlooked; however, religion was a key component of early feminist theory and the transition to feminist essays sans religion provide a new perspective on feminist writings. Analysis of authors such as Mary Wollstonecraft and Roxane Gay emphasize the fact that while today's feminist writings may be absent of religion, there are still a shocking amount of similarities between feminist essays of the past and present.

**Sudden Identity Crisis: Dealing with Individual Grief in HBOs *The Leftovers***

Mark Dezell and Molly Robey\*  
English Department, Illinois Wesleyan University

HBO's *The Leftovers* employs the typical post-apocalyptic equation. The audience follows a band of characters as they grapple with the fallout of a fantastical and global disaster. Exploring the available texts, criticism, and observable trends of the post-apocalyptic fiction genre, I found that it tends to closely align itself with cultural studies. The majority of critics focus their arguments on the etiology of the text's apocalyptic event and the group-based survival (i.e. an apocalyptic plague represents societal fear/anxiety towards immigration). However, the "sudden departure" of *The Leftovers* differs in that there is no physical or resource-draining event. Losing 2% of the population without cause is still catastrophic, but the struggles become personal. I would argue that *The Leftovers* employs a unique apocalypse and character-driven writing to emphasize an individual's grief and struggle. By examining four of the show's main characters and their personal coping with the event, we can see the personal identity crisis that defines this show above any cultural lens.

## Poster Presentations

Location: Center for Natural Sciences

### **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 (ES) – Oral and Poster Presentations

Location: State Farm Hall

Session 1, Poster Presentations - 9:00 – 10:00 a.m.

Session 2, Oral Presentations – 10:00-11:00 a.m.

Session 3, Poster Presentations – 11:00 a.m.-12:00 noon

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

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

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

## Poster Presentation P1

### **Assimilation of Bacteriophages by Marine Invertebrate Larvae (Annelida, Echinodermata, and Mollusca)**

Quinn Higginbotham and William Jaeckle\*  
Biology Department, Illinois Wesleyan University

Studies on feeding for free-living, immature, developmental form of marine invertebrates known as larvae have focused on the capture of food particles (i.e. unicellular organisms) that are visible using light microscopy. However, there is an abundance of dissolved organic matter (DOM) that are too small to be detected by light microscopy and we know little about the ability of larvae to exploit DOM as a food source. Bacteriophages (hereafter phages), or viruses that use bacteria as hosts, are considered DOM because of their small size ( $<0.5\mu\text{m}$ ), and are abundant in seawater ( $1\times 10^8$  phages / mL). We tested the hypothesis that feeding larvae from the phyla Annelida, Echinodermata, and Mollusca consume phages by incubating larvae with phages labelled with the fluorescent tag DTAF (5-[[4,6-Dichlorotriazin-2-yl]Amino]fluorescein); larvae incubated in filtered sea water for the same amount of time were experimental controls. We used epifluorescence microscopy to detect the amount and distribution of fluorescence present in individuals. In every larval from tested, there was significantly more fluorescence in the digestive system of experimental larvae compared to control larvae ((one-way ANOVA Sabellaridae (Annelida) [ $F_{(1,12)} = 40.801$ ,  $p = 3.446\times 10^{-5}$ ], Chaetopteridae (Annelida) [ $F_{(1,7)} = 58.052$ ,  $p = 1.246\times 10^{-4}$ ], Ophuroidea (Echinodermata) [ $F_{(1,12)} = 22.603$ ,  $p = 4.687\times 10^{-4}$ ], and Gastropoda (Mollusca) [ $F_{(1,6)} = 32.01$ ,  $p = 1.310\times 10^{-3}$ ]). These results indicate that phages enter the digestive system of the tested larvae and could represent a previously unrecognized source of nutrition for planktonic larvae.

## Poster Presentation P2

### **Backyard Heroes: Soil Bacteria Fighting Antibiotic Resistance**

Lilia Garcia and Loralyn Cozy\*  
Biology Department, Illinois Wesleyan University

In the 1950's, an overwhelming number of new antibiotics flooded the market to treat bacterial infections. Since then, many bacterial strains have mutated to become resistant to available drugs, such as the ESKAPE pathogens, six bacterial strains commonly found in hospitals. Thus, there is an urgent need for new antibiotics and treatment options. But, how are antibiotics discovered? Antibiotics are antimicrobial compounds (AMC) made by bacteria to compete with other organisms in their environment. The soil contains a rich source of bacteria that produce AMC's that have yet to be characterized. In this work, a collection of soil bacteria was tested against each ESKAPE pathogen. Soil isolates that were able to inhibit the growth of ESKAPE-pathogens suggested the production of AMC's. The soil isolates were characterized through various physiological and qualitative studies, such as gram stain and motility tests, then sequenced for identity. A rod-shaped *Pseudomonas* strain was able to kill *B. subtilis*, a gram positive bacteria similar to *S. aureus*, and the effective compound was extracted in ethyl acetate. Then, the resistance profile of the *Pseudomonas* was assessed. Overall, this research helps diversify the amount of known AMC's that can be used to battle resistant bacteria, like ESKAPE pathogens.



Poster Presentation P3

**Bacteriophage Zahn: Making Waves as a Singleton**

Kylie Spiegel, Anjali Nimavat, Emmett Agting and Richard Alvey\*, David Bollivar\*  
Biology Department, Illinois Wesleyan University

Bacteriophage research provides an opportunity to examine the evolution of a diverse group of biological entities. Using bacteriophages to treat bacterial infections is also a key component in biomedical research, as phages can be considered potential antibacterial agents due to their ability to infect and destroy bacteria. A bacteriophage from a water sample was isolated using bacterial host *Rhodobacter capsulatus*. Zahn was isolated in the summer of 2018 from West Lake in Davenport, Iowa. Using the bacterial host, the bacteriophage Zahn was isolated through the enrichment process. A lysate sample made after the purification of Zahn was used to create a TEM image, showing Zahn to have morphological uniqueness. After this discovery, a DNA preparation procedure to purify the phage DNA from the bacterial DNA was completed and it was sent to the Pittsburgh Bacteriophage Institute for sequencing. Zahn was determined to be a singleton, having no known close relatives, after acquiring the sequence. The genome of Zahn was then annotated using PECAAN. PECAAN was used to identify potential start sites and putative functions for Zahn's genes. Once completed the annotated genome of Zahn will be submitted to GenBank to contribute to our knowledge of the evolution of bacteriophages.

Poster Presentation P4

**Determination of Host Range Variation between Highly Related Members of a Novel Cluster of *Rhodobacter capsulatus* Bacteriophages**

Brooke Koebele, Rosemary Josenkoski, and David W. Bollivar\*, Richard M. Alvey\*  
Biology Department, Illinois Wesleyan University

Bacteriophages, viruses that infect bacteria, have been studied in the past, but recent advances in sequencing technologies allow for a greater understanding of the composition, function, and evolution of these entities. *Rhodobacter capsulatus*, a purple, nonsulfur, alphaproteobacterium has served as a host for isolation of new bacteriophages at Illinois Wesleyan. There have now been over 40 isolated *R. capsulatus* bacteriophages, which, based on genomic sequence, can be arranged into 6 distinct clusters and 3 unclustered singletons. While these phages are grouped according to the similarity in their genetic sequence, many genes remain uncharacterized. We present evidence that some of these genes may play a role in host range expansion. The RcC cluster phages exhibit a high degree of similarity at the genomic level but display variation in host range. All members of cluster RcC are able to infect host strains YW1 and B10 except for RcOceanus. Three regions of variation were identified by comparing genomes of RcC phages RcDormio and RcOceanus. Using genetic recombination experiments we tested the requirement of these genes for host-range expansion. Investigating these uncharacterized genes may lead to an increased understanding of their function and allow for the development of methods for genetic experimentation.

Poster Presentation P5

**Drinking with Your Kidney: Seawater Ingestion by Starfish Larvae Through the Hydropore**

Shenyu (Cooper) Lyu and William B. Jaeckle\*  
Biology Department, Illinois Wesleyan University

The life history of most seastars includes a free-living, planktonic larva that must feed in order to grow and develop to become a juvenile. Each larva develops a set of interconnected internal body cavities (coeloms), which includes the anterior axocoels, medial hydrocoels, and posterior somatocoels. On the left side of the larval body, a pore canal extends from the fused axohydrocoel to the hydropore on the dorsal surface. Ruppert and Balsler (1986) suggested that the left axohydrocoel functions as a larval kidney and that "urine" is excreted through the hydropore. To test the larval kidney hypothesis, seastar larvae collected from the Gulf Stream (Fort Pierce, FL) were incubated with 1.0 mg/mL of an iron-containing protein (ferritin) or polysaccharide (iron dextran) for 2-6 hours. In larvae exposed to ferritin, we detected iron in cells lining the coeloms that are continuous with the left axohydrocoel. In contrast, when larvae were incubated with iron dextran, the label was found only in the lumen of these coeloms. In both ferritin- and iron dextran-treated larvae, the label was also detected in the cells of the stomach and intestine. These results suggest the presence of an influx of seawater into both the coelomic and digestive systems. Our data indicate that the larval kidney hypothesis requires reassessment in order to account for the delivery of seawater into the coelomic system of seastar larvae.

Poster Presentation P6

**Effects of Phase Polarity and Charge Balance of Spinal Cord Stimulation on Behavior and Gene Expression in a Rat Model of Neuropathic Pain**

Jonathan Rink<sup>1,3</sup>, Joe Williams<sup>2\*</sup>, Ricardo Vallejo<sup>1,2</sup>, Ashim Gupta<sup>1,2</sup>, Cynthia L. Cass<sup>1,2</sup>, Courtney Kelley<sup>1,2</sup>, William Smith<sup>1</sup>, Alejandro Vallejo<sup>1</sup>, Ramsin Benyamin<sup>1,2,4</sup>, David L. Cedeño<sup>1,2</sup>  
<sup>1</sup>Millennium Pain Center, Research; <sup>2</sup>Illinois Wesleyan University, Psychology; <sup>3</sup>Illinois Wesleyan University, Biology; <sup>4</sup>University of Illinois at Urbana-Champaign, College of Medicine, Surgery

Due to an increased prevalence of chronic neuropathic pain and heightening opioid-related concerns, safer and non-addictive treatment alternatives are needed. One such alternative is spinal cord stimulation (SCS) therapy, which involves applying high frequency electromagnetic pulses to target areas along the spinal cord. Although SCS provides pain relief to patients who have failed more conservative treatments, little is known about the mechanism by which SCS provides pain relief. The goal of this project is to investigate the effect of phase polarity and charge balance of SCS waveforms on pain behavior and gene expression in a neuropathic pain rodent model. Rats were implanted with a four-contact mini-lead and randomly assigned to two control and five test groups featuring different SCS waveforms. Behavioral score as a percent of baseline (BSPB) was assessed, and the ipsilateral dorsal quadrant of the spinal cord adjacent to the lead was harvested post-stimulation and processed to determine gene expression via RT-PCR. BSPB was significantly improved post-stim compared to pre-stim for four waveforms, and RT-PCR analysis showed that eight genes demonstrated a significant difference between SNI and/or the other waveforms. Our results exhibit that specific waveforms differentially modulate several key transcriptional pathways relevant in chronic pain conditions.

Poster Presentation P7

**Elsker : A new bacteriophage to combat antibiotic resistant *Enterobacter***

Rachel Maurer and David Bollivar\*  
Biology Department, Illinois Wesleyan University

The World Health Organization has called bacterial antibiotic resistance one of the biggest threats to global health. The rise of antibiotic resistance and the laborious process of creating new antibiotics has led to a resurgence of interest in combating bacterial infections with bacteriophages. Bacteriophages are viruses that infect and kill specific strains of bacteria. Phages kill specific bacterial hosts, unlike broad spectrum antibiotics which kill not only the pathogenic bacteria but bacteria that make up the healthy microbiome. Phage therapy has recently been used to combat multidrug resistant (MDR) bacteria, but wider application will require the identification of more novel bacteriophages. Bacteria in the *Enterobacter* genus are an example of clinically relevant bacteria displaying broad MDR. Few antibiotics are effective against highly resistant *Enterobacter* species, which cause infection of the bloodstream and urinary and respiratory tracts. The goal of this study was to isolate and characterize a bacteriophage that could infect and kill a non-pathogenic model *Enterobacter*. Pre-filtration water samples were collected from the Bloomington-Normal Water Reclamation District. The *Enterobacter aerogenes* specific-phage, known as Elsker, underwent enrichment and isolation. The next steps in this project will be to characterize Elsker by genome sequencing and transmission electron microscopy (TEM).

Poster Presentation P8

**Harboring Hartney: Making A Splash In Cluster B**

Vanessa Chapa, Maeghan Eaker, Saralexia Torres and Richard Alvey\*, David Bollivar\*  
Biology Department, Illinois Wesleyan University

Bacteriophages, which are viruses, have the ability to infect numerous species of bacteria and are the most diverse biological entities on Earth, as roughly 10<sup>31</sup> exist. The discovery and sequencing of DNA from the newly discovered *Rhodobacter capsulatus* bacteriophage, Hartney, is used to further advance our understanding of the diversity of bacteriophages. Hartney was isolated from the Illinois River in Morris, Illinois. Hartney was obtained through enrichment and amplified. The genome was sequenced at NC State University and assembled at IWU to determine that Hartney belonged in Cluster B, which shows relation to Titan, Spartan, and Thunderbird. The tail and capsid sizes were determined through the use of Transmission Electron Microscopy (TEM) analysis at Indiana University. This analysis revealed that the tail size is 134 nanometers and the capsid diameter is 64 nanometers. The measurements indicate that the phage is a siphoviridae. Annotation of this phage was done using Genemark, Starterator, PECAAN, and Glimmer to determine the genes present. Once completed, these results will be submitted to GenBank.

Poster Presentation P9

**Ingestion and assimilation of dissolved organic matter by feeding larvae of the families Chaetopteridae, Magelonidae, Polygordiidae, Sabellariidae, and Spionida (Annelida) and the Sipuncula.**

Seth Borrowman and Will Jaeckle\*  
Biology Department, Illinois Wesleyan University

The life history of many marine invertebrates includes a free-living larval stage that must acquire food. These planktonic larvae live in an environment where the abundance of particulate foods (1-20  $\mu\text{m}$ ) is low and have evolved a diversity of feeding methods. Larvae are also exposed to dissolved organic materials (DOM) which may be a source of nutrition. We tested the hypothesis that feeding larvae of Polychaeta and Sipuncula are able to ingest seawater and that the cells lining the gut then assimilate DOM. Larvae were collected from Ft. Pierce, FL. Specimens were exposed to an iron-containing protein (ferritin) or polysaccharide (iron-dextran); experimental controls were not exposed to an iron-containing molecule. Iron in larvae was detected using the "Prussian Blue" reaction and the presence and distribution of the blue product was examined using light microscopy. In all examined larvae we found the blue label within the gut lumen, but not within the cells lining the digestive system, and control specimens lacked blue color. These results suggest that these larvae ingest seawater, delivering DOM into the digestive system, but do not support the hypothesis that DOM is a nutritional source. Further work is necessary to describe digestion in polychaete and sipunculan larvae.

Poster presentation P10

**Investigation of the Shared and Divergent Anatomical Features of Fishes From the Suborder Characoidei**

Samantha Ziomek and Brian Walter\*  
Biology Department, Illinois Wesleyan University

The order Characiformes is split into two major suborders; Characoidei and Citharinoidei, and includes over 2,000 different species of ray-finned fish, including a variety of Tetras often found in pet stores. Members are identified by the adipose fin, a small fin between the dorsal fin and tail. Of the ~1,800 species found in South America, ~1,100 are within the family Characidae (as defined by the lack of the supraorbital bone) with remaining species spread among 13 other families. Defining phylogenetic relationships among and within each family has proven to be challenging, as a result, the evolutionary relationships between these families and their proper classification remain unclear. This project involves investigating the major distinctive anatomical and morphological differences and similarities between three families of the suborder Characoidei; Characidae, Lebiasinidae, and Gasteropelecidae. A comparative analysis of adult anatomy and morphology was carried out using: (1) morphometric analysis, which utilizes technology, such as image analysis, to detect quantitative characteristics within groups, and (2) quantification of various meristic features of the skeletal anatomy following staining. This research has the intention of contributing knowledge to what is already existent in the efforts to clearly describe the relationship between these families in an anatomical manner.

Poster Presentation P11

**Relative Abundance and Habitat Associations of American Badgers (*Taxidea taxus*) and Plains Pocket Gophers (*Geomys bursarius*) in McLean County, Illinois**

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

Prior to Euro-American settlement in the early 1800's, approximately 60% of Illinois consisted of prairie, but by 2006 less than 0.01% remained. Despite such losses, prairie-dependent species such as the American Badger (*Taxidea taxus*) and the Plains Pocket Gopher (*Geomys bursarius*) persist in intensive agricultural landscapes. The purpose of this study was to determine the relative abundance and habitat associations of both species in McLean County, IL, via roadside automobile surveys on 272.62 km of secondary roads in all 30 townships in 2017 - 2018. We found 88 badger dens (0.32 dens/km) mostly in central and eastern McLean County. Badgers dig multiple dens in a year, and based on home range size in intensive agricultural areas, we estimated 5 - 9 badgers were present in 18 townships. Den locations were apparently not chosen based on the amount of grassland habitat within badger home ranges, as there was no significant difference in the amount of hay/pasture within 5 km around dens ( $339.40 \pm 208.29$  ha;  $\bar{x} + SD$ ) compared to hay/pasture within 5 km of randomly chosen locations ( $265.90 \pm 307.10$  ha;  $t_{13} = 0.26$ ,  $P = 0.64$ ). Likewise, we recorded 245 pocket gopher mounds in 16 clusters (15.31 mounds/cluster; 0.06 clusters/km) in 5 townships, all of which were found in central and eastern McLean County.

Poster Presentation P12

**Sucha Journey: The Path to Isolating, Purifying, Characterizing, and Annotating Sucha the Phage**

Matthew Crosse, Ivy Do, Katie Vogler, and Richard Alvey\* and David Bollivar\*  
Biology Department, Illinois Wesleyan University

Sucha is a bacteriophage, a virus that infects *Microbacterium foliorum*. Sucha was collected from a cow farm in Quincy, IL. It was isolated by direct plating and purified at Illinois Wesleyan University, sequenced by the University of Pittsburgh, and annotated at Illinois Wesleyan University. Bacteriophages are thought to be the most numerous biological entities on Earth. To help understand the evolutionary relationships of bacteriophages, they are organized by cluster based on nucleotide sequence identity. Sucha resides in the EJ cluster as its fourth member. Sucha was found to produce small clear plaques and did produce a lysogen, suggesting that the EJ cluster bacteriophages are temperate phages. Sucha also showed similarity to other bacteriophages in a different cluster, the GA cluster: Appa and Warren based on similarity of the polypeptides present. PECAAN and embedded software was used to analyze similarities with other previously studied phages. The knowledge gained from Sucha will contribute to the ever expanding knowledge of bacteriophages.

#### Poster Presentation P13

### **The Discovery of *Rhodobacter capsulatus* Phage Kemmy through Isolation and Genomic Analysis**

Jackson Rapala, Saylor Williams and Richard Alvey\* and David Bollivar\*  
Biology Department, Illinois Wesleyan University

The SEA-PHAGES program introduces students to microbiology and bioinformatics through guided research. In addition students also learn about bacteriophages which are estimated to be one of the most diverse biological bodies. One of the bacterial hosts used in the laboratory was *Rhodobacter capsulatus*. In the fall of 2018, Kemmy was isolated from a water sample obtained in Roselle, Illinois. After isolation, Kemmy was purified and analyzed through transmission electron microscopy (TEM) to measure the tail length and capsid diameter, which were found to be 112 nm and 65 nm, respectively. In addition, phage DNA was extracted and sent to the University of Pittsburg to be sequenced. In the spring of 2019, the genome of Kemmy was annotated and the gene functions determined using programs such as PECANN and Phamerator. Through sequencing and annotation, Kemmy was determined to be a member of the RcC cluster of bacteriophages. At the end of this project, Kemmy will be submitted to GenBank, contributing to the ever expanding knowledge of bacteriophages.

#### Poster Presentation P14

### **Thyroid Hormone Accelerates Pericorneal Nerve Ring Formation and Leads to Precocious Corneal Innervation**

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

The cornea, the transparent outermost layer of the eye, protects and hydrates the eye through its dense network of nerves. Inexplicably, damaged corneal nerves can take years to regenerate and regain normal function. Here, we examine the stimulatory potential of thyroid hormone (TH) on the acquisition of nerves by the cornea during development. Normally, presumptive corneal nerves are initially repelled at the corneal margin and instead encircle the periphery of the cornea in a nerve ring prior to their synchronous, circumferential entry. TH exposure accelerated formation of the nerve ring and premature, disorganized nerve entry into the cornea. Commencing TH treatments after nerve ring formation was underway was sufficient to accelerate innervation and increase the density of nerve fibers in the cornea, without altering the radial innervation pattern. Mechanistically, neuronal explants cultured *in vitro* displayed increased neurite outgrowth in the presence of TH, indicating that the neurostimulatory effects of TH are mediated directly on corneal nerves. We conclude that TH treatment may provide a therapeutic strategy to promote corneal re-innervation following injury as it accelerates multiple aspects of cornea innervation.

Poster Presentation P15

**Wrangling Warren: A Phage Discovery**

Manish Pathuri, Lane Warren, and Richard Alvey\*, David Bollivar\*  
Biology Department, Illinois Wesleyan University

Bacteriophages are viruses that infect bacteria, found all over the world. Due to the number of bacteriophages, new phages are constantly being discovered and sequenced. Warren, a *Microbacterium foliorum* phage was discovered in a sample from Muncie, IL. It was isolated and had its DNA extracted at IWU. Using protocols such as TEM analysis and PCR, Warren seemed to have unique characteristics so it was sent to the University of Pittsburgh for genomic sequencing. The genomic sequence of Warren was used to place it in a new cluster of *M. foliorum* phages, the GA cluster, along with the previously sequenced Appa which was isolated in Pennsylvania. Annotation of Warren was completed using the program PECAAN, which uses GeneMark and Glimmer to identify the start sites of the genes and used phages from similar clusters as well as HHPred to identify gene function. Of the 66 genes annotated, 23 were given functions.

Poster Presentation P16

**An Exploration of the Antioxidative Effect of Common Spices in Black Tea**

Chaoqiuyu Wang, and Manori Perera\*<sup>1</sup>, Nathan Hocker\*<sup>2</sup>  
Chemistry Department, Illinois Wesleyan University<sup>1</sup> and Southern Illinois University School of Medicine<sup>2</sup>

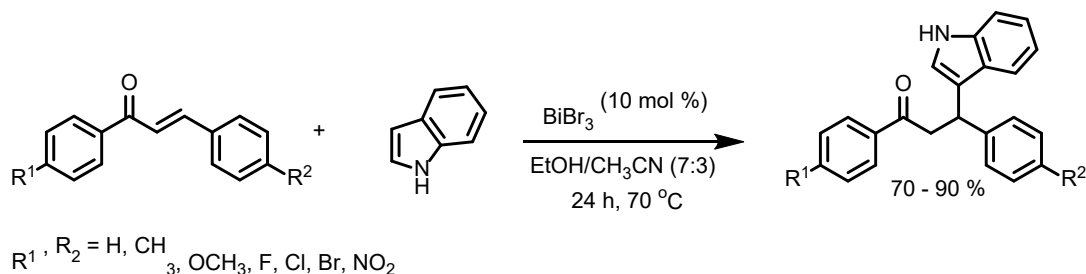
With thousands of years of history, tea has become the most consumed flavored beverage all over the world. Tea is separated into three large groups -- green, black and oolong tea -- based on the fermentation of tea leaves and taste. Large number of studies have indicated that the well-known health benefits is contributed by the polyphenol compounds, a group of antioxidants, in tea. To enhance the taste of tea typically various additives can be incorporated. Historically, in western countries milk and sugar and in eastern countries spices such as cinnamon, clove and ginger were added to tea. Studies have shown that additives such as milk and sugar may reduce the total antioxidants capacity of tea. Spices, on the other hand, are famous for their antioxidative characteristic independent of tea. However, not many studies focus on the antioxidant properties of these spices similar to antioxidant studies of tea. The aim of this study is to qualitatively identify the polyphenols of interest in spiced black tea by using techniques such as high-performance liquid chromatography (HPLC) and liquid chromatography mass spectrometry (LC-MS).



