



2023

Linfield University's 31st  
Student Symposium

A celebration of

**Scholarship  
and Creative  
Achievement**

31st Annual Linfield University

# STUDENT SYMPOSIUM

A Celebration of Scholarship  
and Creative Achievement

May 19, 2023

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# SCHEDULE AT A GLANCE

	JERELD R. NICHOLSON LIBRARY		VIVIAN A. BULL MUSIC CENTER	MILLER FINE ARTS CENTER
	Grand Avenue	Austin Reading Room	Delkin Hall	Linfield and Lou Galleries
9 a.m.				
9:15 a.m.				
9:30 a.m.			9:15-9:45 a.m. DEBATE SHOWCASE ORAL PRESENTATION #14	
9:45 a.m.				
10 a.m.				
10:15 a.m.			10 -10:15 a.m. ORAL PRESENTATION #21 MIKAYLA MINTON	
10:30 a.m.				
10:45 a.m.			10:30-10:45 a.m. ORAL PRESENTATION #23	
11 a.m.				
11:15 a.m.				
11:30 a.m.	9 a.m.-3 p.m. POSTERS AVAILABLE FOR VIEWING #1-#12 15- 20, 22, 31-35, 37-40		11-11:15 a.m. THEATRE PERFORMANCE #36 "TOGETHER" FROM THE MUSICAL "FIREBRINGER"	
11:45 a.m.		10 a.m. - 2 p.m. ORAL PRESENTATION #41		9 a.m.-3 p.m. ART EXHIBIT AVAILABLE FOR VIEWING
12 p.m.		UNDERGRADUATE LITERATURE AND CREATIVE WRITING CONFERENCE		
12:15 p.m.				
12:30 p.m.				
12:45 p.m.				
1 p.m.				
1:15 p.m.			1-2 p.m. MUSIC PERFORMANCE STUDENT SHOWCASE RECITAL	
1:30 p.m.				
1:45 p.m.				
2 p.m.				
2:15 p.m.		2-2:45p.m. STUDENTS STAND BY POSTERS #1-#12 15- 20, 22, 31-35, 37-40		
2:30 p.m.			2:30-3 p.m. SPEECH & PERFORMANCE SHOWCASE #13	
3 p.m.				

Refreshments will be available in the Nicholson Library throughout the day.

# PRESENTATION SCHEDULE

TIME	TYPE	LOCATION	PRESENTATION
9:15-9:45 a.m	Debate	Delkin Hall	14 Debate Showcase
10 -10:15 a.m.	Oral Presentation	Delkin Hall	21 Ending Law Enforcement's Accountability Crisis: The Case Against Qualified Immunity
10 -2 p.m.	Oral Presentation	Austin Reading Room	41 The Linfield University Undergraduate Literature and Creative Writing Conference
10:30-10:45 a.m.	Oral Presentation	Delkin Hall	23 Reimagining Maasai Mara
11-11:15 a.m.	Theatre Performance	Delkin Hall	36 "Together" from the Musical "Firebringer"
1-2 p.m.	Music Performance	Delkin Hall	24-30 Student Showcase Recital
2:30-3 p.m.	Oral Presentation	Delkin Hall	13 Speech and Performance Showcase



# PRESENTATIONS BY DEPARTMENT

DESCRIPTION #

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*Emma Sammartino*

Faculty Sponsor – Megan Bestwick

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*James Weiser*

Faculty Sponsor – Megan Bestwick

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Annotation of the Microtubule Star (mts) Gene in *Drosophila Ananassae* Using *Drosophila Melanogaster* as a Reference Organism for Comparative Genomics 10

*Danesh Khazaei*

Faculty Sponsor – Catherine Reinke

Putative Roles of Parasitoid Wasp Venom Proteins in the Modulation of Biological Pathways 11

*Riley Omonaka*

Faculty Sponsor – Catherine Reinke

## Chemistry

Development of Copper Catalyzed Alkylboron Oxidative Homocoupling 12

*Katie Russell*

Faculty Sponsor – Andrew Baggett

## **Economics**

**Degrees Conferred in 2