### Bismuth(III) bromide catalyzed 1,4-addition of indoles to chalcones

Zhijia Geng, Lauren Yep, Jared Renfroe and Ram Mohan\*  
Chemistry Department, Illinois Wesleyan University

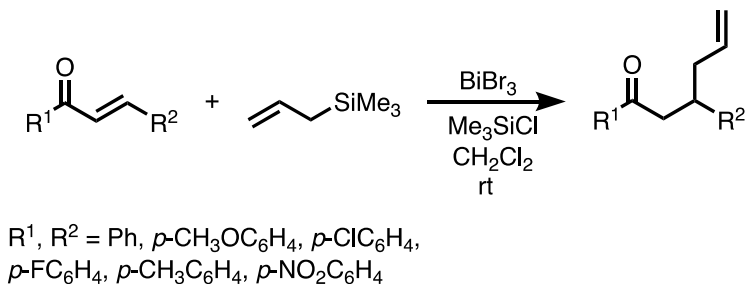
Substituted indoles are of interest from a medicinal chemistry perspective. We have studied the utility of bismuth(III) bromide and other Lewis acid catalysts for the Michael addition of indoles to a variety of chalcones to yield substituted indoles. Bismuth(III) compounds are especially attractive from a green chemistry perspective because they are remarkably nontoxic, non-corrosive and relatively inexpensive. The results of this study will be presented.



### Bismuth(III) bromide catalyzed Michael addition of allyltrimethylsilanes to $\alpha,\beta$ -unsaturated ketones

Richard Guingrich, Robert Reichert and Ram S. Mohan\*  
Chemistry Department, Illinois Wesleyan University

The products of 1,4-addition of nucleophiles to  $\alpha,\beta$ -unsaturated ketones are of interest as they are easily amenable to further synthetic manipulations. We have studied the utility of bismuth bromide and other Lewis acid catalysts for the conjugate addition of allyltrimethylsilanes to  $\alpha,\beta$ -unsaturated ketones. Bismuth(III) compounds are especially attractive from a green chemistry perspective because they are remarkably nontoxic, non-corrosive and relatively inexpensive. The results of this study will be presented.





**The Effects of Spinal Cord Stimulation on Physical and Social Pain**

Kaylee Braun, and Joe Williams\*

Neuroscience Program, Illinois Wesleyan University

Spinal cord stimulation is a relatively new form of treatment for those who suffer chronic back pain. While it has been proven to be an effective form of treatment, the neurological mechanism behind this is still unknown. It is also known that the brain mechanisms for physical pain are similar to those of social pain. The present study used electroencephalography (EEG) to determine the mechanism behind both physical pain and social pain in patients who have been surgically implanted with spinal cord stimulators. This was done by analyzing data from four variations: 1. The stimulator was on and subjects were told it was on 2. The stimulator was on and they were told it was off. 3. It was off and they were told it was on. 4. It was off and they were told it was off. Results from these four conditions will be discussed.

Poster Presentation P21



**Estimating Stream Flow from Rainfall Runoff as a Tool for Predicting Variability in Freshwater Mussel Surveys**

Jacob Williams and Aaron Wilson\*

Environmental Studies Department, Illinois Wesleyan University

The goal of this study was to create a method to model streamflow and estimate the impact of streamflow on the results of threatened freshwater mussel surveys. Observations in recent studies have shown that surveying mussel biodiversity and abundance at the same location under different streamflow conditions can produce significantly different results. Therefore, to accurately assess population changes through repeated surveys, one must account for variability due to streamflow. Streamflow data is available from the United States Geological Survey, however, these data do not cover all locations in a river system. Data from the Spoon River system in western Illinois were chosen to create streamflow models, because of the availability of repeated mussel survey data for that river system. Streamflow was modeled directly from rainfall runoff; this was estimated in ArcMap software using land use, land cover, soil property, and precipitation data. The stream was delineated in ArcMap from a digital elevation map, and weighted by the calculated rainfall runoff data. This work represents an important first step towards developing an adaptable method for estimating stream flow at any point on a river system for any period of time.

Poster Presentation P22

**Accuracy and Precision of a Custom Instrument that Studies Cosmic Analog Dusts**

Katie North, Ruihan Zhang and Thushara Perera\*

Physics Department, Illinois Wesleyan University

A custom instrument has been designed and built to study cosmic analog dusts in the laboratory. Two successful data acquisition runs have been conducted with the novel instrument thus far. But data is only as precise/accurate as the instruments that acquire it. An examination on the resolution and accuracy of our instrument is presented. For this purpose, we first analyzed the data acquired prior to purging water vapor from the instrument in order utilize water spectral lines that are present at the frequencies 556 GHz and 752 GHz. Secondly, using a CNC milling machine, we constructed a thick-grill, high-pass filter out of brass, which has a sharp transmission turn-on at 216 GHz, and obtained spectra with and without it. All three of these spectral features have been used to assess the accuracy and resolution of our instrument.

Poster Presentation P23

**Nowhere-zero group irregular labelings of graphs**

Yutong Li and Dan Roberts\*

Mathematics Department, Illinois Wesleyan University

A labeling of graph is an assignment of values to its edges, vertices, or both. A  $Z_k$ -antimagic labeling of a graph is a labeling of the edges, where permissible values are from the set  $\{1,2,3,\dots,k-1\}$ , and the sum of all edges at a vertex is different from the sum at each of the other vertices. We study a similar structure in group theory that can be used to obtain  $Z_k$ -antimagic labelings of graphs.

Poster Presentation P24

**The Effect of Spinal Cord Stimulation for Chronic Pain Treatment**

David Park and Joe Williams\*

Neuroscience Program, Illinois Wesleyan University

Spinal Cord Stimulation (SCS) is a form of therapy to treat forms of chronic pain. Although the efficacy of SCS treatment is relatively positive and is used clinically, the neurobiological mechanisms behind this treatment are not fully understood. The present study uses an animal model of chronic pain, involving transection of the sciatic nerve of one paw, to measure whether there are changes in the expression of following injury and subsequent SCS treatment. The study also examines the efficacy of different forms of SCS treatment by changing stimulation parameters (cathodic, anodic, symmetrical and asymmetrical stimulation parameters) and examines whether the degree of pain relief exhibited with each treatment correlates with changes in gene expression.

Poster Presentation P25

**The Effects of Intermittent Training on Recovery of Fine Motor Control and Synaptic Plasticity in a Mouse Model**

Victoria Nemchek, Emma M. Haan, Amy Gourley, and Abigail L. Kerr\*  
Neuroscience Program, Illinois Wesleyan University

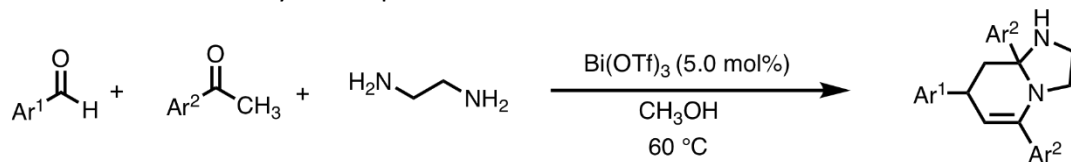
Stroke is a leading cause of disability. Focused training of the impaired limb has been shown to improve its functional outcome in animal models. Yet, most human stroke survivors exhibit persistent motor deficits, likely due to differences in rehabilitation intensity between experimental (animal) and clinical (human) settings. The current study investigated the effect of training intensity on behavioral outcome and neural plasticity in a mouse model of stroke. After learning a skilled reaching task, mice received a unilateral stroke. Post-operatively, animals received either daily rehabilitative training, intermittent rehabilitative training (every other day), or no rehabilitative training. Assessment of the impaired limb illustrated that daily training resulted in significantly better performance than no training, while the intermittent group fell between the two. Analyses are underway investigating the impact of varying rehabilitation intensity on synapse density. Our results indicate that lower intensity training provides some behavioral advantages but is not as effective as daily training.

Poster Presentation P26

**Bismuth(III) triflate catalyzed synthesis of substituted hexahydroimidazo[1, 2-a]pyridines**

Noah Haskin and Ram Mohan\*  
Chemistry Department, Illinois Wesleyan University

The synthesis of nitrogen containing heterocycles is of particular interest in the pharmaceutical industry due to the numerous biological activities exhibited by such compounds. Their synthesis using multicomponent reactions saves steps, and minimizes waste generation. We have investigated the utility of bismuth(III) triflate as a catalyst for the multicomponent synthesis of a series of hexahydroimidazo[1, 2-a]pyridines. Bismuth(III) compounds are especially attractive from a green chemistry perspective because they are remarkably nontoxic, non-corrosive and relatively inexpensive. The results of this study will be presented.



Ar<sup>1</sup> = Ph, *p*-CH<sub>3</sub>OC<sub>6</sub>H<sub>4</sub>, *p*-ClC<sub>6</sub>H<sub>4</sub>,  
*p*-FC<sub>6</sub>H<sub>4</sub>, *p*CH<sub>3</sub>C<sub>6</sub>H<sub>4</sub>, *p*-NO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>

Ar<sup>2</sup> = Ph

catalyst = Bi(OTf)<sub>3</sub>

Poster Presentation P27

**A Computational Approach to Analysing the Magnetization of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice**

Tao (Paul) Jin, Minzhao Liu, David Nico Lopez and Narendra Jaggi\*

Physics Department, Illinois Wesleyan University

Networks of magnetic nanowires provide a platform for studying the fundamental physics of “*spin ice*” systems. Magnetotransport and magnetization response of magnetic nanowires, set up as Armchair and Brickwork lattices, show unusual behavior. In the present study, we use computer simulations to try to predict the magnetization response of these two structures under different applied external magnetic fields and at different angles.

The mathematical equations that describe this physics constitute the Landau-Lifshitz-Gilbert (LLG) system of coupled nonlinear differential equations of large number of variables, and are essentially impossible to solve analytically. We have conducted computer simulations of the spatial distribution of the magnetization of these materials, by using an open source GPU accelerated software, called *mumax3*, which is a state-of-the-art tool for the international community of micromagnetics researchers. We integrate these density maps to produce hysteresis loops of magnetization for different applied magnetic fields and at different angles. We have observed abrupt transitions of magnetization and detailed micromagnetic structures that are in agreement with recently published experimental results.

Poster Presentation P28

**Mathematical Models and Computer Simulations of Telomere Shortening**

David Nico Lopez, Nicholas Milcik, and Narendra Jaggi\*

Physics Department, Illinois Wesleyan University

As a culture of cells reproduces, telomeres, structures marking the ends of chromosomes, within each cell grow shorter with each division until disappearing entirely, halting the process in a phenomenon known as cellular senescence. Classical in-vitro studies on cellular senescence have found a *bimodal distribution* of what is called the proliferative potential. This has not been explained by older stochastic mathematical models. Very recent studies (2019) involving computer simulations of models that incorporate two distinct types of shortening mechanisms produce results that qualitatively mirror the observed bimodal distribution. In this research project, we simulate the evolution of this particular mathematical model using *Python*. We will present *our* computational results that *reproduce* the bimodal results that the authors<sup>1</sup> have reported. We may also attempt to include in our model additional biologically relevant phenomena/mechanisms, in order to deepen the current understanding of cell senescence.

Poster Presentation P29

**A Computational Approach to the Analysis of Magnetoresistance Signatures of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice**

Tao (Paul) Jin, Minzhao Liu, David Nico Lopez and Narendra K. Jaggi\*

Department of Physics, Illinois Wesleyan University

Artificial lattices of magnetic nanowires display unusual magnetotransport properties. In this study, we chose two particular artificial structures and studied their magnetoresistance response under different applied external magnetic field and at different angles. These structures demonstrate abrupt transitions and hysteresis of magnetization, which gives interesting magnetoresistance response. The underlying Hamiltonian of these systems is far too complex for any closed form analytic solutions. Therefore, we use computer simulations to calculate the spatially varying magnetization density in these structures, by using an open source GPU accelerated software *mumax3*. These magnetization maps (from *mumax3*) are combined with a local model of Anisotropic Magnetic Field-dependent Resistivity (AMR) to calculate the local electric field is calculated at all points. We have demonstrated the experimentally observed non-linear abrupt transitions of magnetization of these materials and the corresponding magnetoresistance. Some aspects of our simulations agree well the data. Work is in progress to figure out the sources of remaining differences between data and our simulations.

Poster Presentation P30

**Suicide Rates in Hispanic Female Adolescents**

Nathalie Orozco and Carolyn Nadeau\*

Hispanic Studies, Illinois Wesleyan University

Suicide rates in Hispanic female adolescents are studied using a systematic approach. This study looks at the potential cultural and behavioral factors, signs leading up to a suicide attempt, and treatments for the population with the highest suicide rate out of any ethnic population. Peer reviewed articles are analyzed for recurring themes in the literature. With Hispanic females being 82% more likely than non-Hispanic White females and 46% more likely than non-Hispanic African American females to attempt suicide, this research explores data that can be used to help decrease the disparity between Hispanic female adolescents and their non-Hispanic counterparts.

## Poster Presentation P31

### **Engineering with DNA**

Philip Andrango and Gabe Spalding\*  
Physics Department, Illinois Wesleyan University

Our end-goal is not a biological application, but an engineering aim: to create high-density *information storage devices*. The recent discovery of hachimoji DNA increases the number of base pairs available for encoding information, beyond what is possible with natural DNA. Our work entails creation of micro-containers to create, deliver, and place DNA *origami*, following the work of a previous IWU student, Andy Zhenghao Ding. Our “lab on a chip” is fabricated in a clear, transparent form of commercial silicone rubber (a polymer suspended in liquid, that can be made solid when a crosslinker is added). This allows for the formation of microstructures from molds, which we produce, using photolithographic processes. Oxygen plasma treatment creates a non-reactive Si-O-Si surface, compatible with processing biomolecules. Andy has provided a chip design that is aimed at producing very dilute, 5-micron droplets, each containing either zero or one single DNA molecule, along with other components necessary for the (programmed) formation of origami platelets. While the long-term goal entails using optical tweezers to control the placement of these nanocomponents onto a silicon wafer, our next steps involve validation of the microfluidic design, later to be followed by studies of the kinetics of origami formation.

## Poster Presentation P32

### **Exploration of Devices for Tailoring Laser Light**

Richa Sapkota, Shiyi Yuan, and Gabe Spalding\*  
Physics Department, Illinois Wesleyan University

There are many reasons for wanting to exert adaptive control over lasers. Here, we describe our exploration of liquid-crystal on silicon “Spatial Light Modulators” (SLMs), which can be reconfigured to provide either amplitude or phase control over a laser beam (or, in principle, both). Computer control of these devices allows the creation of optical systems that replace conventional lenses and other, more exotic components, in an adaptable manner. We will describe our characterization and calibration tests for devices on hand in our labs, as well as our assessment of their potential for various applications, including the study of Laser Modes, encoding information into light beams, and utilization of the linear momentum, spin angular momentum, and orbital angular momentum of light beams, as well as the potential for application to studies of single-photon quantum mechanics.

Poster Presentation P33

**Generating Ultrasonic Acoustic Holograms with Circular Arrays**

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

Acoustic holograms are formed by interfering multiple sonic sources of identical frequency and differing phase. By using ultrasonic transducers, 3D printed arrays, it is possible to computer generate holographic arrays at 40 kHz in different configurations. Various algorithms can then be used to model three-dimensional geometries generated from the fourier transform of the phase delays of the array. By using circular arrays, I am able to explore vortex generation in an ultrasonic environment with a cost-effective desktop setup. These holograms can be measured and plotted using another transceiver attached to an X-Y plotter. This work demonstrates how to build and control this set-up, and opens up the ability to do research with ultrasonic holograms by future students. I show how to both control and measure a hologram through a LabVIEW environment, and suggest points of optimization for future more powerful arrays.

Poster Presentation P34

**Machine Vision applied to the Micro World**

Mark Siegel and Gabriel Spalding\*  
Physics Department, Illinois Wesleyan University

By implementing machine vision algorithms, it is possible to test the Stokes-Einstein relation describing statistical variance in a micron-sized sphere's position as it undergoes "Brownian motion," where surrounding molecules randomly collide with our spheres, pushing them around to a measurable degree. By utilizing image processing algorithms available in *Mathematica*, position tracking can be automated, taking images captured by a camera mounted to the microscope as input, which are then quantitatively analyzed via machine vision algorithms. After completing an analysis of "freely diffusing" matter, these methods will be applied to analyze the behavior of microparticles in an optical trap, which essentially provides a tunable potential well. This model system is ideal for studying the emergence of the thermodynamic limit, where there is significant interest in a relatively new class of "fluctuation theorems," from which the Second Law of thermodynamics emerges (and, with it, the "arrow of time," itself).



Poster Presentation P35

### **A Pedagogical Look at Kirkwood Gaps**

Maksymilian Malec and Robert Wagner\*  
Physics Department, Illinois Wesleyan University

Kirkwood Gaps are gaps in the distribution of asteroid orbital periods which correspond to orbital resonances between Jupiter and the asteroids. Simplified explanations account for this effect by saying that Jupiter pulls on the asteroid at the same location each orbit, pulling it into a new orbit. However, in simulations what is found is simply an oscillation, with the orbital distance and eccentricity of the objects orbit never rising to a breaking point of the orbit. More detailed explanations are often summarized as “Chaos Theory”, which gives no intuitive idea of the actual cause. The goal of my research is to provide a pedagogical look at Kirkwood Gaps utilizing multiple levels of complexity to describe the origins of Kirkwood gaps in a way that can be understood across various educational levels.

Poster Presentation P36

### **Optical Fourier Analysis Using a DMD**

Ziyan Liu and Gabe Spalding\*  
Physics Department, Illinois Wesleyan University

What Fourier analysis does is to deconstruct complex functions into simpler component segments that are periodic. This project is designed to conduct Fourier analysis *optically*, using a 4f imaging system, where the back focal plane is related to the front focal plane via a complex Fourier transform (sensitive to both the amplitude *and* phase of each periodic component). Through computer control of a Digital Micromirror Device (DMD), we are able to flexibly apply different patterns to manipulate the input light waves and, at the same time, examine the result in the back focal plane. A camera placed in that plane allows for quantitative analysis, via image analysis. In this poster, we will describe the challenges involved, the progress attained, and suggestions for future work along these lines.

Poster Presentation P37

**Altered Paw Pain Thresholds due to Different Spinal Cord Stimulation Parameters**

Jillian Cole and Joe Williams\*

Psychology Department, Illinois Wesleyan University

Chronic pain causes individuals substantial personal distress and economic hardship as traditional opioid prescription treatment can be ineffective and expensive. An alternative treatment to opioid prescription is spinal cord stimulation. In this subset of a larger study, experimenters assessed effects of different stimulation parameters used to treat simulated chronic pain in rats (spared nerve injury simulation; SNI). Rats were assigned to one of seven treatments (N=49); Naive, Sham, SNI-no treatment, High-Density Active Balance (stimulation), High-Density Passive Balance, Low-Density Active Balance, and Low-Density Passive Balance. Pain tolerance was analyzed via the von Frey method of withdrawal threshold measurement. Rats were tested at baseline before SNI, five days post-SNI, and 48 hours post-stimulation. SNI lesions had the expected effect of increased ipsilateral paw sensitivity, and analyses revealed that all treatments except Low-Density Passive Balance were effective in alleviating paw sensitivity, though pain thresholds never returned to baseline.

Poster Presentation P38

**Scanning Single Photon Detector Implementation of Quantum “Ghost Imaging”**

Tao (Paul) Jin, Minzhao Liu and Gabriel C. Spalding\*

Physics Department, Illinois Wesleyan University

Entangled photons can be exploited for single-photon imaging: photons are accumulated one by one to form an image on a camera. To improve the signal-to-noise ratio, one can use “heralded imaging,” where camera data is only accepted if a partner (entangled) photon is detected in coincidence, at a second detector. A secondary consequence of the strong correlations between entangled photons is that we can place the object into the path of the second detector, and yet still create an image on the original camera, using only photons that *never interacted with the viewed object*. This configuration is called “ghost imaging.” To reduce cost, we designed and implemented a modified version, replacing the fast-gated camera with single-photon sensitivity with a *single-pixel* detector that scans the image plane. Our design had to carefully preserve optical alignment so that the detector is always pointing at the source of entangled photons. Our next step will be to use ghost diffraction to demonstrate that entangled photon pairs are correlated in ways that extend beyond what is allowed by classical physics.

Poster Presentation P39

**Terahertz Absorption Spectra of Silicate Cosmic Analog Dusts Using a Novel Spectrometer**

Katie North, Binh Phan, Ruihan Zhang and Thushara Perea\*

Physics Department, Illinois Wesleyan University

Metal containing amorphous silicate grains are expected to be a major component of interstellar dust. Amorphous silicate grains containing magnesium, iron, and calcium have been synthesized in the IWU chemistry department. Our group has completed the construction of an apparatus for obtaining terahertz absorption spectra of cold samples at astronomically interesting temperatures. To study the dusts, we installed dust samples, embedded in low-density polyethylene pellets, in a sample-exchanger and cooled them down to 3.0 Kelvin. Using a blackbody radiation source, a Fourier Transform Spectrometer, and a sensitive millimeter wavelength light detector, we measured the terahertz absorption spectra of several cosmic analog dusts. We present the full analysis of the data here, along with the specific trends observed.

Poster Presentation P41

**On the Nature of Synesthesia: A Learned Association or Something More?**

Niyant Vora and Jason Themanson\*

Psychology Department, Illinois Wesleyan University

Synesthesia is a phenomenon that has captivated the interest of many researchers, as it is a unique experience of the blending of the senses. The following study was conducted in an effort to understand whether synesthetic experiences can be learned, as a 2014 paper claimed. While there has been much research demonstrating that synesthesia is more common than previously thought, and likely to develop in young children as a learning mechanism, the amount of available event-related brain potential (ERP) studies on synesthesia are much less available. The current study, utilizes pre- and post-test ERP data from participants to understand whether a learned association or synesthetic experience occurred during the 4 weeks of training on letter-color and music-color association task. The difference between the pre- and post-ERP tests was analyzed to determine if such training altered three specific ERP components believed to resemble the ERP of synesthetes.

Poster Presentation P42

**Sherlock Bones: Deductive Reasoning in Dogs?**

Kate McHugh and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

Humans regularly use deductive reasoning to make decisions. For example, if Anne is with Bob and Bob is at the Coffee Hound, I can infer that Anne is also at the Coffee Hound. Is deductive reasoning uniquely human? Here we asked: can dogs use deductive reasoning? An experimenter showed dogs two buckets then reached into the buckets, one at a time, to demonstrate the contents. Each bucket contained two objects: either two neutral objects (A and B) or a neutral object (C) and a treat. Once the dogs saw one item, we returned it to the bucket and repeated the process with the second item. Once the dog saw the items in both buckets twice, the buckets were hidden and rotated out of the dog's sight. The researcher demonstrated one of the objects in each bucket (A and C) and dogs searched the bucket containing the treat. If dogs use the same reasoning as us, they should find the treat because in the same bucket as object C. Results showed that contrary to predictions dogs chose both buckets about equally. While this may suggest they lack deductive logic, it is possible they failed to demonstrate it due to methodological constraints.

Poster Presentation P43

**Task Specificity & Functional Outcome: What is best for Post-Stroke Rehabilitation?**

Rachel Tomazin and Abigail Kerr\*

Psychology Department, Illinois Wesleyan University

Stroke is a debilitating insult to the brain occurring from a blockage in blood supply (ischemic), or a bleed (hemorrhagic) in one hemisphere of the brain. Worldwide, approximately 10 million people are left with moderate to severe disability due to stroke; the most common deficit is upper extremity impairment. Current stroke rehabilitation strategies utilize task specific training of a skill, meaning one practices the specific skill they want to regain. However, it is possible that there are more generalized types of therapy that can be as effective in rehabilitating debilitated skills. The current study utilizes several skilled reaching tasks in mice that have shown striking parallels to human dexterous movements to observe the effects of task-specific versus generalized upper extremity rehabilitation post-stroke. Our findings have meaningful implications for rehabilitative strategies post-stroke and test the validity of a skilled reaching task used in the rodent model.

Poster Presentation P44

### **The Appeal of Crime Podcasts**

Grant Werner and Amanda Vicary\*

Psychology Department, Illinois Wesleyan University

Research has shown that women, compared to men, enjoy reading true crime books more, and recent statistics indicate that women make up the majority of crime podcast listeners. We also know that women report having a greater fear of crime than men. However, it remains unclear why learning about crime appeals to women more than men and whether the difference in fear could be part of the explanation. In the current study, we had participants complete questionnaires before and after listening to a crime podcast in order to determine if women truly did enjoy it more than men, and if so, whether a heightened fear of crime could explain this difference.

Poster Presentation P45



### **The Effects of Observing Aggression and Affiliation on Domestic Dog Behavior**

Kyle Cook and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

Social learning is an effective learning strategy in humans; both for good (learning adaptive behaviors) and for bad (learning negative behaviors). In a classic study Bandura (1961), showed that children increased their aggressive behaviors after observing adult models interacting aggressively with a “Bobo” doll (hitting it, kicking it, berating it, etc.). There is good reason to believe this effect is not unique to humans: Pongracz and colleagues (2002) explored the generalizability of this effect across species by demonstrating that domestic dogs can learn problem solutions through observation. Here we further this work by exploring the behaviors of dogs after observing three types of human interactions: aggression, cooperation, and affectively neutral. We hypothesize that if dogs view high levels of aggressive behaviors between two human demonstrators (for example, tug of war) they will exhibit more aggressive behaviors towards the toy (for example, ripping it, trying to engage in a tug-of-war, etc.) than if they view neutral or cooperative behaviors between two demonstrators. We further hypothesize that dogs will prefer to be closer to the ‘victim’ of aggression and more likely to take a treat from said ‘victim’ rather than the aggressor. We will share the results of this experiment, connecting it to the literature on observational learning in human and nonhuman animals alike.

**This or that?: Object individuation in domesticated dogs (*Canis familiaris*)**

Ellen Stumph and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

Humans rely on organizing and categorizing our world to function in our everyday lives. This ability to categorize rests on object individuation, the ability to track the identity of objects when they leave and reenter sight. Objects can be individuated using three types of information: spatiotemporal, object property and object kind. Previous research has shown that a surprising candidate mechanism may affect infants' use of object kind information: noun comprehension (Xu 1999; Xu 2002). Research using a comparative approach suggests that the ability to use kind information to aid in object individuation may not be unique to humans: great apes, rhesus monkeys and dogs all successfully individuate objects using spatiotemporal and property/kind information (Brauer & Call 2011; Phillips & Santos 2005; Uller 1997). However, little is known about non-linguistic animals ability to individuate objects using kind information alone. Here we explore the effect of a language cue on dogs' ability to use kind information for object individuation. We predict that dogs will be able to use a language cue to successfully individuate objects using kind information. Thus, non-linguistic animals may be able to use kind information to aid in object individuation given appropriate supports.

# Educational Studies – Poster and Oral Presentations

## State Farm Hall

### Poster Presentations – Session 1

9:00 – 10:00 am

SFH FOYER/SFH 101

1.1 Lauren Zanoni

1.2 Ning Wei

1.3 Kaitlyn O'Brien

1.4 Luke Witteveen

1.5 Ariel Tang

1.6 Jennifer Murphy

1.7 Catherine Mojsiewicz

### Oral Presentations – Session 2

10:00 – 11:00 am

SFH 102

Moderator: Allison Henry

2.1 Linh Le

2.2 Maribeth Johnson

2.3 William Heidenreich

2.4 Ellie Giannakopoulos

### Poster Presentations – Session 3

11:00 – 12:00 noon

SFH FOYER/SFH 101

3.1 Meghán McGarrity

3.2 Alexis Obert

3.3 Cathy Peng

3.4 Michael Messer

3.5 Emma Dalton

3.6 Olivia Ruff

Poster Presentation P1.1

**Fostering Engagement Through Inquiry-Based Learning**

Lauren Zanoni and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Inquiry-based learning (IBL) occurs when students engage in work that mirrors elements of the scientific process, such as conducting an investigation and communicating results (Martin-Hansen, 2002). Similar to the inquiry process, in Genius Hour students choose a topic they are passionate about, and engage in research and reflection as they create a finished project (Juliani, 2007). In my study, I determined how the incorporation of inquiry-based learning in a fifth grade classroom facilitates students' cognitive, behavioral, and emotional engagement. Within this study, cognitive engagement refers to students' investment and motivation to learn, behavioral engagement involves the positive conduct students show towards their peers and the activities, and emotional engagement refers to the value or belonging students feel towards their work and/or groupmates (Fredricks, Blumenfeld, & Paris, 2004). I collected and analyzed data through field notes, class photos, and student work samples. The results of my study showcase how inquiry-based learning experiences enable students to be engaged in and passionate about learning.

Poster Presentation P1.2

**The Power of Arts: Contribution of Arts-based Education on Children's Learning in the Early Years**

Ning Wei and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

The significance of the use of arts in children's educational contexts is well-demonstrated and the value of arts-based education had been highlighted in recent years (Eisner, 1990; Ewing, 2013; McArdle & Piscitelli, 2002; McArdle & Wright, 2014; Olsson, 2009; Tarr, 2008; Vecchi, 2010; Wright, 2003). The purpose of this paper is to explore how arts-based education supports children's learning in early years. Using *Aistear* (NCCA, 2009) as a conceptual framework, this article provides evidence that arts-based education offers young children across different countries great opportunities to enhance learning in terms of their physical and emotional well-being, communication, creativity and cultural belonging. Additionally, it addresses the practical limitations of arts-based education that educators experienced during teaching. Future research should consider an investigation to improve the efficiency of arts-based education, as well as per-service teachers' training program in arts-based education.



Poster Presentation P1.3



**A Noteworthy Study: Music in the Spanish Classroom**

Kaitlyn O'Brien and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Music can significantly impact student learning and academic performance in the language classroom. More specifically, music implementation in the secondary Spanish classroom can assist students in their learning and foster second language acquisition (Engh, 2013). For many students, learning a second language can be a difficult and stressful task. In this qualitative study, I aim to address the ways in which music helps students with SLA, in terms of retaining vocabulary and grammar concepts, lowering their stress levels, and increasing motivation. The study involves 24 participants from a Spanish I classroom in a suburban school. In this study, academic performance refers to student progress as well as outcomes on formative assessments. Data was collected through field notes, surveys, and formative assessments. The findings of this study are pertinent to the field of education, since music enhances student learning and performance in the secondary Spanish classroom and could really impact the future of SLA.

Poster Presentation P1.4

**Points vs. Mastery: The Effects of Standards Based Grading**

Luke Witteveen and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Every few years, a new trend in education emerges that aims to help a greater number of students to succeed in the classroom. There was “No Child Left Behind Act” in 2001, followed by Common Core State Standards in 2009, and finally the newest innovation in *standards-based grading*, currently being implemented in classrooms. This grading style requires teachers to adhere to specific standards set by the state and school district. There has been a controversial debate in previous studies as to whether standards-based grading is beneficial towards students’ deeper learning (Jones, 2013) or distracts students from success (Peters, 2017). This study was conducted in an urban high school in a United States History classroom with twenty-two sophomore students. Formative assessments, summative assessments, and observational journals were analyzed to determine mastery of content and student reaction to the grading style. This study argues that although standards-based grading focuses on mastery of content, it has little effect on student learning.

Poster Presentation P1.5

**No More Tragedies: Adolescent Suicide Facts and Prevention**

Xiaoyu Tang and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

The purpose of this research synthesis is to strengthen the suicide prevention programs for adolescents in a school setting, and to raise public awareness of the significance of one's mental well-being. This study aims to investigate the facts and prevention methods for adolescent suicide. To examine the research question, three major domains were demonstrated: population of suicide attempters and completers, major reasons for adolescents to commit suicide, and effective prevention methods. This research synthesis adopts a bottom-up research approach, searching for relevant studies from general to specific. It has been found that the adolescent's suicide can be prevented through methods that include mindfulness classes, parent-teacher conferences, enhanced classroom management, and screening process.

Poster Presentation P1.6

**Positive Relationships in the Classroom**

Jennifer Murphy and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Advocates of evidence-based education argue that students who have positive relationships with their teachers are more likely behave and academically perform well in school as these relationships shape the way children think and act. Aligned with principles of *attachment theory* (Ainsworth, 1982; Bowlby, 1969), positive teacher-student relationships enable students to feel safe and secure in their learning environments and provide scaffolding for important social and academic skills (Baker, 2008; O'Connor, Dearing, & Collins, 2011; Silver, Measelle, Armstron, & Essex, 2005). In this study, I examine how to facilitate positive teacher-student relationships and how having these relationships affects students' behavior and academic performance. Educators will benefit from this study as the findings point to ways in which teachers can support students academically and behaviorally.



Poster Presentation P1.7

### **Reader's Theatre and Its Effect on Students**

Catherine Mojsiewicz and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Reader's Theater is a reading instructional method that calls for reading scripts aloud. This research synthesis focuses on the effects Reader's Theater can have on students in the classroom. Many studies have been conducted in classrooms where the educator uses Reader's Theater as a tool to improve reading fluency. In order for a someone to have fluency when reading, they must be able to read at an appropriate rate, with accuracy, phrasing, and expression (Lekwilai, 2014). Reader's Theatre causes repetitive reading which facilitates rapid word recognition. This leads to enhancing other factors in reading fluency as well. When searching Reader's Theatre and teaching methods, this technique of reading scripts out loud was also found as a tool used to teach other subjects such as science and mathematics. Since it improves understanding and expression when reading, it also influences the students' ability to retain that information. This literature review examines the many studies and articles that prove Reader's Theatre is a positive tool that helps improve reading fluency, as well as assists teaching other subjects. Also, due to the nature of Reader's Theatre, it facilitates positive social interactions and confidence in the students.

Oral Presentation O2.1

### **Learning About Love: Healthy Relationship Education and Program Outcomes in Adolescents**

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

Recent research has shown the unique influence of peer relationship on identity development in adolescents (McLean & Jennings, 2012; Nguyen, Cohen, & Hines, 2012). Although there is a lack of research on the developmental importance of adolescent romantic relationships, these relationships are expected to contribute significantly to shaping self-identity, maintaining socio-emotional health, and academic achievement (Caver, Joyner, & Urdu, 2003). Therefore, healthy adolescent romantic relationship is gaining interest among researchers and educators. This research synthesis examined 20 empirical papers on school-based healthy *relationship education* and analyzed their program evaluation findings under the Social and Emotional Learning (SEL) framework. These findings were divided into categories following the main competencies identified in SEL: social awareness, relationship skills, and responsible decision-making to highlight the impact of healthy relationship programs on adolescence social development. Through this research synthesis, 6<sup>th</sup>-12<sup>th</sup> grade educators and administrators can advocate for an implementation or expansion of adolescence relationship education in their local schools using evidence of improvement in SEL competencies and reduction in teen dating violence.

## Oral Presentation O2.2

### **Teacher Participation in Professional Development and its Contribution to School Improvement**

Maribeth Johnson and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

In recent years, efforts to restructure professional development programs for teachers have had a significant emphasis on collaboration amongst teachers, administrators, and professional development providers (Darling-Hammond, Wei, Andree, Richardson & Orphanos, 2009). These cooperative techniques have been integrated into existing programs as well as have inspired the formation of new, job-embedded programs. In order to get a sense of the variety of these programs, I examined 20 research articles and analyzed how teacher participation is being utilized in professional development activities currently, how it could be utilized more effectively, and how teacher participation in professional development activities contributes to school improvement using qualitative research techniques from Ryan and Bernard (2003). Job-embedded professional development that includes elements of teacher choice, direct relation to the student/school context, and teacher leadership were shown to contribute to school improvement.

## Oral Presentation O2.3

### **The Effectiveness of Differentiated Instruction in a Multimodal Summative Assessment**

William Heidenreich and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

The main focus of my inquiry was to assess the effectiveness of incorporating differentiated instruction into a multimodal assessment. In addition to analyzing the effectiveness of differentiated instruction in this lesson, I analyzed the importance that 4MAT Learning plays in implementing curriculum that best caters to students' needs. *4MAT learning*, defined as the cognitive tendencies displayed by an individual during the learning process, if used effectively, can help educators create curriculum that fosters an optimal learning environment for students. Likewise, in my study, I analyzed the cognitive tendencies displayed by students, recorded them accordingly, then used that data in appliance to the *4MAT Learning Theory*. In doing so, I compared the cognitive tendencies to those discussed in the *4MAT Learning Theory*; after a feasible comparison was made, I implemented instruction that catered to that students' cognitive tendencies, in accordance with the *4MAT Learning Theory*.

## Oral Presentation O2.4

### **Engaging in Student Choice**

Ellie Giannakopoulos and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Teaching academic material to students is only half the responsibility of educators. In order for students to fully retain information and become active learners, engaging them in their curriculum is vital. Offering choice to students presents the opportunity for this active learning and engagement to take place. Student choice must be meaningful and applicable to student's interests so that they can successfully connect what they are learning to their own lives. During this self-study, fourth grader students were provided choice within lessons and assessment activities in various subjects. These students were then observed while participating in choice-related material to determine overall engagement and comprehension of lessons being taught. The purpose of this study was to determine how choice affects student engagement in the classroom; specifically, the impact of hands-on learning and independent inquiry. Analysis of lesson plans, assessments, and student feedback illustrated that student choice is effective in engaging students.

## Poster Presentation P3.1

### **Flex on This! Flexible Seating in the Classroom**

Meghán McGarrity and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

*Flexible seating*, or otherwise known as *alternative seating*, refers to classroom set ups that integrate different seating options rather than traditionally arranged rows of desks. In a regular classroom, some students sitting in traditional desks are uncomfortable; learning can be a battle because of the strain on their bodies. Students who learn in a traditional seating arrangement might be less likely to be engaged or to be able to focus on lessons, not to mention other contributing factors, such as the effects on classroom behavior and their motivation to learn. The purpose of this self study was to see if flexible seating played a role in student learning. Participating in this study were 6<sup>th</sup> grade students who engaged in a classroom full of couches, chairs, and seat cushions. Their experiences in academic learning, behavior, and opinions were documented through field notes, student surveys, classroom photos, and a series of questionnaires. Results from the analysis of the collected data showed that students were able to focus, stay engaged, and participate more in a classroom that implemented flexible seating.

Poster Presentation P3.2

**Engaging Behavior: Standards-Based Grading in the Secondary ELA Classroom**

Alexis Obert and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

There is movement in the field of education revolving around the grading system. After centuries of use, the traditional grading system in which students earn extra credit, take tests, and strive for As, is being shifted aside in favor of standards-based grading, a system in which students practice their skills and are assessed only on how they do. Standards-based grading is a controversial subject, due in part to a lack of understanding of what exactly it is and fear that it may not be good for the students. During student teaching, I worked in a school that had made the move to standards-based grading a few years prior. I observed how standards-based grading affected the students' behavioral engagement. This self-study includes a literature review, a methodology, an analysis of data, and concluding thoughts on standards-based grading. After completing my self-study, I found myself in favor of standards-based grading. Additional research is necessary as this is still a fairly new grading system, but I found standards-based grading to have no negative affect on behavioral engagement.

Poster Presentation P3.3



**ENGLISH LANGUAGE LEARNING AND TEACHING**

Jinyu Peng and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

The population of English language learners (ELL) is rapidly and continuously growing (Ok & Ratliffe, 2018). Thus, it is more and more important for current and future educators to enrich their knowledge and skills in teaching ELL, and more importantly focus on the connections between language teaching and learning. The compatibility of the two will heavily influence how much a student will really learn (Zhou, 2011). The purpose of this literature review is to enhance educators' knowledge on ELL by looking into studies conducted on relative topics including: what language learning strategies are being used more often by students, how to better facilitate students' language learning, and what can future research examine. Both language teachers and students will be less emotionally stressed and will benefit tremendously if they are better informed on how to do their jobs more effectively.

Poster Presentation P3.4

**1:1 Technology Integration**

Michael Messer and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

In the past few years, the common trend for public schools is to move to a 1:1 technology approach in the classroom. Students are given a device (e.g., laptop, Chromebook, iPad) their freshmen year and are instructed to use them for their work in school for 4 years. This paper delves into the effects of this approach and weighs whether it is worth the change it brings. “Although the content may not change, the technology enables the use of innovative and engaging instructional approaches” (Storz & Hoffman, 2013, p. 3). This change not only affects the students, but the teachers as well. Students need to be prepared for the ever-changing modern world of technology. It is the duty of school and its educators to prepare these students for this world. Is the 1:1 approach the best way to do this?

Poster Presentation P3.5

**Brain Breaks in the Elementary Classroom**

Emma Dalton and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

At the elementary level, many teachers notice a decline in student engagement at various times of the day. Fredricks, Blumenfeld, and Paris (2004) state that there are three levels of engagement: behavioral engagement, cognitive engagement, and emotional engagement. This study discusses how using *brain breaks*, or pauses of instruction to focus students’ attention on a different movement activity, affect student engagement. Data was collected through video clips and written field notes. The results of this study suggest that *brain breaks* positively influence the engagement of students. These findings are significant to the field of education because they could point out ways in which teachers could enhance student engagement and meet physical activity standards.

**Disciplinary Literacy: Providing Students with the Literacy Tools to Succeed Across Disciplines**

Olivia Ruff and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

Now more than ever it is important to help adolescents with reading and writing, as two thirds of middle school and high school students struggle with reading and writing in various content areas (Carnegie Council on Advancing Adolescent Literacy, 2010). There are no specific rules informing readers the “right” way to approach a text, not even in the Common Core State Standards. How can we ask students to closely read texts in several disciplines without having explained how to do so? We are setting our students up for failure if we neglect teaching them how to read across disciplines. In an effort to understand how teachers implement literacy strategies across disciplines, I examined research articles on the implementation of disciplinary literacy and the effects of literacy strategies in mathematics, English, science, and history curriculum. Additionally, further research is necessary to explore literacy teaching in other content areas as well as a closer examination of other literacy strategies to determine the effects and advantages of literacy teaching.



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*Learning Through Research*

Thirtieth Annual

John Wesley Powell  
Student Research Conference



Saturday, April 13, 2019

8:30 a.m. – 4:00 p.m.

*Official Program*



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## Acknowledgements

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 Amy Jo Caulkins, Associate Provost's Office, in organizing many aspects of the conference and assembling and printing the program booklet.

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The photography and videography coverage by Jason Reblando.

The Undergraduate Research Advisory Committee:

Stephanie Davis-Kahl and Tyler Schwend (chairs), Emily Kelahan, William Munro, Carolyn Nadeau, Gabe Spalding and Lynda Duke (ex officio)

## Annual Intellectual Theme

*All participants that feel their work fits with the theme will be designated with the logo below.*



### **Changing Climates**

As we assess our natural and social environments in 2018, we are finding ourselves in the midst of any number of “changing climates”—all with significant implications for humanity and the world around us. At the same time that we investigate the changing climates around us, we also can—and must—engage in the active project of changing climates.

<https://www.iwu.edu/annual-theme/2018/>



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# Schedule of Events

Saturday, April 13, 2019

| <b>Time</b>                    | <b>Event</b>  | <b>Location</b>                   |
|--------------------------------|---|-----------------------------------|
| <b>8:30 a.m. – 9:00 a.m.</b>   | Continental Breakfast and Poster Setup                          | Atrium of CNS and State Farm Hall |
| <b>9:00 a.m. – 10:00 a.m.</b>  | Poster Session A (Odd Numbered)                                 | Atrium of CNS                     |
|                                | Poster Presentations – Educational Studies                      | State Farm Hall                   |
| <b>10:00 a.m. – 11:00 a.m.</b> | Oral Presentations – Sessions 1-6                               | CNS                               |
|                                | Oral Presentations – Educational Studies                        | SFH                               |
| <b>11:00 a.m. – 12:00 p.m.</b> | Oral Presentations – Sessions 7-12                              | CNS                               |
|                                | Poster Presentations – Educational Studies                      | SFH                               |
| <b>12:00 p.m. – 2:00 p.m.</b>  | Luncheon (for conference participants,<br>parents and advisors) | Young Main Lounge                 |
|                                | Music Composition Performances                                  |                                   |
|                                | Keynote Address: Renée Scheltema                                |                                   |
| <b>2:00 p.m. – 3:00 p.m.</b>   | Poster Session B (Even Numbered)                                | Atrium of CNS                     |
| <b>3:00 p.m. – 4:00 p.m.</b>   | Senior Art Show and Critique                                    | Merwin and Wakeley Galleries      |

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## Keynote Speaker

### “Normal is Over”

**Renée Scheltema**, Documentary Filmmaker and Sustainability Expert

After her degree in Criminology at Leiden University, she studied at the University of California in Berkeley, USA. Her main subjects: TV-Journalism and Photo-Journalism.

For 35 years Renée has worked for Dutch television as a Director, Producer and Camera-person. Some of her documentaries, like “Hush, A Portrait of Tracy Payne”, “Seven Days in Burma”, “The Death Penalty”, “Portrait of A Zen Couple”, and “The Bus” were selected at International Film Festivals. “Nicolaas Pierson: A Conversation” (in Dutch), “Happy in Zimbabwe?” Portrait of a Tibetan lama visiting NGO’s in Zimbabwe (in English), and “Rob Nairn” (in English). Many documentaries were co-productions with Dutch TV and Non-governmental organizations like Amnesty, UNDP, UNESCO, SNV, focusing on social issues.

Her art series “Canvas Extreme” consists of 7 x 28’ minute portraits of contemporary cutting-edge artists in South Africa, shot during the first years of the Mandela era. The series was sold to TV stations in France, Spain, Mexico, Switzerland and the Netherlands.

She finished her award-winning documentary feature called “Something Unknown Is Doing We Don’t Know What” in 2009, investigating the Science behind Psychic Experiences, featuring top scientists in the US. [www.SomethingUnknown.com](http://www.SomethingUnknown.com)

And after 4 years as a One-Woman-Crew, Renée completed “Normal Is Over”, an award-winning feature documentary connecting the dots: A look at the financial and economic paradigm underlying our planetary problems, while offering various SOLUTIONS. (2016, 103 min). The film is about humanity’s wisest response to climate change, species extinction, resource depletion, income inequality and the connection between these issues. <https://NormalisOver.org>

Renée set up The Making of The Future Foundation. Its mission is to create meaningful change for a regenerative planet; to connect “money to nature” by inspiring people to build a “new normal” for the health of our planet.

As a professional photographer, Renée has worked for Magazines and Newspapers in Holland, the US, and South Africa. She was a member of Gamma Liaison in New York, now called Getty Images.

# Student Participants

## Art, Music, Poster and Oral Presentations

Presentation Key:

O – Oral Presentation                      Example: O1.3 = Session 1, 3<sup>rd</sup> in order

P – Poster Presentation                      Example: P12 = Poster number 12

| Name                 | Order   |
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| Zhijia Geng          | P17     |
| Ellie Giannakopoulos | ES O2.4 |
| Macey Grant          | Art     |
| Richard Guingrich    | P18     |

|                      |                     |
|----------------------|---------------------|
| Katelyn Hailey       | O12.3               |
| Kathryn Halford      | O8.1                |
| Noah Haskin          | P11, P26            |
| Lixuan (Lucy) He     | Art                 |
| William Heidenreich  | ES O2.3, O12.2      |
| Quinn Higginbotham   | P1                  |
| Tao (Paul) Jin       | P27, P29, P38       |
| Maribeth Johnson     | ES O2.2             |
| Paul Johnson         | P33                 |
| Rosemary Josenkoski  | P4                  |
| Abigail Kauerauf     | O4.3, O10.1         |
| Brooke Koebele       | P4                  |
| Linh Le              | ES O2.1             |
| Payton Letko         | O8.2                |
| Yutong Li            | P23                 |
| Minzhao Liu          | P27, P29, P38       |
| Ziyan Liu            | P36, O3.1           |
| David Nico Lopez     | P27, P28, P29, O3.1 |
| Heidi (Trang) Luu    | O3.2                |
| Shenyu (Cooper) Lyu  | P5, O11.1           |
| Maksymilian Malec    | P35                 |
| Rachel Maurer        | P7                  |
| Meghán McGarrity     | ES P3.1             |
| Kate McHugh          | P42                 |
| Jack McKermitt       | P11                 |
| Michael Messer       | ES P3.4             |
| Nicholas Milcik      | P28                 |
| Michael Modaff       | O3.1                |
| Catherine Mojsiewicz | ES P1.7             |
| Jennifer Murphy      | ES P1.6             |
| Andrew Neeley        | O12.1               |
| Chaeptr Negro        | O1.3                |

| Name               | Order          |
|--------------------|----------------|
| Victoria Nemchek   | P25            |
| Anjali Nimavat     | P3             |
| Katie North        | P22, P39       |
| Alexis Obert       | ES P3.2, O4.2  |
| Kaitlyn O'Brien    | ES P1.3, O10.3 |
| Nathalie Orozco    | P30            |
| Lorren Pack        | O7.1           |
| Alexander Palacios | P11            |
| David Park         | P24            |
| Ria Patel          | O1.1           |
| Manish Pathuri     | P15            |
| Jinyu Peng         | ES P3.3        |
| Binh Phan          | P39            |
| Taylor Plantan     | O9.3           |
| Danielle Ponsot    | O8.3           |
| Teagan Potter      | O5.3           |
| Anna Poulton       | O11.2          |
| Nicolina Purpura   | O3.3           |
| Jackson Rapala     | P13            |
| Robert Reichert    | P18            |
| Michelle Rekowski  | O9.2           |
| Jonathan Rink      | P6             |
| Olivia Ruff        | ES P3.6        |
| Richa Sapkota      | P32            |
| Oscar Schmidt      | P11            |

|                  |            |
|------------------|------------|
| Mark Siegel      | P34        |
| Kylie Spiegel    | P3         |
| Ellen Stumph     | P46        |
| Xiaoyu Tang      | ES P1.5    |
| Katharine Teykl  | O6.3       |
| Rachel Tomazin   | P43        |
| Saralexia Torres | P8         |
| Katie Vogler     | P12        |
| Niyant Vora      | P41, O10.2 |
| Chaoqiuyu Wang   | P16        |
| Patrick Ward     | O11.3      |
| Lane Warren      | P15        |
| Ning Wei         | ES P1.2    |
| Grant Werner     | P44        |
| Minji Will       | Music      |
| Jacob Williams   | P21        |
| Saylor Williams  | P13        |
| Emily Wilkes     | Art        |
| Luke Witteveen   | ES P1.4    |
| Julie Xu         | O1.1       |
| Lauren Yep       | P17        |
| Shiyi Yuan       | P32        |
| Lauren Zanoni    | ES P1.1    |
| Ruihan Zhang     | P22, P39   |
| Elise Ziegenhorn | P14        |
| Samantha Ziomek  | P10        |

## Presentations Organized by Area of Study

| Area                 | Name                | Project Title  |
|----------------------|---------------------|--|
| <b>Anthropology</b>  | Chaepther Negro     | Rice Terrace Degradation in Ifugao: Causation and Cultural Preservation Through Community-Based Solutions  |
| <b>School of Art</b> | Macy Grant          | Seniort Art Show   |
|                      | Lixuan (Lucy) He    | Seniort Art Show   |
|                      | Emily Wilkes        | Seniort Art Show   |
| <b>Biology</b>       | Emmett Agting       | Bacteriophage Zahn: Making Waves as a Singleton  |
|                      | Seth Borrowman      | Ingestion and assimilation of dissolved organic matter by feeding larvae of the families Chaetopteridae, Magelonidae, Polygordiidae, Sabellariidae, and Spionida (Annelida) and the Sipuncula. |
|                      | Vanessa Chapa       | Harboring Hartney: Making a Splash in Cluster B  |
|                      | Julia Chen          | A Novel Bacteriophage Capable of Jumping Between Marine and Freshwater Hosts   |
|                      | Matthew Crosse      | Sucha Journey: The Path to Isolating, Purifying, Characterizing, and Annotating Sucha the Phage  |
|                      | Ivy Do              | Sucha Journey: The Path to Isolating, Purifying, Characterizing, and Annotating Sucha the Phage  |
|                      | Maeghan Eaker       | Harboring Hartney: Making a Splash in Cluster B  |
|                      | Emily Erdmann       | Elbi and Stepo: Two Novel Cyanobacteriophages that Infect the Filamentous, Heterocyst-Forming Cyanobacterium Anabaena  |
|                      | Lilia Garcia        | Backyard Heroes: Soil Bacteria Fighting Antibiotic Resistance  |
|                      | Noah Haskin         | Relative Abundance and Habitat Associations of American Badgers ( <i>Taxidea taxus</i> ) and Plains Pocket Gophers ( <i>Geomys bursarius</i> ) in McLean County, Illinois                      |
|                      | Quinn Higginbotham  | Assimilation of Bacteriophages by Marine Invertebrate Larvae (Annelida, Echinodermata, and Mollusca)   |
|                      | Rosemary Josenkoski | Determination of Host Range Variation between Highly Related Members of a Novel Cluster of <i>Rhodobacter capsulatus</i> Bacteriophages  |
|                      | Brooke Koebele      | Determination of Host Range Variation between Highly Related Members of a Novel Cluster of <i>Rhodobacter capsulatus</i> Bacteriophages  |
|                      | Shenyu (Cooper) Lyu | A New Species of <i>Pristimantis</i> (Amphibia: Anura: Strabomantidae) From the Puna of Northern Peru  |
|                      | Shenyu (Cooper) Lyu | Drinking with Your Kidney: Seawater Ingestion by Starfish Larvae Through the Hydropore   |
|                      | Rachel Maurer       | Elsker: A New Bacteriophage to Combat Antibiotic Resistant Enterobacter  |
|                      | Jack McKermitt      | Relative Abundance and Habitat Associations of American Badgers ( <i>Taxidea taxus</i> ) and Plains Pocket Gophers ( <i>Geomys bursarius</i> ) in McLean County, Illinois                      |

|                     |                    |   |
|---------------------|--------------------|---|
|                     | Anjali Nimavat     | Bacteriophage Zahn: Making Waves as a Singleton   |
|                     | Alexander Palacios | Relative Abundance and Habitat Associations of American Badgers ( <i>Taxidea taxus</i> ) and Plains Pocket Gophers ( <i>Geomys bursarius</i> ) in McLean County, Illinois |
|                     | Ria Patel          | A Novel Bacteriophage Capable of Jumping Between Marine and Freshwater Hosts  |
|                     | Manish Pathuri     | Wrangling Warren: A Phage Discovery   |
|                     | Anna Poulton       | A New Terrestrial-Breeding Frog (Strabomantidae: <i>Pristimantis</i> ) From Northern Peru   |
|                     | Jackson Rapala     | The Discovery Of <i>Rhodobacter capsulatus</i> Phage Kemmy through Isolation and Genomic Analysis   |
|                     | Jonathan Rink      | Effects of Phase Polarity and Charge Balance of Spinal Cord Stimulation on Behavior and Gene Expression in a Rat Model of Neuropathic Pain                                |
|                     | Oscar Schmidt      | Relative Abundance and Habitat Associations of American Badgers ( <i>Taxidea taxus</i> ) and Plains Pocket Gophers ( <i>Geomys bursarius</i> ) in McLean County, Illinois |
|                     | Kylie Spiegel      | Bacteriophage Zahn: Making Waves as a Singleton   |
|                     | Saralexis Torres   | Harboring Hartney: Making a Splash in Cluster B   |
|                     | Katie Vogler       | Sucha Journey: The Path to Isolating, Purifying, Characterizing, and Annotating Sucha the Phage   |
|                     | Lane Warren        | Wrangling Warren: A Phage Discovery   |
|                     | Saylor Williams    | The Discovery Of <i>Rhodobacter capsulatus</i> Phage Kemmy through Isolation and Genomic Analysis   |
|                     | Julie Xu           | A Novel Bacteriophage Capable of Jumping Between Marine and Freshwater Hosts  |
|                     | Elise Ziegenhorn   | Thyroid Hormone Accelerates Pericorneal Nerve Ring Formation and Leads to Precocious Corneal Innervation  |
|                     | Samantha Ziomek    | Investigation of the shared and divergent anatomical features of fishes from the superorder Characoidei   |
| <b>Business/DTE</b> | Ziyan Liu          | Analyzing the Mobile App Industry and the Market of Internet Memes with its Application   |
|                     | David Nico Lopez   | Analyzing the Mobile App Industry and the Market of Internet Memes with its Application   |
|                     | Michael Modaff     | Analyzing the Mobile App Industry and the Market of Internet Memes with its Application   |
| <b>Chemistry</b>    | Zhijia Geng        | Bismuth(III) bromide catalyzed 1,4-addition of indoles to chalcones   |
|                     | Richard Guingrich  | Bismuth(III) bromide catalyzed Michael addition of allyltrimethylsilanes to $\alpha,\beta$ -unsaturated ketones   |
|                     | Noah Haskin        | Bismuth(III) triflate catalyzed synthesis of substituted hexahydroimidazo[1, 2-a]pyridines  |
|                     | Robert Reichert    | Bismuth(III) bromide catalyzed Michael addition of allyltrimethylsilanes to $\alpha,\beta$ -unsaturated ketones   |
|                     | Chaoqiuyu Wang     | An Exploration of the Antioxidative Effect of Common Spices in Black Tea  |
|                     | Lauren Yep         | Bismuth(III) bromide catalyzed 1,4-addition of indoles to chalcones   |

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|----------------------------|----------------------|---|
| <b>Economics</b>           | Heidi (Trang) Luu    | International migration and FDI: Can migrant networks foster homeward investments?                |
| <b>Educational Studies</b> | Kevin Butler         | A Brief Review of Research on Forms of Instruction  |
|                            | Emma Dalton          | Brain Breaks in the Elementary Classroom  |
|                            | Ellie Giannakopoulos | Engaging in Student Choice  |
|                            | William Heidenreich  | The Effectiveness of Differentiated Instruction in a Multi-modal Summative Assessment             |
|                            | Maribeth Johnson     | Teacher Participation in Professional Development and its Contribution to School Improvement      |
|                            | Linh Le              | Learning About Love: Healthy Relationship Education and Program Outcomes in Adolescents           |
|                            | Meghán McGarrity     | Flex on this! Flexible seating in the classroom   |
|                            | Michael Messer       | 1:1 Technology Integration  |
|                            | Catherine Mojsiewicz | Reader's Theater and Its Effects on Students  |
|                            | Jennifer Murphy      | Positive Relationships in the Classroom   |
|                            | Alexis Obert         | Engaging Behavior: Standards-Based Grading in the Secondary ELA Classroom                         |
|                            | Kaitlyn O'Brien      | A Noteworthy Study: Music in the Spanish Classroom  |
|                            | Jinyu Peng           | English language learning and teaching  |
|                            | Olivia Ruff          | Disciplinary Literacy: Providing Students with the Literacy Tools to Succeed Across Disciplines   |
|                            | Xiaoyu Tang          | No More Tragedies: Adolescent Suicide Facts and Prevention  |
|                            | Ning Wei             | The Power of Arts: Contribution of Arts-based Education on Children's Learning in the Early Years |
|                            | Luke Witteveen       | Points vs. Mastery: The Effects of Standards Based Grading  |
|                            | Lauren Zanoni        | Fostering Engagement Through Inquiry-Based Learning   |
| <b>English</b>             | Adam Cady            | La Batalla de Ideas Continua: The Revolutionary Writings of Jose Martí                            |
|                            | Mark Dezell          | Sudden Identity Crisis  |
|                            | Katelyn Hailey       | Losing God to Find Equality: Feminist Essays and the Departure from Religion                      |
|                            | Kathryn Halford      | Unreadable Texts and Digital Literature: Searching for Meaning in House of Leaves                 |
|                            | William Heidenreich  | An Audience of two: Kurt Vonnegut and the Textual Portrayals of his Greatest Influences           |
|                            | Abigail Kauerauf     | Clear but Bone-Cracking Cold: Nature, Danger, and Noir in Winter's Bone and Wind River            |
|                            | Payton Letko         | The Strong Shojo: Hayao Miyazaki's Feminist Characters in Cultural Context                        |

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|--|--------------------|---|
|  | Alexis Obert       | Picturing Death: Death and Grief in Children's Picture Books  |
|  | Danielle Ponsot    | Centrifuge: Balancing Priorities in Out of Orbit  |
| <b>Environmental Studies</b>           | Jacob Williams     | Estimating Stream Flow from Rainfall Runoff as a Tool for Predicting Variability in Freshwater Mussel Surveys   |
| <b>German Studies</b>                  | Abigail Kauerauf   | Neither Heroes nor Traitors: Babylon Berlin and the Experiment of the Weimar Republic   |
|  | Niyant Vora        | Words, Thoughts, and Mental Illness   |
| <b>Greek and Roman Studies</b>         | Brent Baughan      | Gender Identity and Hegemony in Roman Society   |
|  | Michelle Rekowski  | The Essential Outcasts: Infames in the Roman Empire   |
| <b>Hispanic Studies</b>                | Kaitlyn O'Brien    | Consecuencias del Sistema (Societal Consequences)   |
|  | Nathalie Orozco    | Suicide Rates in Hispanic Female Adolescents  |
| <b>History</b>                         | Brandon Chopp      | Absolutely Free? Frank Zappa's Musical Assault on American Conformity, 1966-1968  |
|  | Nicolina Purpura   | The Truth Behind the Disability   |
| <b>International Studies</b>           | Josephina Blumberg | Women monitoring women: Participatory monitoring and evaluation of women's empowerment organizations funded by private-sector and international aid donors in post-conflict countries |
|  | Ann Crumbaugh      | Fueling the Brewery, Feeding the Poor: Cassava Commercialization and Food Insecurity in Rural Zambia  |
|  | Teagan Potter      | The Divergence Between Disability and Literature in Latin America: Examining the Lack of Disability Representation in Children's Literature in an Othered and Stigmatized World       |
| <b>Literature and Cultural Studies</b> | Taylor Plantan     | Karolina Pavlova: From the 19th Century Literary Salon to the Literary Canon  |
| <b>Mathematics</b>                     | Yutong Li          | Nowhere-zero group irregular labelings of graphs  |
|  | Patrick Ward       | Multidecompositions of Complete Directed Graphs into Directed Graph Pairs   |
| <b>School of Music</b>                 | Charles Franz      | I Need a Camera: Wico's Yankee Hotel Foxtrot and the American Folk Music Tradition  |
|  | Mitchell Galgan    | Solar Chips, A Work for Solo Double Bass  |
|  | Minji Will         | Mono no aware   |



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|----------------------------------|-------------------|--|
|                                  | Katharine Teykl   | Horses, Gunshots, and Saloons: The Portrayal of the American West in Libby Larsen's Songs from Letters   |
| <b>Neuroscience Program</b>      | Kaylee Braun      | The Effects of Spinal Cord Stimulation on Physical and Social Pain   |
|                                  | Victoria Nemchek  | The Effects of Intermittent Training on Recovery of Fine Motor Control and Synaptic Plasticity in a Mouse Model                                  |
|                                  | David Park        | The Effect of Spinal Cord Stimulation For Chronic Pain Treatment   |
| <b>School of Nursing</b>         | Amy Clapp         | Effects of Weighted Blankets on College Students' Anxiety  |
|                                  | Andrew Coop       | Nursing Students' Knowledge of Alcohol-Interactive Medications   |
| <b>Physics &amp; Engineering</b> | Philip Andrango   | Engineering with DNA   |
|                                  | Tao (Paul) Jin    | Scanning Single Photon Detector Implementation of Quantum "Ghost Imaging"  |
|                                  | Tao (Paul) Jin    | A Computational Approach to Analysing the Magnetization of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice                  |
|                                  | Tao (Paul) Jin    | A Computational Approach to the Analysis of Magnetoresistance Signatures of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice |
|                                  | Paul Johnson      | Generating Ultrasonic Acoustic Holograms with Circular Arrays  |
|                                  | Minzhao Liu       | Scanning Single Photon Detector Implementation of Quantum "Ghost Imaging"  |
|                                  | Minzhao Liu       | A Computational Approach to Analysing the Magnetization of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice                  |
|                                  | Minzhao Liu       | A Computational Approach to the Analysis of Magnetoresistance Signatures of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice |
|                                  | Ziyan Liu         | Optical Fourier Analysis Using a DMD   |
|                                  | David Nico Lopez  | A Computational Approach to Analysing the Magnetization of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice                  |
|                                  | David Nico Lopez  | A Computational Approach to the Analysis of Magnetoresistance Signatures of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice |
|                                  | David Nico Lopez  | Mathematical Models and Computer Simulations of Telomere Shortening  |
|                                  | Maksymilian Malec | A Pedagogical Look at Kirkwood Gaps  |
|                                  | Nicholas Milcik   | Mathematical Models and Computer Simulations of Telomere Shortening  |
|                                  | Katie North       | Accuracy and Precision of a Custom Instrument that Studies Cosmic Analog Dusts   |
|                                  | Katie North       | Terahertz absorption spectra of silicate cosmic analog dusts using a novel spectrometer  |

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|-------------------------------|----------------|---|
|                               | Binh Phan      | Terahertz absorption spectra of silicate cosmic analog dusts using a novel spectrometer   |
|                               | Richa Sapkota  | Exploration of Devices for Tailoring Laser Light  |
|                               | Mark Siegel    | Machine Vision applied to the Micro World   |
|                               | Shiyi Yuan     | Exploration of Devices for Tailoring Laser Light  |
|                               | Riuhan Zhang   | Accuracy and Precision of a Custom Instrument that Studies Cosmic Analog Dusts  |
|                               | Riuhan Zhang   | Terahertz absorption spectra of silicate cosmic analog dusts using a novel spectrometer   |
| <b>Political Science</b>      | Lorren Pack    | Rape Myth Effects on Juror Decisions in Deliberations of Rape Cases: How Rape Myths Affect Jury Deliberations                                 |
| <b>Psychology</b>             | Jillian Cole   | Altered Paw Pain Thresholds due to Different Spinal Cord Stimulation Parameters   |
|                               | Kyle Cook      | The effects of observing aggression and affiliation on domestic dog behavior  |
|                               | Kate McHugh    | Sherlock Bones: Deductive Reasoning in Dogs?  |
|                               | Ellen Stumph   | This or that?: Object individuation in domesticated dogs ( <i>Canis familiaris</i> )  |
|                               | Rachel Tomazin | Task Specificity & Functional Outcome: What is best for Post-Stroke Rehabilitation?   |
|                               | Niyant Vora    | On the Nature of Synesthesia: A Learned Association or Something More?  |
|                               | Grant Werner   | The appeal of crime podcasts  |
| <b>Sociology</b>              | Mary Breeden   | LGBTQIA+ Campus Climate at a Small Liberal Arts University: An Exploratory Study with the Aim of Improving the Environment for Queer Students |
|                               | Lisa Cheng     | Social Movements: Analyzing Factors Affecting Movement Participation among College Students   |
| <b>School of Theatre Arts</b> | Andrew Neeley  | Comedy, Kardashians, and Capitalism: The Effect of Ladyish  |

## School of Art

### BA/BFA Senior Exhibition Presentations

3:00 p.m. Merwin and Wakeley Galleries

Student Presenters:

Macey Grant

Emily Wilkes

Lixuan (Lucy) He

Refreshments will be served.

## Music Composition Student Presentations

### Young Main Lounge, Memorial Student Center

(as part of the conference luncheon program)

Solar Chips

Mitchell Galgan '19

- i. Whole Grain Zesty Tomato Chips
- ii. It's the 17<sup>th</sup> hole, and I'm chipping for Octuple Bogey
- iii. Craig, he likes chips. a lot. it tore his family apart.

Mitchell Galgan, bass

Mono no Aware

Minji Will '19

Minji Will, voice, guitar  
Daria Dodonova, Isabella Lu, violin  
Bailey Knowles, viola  
Chaepter Negro, cello  
Mitchell Galgan, bass  
Jonah Kilma, drums

# Music Composition Student Presentations

## **Solar Chips, A Work for Solo Double Bass**

Mitchell Galgan, and David Vayo\*  
School of Music, Illinois Wesleyan University

Solar Chips (2018) is a three movement work for solo double bass. The piece displays the wide expressive range of the instrument, utilizing extended techniques such as snap pizzicato, bowing underneath the bridge, and the use of tremolo to mimic TV static or white noise. The work was composed through a series of recorded improvisations, which were edited and pieced together into the final product. The titles of each movement were also improvised around the theme of “chips”. Movement I., “Whole Grain Zesty Tomato Chips”, uses odd meters and uneven phrasing to capture the bright sensation of biting into a zesty, flavored chip. Movement II., “It’s the 17<sup>th</sup> Hole, and I’m Chipping for Octuple Bogey” is a slow lament, painting a picture of what one might feel near the end of a disastrous round of golf. Lastly, movement III., “Craig, he likes chips. a lot. it tore his family apart”, tells the story of an addict, a chip addict, and the strained relationships his addiction causes. The fast tempo and jagged rhythms bring the work to a searing conclusion.

## **Mono no aware (Unblossomed)**

Minji Will and David Vayo\*  
School of Music, Illinois Wesleyan University

Mono no aware (物の哀れ), translates literally to "the pathos of things." It is a Japanese term for the awareness of impermanence or fleetingness of things. A feeling of gentle sadness at their passing, and a more pronounced sadness about this state being the reality of life. This song (written for voice, electric guitar, electric bass, drumset, and string quartet), is inspired by Japanese cherry trees, and how their beautiful blossoms last about one week. It is also inspired by one of my favorite childhood books: The Giving Tree. It uses the image of a person resting against, and being understood and nourished by, a tree. In the second half of the piece, the music intensifies as the person realizes the tree itself has lost its ability to blossom—a part of it has died. This is a metaphor for relationships where one person gives so much of themselves to benefit another that they lose a part of themselves in the process.

# Oral Presentations

## Center for Natural Sciences, Rooms E101-E106

### 10:00-11:00 a.m. Sessions 1-6

#### Session 1 – Room E101

*Biology & Anthropology*

10:00 (1.1) Julia Chen, Ria Patel, Julie Xu

10:15 (1.2) Emily Erdmann

10:30 (1.3) Chaeptr Negro

#### Session 2 – Room E102

*Nursing & Educational Studies*

10:00 (2.1) Amy Clapp

10:15 (2.2) Andrew Coop

10:30 (2.3) Kevin Butler

#### Session 3 – Room E103

*Business/DTE & Economics & History*

10:00 (3.1) Ziyan Liu, David Nico Lopez, Michael Modaff

10:15 (3.2) Heidi (Trang) Luu

10:30 (3.3) Nicolina Purpura

#### Session 4 – Room E104

*English*

10:00 (4.1) Adam Cady

10:15 (4.2) Alexis Obert

10:30 (4.3) Abigail Kauerauf

#### Session 5 – Room E105

*International Studies*

10:00 (5.1) Josephina Blumberg

10:15 (5.2) Ann Crumbaugh

10:30 (5.3) Teagan Potter

#### Session 6 – Room E106

*History & Music*

10:00 (6.1) Brandon Chopp

10:15 (6.2) Charles Franz

10:30 (6.3) Katharine Teykl

### 11:00 a.m.-12:00 p.m. Sessions 7-12

#### Session 7 – Room E101

*Political Science & Sociology*

11:00 (7.1) Lorren Pack

11:15 (7.2) Mary Breeden

11:30 (7.3) Lisa Cheng

#### Session 8 – Room E102

*English*

11:00 (8.1) Kathryn Halford

11:15 (8.2) Payton Letko

11:30 (8.3) Danielle Ponsot

#### Session 9 – Room E103

*Greek and Roman Studies & Literature and Culture Studies*

11:00 (9.1) Brent Baughan

11:15 (9.2) Michelle Rekowski

11:30 (9.3) Taylor Plantan

#### Session 10 – Room E104

*German Studies & Hispanic Studies*

11:00 (10.1) Abigail Kauerauf

11:15 (10.2) Niyant Vora

11:30 (10.3) Kaitlyn O'Brien

#### Session 11 – Room E105

*Biology & Mathematics*

11:00 (11.1) Shenyu (Cooper) Lyu

11:15 (11.2) Anna Poulton

11:30 (11.3) Patrick Ward

#### Session 12 – Room E106

*School of Theatre Arts & English*

11:00 (12.1) Andrew Neeley

11:15 (12.2) William Heidenreich

11:30 (12.3) Katelyn Hailey

Presentations are 12-15 minutes in length. There will be 15 minutes designated for a question-and-answer period for all presenters following the final presentation.

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

## Oral Presentation O1.1

### **A Novel Bacteriophage Capable of Jumping Between Marine and Freshwater Hosts**

Julia Chen, Ria Patel, Julie Xu and Richard Alvey\*  
Biology Department, Illinois Wesleyan University

Understanding how viruses evolve when moving from host to host is an important area of study in ecology and epidemiology. Previously, a novel bacteriophage, Xuper, was isolated and characterized using the host *Rhodobacter capsulatus*, a bacterium that lives in freshwater environments. This bacteriophage was particularly interesting due to many distinguishing features: a unique prolate capsid, a DNA genome that is the largest of any known *R. capsulatus* phage, and the fact that it has no known relatives in our collection of viral isolates. However, we recently discovered that Xuper does have a remarkable similarity to two bacteriophages that infect *Ruegeria pomeroyi*, a bacterium that lives in marine environments. In examining the ability of Xuper to also infect this alternative host, we found that although it was capable of infecting this host, it was significantly less efficient in doing so. Through sequential plating experiments, we generated Xuper mutants that were better adapted for infecting the marine host than their freshwater isolation host, and the mutations responsible for these changes were identified using DNA sequencing. These findings will help to elaborate on mechanisms of host switching, phage evolution, and may begin to help us define functions for newly discovered phage genes.

## Oral Presentation O1.2

### **Elbi and Stepo: Two Novel Cyanobacteriophages that Infect the Filamentous, Heterocyst-Forming Cyanobacterium Anabaena**

Emily Erdmann and Richard Alvey\*  
Biology Department, Illinois Wesleyan University

Cyanobacteria, a phylum of photosynthetic bacteria, play an important ecological role in aquatic environments by providing a source of fixed carbon and nitrogen that food webs rely heavily upon. Cyanophages are invisible viral parasites that infect cyanobacteria and help balance the dynamics of the cyanobacteria population. One cyanobacterium, Anabaena, is of special interest in cyanophage research due to its filamentous nature and its ability to form heterocysts, specialized nitrogen-fixing cells. A few Anabaena-infecting cyanophages were discovered and analyzed in the 1970s, but since then the field has remained understudied. Here, two novel cyanophages, Elbi and Stepo, that infect Anabaena were discovered and isolated. These two phages differ in both their morphology and plaque morphology. The double-stranded DNA genome of one of the phages was extracted, purified, and sent for sequencing. The sequence was analyzed and compared with previously published cyanophage genomes. Additionally, the infection process of both cyanophages was observed via time-lapse light microscopy. The results of this imaging suggest that cyanophage infection of Anabaena proceeds down the filament from one cell to the next and that heterocysts are resistant to either phage infection or the associated cell lysis.

### Oral Presentation O1.3



#### **Rice Terrace Degradation in Ifugao: Causation and Cultural Preservation Through Community-Based Solutions**

Chaepter Negro and Rebecca Mafazy\*

Anthropology Department, Illinois Wesleyan University

The Cordilleran rice terraces of Northern Luzon, Philippines, are a testament to Filipino ingenuity and remain an important social-ecological system within highland indigenous communities. Ifugao, one of six Cordillera Administrative Region (CAR) provinces, is best known for its expansive and World Heritage Site recognized rice terraces, and has been a popular tourist destination in the Philippines for the past twenty years. According to local rice farmers, though, the terraces in Ifugao are quickly becoming degraded, as a series of external and internal factors have placed pressure on the indigenous community. Drawing from anthropological, ecological, and historical sources, I examine the agendas of different rice terrace stakeholders and their solutions to end terrace degradation. I analyze the effects of rural out-migration, eco-tourism, and climate change to pinpoint the root cause of terrace degradation, heavily relying on the insider perspectives of indigenous Ifugao farmers. Ultimately, I create an academic space where the most important rice terrace stakeholders, the farmers, are able to express their anxieties concerning terrace degradation and propose community-based solutions.

### Oral Presentation O2.1

#### **Effects of Weighted Blankets on College Students' Anxiety**

Amy Clapp and Noël Kerr\*

School of Nursing, Illinois Wesleyan University

**Background:** College students lack resources to alleviate anxiety, which may have a negative impact on academic success and sleep. Therapies such as weighted blankets may provide relief, but information about the use of weighted blankets for students is lacking.

**Purpose:** To compare the effect of weighted versus standard blankets on anxiety, sleep, and GPA in a sample of undergraduate students.

**Conceptual framework:** Students self-identified as having anxiety. Measurements were operationalized through the Overall Anxiety Severity and Impairment Scale (OASIS).

**Methods:** A pilot study using a randomized, controlled design was conducted. Participants (N=36) identified as belonging to one of three groups: having anxiety and taking medication, having anxiety and not taking medication, and not experiencing anxiety. Participants were randomly assigned to use a weighted or standard blanket throughout the fall 2018 semester, and completed three online surveys including items about sleep and the OASIS. SPSS will be used to analyze descriptive, bivariate, and parametric statistics.

**Findings:** The findings will be completed before the JWP research conference.

**Conclusions:** The findings may provide insight into how complementary and alternative therapies could be aligned with care provided for students by university health and counseling services, and evidence-based practice in mental health nursing.

## Oral Presentation O2.2

### **Nursing Student's Knowledge of Alcohol-Interactive Medications**

Andrew Coop and Carolyn Jarvis\*, Ann Eckhardt\*, Victoria Folsie\*, Brad Sheese\*  
School of Nursing, Illinois Wesleyan University

In 2018, nearly 57% of American adults reported drinking alcohol in the past month and 41.5% also reported taking alcohol-interactive (AI) medications. Consuming alcohol and medications concurrently may result in adverse effects. The purpose of this study was to determine whether a one-hour lecture about AI medications was effective in teaching a class of undergraduate nursing students ( $N = 50$ ) at a small Midwestern university. The Jarvis Nursing Knowledge of Alcohol-Interactive Medications survey was distributed in August at the beginning of the semester and again 2 weeks post lecture. Students scored significantly higher on the posttest ( $27.47 \pm 14.18$  vs.  $37.33 \pm 16.60$ ;  $p < .02$ ). While scores increased significantly, students failed to recognize the correct medication-alcohol interaction consistently. A one-hour lecture emphasizing AI medications in the pre-licensure program enhanced students' knowledge; however, future research is needed to determine retention of AI medication knowledge.

## Oral Presentation O2.3



### **A Brief Review of Research on Forms of Instruction**

Kevin Butler and Emily Kelahan\*  
Educational Studies, Illinois Wesleyan University

In colleges of education, there is very strong support for minimally-guided instruction. This form of teaching is based around being a “guide on the side” as opposed to a “sage on the stage” – in other words, direct instruction of one’s students is seen as ineffective or even harmful, whereas instructional approaches based on encouraging students to teach themselves and construct their own knowledge with the teacher acting solely as a “facilitator” is seen as best practice. Despite the prevalence of this viewpoint amongst most education professors, there is very little evidence for its effectiveness. In fact, minimally-guided instruction can be quite harmful – it tends to widen the achievement gap between white students and students of color, and between high-income students and low-income students. It also leads to lower overall academic achievement and life success when compared with the results of directly instructing one’s students. This project summarizes the extensive research literature from the past several decades regarding which teaching strategies are most and least effective.



### Oral Presentation O3.1

#### **Analyzing the Mobile App Industry and the Market of Internet Memes with its Application**

Ziyan Liu, David Nico Lopez, Michael Modaff and Tara Gerstner\*  
Business Administration Department, Illinois Wesleyan University

Internet memes are humorous and viral content, predominantly shared by millennials and generation Z, that reflect contemporary social and political themes. They have exponentially thrived through the globalization of mobile apps and social demographic shifts. However, according to our study, although nearly all college students have participated in the creation of memes, most of them use social networks that are not specifically intended to share them. Consequently, there is an underlying difficulty in finding an ideal platform to generate, share, and enjoy this creative outlet. As a culmination of our research, we developed a centralized system for the creation and communication of internet memes. Caption\_It, is an app coded in Swift and Java that attempts to provide a unified platform for the viralization of memes, and, consequently, helps us better understand and even contribute to these social phenomena.

### Oral Presentation O3.2



#### **International migration and FDI: Can migrant networks foster homeward investments?**

Heidi (Trang) Luu and Ilaria Ossella-Durbal\*  
Economics Department, Illinois Wesleyan University

With the growing trend and magnitude of international migration, research efforts looking at the economic impact of migrants have also increased in number. They point towards several positive effects on both the destination country and origin country's economies. In line with this body of work, the influence of migrants on FDI coming from the destination countries to the origin countries cannot be overlooked, as FDI can play an essential role in the origin countries' economic development. This impact has been hypothesized to be positive in the existing literature due to migrant networks' ability to reduce information and transaction costs and break down certain investment-related barriers. Through a regression analysis on a panel dataset extending the period from 2000-2017, this paper will estimate the above relationship, focusing on how migrants in the US influence FDI coming from the US to their origin countries. The regression builds upon standard FDI determinant and gravity models, using data on foreign-born population from the US Census Bureau for 86 countries of origin and data on stocks of US FDI to those countries from the Bureau of Economic Analysis. The results of this paper will inform international efforts to collaborate on policies regarding migration and economic development.



### Oral Presentation O3.3

#### **The Truth Behind the Disability**

Nicolina Purpura and Jim Matthews\*  
History Department, Illinois Wesleyan University

In our society, disabilities have always been seen as detrimental ailments that keep people from integrating themselves into what we call "normalcy." However, is the disability really as problematic as we make it out to be? In this paper, I will argue that the real problem with having a disability is the negative perception that society has toward differences. I will start out by analyzing Thérèse-Adèle Husson, a young woman in nineteenth-century France who was an independent, intelligent author who also happened to be blind. I will analyze the radical views she had pertaining to the idea that disabilities are really a social construct, and people who consider themselves as non-disabled continue to reinforce this by lowering expectations and negatively perceiving their disabled counterparts. Finally, I will argue the treatment of disabled people today is not much different from Husson's experiences; thus, Husson's views may have been ahead of her time, but as time has passed, we have failed to address those views, and we must address them to create true equality.

### Oral Presentation O4.1

#### ***La Batalla De Ideas Continua: The Revolutionary Writings of Jose Martí***

Adam Cady and Molly Robey\*  
English Department, Illinois Wesleyan University

A larger-than-life founding figure essential to Cubans' national identity, 19<sup>th</sup> century writer and revolutionary Jose Martí has come to occupy an enormous space in the Cuban cultural consciousness. Many contemporary scholars note, however, that the ruling communist government's propagandistic depictions of Martí as an absolute opponent of American society and imperialism—a "national hero" whose ideological legacy coincides perfectly with the leftist values of the midcentury Cuban Revolution—are ultimately reductive, simplifying what is otherwise a dense and complicated worldview. At the same time, this tendency of modern scholarship to distance Martí's legacy from that of Fidel Castro and the Revolution has had the similarly misleading effect of suggesting that Martí's body of work is not only ideologically distinct from, but actually opposed to, the values of the Communist Party of Cuba. It is my contention that Martí's writings exist as part of the same ideological progression that inspired the Cuban Revolution of the 1950s, though the writer's anti-American, anti-imperialist, anti-capitalist messaging is much less straightforward than the revolutionary government has claimed.

## Oral Presentation O4.2

### **PICTURING DEATH: DEATH AND GRIEF IN CHILDREN'S PICTURE BOOKS**

Alexis Obert and Molly Robey\*  
English Department, Illinois Wesleyan University

For my project, I am analyzing the representation of death in children's picture books. The overall argument of my project is that by tracing the history of picture books and looking at the psychology of how children cope with death, it is clear to see that using picture books to discuss death is an effective method that is beneficial to children. The first section of my paper traces the history of picture books, detailing when they first become a mainstream genre and when topics such as death began appearing in them. The second section gives context by summarizing the books that I have chosen to examine. *Ida, Always*, written by Caron Levis, discusses death by using polar bears and calming artwork. *Cry, Heart, But Never Break*, written by Glenn Ringtved, imagines Death as a comforting character and uses sketch-style artwork. *Death Is Stupid*, written by Anastasia Higginbotham, talks about the messy and hurtful reality of death, using found objects to create pictures. In the third and final section of this paper, I analyze the stories and the artwork in order to discover through what means picture books are effective at conveying death appropriately.

## Oral Presentation O4.3

### **Clear but Bone-Cracking Cold: Nature, Danger, and Noir in *Winter's Bone* and *Wind River***

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

My research explores the role of environment in the rural noirs *Winter's Bone* (2006) and *Wind River* (2017). In this paper, I address the pride the protagonists feel towards their land, the reality of the oppressive forces of such lands, and how the personification of nature in these texts exemplifies noir. My argument is that Ree Dolly and Cory Lambert must respectively navigate their deceptive neighbors, their tenuous grips on their livelihoods, and survive the oppressive forces of their surroundings. Only when Ree and Cory understand their role in the natural world can they attempt to remedy their social world. I first establish my rural noir framework in order to analyze the land-locked contexts depicted in the texts and how nature further inhibits the protagonists from contentment. Then, I analyze the texts' pivotal revelations, when the protagonists realize they must surrender themselves to nature in order to survive.



#### Oral Presentation O5.1

### **Women monitoring women: Participatory monitoring and evaluation of women's empowerment organizations funded by private-sector and international aid donors in post-conflict countries**

Josephina Blumberg and William Munro\*  
International Studies, Illinois Wesleyan University

This research examines how the monitoring and evaluation (M&E) approaches of a private foundation and international donor agency shape the rhetoric and the contextual setting in which women's empowerment organizations operate. Current scholarly literature highlights the failings of women's empowerment indexes used in M & E, specifically the difficulty in achieving inclusive participation for women due to the exclusion of local stakeholders from shaping the measurable indicators and ultimate priorities. The differences in the implementation of various women's empowerment indexes has been linked to the concept of political accountability and motivations of donors. Projects financed by the Ford Foundation and USAID are selected as case studies because of the donors' instrumental role in supporting women's empowerment programs and their participation in international conferences in the 1990's, which signal a shift in focus on women's empowerment within the development sector. To understand the M&E approaches used by these donors, the research examines this shift in the 1990's in the development discourse, which stresses aid effectiveness and a need to rethink monitoring and evaluation. This allows for a comparison of the impact of the Ford Foundation's and USAID's interpretations of evaluation approaches on the language and practice of women's empowerment organizations.

#### Oral Presentation O5.2



### **Fueling the Brewery, Feeding the Poor: Cassava Commercialization and Food Insecurity in Rural Zambia**

Ann Crumbaugh and William Munro\*  
International Studies, Illinois Wesleyan University

Since the global food crisis of 2008, increased awareness of global hunger has motivated a wave of efforts to reduce hunger in developing countries. Zambia, where over 48 percent of children under the age of five are stunted, is an especially urgent case. Hunger in Zambia is a complex issue compounded by the effects of poverty and climate change. Hunger and poverty disproportionately affect rural farming communities, where more than 80 percent of people live below the poverty line. One increasingly popular model for reducing rural poverty and food insecurity is to promote smallholder participation in agricultural value chains, and to support agro-processing. In 2016 Zambian Breweries launched a project to build a commercial cassava value chain in the Luapula region in order to feed its brewing plant in Ndola, Zambia's third largest city. This research examines the implementation of that project in order to evaluate its likely effect on rural food insecurity in Luapula Province.

Oral Presentation O5.3

**The Divergence Between Disability and Literature in Latin America: Examining the Lack of Disability Representation in Children's Literature in an Othered and Stigmatized World**

Teagan Potter and Scott Sheridan\*  
International Studies, Illinois Wesleyan University

This research highlights the correlation between disability and stigmatization in Latin America in a post-UN Convention on the Rights of Persons with Disabilities world. This nexus is highlighted through an interdisciplinary project combining both social sciences and the humanities by the examination of societal views, poverty, accessibility to education, Othering, and literature. How disability is handled at the educational level is a global issue, especially considering the majority of children with disabilities live in the developing world. Despite regulations presented by the UN both in its Convention and Sustainable Development Goals, governments are slow to adopt these principles into their legal framework which presents a seemingly endless cycle of prejudice and stigmatization that furthers the gap between children with disabilities and children without disabilities. While most Latin American countries agree that they should incorporate children with disabilities into their development plans, they also argue that incorporating these children is simply too expensive, and, therefore, other development goals take precedence. The lack of literature accurately representing children with disabilities in Latin America is in direct correlation to the stigmas surrounding the conditions and the oversight at the governmental level. However, research shows that the introduction of children's literature containing diverse characters, such as children with disabilities, influences young children's ability to empathize with peers who may appear to be different or who require special educational needs.

Oral Presentation O6.1



**Absolutely Free? Frank Zappa's Musical Assault on American Conformity, 1966-1968**

Brandon Chopp and W. Michael Weis\*  
History Department, Illinois Wesleyan University

Throughout his career, American composer Frank Zappa (1940-1993) expounded the potency of music in regard to the medium's inherent ability to enact critical assessments of society. Zappa's music exemplified many new possibilities in popular music that have influenced generations of musicians to push the boundaries of the media format. In the context of the Counterculture of the 1960s, Zappa utilized his initial, experimental rock albums, *Freak Out!* (1966), *Absolutely Free* (1967), and *We're Only in It for the Money* (1968), with his band, The Mothers of Invention, to demonstrate his vision for the United States during the 1960s and beyond. Although Zappa critiqued the country throughout his life, he never deviated far from what he expressed so explicitly within these three albums. Zappa employed his early musical output to lambaste conformist aspects of the United States in the 1950s and the resultant society, culture, politics, and music of the following decade, as well as to propound and to exemplify his individualist ideals in order to combat elements of conformity in the nation. This work focuses on the arguably most important period of Zappa, and expands upon the existing concepts and insufficient analyses of his early music.

## Oral Presentation O6.2

### **I Need a Camera: Wilco's Yankee Hotel Foxtrot and the American Folk Music Tradition**

Charles Franz and Molly Robey\*  
School of Music, Illinois Wesleyan University

Since its tumultuous creation and release in 2001, Wilco's *Yankee Hotel Foxtrot* has been seen as a landmark album of the 2000s, appearing on numerous music publications' lists of the best albums of the decade and of all time. It is also viewed as a radical departure from the band's roots in alternative country and folk music, due to its reliance on electronics and noise, unusual instrumentation, and unconventional song structures. This essay attempts to redefine *Yankee* as a confessional folk album: one that continues a tradition apparent in the work of musicians from Robert Johnson, Hank Williams, and Townes Van Zandt, among others.. Through introspective songwriting these artists reflect the troubled times in which they are living. By detailing his personal demons on *Yankee*, guitarist and principal songwriter Jeff Tweedy shines a light on some of the ills of America in the 21st century.

## Oral Presentation O6.3

### **Horses, Gunshots, and Saloons: The Portrayal of the American West in Libby Larsen's *Songs from Letters***

Katharine Teykl and Adriana Ponce\*  
School of Music, Illinois Wesleyan University

Libby Larsen's song cycle *Songs from Letters* is based upon letters that were purported to have been written by Calamity Jane to her daughter Janey. The letters describe her travels in the American West, her relationship with "Wild" Bill Hickok, as well as her own internal struggles and regret. However, in recent years, new scholarship related to the authorship of the letters has determined that the author of the letters was not Calamity Jane, but rather a woman named Jean McCormick, the woman who presented the letters as evidence that she was the daughter of Calamity Jane and Wild Bill Hickok. The musical imagery of the American West and Calamity Jane's emotions within the song cycle creates a new interpretation of the song cycle, one that is based on McCormick's imagination of Calamity Jane's experiences and emotions. It is through these images that we see a dramatic view of the life of Calamity Jane, and how *Songs from Letters* combines the ideas of both Larsen and McCormick to create this new interpretation of the song cycle.

Oral Presentation O7.1



**Rape Myth Effects on Juror Decisions in Deliberations of Rape Cases:  
How Rape Myths Affect Jury Deliberations**

Lorren Pack and Greg Shaw\*

Political Science Department, Illinois Wesleyan University

Members of juries hold bias, whether implicitly or explicitly. This study determines that jury members do not always change their bias after deliberations, especially in rape cases, but that some may change if they are challenged. Through pre-tests, jury deliberations, and post-tests this study monitored the participants' biases in order to determine if these biases affected their behavior during the deliberation. This study found that participants tended to self-censor, suppressing their rape biases, instead of stating them explicitly to the group. However, many of the participants did change their minds on the rape myths that were involved in the case and seemed to internalize an understanding of why the myths they had endorsed earlier were wrong.

Oral Presentation O7.2



**LGBTQIA+ Campus Climate at a Small Liberal Arts University:  
An Exploratory Study with the Aim of Improving  
the Environment for Queer Students**

Mary Breeden and Meghan Burke\*

Sociology Department, Illinois Wesleyan University

Research suggests that a significant portion of LGBTQIA+ individuals report that their sexual orientation and/or gender identity play a substantial role in choosing which postsecondary institution to attend; thus, it is incumbent upon institutions for higher education to assess their respective campus climates. This project evaluates LGBTQIA+ campus climate at a small, private, Midwestern liberal arts university. Utilizing a grounded theory approach, I interviewed my queer-identified classmates – selected via a combination of strategic and snowball sampling – about their experiences on campus. Through these discussions, I gained a better understanding of queer students' experiences within the classroom, extracurricular activities, living spaces, and elsewhere throughout the institution. Findings include a divide between cisgender and transgender or nonbinary participants' perceptions of campus climate, as well as incongruence in institutional policy and students' lived experiences. The information I gleaned from these interviews was then used to suggest ways for the university to better serve its LGBTQIA+ population.

Oral Presentation O7.3



**Social Movements: Analyzing Factors Affecting Movement Participation among College Students**

Lisa Cheng and Meghan Burke\*

Sociology Department, Illinois Wesleyan University

As the prevalence of social justice efforts and social movements has risen in today's political climate, activist groups are always searching for more participation. Because youth participation is crucial to the functioning of social movements, the aim of the current paper is to analyze the factors affecting attitudes and perceptions of social movements among young adults. I draw on survey data collected from students at a small, Midwestern liberal arts university to analyze the factors that may influence movement participation. I find that social movements that focus on issues such as human rights, women's rights, environmental justice, and equality for marginalized groups most strongly compel student participation. In addition, students were motivated to join social movements based on their beliefs and personal experiences. Social frame theory, social identity theory, and the impact of social media inform my analysis and the implications for my findings.

Oral Presentation O8.1

**Unreadable Texts and Digital Literature: Searching for Meaning in *House of Leaves***

Kathryn Halford and Molly Robey\*

English Department, Illinois Wesleyan University

Mark Z. Danielewski's avant-garde novel *House of Leaves* occupies a liminal space in the world of the book, emphasizing the materiality of texts while also engaging in components of hypertext, or literature that exists online and uses features of the internet to work with the plot. This essay analyzes the ways in which Danielewski challenges the boundaries of the realist novel as well as how physical texts can interact with and continue through digital spaces. Using critic Natalya Bekhta's five attributes of the readability of realist novels, this essay creates a metric by which to analyze *House of Leaves* stylistic divergences. This essay, like many before it, accepts that *House of Leaves* is unique from other texts; however, it questions what, specifically, Danielewski's text is different from and how using the realist novel as a foil can allow for greater elucidation of stylistic and thematic significance within the avant-garde text.



## Oral Presentation O8.2

### **The Strong *Shojo*: Hayao Miyazaki's Feminist Characters in Cultural Context**

Payton Letko and Molly Robey\*  
English Department, Illinois Wesleyan University

Hayao Miyazaki's films often feature strong female heroines and include generations of complex female characters in diverse roles, as both heroes and villains. Throughout his career, Miyazaki has created a plethora of feminist characters in his Japanese anime films. However, scholars have claimed that Miyazaki's heroines do not live up to the role of feminists, but instead act as ecological and environmental activists. I argue that these scholars are not considering the cultural context in which the films were made and are imposing Western feminism on these characters instead of recognizing Japanese feminism. My exploration of Hayao Miyazaki's background and views of his own female characters, highlights the disparities between Western and Japanese feminisms, and my analysis of Miyazaki's female characters within their cultural context displays how these female characters are indeed feminists. I intend for this work to demonstrate the importance of considering cultural context in a globalized world.

## Oral Presentation O8.3

### **Centrifuge: Balancing Priorities in *Out of Orbit***

Danielle Ponsot and Molly Robey\*  
English Department, Illinois Wesleyan University

The play *Out of Orbit* by Jennifer Maisel shows a realistic perspective of feminism. My paper will argue that the mother, Sara, will only be truly successful when she realizes that she cannot balance her family, her career and her love life. I will begin by defining a feminist character in theater criticism thus far, which I will compare and contrast to Sara. Then I will analyze the script through the categories Style, Structure/ Timeline, Characters, Story, Theme and Conflict to prove that all elements of the play support my argument. Finally, I will write a vision statement for how I would direct this play, emphasizing the unmanageable pressure placed on women to be "perfect." In our world today, women still struggle to be as successful as men in the workplace, but this play shows that overall balance is more important than extreme success in one aspect of life.

## Oral Presentation O9.1

### **Gender Identity and Hegemony in Roman Society**

Brent Baughan and Amanda Coles\*

Greek and Roman Studies, Illinois Wesleyan University

Roman society from the early Republican period to the Flavian Imperial dynasty (509BCE-96CE) relied on a system of complete cultural dominance of masculine actors to promote and maintain patriarchy, a process the Italian political theorist Gramsci calls hegemony. This paper argues that Roman men propagated ideal gender norms and socially ostracized men and violently punished women and intersex people for deviating from those norms, by analyzing literary and epigraphic treatments of gender from the period. Other scholars take Roman patriarchy as existing for its own sake or that it was innately part of the Roman state apparatus, while in reality it was a constructed system which required constant maintenance. Revealing the consequences of deviation within such a consistently reinforced system is a new direction for scholars of Roman society.

## Oral Presentation O9.2

### **The Essential Outcasts: *Infames* in the Roman Empire**

Michelle Rekowski and Amanda Coles\*

Greek and Roman Studies, Illinois Wesleyan University

During the early empire (27 BCE- 200 CE) elite Romans suppressed the legal rights of *infames* due to their own insecurities about their loss of power to the emperor. *Infames* are a social group comprised of actors, gladiators, and prostitutes who were barred from certain legal privileges. Actors and gladiators performed and fought in public religious festivals in which every member of Roman society participated. Even prostitution was part of the revelry surrounding these festivals. One of the nobility's chief fears was losing bodily autonomy to omnipotent emperors. These professions were seen as forms of selling one's body which went against this need for autonomy. I use Kristeva's theory of abjection to analyze satirical works, legal documentation, and graffiti to determine the legal and social significance of the *infames'* exclusion. Kristeva argues that society regulates that which it fears, and because Romans feared losing their autonomy, they limited the actions of those who willingly relinquished it. My research into this group sheds light on the often ignored experience of the lowest members of Roman society.

Oral Presentation O9.3



**Karolina Pavlova: From the 19th Century Literary Salon to the Literary Canon**

Taylor Plantan and Marina Balina\*

Literature and Culture Studies in English Translation, Illinois Wesleyan University

Unrecognized during her time, Karolina Pavlova is known today as a fundamental predecessor to contemporary women's poetry. In the nineteenth century Russia, female poets were widely excluded from the male-dominated literary field, exclusively limited to participation in literary salons and the writing of private literary albums. Pavlova, however, broke free of this gendered framework and developed her own literary voice first by translating influential texts of German Romantic poetry. Her work in translation served as a bridge into her own creative ability, which later combined male-dominated prosaic genres, with poetry, a "permitted" female form of literary expression. Unifying these two forms of creative writing in her autofiction, *A Double Life*, Pavlova used prose as a foundation for the narrative's plot, and poetry as a means of conveying intimate emotion. Thus, Pavlova not only redefined gender restrictions for female creativity, but she also became an innovator in introducing Russian literature to new genre forms.

Oral Presentation O10.1

**Neither Heroes nor Traitors: *Babylon Berlin* and the Experiment of the Weimar Republic**

Abigail Kauerauf and Jamie Zelechowski\*

German Department, Illinois Wesleyan University

In my essay, I investigate the lives of World War I veterans Bruno Wolter and Gereon Rath, in *Babylon Berlin* (2017–). One suffers from shell shock, while the other views the war with a sense of pride that stems from nationalism for the German Empire. My argument is that Gereon and Bruno must keep their opinions towards the war secret to navigate through the Weimar Republic unsuspected. Although Gereon and Bruno represent a barrier between order and disorder as policemen (Richardson 262), the men nevertheless also represent that which the leaders of the Weimar Republic would prefer to remain hidden. I first analyze Gereon and Bruno's respective war experiences through a historical lens and describe which groups of German veterans they represent. I then investigate three episodes from the show to emphasize the political groups with which these men are also connected, and why they therefore wish to remain anonymous in the *Großstadt*.



#### Oral Presentation O10.2

### **Words, Thoughts, and Mental Illness**

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

In this paper, I examine how societal and scientific/medical perceptions of mental illnesses have changed in (West) Germany since World War II. I do so by conducting an analysis of the language used in the medical and popular discourse on mental illness during that time. Language is important, because the terminology used to define something can greatly affect one's perceptions. In the case of mental illness these perceptions greatly affected the way in which they are treated. In order to put these discussions into context, I will be focusing upon an autobiography written by a former schizophrenic cataloguing her experiences in German medical care between 1936 and 1959, and how these experiences changed since then. By looking at this information, I demonstrate that while stigma against people suffering from mental illnesses has greatly decreased in scientific perception, such stigma has only recently begun to decrease in German society.

#### Oral Presentation O10.3



### **Consecuencias del Sistema (Societal Consequences)**

Kaitlyn O'Brien and Cesar Valverde\*  
Hispanic Studies Department, Illinois Wesleyan University

This paper examines the impact of societal norms on relationships formed within families. Oftentimes, outside influences affect personal relationships. This is evident through the analysis of two short stories: *El solitario* by Horacio Quiroga (Uruguay, 1878) and *La compuerta número 12* by Baldomero Lillo (Chile, 1867). In both stories, society influences the characters, which in turn influences their relationships. By analyzing the themes and societal conflict present in both works, readers can better understand the reasons behind the conflicts and their links between society and family.

Oral Presentation O11.1

**A New Species of *Pristimantis* (Amphibia: Anura: Strabomantidae) From the Puna of Northern Peru**

Shenyu (Cooper) Lyu and Edgar Lehr\*  
Biology Department, Illinois Wesleyan University

Frogs of the genus *Pristimantis* have a high species diversity in northwestern South America. Of the 524 species currently assigned to the genus *Pristimantis*, 139 (= 26%) species occur in Peru. They are distributed from lowland rainforests to elevations of about 4000 m in the Andes. *Pristimantis* frogs are evolutionary successful because of their reproductive strategy that involves direct development without a free-swimming tadpole stage. 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. Our new species is most similar to *Pristimantis aptus*, *P. attenboroughi*, *P. seorsus*, and *P. vilcabambae*.

Oral Presentation O11.2

**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 (= SVL) between 24.2–26.1 mm (n = 4) and male SVL 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 morphologically most similar to *Pristimantis chimu*, from which it differs by lacking a cranial crest and tarsal tubercles, and genetically most similar to *P. simonsii* and *P. cryophilus*.

### Oral Presentation O11.3

#### **Multidecompositions of Complete Directed Graphs into Directed Graph Pairs**

Patrick Ward and Daniel Roberts\*

Mathematics Department, Illinois Wesleyan University

A directed graph is a way to encode information about directional relationships among objects. The complete directed graph on  $n$  objects is the directed graph with arrows pointing in both directions for each pair of objects. In this project we are interested in decomposing complete directed graphs into pairs of smaller directed graphs. In particular, we choose to focus on directed graphs pairs. A directed graph pair is two directed graphs that together form a smaller complete directed graph.

### Oral Presentation O12.1

#### **Comedy, Kardashians, and Capitalism: The Effect of *Ladyish***

Andrew Neeley and Molly Robey\*

School of Theatre Arts, Illinois Wesleyan University

In the United States it is a well-known dilemma that many theatres have issues with producing theatre that is both artistically and economically viable. In his book *The Empty Space*, Peter Brooks outlines this problem and how theatrical productions created for financial purposes fails artistically. While this theory often holds true, it ignores the reliance US theatres have on producing work that makes enough money to keep the lights on. This paper will attempt to show a solution to this problem and to explore the method of using pop culture and comedy as a tool for creating theatre that is both artistically and economically viable. As seen in the play *Ladyish* written by Chelsea Marcantel and produced at Illinois Wesleyan University in 2017, commercial theater can entertain an audience while also having an important artistic message.

## Oral Presentation O12.2

### **An Audience of two: Kurt Vonnegut and the Textual Portrayals of his Greatest Influences**

William Heidenreich and Molly Robey\*  
English Department, Illinois Wesleyan University

Reluctant to begin a career as an author, Kurt Vonnegut Jr. found the inspiration to do so from his ex-wife, Jane Cox, and sister, Alice Vonnegut. The influence of these women extended into the texts themselves; Jane and Alice being portrayed in a score of Vonnegut's novels. While some critics have argued that only Alice appears in Vonnegut's writing, others have said that only Jane surfaces as a character. I plan to discuss how both women are represented in Vonnegut's texts, using knowledge of their lives to support my argument. In conjunction with exploring the women's emergence in Vonnegut's novels, I will analyze how he transforms them into literary elements different from their "real-life" character, through hyperbole and other aspects commonly found in science-fiction literature. Moreover, I plan to explore Vonnegut's early literature, presumably inspired by Jane Cox, as well as the literature published following the death of his sister, in an attempt to see how these events are portrayed in his writing.

## Oral Presentation O12.3



### **Losing God to Find Equality: Feminist Essays and the Departure from Religion**

Katelyn Hailey and Molly Robey\*  
English Department, Illinois Wesleyan University

Feminist theory of today presents religion as a hindrance or blatant contradiction to feminism; however, religion played a foundational role in original feminist theory. By thoroughly investigating feminist writings of the past and present, this paper addresses the lack of scholarly criticism regarding religion in the feminist essay. With thorough analysis on the origins of feminist theory, as well as the transition away from religion in feminist writings, the feminist essay of the past and present can be fully understood and examined side by side. I tentatively propose the argument that the representation of early feminism's religious roots in feminist essays are generally ignored or overlooked; however, religion was a key component of early feminist theory and the transition to feminist essays sans religion provide a new perspective on feminist writings. Analysis of authors such as Mary Wollstonecraft and Roxane Gay emphasize the fact that while today's feminist writings may be absent of religion, there are still a shocking amount of similarities between feminist essays of the past and present.

## Poster Presentations

Location: Center for Natural Sciences

### **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 (ES) – Oral and Poster Presentations

Location: State Farm Hall

Session 1, Poster Presentations - 9:00 – 10:00 a.m.

Session 2, Oral Presentations – 10:00-11:00 a.m.

Session 3, Poster Presentations – 11:00 a.m.-12:00 noon

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

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

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



Poster Presentation P1

**Assimilation of Bacteriophages by Marine Invertebrate Larvae (Annelida, Echinodermata, and Mollusca)**

Quinn Higginbotham and William Jaeckle\*  
Biology Department, Illinois Wesleyan University

Studies on feeding for free-living, immature, developmental form of marine invertebrates known as larvae have focused on the capture of food particles (i.e. unicellular organisms) that are visible using light microscopy. However, there is an abundance of dissolved organic matter (DOM) that are too small to be detected by light microscopy and we know little about the ability of larvae to exploit DOM as a food source. Bacteriophages (hereafter phages), or viruses that use bacteria as hosts, are considered DOM because of their small size ( $<0.5\mu\text{m}$ ), and are abundant in seawater ( $1\times 10^8$  phages / mL). We tested the hypothesis that feeding larvae from the phyla Annelida, Echinodermata, and Mollusca consume phages by incubating larvae with phages labelled with the fluorescent tag DTAF (5-[[4,6-Dichlorotriazin-2-yl]Amino]fluorescein); larvae incubated in filtered sea water for the same amount of time were experimental controls. We used epifluorescence microscopy to detect the amount and distribution of fluorescence present in individuals. In every larval from tested, there was significantly more fluorescence in the digestive system of experimental larvae compared to control larvae ((one-way ANOVA Sabellaridae (Annelida) [ $F_{(1,12)} = 40.801$ ,  $p = 3.446\times 10^{-5}$ ], Chaetopteridae (Annelida) [ $F_{(1,7)} = 58.052$ ,  $p = 1.246\times 10^{-4}$ ], Ophuroidea (Echinodermata) [ $F_{(1,12)} = 22.603$ ,  $p = 4.687\times 10^{-4}$ ], and Gastropoda (Mollusca) [ $F_{(1,6)} = 32.01$ ,  $p = 1.310\times 10^{-3}$ ]). These results indicate that phages enter the digestive system of the tested larvae and could represent a previously unrecognized source of nutrition for planktonic larvae.

Poster Presentation P2

**Backyard Heroes: Soil Bacteria Fighting Antibiotic Resistance**

Lilia Garcia and Loralyn Cozy\*  
Biology Department, Illinois Wesleyan University

In the 1950's, an overwhelming number of new antibiotics flooded the market to treat bacterial infections. Since then, many bacterial strains have mutated to become resistant to available drugs, such as the ESKAPE pathogens, six bacterial strains commonly found in hospitals. Thus, there is an urgent need for new antibiotics and treatment options. But, how are antibiotics discovered? Antibiotics are antimicrobial compounds (AMC) made by bacteria to compete with other organisms in their environment. The soil contains a rich source of bacteria that produce AMC's that have yet to be characterized. In this work, a collection of soil bacteria was tested against each ESKAPE pathogen. Soil isolates that were able to inhibit the growth of ESKAPE-pathogens suggested the production of AMC's. The soil isolates were characterized through various physiological and qualitative studies, such as gram stain and motility tests, then sequenced for identity. A rod-shaped *Pseudomonas* strain was able to kill *B. subtilis*, a gram positive bacteria similar to *S. aureus*, and the effective compound was extracted in ethyl acetate. Then, the resistance profile of the *Pseudomonas* was assessed. Overall, this research helps diversify the amount of known AMC's that can be used to battle resistant bacteria, like ESKAPE pathogens.

Poster Presentation P3

**Bacteriophage Zahn: Making Waves as a Singleton**

Kylie Spiegel, Anjali Nimavat, Emmett Agting and Richard Alvey\*, David Bollivar\*  
Biology Department, Illinois Wesleyan University

Bacteriophage research provides an opportunity to examine the evolution of a diverse group of biological entities. Using bacteriophages to treat bacterial infections is also a key component in biomedical research, as phages can be considered potential antibacterial agents due to their ability to infect and destroy bacteria. A bacteriophage from a water sample was isolated using bacterial host *Rhodobacter capsulatus*. Zahn was isolated in the summer of 2018 from West Lake in Davenport, Iowa. Using the bacterial host, the bacteriophage Zahn was isolated through the enrichment process. A lysate sample made after the purification of Zahn was used to create a TEM image, showing Zahn to have morphological uniqueness. After this discovery, a DNA preparation procedure to purify the phage DNA from the bacterial DNA was completed and it was sent to the Pittsburgh Bacteriophage Institute for sequencing. Zahn was determined to be a singleton, having no known close relatives, after acquiring the sequence. The genome of Zahn was then annotated using PECAAN. PECAAN was used to identify potential start sites and putative functions for Zahn's genes. Once completed the annotated genome of Zahn will be submitted to GenBank to contribute to our knowledge of the evolution of bacteriophages.

Poster Presentation P4

**Determination of Host Range Variation between Highly Related Members of a Novel Cluster of *Rhodobacter capsulatus* Bacteriophages**

Brooke Koebele, Rosemary Josenkoski, and David W. Bollivar\*, Richard M. Alvey\*  
Biology Department, Illinois Wesleyan University

Bacteriophages, viruses that infect bacteria, have been studied in the past, but recent advances in sequencing technologies allow for a greater understanding of the composition, function, and evolution of these entities. *Rhodobacter capsulatus*, a purple, nonsulfur, alphaproteobacterium has served as a host for isolation of new bacteriophages at Illinois Wesleyan. There have now been over 40 isolated *R. capsulatus* bacteriophages, which, based on genomic sequence, can be arranged into 6 distinct clusters and 3 unclustered singletons. While these phages are grouped according to the similarity in their genetic sequence, many genes remain uncharacterized. We present evidence that some of these genes may play a role in host range expansion. The RcC cluster phages exhibit a high degree of similarity at the genomic level but display variation in host range. All members of cluster RcC are able to infect host strains YW1 and B10 except for RcOceanus. Three regions of variation were identified by comparing genomes of RcC phages RcDormio and RcOceanus. Using genetic recombination experiments we tested the requirement of these genes for host-range expansion. Investigating these uncharacterized genes

may lead to an increased understanding of their function and allow for the development of methods for genetic experimentation.

Poster Presentation P5

**Drinking with Your Kidney: Seawater Ingestion by Starfish Larvae Through the Hydropore**

Shenyu (Cooper) Lyu and William B. Jaeckle\*  
Biology Department, Illinois Wesleyan University

The life history of most seastars includes a free-living, planktonic larva that must feed in order to grow and develop to become a juvenile. Each larva develops a set of interconnected internal body cavities (coeloms), which includes the anterior axocoels, medial hydrocoels, and posterior somatocoels. On the left side of the larval body, a pore canal extends from the fused axohydrocoel to the hydropore on the dorsal surface. Ruppert and Balsler (1986) suggested that the left axohydrocoel functions as a larval kidney and that "urine" is excreted through the hydropore. To test the larval kidney hypothesis, seastar larvae collected from the Gulf Stream (Fort Pierce, FL) were incubated with 1.0 mg/mL of an iron-containing protein (ferritin) or polysaccharide (iron dextran) for 2-6 hours. In larvae exposed to ferritin, we detected iron in cells lining the coeloms that are continuous with the left axohydrocoel. In contrast, when larvae were incubated with iron dextran, the label was found only in the lumen of these coeloms. In both ferritin- and iron dextran-treated larvae, the label was also detected in the cells of the stomach and intestine. These results suggest the presence of an influx of seawater into both the coelomic and digestive systems. Our data indicate that the larval kidney hypothesis requires reassessment in order to account for the delivery of seawater into the coelomic system of seastar larvae.

Poster Presentation P6

**Effects of Phase Polarity and Charge Balance of Spinal Cord Stimulation on Behavior and Gene Expression in a Rat Model of Neuropathic Pain**

Jonathan Rink<sup>1,3</sup>, Joe Williams<sup>2\*</sup>, Ricardo Vallejo<sup>1,2</sup>, Ashim Gupta<sup>1,2</sup>, Cynthia L. Cass<sup>1,2</sup>, Courtney Kelley<sup>1,2</sup>, William Smith<sup>1</sup>, Alejandro Vallejo<sup>1</sup>, Ramsin Benyamin<sup>1,2,4</sup>, David L. Cedeño<sup>1,2</sup>  
<sup>1</sup>Millennium Pain Center, Research; <sup>2</sup>Illinois Wesleyan University, Psychology; <sup>3</sup>Illinois Wesleyan University, Biology; <sup>4</sup>University of Illinois at Urbana-Champaign, College of Medicine, Surgery

Due to an increased prevalence of chronic neuropathic pain and heightening opioid-related concerns, safer and non-addictive treatment alternatives are needed. One such alternative is spinal cord stimulation (SCS) therapy, which involves applying high frequency electromagnetic pulses to target areas along the spinal cord. Although SCS provides pain relief to patients who have failed more conservative treatments, little is known about the mechanism by which SCS provides pain relief. The goal of this project is to investigate the effect of phase polarity and charge balance of SCS waveforms on pain behavior and gene expression in a neuropathic pain rodent model. Rats were implanted with a four-contact mini-lead and randomly assigned to two control and five test groups featuring different SCS waveforms. Behavioral score as a percent of baseline (BSPB) was assessed, and the ipsilateral dorsal quadrant of the spinal cord adjacent to the lead was harvested post-stimulation and processed to determine gene expression via RT-PCR. BSPB was significantly improved post-stim compared to pre-stim for four waveforms, and RT-PCR analysis showed that eight genes demonstrated a significant difference between SNI and/or the other waveforms. Our results exhibit that specific waveforms differentially modulate several key transcriptional pathways relevant in chronic pain conditions.

Poster Presentation P7

**Elsker : A new bacteriophage to combat antibiotic resistant *Enterobacter***

Rachel Maurer and David Bollivar\*  
Biology Department, Illinois Wesleyan University

The World Health Organization has called bacterial antibiotic resistance one of the biggest threats to global health. The rise of antibiotic resistance and the laborious process of creating new antibiotics has led to a resurgence of interest in combating bacterial infections with bacteriophages. Bacteriophages are viruses that infect and kill specific strains of bacteria. Phages kill specific bacterial hosts, unlike broad spectrum antibiotics which kill not only the pathogenic bacteria but bacteria that make up the healthy microbiome. Phage therapy has recently been used to combat multidrug resistant (MDR) bacteria, but wider application will require the identification of more novel bacteriophages. Bacteria in the *Enterobacter* genus are an example of clinically relevant bacteria displaying broad MDR. Few antibiotics are effective against highly resistant *Enterobacter* species, which cause infection of the bloodstream and urinary and respiratory tracts. The goal of this study was to isolate and characterize a bacteriophage that could infect and kill a non-pathogenic model *Enterobacter*. Pre-filtration water samples were collected from the Bloomington-Normal Water Reclamation District. The *Enterobacter aerogenes* specific-phage, known as Elsker, underwent enrichment and isolation. The next steps in this project will be to characterize Elsker by genome sequencing and transmission electron microscopy (TEM).

Poster Presentation P8

**Harboring Hartney: Making A Splash In Cluster B**

Vanessa Chapa, Maeghan Eaker, Saralex Torres and Richard Alvey\*, David Bollivar\*  
Biology Department, Illinois Wesleyan University

Bacteriophages, which are viruses, have the ability to infect numerous species of bacteria and are the most diverse biological entities on Earth, as roughly 10<sup>31</sup> exist. The discovery and sequencing of DNA from the newly discovered *Rhodobacter capsulatus* bacteriophage, Hartney, is used to further advance our understanding of the diversity of bacteriophages. Hartney was isolated from the Illinois River in Morris, Illinois. Hartney was obtained through enrichment and amplified. The genome was sequenced at NC State University and assembled at IWU to determine that Hartney belonged in Cluster B, which shows relation to Titan, Spartan, and Thunderbird. The tail and capsid sizes were determined through the use of Transmission Electron Microscopy (TEM) analysis at Indiana University. This analysis revealed that the tail size is 134 nanometers and the capsid diameter is 64 nanometers. The measurements indicate that the phage is a siphoviridae. Annotation of this phage was done using Genemark, Starterator, PECAAN, and Glimmer to determine the genes present. Once completed, these results will be submitted to GenBank.

Poster Presentation P9

**Ingestion and assimilation of dissolved organic matter by feeding larvae of the families Chaetopteridae, Magelonidae, Polygordiidae, Sabellariidae, and Spionida (Annelida) and the Sipuncula.**

Seth Borrowman and Will Jaeckle\*  
Biology Department, Illinois Wesleyan University

The life history of many marine invertebrates includes a free-living larval stage that must acquire food. These planktonic larvae live in an environment where the abundance of particulate foods (1-20  $\mu\text{m}$ ) is low and have evolved a diversity of feeding methods. Larvae are also exposed to dissolved organic materials (DOM) which may be a source of nutrition. We tested the hypothesis that feeding larvae of Polychaeta and Sipuncula are able to ingest seawater and that the cells lining the gut then assimilate DOM. Larvae were collected from Ft. Pierce, FL. Specimens were exposed to an iron-containing protein (ferritin) or polysaccharide (iron-dextran); experimental controls were not exposed to an iron-containing molecule. Iron in larvae was detected using the "Prussian Blue" reaction and the presence and distribution of the blue product was examined using light microscopy. In all examined larvae we found the blue label within the gut lumen, but not within the cells lining the digestive system, and control specimens lacked blue color. These results suggest that these larvae ingest seawater, delivering DOM into the digestive system, but do not support the hypothesis that DOM is a nutritional source. Further work is necessary to describe digestion in polychaete and sipunculan larvae.

Poster presentation P10

**Investigation of the Shared and Divergent Anatomical Features of Fishes From the Suborder Characoidei**

Samantha Ziomek and Brian Walter\*  
Biology Department, Illinois Wesleyan University

The order Characiformes is split into two major suborders; Characoidei and Citharinoidei, and includes over 2,000 different species of ray-finned fish, including a variety of Tetras often found in pet stores. Members are identified by the adipose fin, a small fin between the dorsal fin and tail. Of the ~1,800 species found in South America, ~1,100 are within the family Characidae (as defined by the lack of the supraorbital bone) with remaining species spread among 13 other families. Defining phylogenetic relationships among and within each family has proven to be challenging, as a result, the evolutionary relationships between these families and their proper classification remain unclear. This project involves investigating the major distinctive anatomical and morphological differences and similarities between three families of the suborder Characoidei; Characidae, Lebiasinidae, and Gasteropelecidae. A comparative analysis of adult anatomy and morphology was carried out using: (1) morphometric analysis, which utilizes technology, such as image analysis, to detect quantitative characteristics within groups, and (2) quantification of various meristic features of the skeletal anatomy following staining. This research has the intention of contributing knowledge to what is already existent in the efforts to clearly describe the relationship between these families in an anatomical manner.

Poster Presentation P11

**Relative Abundance and Habitat Associations of American Badgers (*Taxidea taxus*) and Plains Pocket Gophers (*Geomys bursarius*) in McLean County, Illinois**

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

Prior to Euro-American settlement in the early 1800's, approximately 60% of Illinois consisted of prairie, but by 2006 less than 0.01% remained. Despite such losses, prairie-dependent species such as the American Badger (*Taxidea taxus*) and the Plains Pocket Gopher (*Geomys bursarius*) persist in intensive agricultural landscapes. The purpose of this study was to determine the relative abundance and habitat associations of both species in McLean County, IL, via roadside automobile surveys on 272.62 km of secondary roads in all 30 townships in 2017 - 2018. We found 88 badger dens (0.32 dens/km) mostly in central and eastern McLean County. Badgers dig multiple dens in a year, and based on home range size in intensive agricultural areas, we estimated 5 - 9 badgers were present in 18 townships. Den locations were apparently not chosen based on the amount of grassland habitat within badger home ranges, as there was no significant difference in the amount of hay/pasture within 5 km around dens ( $339.40 \pm 208.29$  ha;  $\bar{x} + SD$ ) compared to hay/pasture within 5 km of randomly chosen locations ( $265.90 \pm 307.10$  ha;  $t_{13} = 0.26$ ,  $P = 0.64$ ). Likewise, we recorded 245 pocket gopher mounds in 16 clusters (15.31 mounds/cluster; 0.06 clusters/km) in 5 townships, all of which were found in central and eastern McLean County.

Poster Presentation P12

**Sucha Journey: The Path to Isolating, Purifying, Characterizing, and Annotating Sucha the Phage**

Matthew Crosse, Ivy Do, Katie Vogler, and Richard Alvey\* and David Bollivar\*  
Biology Department, Illinois Wesleyan University

Sucha is a bacteriophage, a virus that infects *Microbacterium foliorum*. Sucha was collected from a cow farm in Quincy, IL. It was isolated by direct plating and purified at Illinois Wesleyan University, sequenced by the University of Pittsburgh, and annotated at Illinois Wesleyan University. Bacteriophages are thought to be the most numerous biological entities on Earth. To help understand the evolutionary relationships of bacteriophages, they are organized by cluster based on nucleotide sequence identity. Sucha resides in the EJ cluster as its fourth member. Sucha was found to produce small clear plaques and did produce a lysogen, suggesting that the EJ cluster bacteriophages are temperate phages. Sucha also showed similarity to other bacteriophages in a different cluster, the GA cluster: Appa and Warren based on similarity of the polypeptides present. PECAAN and embedded software was used to analyze similarities with other previously studied phages. The knowledge gained from Sucha will contribute to the ever expanding knowledge of bacteriophages.

Poster Presentation P13

**The Discovery of *Rhodobacter capsulatus* Phage Kemmy through Isolation and Genomic Analysis**

Jackson Rapala, Saylor Williams and Richard Alvey\* and David Bollivar\*  
Biology Department, Illinois Wesleyan University

The SEA-PHAGES program introduces students to microbiology and bioinformatics through guided research. In addition students also learn about bacteriophages which are estimated to be one of the most diverse biological bodies. One of the bacterial hosts used in the laboratory was *Rhodobacter capsulatus*. In the fall of 2018, Kemmy was isolated from a water sample obtained in Roselle, Illinois. After isolation, Kemmy was purified and analyzed through transmission electron microscopy (TEM) to measure the tail length and capsid diameter, which were found to be 112 nm and 65 nm, respectively. In addition, phage DNA was extracted and sent to the University of Pittsburg to be sequenced. In the spring of 2019, the genome of Kemmy was annotated and the gene functions determined using programs such as PECANN and Phamerator. Through sequencing and annotation, Kemmy was determined to be a member of the RcC cluster of bacteriophages. At the end of this project, Kemmy will be submitted to GenBank, contributing to the ever expanding knowledge of bacteriophages.

Poster Presentation P14

**Thyroid Hormone Accelerates Pericorneal Nerve Ring Formation and Leads to Precocious Corneal Innervation**

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

The cornea, the transparent outermost layer of the eye, protects and hydrates the eye through its dense network of nerves. Inexplicably, damaged corneal nerves can take years to regenerate and regain normal function. Here, we examine the stimulatory potential of thyroid hormone (TH) on the acquisition of nerves by the cornea during development. Normally, presumptive corneal nerves are initially repelled at the corneal margin and instead encircle the periphery of the cornea in a nerve ring prior to their synchronous, circumferential entry. TH exposure accelerated formation of the nerve ring and premature, disorganized nerve entry into the cornea. Commencing TH treatments after nerve ring formation was underway was sufficient to accelerate innervation and increase the density of nerve fibers in the cornea, without altering the radial innervation pattern. Mechanistically, neuronal explants cultured *in vitro* displayed increased neurite outgrowth in the presence of TH, indicating that the neurostimulatory effects of TH are mediated directly on corneal nerves. We conclude that TH treatment may provide a therapeutic strategy to promote corneal re-innervation following injury as it accelerates multiple aspects of cornea innervation.



Poster Presentation P15

**Wrangling Warren: A Phage Discovery**

Manish Pathuri, Lane Warren, and Richard Alvey\*, David Bollivar\*  
Biology Department, Illinois Wesleyan University

Bacteriophages are viruses that infect bacteria, found all over the world. Due to the number of bacteriophages, new phages are constantly being discovered and sequenced. Warren, a *Microbacterium foliorum* phage was discovered in a sample from Muncie, IL. It was isolated and had its DNA extracted at IWU. Using protocols such as TEM analysis and PCR, Warren seemed to have unique characteristics so it was sent to the University of Pittsburgh for genomic sequencing. The genomic sequence of Warren was used to place it in a new cluster of *M. foliorum* phages, the GA cluster, along with the previously sequenced Appa which was isolated in Pennsylvania. Annotation of Warren was completed using the program PECAAN, which uses GeneMark and Glimmer to identify the start sites of the genes and used phages from similar clusters as well as HHPred to identify gene function. Of the 66 genes annotated, 23 were given functions.

Poster Presentation P16

**An Exploration of the Antioxidative Effect of Common Spices in Black Tea**

Chaoqiuyu Wang, and Manori Perera\*<sup>1</sup>, Nathan Hocker\*<sup>2</sup>  
Chemistry Department, Illinois Wesleyan University<sup>1</sup> and Southern Illinois University School of Medicine<sup>2</sup>

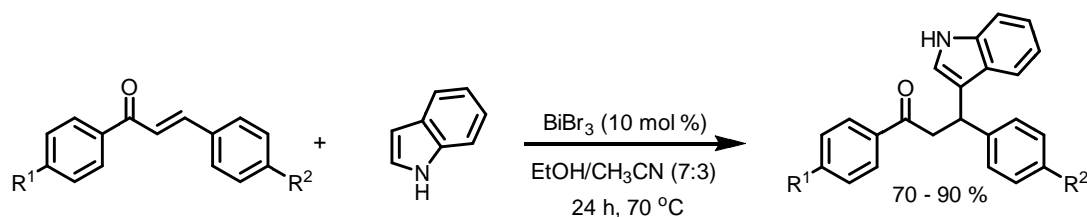
With thousands of years of history, tea has become the most consumed flavored beverage all over the world. Tea is separated into three large groups -- green, black and oolong tea -- based on the fermentation of tea leaves and taste. Large number of studies have indicated that the well-known health benefits is contributed by the polyphenol compounds, a group of antioxidants, in tea. To enhance the taste of tea typically various additives can be incorporated. Historically, in western countries milk and sugar and in eastern countries spices such as cinnamon, clove and ginger were added to tea. Studies have shown that additives such as milk and sugar may reduce the total antioxidants capacity of tea. Spices, on the other hand, are famous for their antioxidative characteristic independent of tea. However, not many studies focus on the antioxidant properties of these spices similar to antioxidant studies of tea. The aim of this study is to qualitatively identify the polyphenols of interest in spiced black tea by using techniques such as high-performance liquid chromatography (HPLC) and liquid chromatography mass spectrometry (LC-MS).



### Bismuth(III) bromide catalyzed 1,4-addition of indoles to chalcones

Zhijia Geng, Lauren Yep, Jared Renfro and Ram Mohan\*  
Chemistry Department, Illinois Wesleyan University

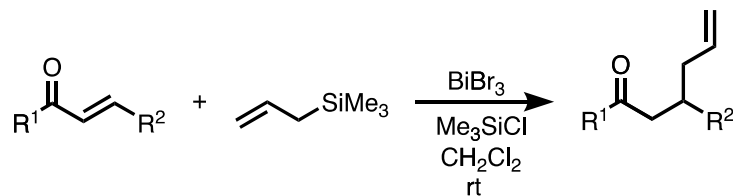
Substituted indoles are of interest from a medicinal chemistry perspective. We have studied the utility of bismuth(III) bromide and other Lewis acid catalysts for the Michael addition of indoles to a variety of chalcones to yield substituted indoles. Bismuth(III) compounds are especially attractive from a green chemistry perspective because they are remarkably nontoxic, non-corrosive and relatively inexpensive. The results of this study will be presented.



### Bismuth(III) bromide catalyzed Michael addition of allyltrimethylsilanes to $\alpha,\beta$ -unsaturated ketones

Richard Guingrich, Robert Reichert and Ram S. Mohan\*  
Chemistry Department, Illinois Wesleyan University

The products of 1,4-addition of nucleophiles to  $\alpha,\beta$ -unsaturated ketones are of interest as they are easily amenable to further synthetic manipulations. We have studied the utility of bismuth bromide and other Lewis acid catalysts for the conjugate addition of allyltrimethylsilanes to  $\alpha,\beta$ -unsaturated ketones. Bismuth(III) compounds are especially attractive from a green chemistry perspective because they are remarkably nontoxic, non-corrosive and relatively inexpensive. The results of this study will be presented.



$\text{R}^1, \text{R}^2 = \text{Ph}, p\text{-CH}_3\text{OC}_6\text{H}_4, p\text{-ClC}_6\text{H}_4,$   
 $p\text{-FC}_6\text{H}_4, p\text{-CH}_3\text{C}_6\text{H}_4, p\text{-NO}_2\text{C}_6\text{H}_4$

Poster Presentation P19

**The Effects of Spinal Cord Stimulation on Physical and Social Pain**

Kaylee Braun, and Joe Williams\*

Neuroscience Program, Illinois Wesleyan University

Spinal cord stimulation is a relatively new form of treatment for those who suffer chronic back pain. While it has been proven to be an effective form of treatment, the neurological mechanism behind this is still unknown. It is also known that the brain mechanisms for physical pain are similar to those of social pain. The present study used electroencephalography (EEG) to determine the mechanism behind both physical pain and social pain in patients who have been surgically implanted with spinal cord stimulators. This was done by analyzing data from four variations: 1. The stimulator was on and subjects were told it was on. 2. The stimulator was on and they were told it was off. 3. It was off and they were told it was on. 4. It was off and they were told it was off. Results from these four conditions will be discussed.

Poster Presentation P20

**Sudden Identity Crisis: Dealing with Individual Grief in HBO's *The Leftovers***

Mark Dezell and Molly Robey\*

English Department, Illinois Wesleyan University

HBO's *The Leftovers* employs the typical post-apocalyptic equation. The audience follows a band of characters as they grapple with the fallout of a fantastical and global disaster. Exploring the available texts, criticism, and observable trends of the post-apocalyptic fiction genre, I found that it tends to closely align itself with cultural studies. The majority of critics focus their arguments on the etiology of the text's apocalyptic event and the group-based survival (i.e. an apocalyptic plague represents societal fear/anxiety towards immigration). However, the "sudden departure" of *The Leftovers* differs in that there is no physical or resource-draining event. Losing 2% of the population without cause is still catastrophic, but the struggles become personal. I would argue that *The Leftovers* employs a unique apocalypse and character-driven writing to emphasize an individual's grief and struggle. By examining four of the show's main characters and their personal coping with the event, we can see the personal identity crisis that defines this show above any cultural lens.

Poster Presentation P21



**Estimating Stream Flow from Rainfall Runoff as a Tool for  
Predicting Variability in Freshwater Mussel Surveys**

Jacob Williams and Aaron Wilson\*

Environmental Studies Department, Illinois Wesleyan University

The goal of this study was to create a method to model streamflow and estimate the impact of streamflow on the results of threatened freshwater mussel surveys. Observations in recent studies have shown that surveying mussel biodiversity and abundance at the same location under different streamflow conditions can produce significantly different results. Therefore, to accurately assess population changes through repeated surveys, one must account for variability due to streamflow. Streamflow data is available from the United States Geological Survey, however, these data do not cover all locations in a river system. Data from the Spoon River system in western Illinois were chosen to create streamflow models, because of the availability of repeated mussel survey data for that river system. Streamflow was modeled directly from rainfall runoff; this was estimated in ArcMap software using land use, land cover, soil property, and precipitation data. The stream was delineated in ArcMap from a digital elevation map, and weighted by the calculated rainfall runoff data. This work represents an important first step towards developing an adaptable method for estimating stream flow at any point on a river system for any period of time.

Poster Presentation P22

**Accuracy and Precision of a Custom Instrument that Studies Cosmic Analog Dusts**

Katie North, Ruihan Zhang and Thushara Perera\*

Physics Department, Illinois Wesleyan University

A custom instrument has been designed and built to study cosmic analog dusts in the laboratory. Two successful data acquisition runs have been conducted with the novel instrument thus far. But data is only as precise/accurate as the instruments that acquire it. An examination on the resolution and accuracy of our instrument is presented. For this purpose, we first analyzed the data acquired prior to purging water vapor from the instrument in order utilize water spectral lines that are present at the frequencies 556 GHz and 752 GHz. Secondly, using a CNC milling machine, we constructed a thick-grill, high-pass filter out of brass, which has a sharp transmission turn-on at 216 GHz, and obtained spectra with and without it. All three of these spectral features have been used to assess the accuracy and resolution of our instrument.

Poster Presentation P23

**Nowhere-zero group irregular labelings of graphs**

Yutong Li and Dan Roberts\*

Mathematics Department, Illinois Wesleyan University

A labeling of graph is an assignment of values to its edges, vertices, or both. A  $Z_k$ -antimagic labeling of a graph is a labeling of the edges, where permissible values are from the set  $\{1,2,3,\dots,k-1\}$ , and the sum of all edges at a vertex is different from the sum at each of the other vertices. We study a similar structure in group theory that can be used to obtain  $Z_k$ -antimagic labelings of graphs.

Poster Presentation P24

**The Effect of Spinal Cord Stimulation for Chronic Pain Treatment**

David Park and Joe Williams\*

Neuroscience Program, Illinois Wesleyan University

Spinal Cord Stimulation (SCS) is a form of therapy to treat forms of chronic pain. Although the efficacy of SCS treatment is relatively positive and is used clinically, the neurobiological mechanisms behind this treatment are not fully understood. The present study uses an animal model of chronic pain, involving transection of the sciatic nerve of one paw, to measure whether there are changes in the expression of following injury and subsequent SCS treatment. The study also examines the efficacy of different forms of SCS treatment by changing stimulation parameters (cathodic, anodic, symmetrical and asymmetrical stimulation parameters) and examines whether the degree of pain relief exhibited with each treatment correlates with changes in gene expression.

**The Effects of Intermittent Training on Recovery of Fine Motor Control and Synaptic Plasticity in a Mouse Model**

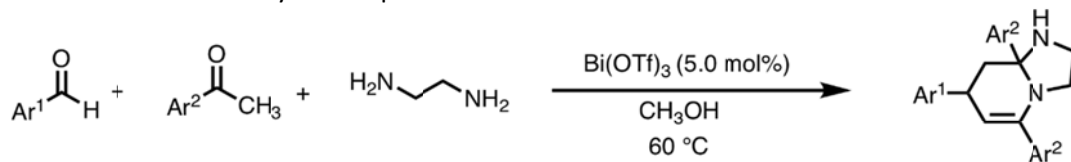
Victoria Nemchek, Emma M. Haan, Amy Gourley, and Abigail L. Kerr\*  
Neuroscience Program, Illinois Wesleyan University

Stroke is a leading cause of disability. Focused training of the impaired limb has been shown to improve its functional outcome in animal models. Yet, most human stroke survivors exhibit persistent motor deficits, likely due to differences in rehabilitation intensity between experimental (animal) and clinical (human) settings. The current study investigated the effect of training intensity on behavioral outcome and neural plasticity in a mouse model of stroke. After learning a skilled reaching task, mice received a unilateral stroke. Post-operatively, animals received either daily rehabilitative training, intermittent rehabilitative training (every other day), or no rehabilitative training. Assessment of the impaired limb illustrated that daily training resulted in significantly better performance than no training, while the intermittent group fell between the two. Analyses are underway investigating the impact of varying rehabilitation intensity on synapse density. Our results indicate that lower intensity training provides some behavioral advantages but is not as effective as daily training.

**Bismuth(III) triflate catalyzed synthesis of substituted hexahydroimidazo[1, 2-a]pyridines**

Noah Haskin and Ram Mohan\*  
Chemistry Department, Illinois Wesleyan University

The synthesis of nitrogen containing heterocycles is of particular interest in the pharmaceutical industry due to the numerous biological activities exhibited by such compounds. Their synthesis using multicomponent reactions saves steps, and minimizes waste generation. We have investigated the utility of bismuth(III) triflate as a catalyst for the multicomponent synthesis of a series of hexahydroimidazo[1, 2-a]pyridines. Bismuth(III) compounds are especially attractive from a green chemistry perspective because they are remarkably nontoxic, non-corrosive and relatively inexpensive. The results of this study will be presented.



Ar<sup>1</sup> = Ph, *p*-CH<sub>3</sub>OC<sub>6</sub>H<sub>4</sub>, *p*-ClC<sub>6</sub>H<sub>4</sub>,  
*p*-FC<sub>6</sub>H<sub>4</sub>, *p*-CH<sub>3</sub>C<sub>6</sub>H<sub>4</sub>, *p*-NO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>

Ar<sup>2</sup> = Ph

catalyst = Bi(OTf)<sub>3</sub>

Poster Presentation P27

**A Computational Approach to Analysing the Magnetization of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice**

Tao (Paul) Jin, Minzhao Liu, David Nico Lopez and Narendra Jaggi\*

Physics Department, Illinois Wesleyan University

Networks of magnetic nanowires provide a platform for studying the fundamental physics of “*spin ice*” systems. Magnetotransport and magnetization response of magnetic nanowires, set up as Armchair and Brickwork lattices, show unusual behavior. In the present study, we use computer simulations to try to predict the magnetization response of these two structures under different applied external magnetic fields and at different angles.

The mathematical equations that describe this physics constitute the Landau-Lifshitz-Gilbert (LLG) system of coupled nonlinear differential equations of large number of variables, and are essentially impossible to solve analytically. We have conducted computer simulations of the spatial distribution of the magnetization of these materials, by using an open source GPU accelerated software, called *mumax3*, which is a state-of-the-art tool for the international community of micromagnetics researchers. We integrate these density maps to produce hysteresis loops of magnetization for different applied magnetic fields and at different angles. We have observed abrupt transitions of magnetization and detailed micromagnetic structures that are in agreement with recently published experimental results.

Poster Presentation P28

**Mathematical Models and Computer Simulations of Telomere Shortening**

David Nico Lopez, Nicholas Milcik, and Narendra Jaggi\*

Physics Department, Illinois Wesleyan University

As a culture of cells reproduces, telomeres, structures marking the ends of chromosomes, within each cell grow shorter with each division until disappearing entirely, halting the process in a phenomenon known as cellular senescence. Classical in-vitro studies on cellular senescence have found a *bimodal distribution* of what is called the proliferative potential. This has not been explained by older stochastic mathematical models. Very recent studies (2019) involving computer simulations of models that incorporate two distinct types of shortening mechanisms produce results that qualitatively mirror the observed bimodal distribution. In this research project, we simulate the evolution of this particular mathematical model using *Python*. We will present *our* computational results that *reproduce* the bimodal results that the authors<sup>1</sup> have reported. We may also attempt to include in our model additional biologically relevant phenomena/mechanisms, in order to deepen the current understanding of cell senescence.

Poster Presentation P29

**A Computational Approach to the Analysis of Magnetoresistance Signatures of Magnetic Nano-Structures: Armchair and Brickwork Artificial Spin Ice**

Tao (Paul) Jin, Minzhao Liu, David Nico Lopez and Narendra K. Jaggi\*

Department of Physics, Illinois Wesleyan University

Artificial lattices of magnetic nanowires display unusual magnetotransport properties. In this study, we chose two particular artificial structures and studied their magnetoresistance response under different applied external magnetic field and at different angles. These structures demonstrate abrupt transitions and hysteresis of magnetization, which gives interesting magnetoresistance response. The underlying Hamiltonian of these systems is far too complex for any closed form analytic solutions. Therefore, we use computer simulations to calculate the spatially varying magnetization density in these structures, by using an open source GPU accelerated software *mumax3*. These magnetization maps (from *mumax3*) are combined with a local model of Anisotropic Magnetic Field-dependent Resistivity (AMR) to calculate the local electric field is calculated at all points. We have demonstrated the experimentally observed non-linear abrupt transitions of magnetization of these materials and the corresponding magnetoresistance. Some aspects of our simulations agree well the data. Work is in progress to figure out the sources of remaining differences between data and our simulations.

Poster Presentation P30

**Suicide Rates in Hispanic Female Adolescents**

Nathalie Orozco and Carolyn Nadeau\*

Hispanic Studies, Illinois Wesleyan University

Suicide rates in Hispanic female adolescents are studied using a systematic approach. This study looks at the potential cultural and behavioral factors, signs leading up to a suicide attempt, and treatments for the population with the highest suicide rate out of any ethnic population. Peer reviewed articles are analyzed for recurring themes in the literature. With Hispanic females being 82% more likely than non-Hispanic White females and 46% more likely than non-Hispanic African American females to attempt suicide, this research explores data that can be used to help decrease the disparity between Hispanic female adolescents and their non-Hispanic counterparts.



Poster Presentation P31

**Engineering with DNA**

Philip Andrango and Gabe Spalding\*  
Physics Department, Illinois Wesleyan University

Our end-goal is not a biological application, but an engineering aim: to create high-density *information storage devices*. The recent discovery of hachimoji DNA increases the number of base pairs available for encoding information, beyond what is possible with natural DNA. Our work entails creation of micro-containers to create, deliver, and place DNA *origami*, following the work of a previous IWU student, Andy Zhenghao Ding. Our “lab on a chip” is fabricated in a clear, transparent form of commercial silicone rubber (a polymer suspended in liquid, that can be made solid when a crosslinker is added). This allows for the formation of microstructures from molds, which we produce, using photolithographic processes. Oxygen plasma treatment creates a non-reactive Si-O-Si surface, compatible with processing biomolecules. Andy has provided a chip design that is aimed at producing very dilute, 5-micron droplets, each containing either zero or one single DNA molecule, along with other components necessary for the (programmed) formation of origami platelets. While the long-term goal entails using optical tweezers to control the placement of these nanocomponents onto a silicon wafer, our next steps involve validation of the microfluidic design, later to be followed by studies of the kinetics of origami formation.

Poster Presentation P32

**Exploration of Devices for Tailoring Laser Light**

Richa Sapkota, Shiyi Yuan, and Gabe Spalding\*  
Physics Department, Illinois Wesleyan University

There are many reasons for wanting to exert adaptive control over lasers. Here, we describe our exploration of liquid-crystal on silicon “Spatial Light Modulators” (SLMs), which can be reconfigured to provide either amplitude or phase control over a laser beam (or, in principle, both). Computer control of these devices allows the creation of optical systems that replace conventional lenses and other, more exotic components, in an adaptable manner. We will describe our characterization and calibration tests for devices on hand in our labs, as well as our assessment of their potential for various applications, including the study of Laser Modes, encoding information into light beams, and utilization of the linear momentum, spin angular momentum, and orbital angular momentum of light beams, as well as the potential for application to studies of single-photon quantum mechanics.

Poster Presentation P33

**Generating Ultrasonic Acoustic Holograms with Circular Arrays**

Paul Johnson and Gabe Spalding\*

Physics Department, Illinois Wesleyan University

Acoustic holograms are formed by interfering multiple sonic sources of identical frequency and differing phase. By using ultrasonic transducers, 3D printed arrays, it is possible to computer generate holographic arrays at 40 kHz in different configurations. Various algorithms can then be used to model three-dimensional geometries generated from the fourier transform of the phase delays of the array. By using circular arrays, I am able to explore vortex generation in an ultrasonic environment with a cost-effective desktop setup. These holograms can be measured and plotted using another transceiver attached to an X-Y plotter. This work demonstrates how to build and control this set-up, and opens up the ability to do research with ultrasonic holograms by future students. I show how to both control and measure a hologram through a LabVIEW environment, and suggest points of optimization for future more powerful arrays.

Poster Presentation P34

**Machine Vision applied to the Micro World**

Mark Siegel and Gabriel Spalding\*

Physics Department, Illinois Wesleyan University

By implementing machine vision algorithms, it is possible to test the Stokes-Einstein relation describing statistical variance in a micron-sized sphere's position as it undergoes "Brownian motion," where surrounding molecules randomly collide with our spheres, pushing them around to a measurable degree. By utilizing image processing algorithms available in *Mathematica*, position tracking can be automated, taking images captured by a camera mounted to the microscope as input, which are then quantitatively analyzed via machine vision algorithms. After completing an analysis of "freely diffusing" matter, these methods will be applied to analyze the behavior of microparticles in an optical trap, which essentially provides a tunable potential well. This model system is ideal for studying the emergence of the thermodynamic limit, where there is significant interest in a relatively new class of "fluctuation theorems," from which the Second Law of thermodynamics emerges (and, with it, the "arrow of time," itself).

Poster Presentation P35

### **A Pedagogical Look at Kirkwood Gaps**

Maksymilian Malec and Robert Wagner\*  
Physics Department, Illinois Wesleyan University

Kirkwood Gaps are gaps in the distribution of asteroid orbital periods which correspond to orbital resonances between Jupiter and the asteroids. Simplified explanations account for this effect by saying that Jupiter pulls on the asteroid at the same location each orbit, pulling it into a new orbit. However, in simulations what is found is simply an oscillation, with the orbital distance and eccentricity of the objects orbit never rising to a breaking point of the orbit. More detailed explanations are often summarized as “Chaos Theory”, which gives no intuitive idea of the actual cause. The goal of my research is to provide a pedagogical look at Kirkwood Gaps utilizing multiple levels of complexity to describe the origins of Kirkwood gaps in a way that can be understood across various educational levels.

Poster Presentation P36

### **Optical Fourier Analysis Using a DMD**

Ziyan Liu and Gabe Spalding\*  
Physics Department, Illinois Wesleyan University

What Fourier analysis does is to deconstruct complex functions into simpler component segments that are periodic. This project is designed to conduct Fourier analysis *optically*, using a 4f imaging system, where the back focal plane is related to the front focal plane via a complex Fourier transform (sensitive to both the amplitude *and* phase of each periodic component). Through computer control of a Digital Micromirror Device (DMD), we are able to flexibly apply different patterns to manipulate the input light waves and, at the same time, examine the result in the back focal plane. A camera placed in that plane allows for quantitative analysis, via image analysis. In this poster, we will describe the challenges involved, the progress attained, and suggestions for future work along these lines.

Poster Presentation P37

**Altered Paw Pain Thresholds due to Different Spinal Cord Stimulation Parameters**

Jillian Cole and Joe Williams\*

Psychology Department, Illinois Wesleyan University

Chronic pain causes individuals substantial personal distress and economic hardship as traditional opioid prescription treatment can be ineffective and expensive. An alternative treatment to opioid prescription is spinal cord stimulation. In this subset of a larger study, experimenters assessed effects of different stimulation parameters used to treat simulated chronic pain in rats (spared nerve injury simulation; SNI). Rats were assigned to one of seven treatments (N=49); Naive, Sham, SNI-no treatment, High-Density Active Balance (stimulation), High-Density Passive Balance, Low-Density Active Balance, and Low-Density Passive Balance. Pain tolerance was analyzed via the von Frey method of withdrawal threshold measurement. Rats were tested at baseline before SNI, five days post-SNI, and 48 hours post-stimulation. SNI lesions had the expected effect of increased ipsilateral paw sensitivity, and analyses revealed that all treatments except Low-Density Passive Balance were effective in alleviating paw sensitivity, though pain thresholds never returned to baseline.

Poster Presentation P38

**Scanning Single Photon Detector Implementation of Quantum “Ghost Imaging”**

Tao (Paul) Jin, Minzhao Liu and Gabriel C. Spalding\*

Physics Department, Illinois Wesleyan University

Entangled photons can be exploited for single-photon imaging: photons are accumulated one by one to form an image on a camera. To improve the signal-to-noise ratio, one can use “heralded imaging,” where camera data is only accepted if a partner (entangled) photon is detected in coincidence, at a second detector. A secondary consequence of the strong correlations between entangled photons is that we can place the object into the path of the second detector, and yet still create an image on the original camera, using only photons that *never interacted with the viewed object*. This configuration is called “ghost imaging.” To reduce cost, we designed and implemented a modified version, replacing the fast-gated camera with single-photon sensitivity with a *single-pixel* detector that scans the image plane. Our design had to carefully preserve optical alignment so that the detector is always pointing at the source of entangled photons. Our next step will be to use ghost diffraction to demonstrate that entangled photon pairs are correlated in ways that extend beyond what is allowed by classical physics.

Poster Presentation P39

**Terahertz Absorption Spectra of Silicate Cosmic Analog Dusts Using a Novel Spectrometer**

Katie North, Binh Phan, Ruihan Zhang and Thushara Perea\*  
Physics Department, Illinois Wesleyan University

Metal containing amorphous silicate grains are expected to be a major component of interstellar dust. Amorphous silicate grains containing magnesium, iron, and calcium have been synthesized in the IWU chemistry department. Our group has completed the construction of an apparatus for obtaining terahertz absorption spectra of cold samples at astronomically interesting temperatures. To study the dusts, we installed dust samples, embedded in low-density polyethylene pellets, in a sample-exchanger and cooled them down to 3.0 Kelvin. Using a blackbody radiation source, a Fourier Transform Spectrometer, and a sensitive millimeter wavelength light detector, we measured the terahertz absorption spectra of several cosmic analog dusts. We present the full analysis of the data here, along with the specific trends observed.

Poster Presentation P41

**On the Nature of Synesthesia: A Learned Association or Something More?**

Niyant Vora and Jason Themanson\*  
Psychology Department, Illinois Wesleyan University

Synesthesia is a phenomenon that has captivated the interest of many researchers, as it is a unique experience of the blending of the senses. The following study was conducted in an effort to understand whether synesthetic experiences can be learned, as a 2014 paper claimed. While there has been much research demonstrating that synesthesia is more common than previously thought, and likely to develop in young children as a learning mechanism, the amount of available event-related brain potential (ERP) studies on synesthesia are much less available. The current study, utilizes pre- and post-test ERP data from participants to understand whether a learned association or synesthetic experience occurred during the 4 weeks of training on letter-color and music-color association task. The difference between the pre- and post-ERP tests was analyzed to determine if such training altered three specific ERP components believed to resemble the ERP of synesthetes.

Poster Presentation P42

**Sherlock Bones: Deductive Reasoning in Dogs?**

Kate McHugh and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

Humans regularly use deductive reasoning to make decisions. For example, if Anne is with Bob and Bob is at the Coffee Hound, I can infer that Anne is also at the Coffee Hound. Is deductive reasoning uniquely human? Here we asked: can dogs use deductive reasoning? An experimenter showed dogs two buckets then reached into the buckets, one at a time, to demonstrate the contents. Each bucket contained two objects: either two neutral objects (A and B) or a neutral object (C) and a treat. Once the dogs saw one item, we returned it to the bucket and repeated the process with the second item. Once the dog saw the items in both buckets twice, the buckets were hidden and rotated out of the dog's sight. The researcher demonstrated one of the objects in each bucket (A and C) and dogs searched the bucket containing the treat. If dogs use the same reasoning as us, they should find the treat because in the same bucket as object C. Results showed that contrary to predictions dogs chose both buckets about equally. While this may suggest they lack deductive logic, it is possible they failed to demonstrate it due to methodological constraints.

Poster Presentation P43

**Task Specificity & Functional Outcome: What is best for Post-Stroke Rehabilitation?**

Rachel Tomazin and Abigail Kerr\*

Psychology Department, Illinois Wesleyan University

Stroke is a debilitating insult to the brain occurring from a blockage in blood supply (ischemic), or a bleed (hemorrhagic) in one hemisphere of the brain. Worldwide, approximately 10 million people are left with moderate to severe disability due to stroke; the most common deficit is upper extremity impairment. Current stroke rehabilitation strategies utilize task specific training of a skill, meaning one practices the specific skill they want to regain. However, it is possible that there are more generalized types of therapy that can be as effective in rehabilitating debilitated skills. The current study utilizes several skilled reaching tasks in mice that have shown striking parallels to human dexterous movements to observe the effects of task-specific versus generalized upper extremity rehabilitation post-stroke. Our findings have meaningful implications for rehabilitative strategies post-stroke and test the validity of a skilled reaching task used in the rodent model.

Poster Presentation P44

### **The Appeal of Crime Podcasts**

Grant Werner and Amanda Vicary\*

Psychology Department, Illinois Wesleyan University

Research has shown that women, compared to men, enjoy reading true crime books more, and recent statistics indicate that women make up the majority of crime podcast listeners. We also know that women report having a greater fear of crime than men. However, it remains unclear why learning about crime appeals to women more than men and whether the difference in fear could be part of the explanation. In the current study, we had participants complete questionnaires before and after listening to a crime podcast in order to determine if women truly did enjoy it more than men, and if so, whether a heightened fear of crime could explain this difference.

Poster Presentation P45



### **The Effects of Observing Aggression and Affiliation on Domestic Dog Behavior**

Kyle Cook and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

Social learning is an effective learning strategy in humans; both for good (learning adaptive behaviors) and for bad (learning negative behaviors). In a classic study Bandura (1961), showed that children increased their aggressive behaviors after observing adult models interacting aggressively with a “Bobo” doll (hitting it, kicking it, berating it, etc.). There is good reason to believe this effect is not unique to humans: Pongracz and colleagues (2002) explored the generalizability of this effect across species by demonstrating that domestic dogs can learn problem solutions through observation. Here we further this work by exploring the behaviors of dogs after observing three types of human interactions: aggression, cooperation, and affectively neutral. We hypothesize that if dogs view high levels of aggressive behaviors between two human demonstrators (for example, tug of war) they will exhibit more aggressive behaviors towards the toy (for example, ripping it, trying to engage in a tug-of-war, etc.) than if they view neutral or cooperative behaviors between two demonstrators. We further hypothesize that dogs will prefer to be closer to the ‘victim’ of aggression and more likely to take a treat from said ‘victim’ rather than the aggressor. We will share the results of this experiment, connecting it to the literature on observational learning in human and nonhuman animals alike.

**This or that?: Object individuation in domesticated dogs (*Canis familiaris*)**

Ellen Stumph and Ellen Furlong\*

Psychology Department, Illinois Wesleyan University

Humans rely on organizing and categorizing our world to function in our everyday lives. This ability to categorize rests on object individuation, the ability to track the identity of objects when they leave and reenter sight. Objects can be individuated using three types of information: spatiotemporal, object property and object kind. Previous research has shown that a surprising candidate mechanism may affect infants' use of object kind information: noun comprehension (Xu 1999; Xu 2002). Research using a comparative approach suggests that the ability to use kind information to aid in object individuation may not be unique to humans: great apes, rhesus monkeys and dogs all successfully individuate objects using spatiotemporal and property/kind information (Brauer & Call 2011; Phillips & Santos 2005; Uller 1997). However, little is known about non-linguistic animals ability to individuate objects using kind information alone. Here we explore the effect of a language cue on dogs' ability to use kind information for object individuation. We predict that dogs will be able to use a language cue to successfully individuate objects using kind information. Thus, non-linguistic animals may be able to use kind information to aid in object individuation given appropriate supports.



# Educational Studies – Poster and Oral Presentations

## State Farm Hall

### Poster Presentations – Session 1

9:00 – 10:00 am

SFH FOYER/SFH 101

1.1 Lauren Zanoni

1.2 Ning Wei

1.3 Kaitlyn O'Brien

1.4 Luke Witteveen

1.5 Ariel Tang

1.6 Jennifer Murphy

1.7 Catherine Mojsiewicz

### Oral Presentations – Session 2

10:00 – 11:00 am

SFH 102

Moderator: Allison Henry

2.1 Linh Le

2.2 Maribeth Johnson

2.3 William Heidenreich

2.4 Ellie Giannakopoulos

### Poster Presentations – Session 3

11:00 – 12:00 noon

SFH FOYER/SFH 101

3.1 Meghán McGarrity

3.2 Alexis Obert

3.3 Cathy Peng

3.4 Michael Messer

3.5 Emma Dalton

3.6 Olivia Ruff

Poster Presentation P1.1

**Fostering Engagement Through Inquiry-Based Learning**

Lauren Zanoni and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Inquiry-based learning (IBL) occurs when students engage in work that mirrors elements of the scientific process, such as conducting an investigation and communicating results (Martin-Hansen, 2002). Similar to the inquiry process, in Genius Hour students choose a topic they are passionate about, and engage in research and reflection as they create a finished project (Juliani, 2007). In my study, I determined how the incorporation of inquiry-based learning in a fifth grade classroom facilitates students' cognitive, behavioral, and emotional engagement. Within this study, cognitive engagement refers to students' investment and motivation to learn, behavioral engagement involves the positive conduct students show towards their peers and the activities, and emotional engagement refers to the value or belonging students feel towards their work and/or groupmates (Fredricks, Blumenfeld, & Paris, 2004). I collected and analyzed data through field notes, class photos, and student work samples. The results of my study showcase how inquiry-based learning experiences enable students to be engaged in and passionate about learning.

Poster Presentation P1.2

**The Power of Arts: Contribution of Arts-based Education on Children's Learning in the Early Years**

Ning Wei and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

The significance of the use of arts in children's educational contexts is well-demonstrated and the value of arts-based education had been highlighted in recent years (Eisner, 1990; Ewing, 2013; McArdle & Piscitelli, 2002; McArdle & Wright, 2014; Olsson, 2009; Tarr, 2008; Vecchi, 2010; Wright, 2003). The purpose of this paper is to explore how arts-based education supports children's learning in early years. Using *Aistear* (NCCA, 2009) as a conceptual framework, this article provides evidence that arts-based education offers young children across different countries great opportunities to enhance learning in terms of their physical and emotional well-being, communication, creativity and cultural belonging. Additionally, it addresses the practical limitations of arts-based education that educators experienced during teaching. Future research should consider an investigation to improve the efficiency of arts-based education, as well as per-service teachers' training program in arts-based education.

Poster Presentation P1.3



**A Noteworthy Study: Music in the Spanish Classroom**

Kaitlyn O'Brien and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Music can significantly impact student learning and academic performance in the language classroom. More specifically, music implementation in the secondary Spanish classroom can assist students in their learning and foster second language acquisition (Engh, 2013). For many students, learning a second language can be a difficult and stressful task. In this qualitative study, I aim to address the ways in which music helps students with SLA, in terms of retaining vocabulary and grammar concepts, lowering their stress levels, and increasing motivation. The study involves 24 participants from a Spanish I classroom in a suburban school. In this study, academic performance refers to student progress as well as outcomes on formative assessments. Data was collected through field notes, surveys, and formative assessments. The findings of this study are pertinent to the field of education, since music enhances student learning and performance in the secondary Spanish classroom and could really impact the future of SLA.

Poster Presentation P1.4

**Points vs. Mastery: The Effects of Standards Based Grading**

Luke Witteveen and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Every few years, a new trend in education emerges that aims to help a greater number of students to succeed in the classroom. There was “No Child Left Behind Act” in 2001, followed by Common Core State Standards in 2009, and finally the newest innovation in *standards-based grading*, currently being implemented in classrooms. This grading style requires teachers to adhere to specific standards set by the state and school district. There has been a controversial debate in previous studies as to whether standards-based grading is beneficial towards students’ deeper learning (Jones, 2013) or distracts students from success (Peters, 2017). This study was conducted in an urban high school in a United States History classroom with twenty-two sophomore students. Formative assessments, summative assessments, and observational journals were analyzed to determine mastery of content and student reaction to the grading style. This study argues that although standards-based grading focuses on mastery of content, it has little effect on student learning.

Poster Presentation P1.5

**No More Tragedies: Adolescent Suicide Facts and Prevention**

Xiaoyu Tang and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

The purpose of this research synthesis is to strengthen the suicide prevention programs for adolescents in a school setting, and to raise public awareness of the significance of one's mental well-being. This study aims to investigate the facts and prevention methods for adolescent suicide. To examine the research question, three major domains were demonstrated: population of suicide attempters and completers, major reasons for adolescents to commit suicide, and effective prevention methods. This research synthesis adopts a bottom-up research approach, searching for relevant studies from general to specific. It has been found that the adolescent's suicide can be prevented through methods that include mindfulness classes, parent-teacher conferences, enhanced classroom management, and screening process.

Poster Presentation P1.6

**Positive Relationships in the Classroom**

Jennifer Murphy and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

Advocates of evidence-based education argue that students who have positive relationships with their teachers are more likely behave and academically perform well in school as these relationships shape the way children think and act. Aligned with principles of *attachment theory* (Ainsworth, 1982; Bowlby, 1969), positive teacher-student relationships enable students to feel safe and secure in their learning environments and provide scaffolding for important social and academic skills (Baker, 2008; O'Connor, Dearing, & Collins, 2011; Silver, Measelle, Armstrong, & Essex, 2005). In this study, I examine how to facilitate positive teacher-student relationships and how having these relationships affects students' behavior and academic performance. Educators will benefit from this study as the findings point to ways in which teachers can support students academically and behaviorally.



## Poster Presentation P1.7

### **Reader's Theatre and Its Effect on Students**

Catherine Mojsiewicz and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Reader's Theater is a reading instructional method that calls for reading scripts aloud. This research synthesis focuses on the effects Reader's Theater can have on students in the classroom. Many studies have been conducted in classrooms where the educator uses Reader's Theater as a tool to improve reading fluency. In order for a someone to have fluency when reading, they must be able to read at an appropriate rate, with accuracy, phrasing, and expression (Lekwilai, 2014). Reader's Theatre causes repetitive reading which facilitates rapid word recognition. This leads to enhancing other factors in reading fluency as well. When searching Reader's Theatre and teaching methods, this technique of reading scripts out loud was also found as a tool used to teach other subjects such as science and mathematics. Since it improves understanding and expression when reading, it also influences the students' ability to retain that information. This literature review examines the many studies and articles that prove Reader's Theatre is a positive tool that helps improve reading fluency, as well as assists teaching other subjects. Also, due to the nature of Reader's Theatre, it facilitates positive social interactions and confidence in the students.

## Oral Presentation O2.1

### **Learning About Love: Healthy Relationship Education and Program Outcomes in Adolescents**

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

Recent research has shown the unique influence of peer relationship on identity development in adolescents (McLean & Jennings, 2012; Nguyen, Cohen, & Hines, 2012). Although there is a lack of research on the developmental importance of adolescent romantic relationships, these relationships are expected to contribute significantly to shaping self-identity, maintaining socio-emotional health, and academic achievement (Caver, Joyner, & Urduy, 2003). Therefore, healthy adolescent romantic relationship is gaining interest among researchers and educators. This research synthesis examined 20 empirical papers on school-based healthy *relationship education* and analyzed their program evaluation findings under the Social and Emotional Learning (SEL) framework. These findings were divided into categories following the main competencies identified in SEL: social awareness, relationship skills, and responsible decision-making to highlight the impact of healthy relationship programs on adolescence social development. Through this research synthesis, 6<sup>th</sup>-12<sup>th</sup> grade educators and administrators can advocate for an implementation or expansion of adolescence relationship education in their local schools using evidence of improvement in SEL competencies and reduction in teen dating violence.

## Oral Presentation O2.2

### **Teacher Participation in Professional Development and its Contribution to School Improvement**

Maribeth Johnson and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

In recent years, efforts to restructure professional development programs for teachers have had a significant emphasis on collaboration amongst teachers, administrators, and professional development providers (Darling-Hammond, Wei, Andree, Richardson & Orphanos, 2009). These cooperative techniques have been integrated into existing programs as well as have inspired the formation of new, job-embedded programs. In order to get a sense of the variety of these programs, I examined 20 research articles and analyzed how teacher participation is being utilized in professional development activities currently, how it could be utilized more effectively, and how teacher participation in professional development activities contributes to school improvement using qualitative research techniques from Ryan and Bernard (2003). Job-embedded professional development that includes elements of teacher choice, direct relation to the student/school context, and teacher leadership were shown to contribute to school improvement.

## Oral Presentation O2.3

### **The Effectiveness of Differentiated Instruction in a Multimodal Summative Assessment**

William Heidenreich and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

The main focus of my inquiry was to assess the effectiveness of incorporating differentiated instruction into a multimodal assessment. In addition to analyzing the effectiveness of differentiated instruction in this lesson, I analyzed the importance that 4MAT Learning plays in implementing curriculum that best caters to students' needs. *4MAT learning*, defined as the cognitive tendencies displayed by an individual during the learning process, if used effectively, can help educators create curriculum that fosters an optimal learning environment for students. Likewise, in my study, I analyzed the cognitive tendencies displayed by students, recorded them accordingly, then used that data in appliance to the *4MAT Learning Theory*. In doing so, I compared the cognitive tendencies to those discussed in the *4MAT Learning Theory*; after a feasible comparison was made, I implemented instruction that catered to that students' cognitive tendencies, in accordance with the *4MAT Learning Theory*.

## Oral Presentation O2.4

### **Engaging in Student Choice**

Ellie Giannakopoulos and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

Teaching academic material to students is only half the responsibility of educators. In order for students to fully retain information and become active learners, engaging them in their curriculum is vital. Offering choice to students presents the opportunity for this active learning and engagement to take place. Student choice must be meaningful and applicable to student's interests so that they can successfully connect what they are learning to their own lives. During this self-study, fourth grader students were provided choice within lessons and assessment activities in various subjects. These students were then observed while participating in choice-related material to determine overall engagement and comprehension of lessons being taught. The purpose of this study was to determine how choice affects student engagement in the classroom; specifically, the impact of hands-on learning and independent inquiry. Analysis of lesson plans, assessments, and student feedback illustrated that student choice is effective in engaging students.

## Poster Presentation P3.1

### **Flex on This! Flexible Seating in the Classroom**

Meghán McGarrity and Leah Nillas\*  
Educational Studies, Illinois Wesleyan University

*Flexible seating*, or otherwise known as *alternative seating*, refers to classroom set ups that integrate different seating options rather than traditionally arranged rows of desks. In a regular classroom, some students sitting in traditional desks are uncomfortable; learning can be a battle because of the strain on their bodies. Students who learn in a traditional seating arrangement might be less likely to be engaged or to be able to focus on lessons, not to mention other contributing factors, such as the effects on classroom behavior and their motivation to learn. The purpose of this self study was to see if flexible seating played a role in student learning. Participating in this study were 6<sup>th</sup> grade students who engaged in a classroom full of couches, chairs, and seat cushions. Their experiences in academic learning, behavior, and opinions were documented through field notes, student surveys, classroom photos, and a series of questionnaires. Results from the analysis of the collected data showed that students were able to focus, stay engaged, and participate more in a classroom that implemented flexible seating.

Poster Presentation P3.2

**Engaging Behavior: Standards-Based Grading in the Secondary ELA Classroom**

Alexis Obert and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

There is movement in the field of education revolving around the grading system. After centuries of use, the traditional grading system in which students earn extra credit, take tests, and strive for As, is being shifted aside in favor of standards-based grading, a system in which students practice their skills and are assessed only on how they do. Standards-based grading is a controversial subject, due in part to a lack of understanding of what exactly it is and fear that it may not be good for the students. During student teaching, I worked in a school that had made the move to standards-based grading a few years prior. I observed how standards-based grading affected the students' behavioral engagement. This self-study includes a literature review, a methodology, an analysis of data, and concluding thoughts on standards-based grading. After completing my self-study, I found myself in favor of standards-based grading. Additional research is necessary as this is still a fairly new grading system, but I found standards-based grading to have no negative affect on behavioral engagement.

Poster Presentation P3.3



**ENGLISH LANGUAGE LEARNING AND TEACHING**

Jinyu Peng and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

The population of English language learners (ELL) is rapidly and continuously growing (Ok & Ratliffe, 2018). Thus, it is more and more important for current and future educators to enrich their knowledge and skills in teaching ELL, and more importantly focus on the connections between language teaching and learning. The compatibility of the two will heavily influence how much a student will really learn (Zhou, 2011). The purpose of this literature review is to enhance educators' knowledge on ELL by looking into studies conducted on relative topics including: what language learning strategies are being used more often by students, how to better facilitate students' language learning, and what can future research examine. Both language teachers and students will be less emotionally stressed and will benefit tremendously if they are better informed on how to do their jobs more effectively.



Poster Presentation P3.4

**1:1 Technology Integration**

Michael Messer and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

In the past few years, the common trend for public schools is to move to a 1:1 technology approach in the classroom. Students are given a device (e.g., laptop, Chromebook, iPad) their freshmen year and are instructed to use them for their work in school for 4 years. This paper delves into the effects of this approach and weighs whether it is worth the change it brings. “Although the content may not change, the technology enables the use of innovative and engaging instructional approaches” (Storz & Hoffman, 2013, p. 3). This change not only affects the students, but the teachers as well. Students need to be prepared for the ever-changing modern world of technology. It is the duty of school and its educators to prepare these students for this world. Is the 1:1 approach the best way to do this?

Poster Presentation P3.5

**Brain Breaks in the Elementary Classroom**

Emma Dalton and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

At the elementary level, many teachers notice a decline in student engagement at various times of the day. Fredricks, Blumenfeld, and Paris (2004) state that there are three levels of engagement: behavioral engagement, cognitive engagement, and emotional engagement. This study discusses how using *brain breaks*, or pauses of instruction to focus students’ attention on a different movement activity, affect student engagement. Data was collected through video clips and written field notes. The results of this study suggest that *brain breaks* positively influence the engagement of students. These findings are significant to the field of education because they could point out ways in which teachers could enhance student engagement and meet physical activity standards.

**Disciplinary Literacy: Providing Students with the Literacy Tools to Succeed Across Disciplines**

Olivia Ruff and Leah Nillas\*

Educational Studies, Illinois Wesleyan University

Now more than ever it is important to help adolescents with reading and writing, as two thirds of middle school and high school students struggle with reading and writing in various content areas (Carnegie Council on Advancing Adolescent Literacy, 2010). There are no specific rules informing readers the “right” way to approach a text, not even in the Common Core State Standards. How can we ask students to closely read texts in several disciplines without having explained how to do so? We are setting our students up for failure if we neglect teaching them how to read across disciplines. In an effort to understand how teachers implement literacy strategies across disciplines, I examined research articles on the implementation of disciplinary literacy and the effects of literacy strategies in mathematics, English, science, and history curriculum. Additionally, further research is necessary to explore literacy teaching in other content areas as well as a closer examination of other literacy strategies to determine the effects and advantages of literacy teaching.

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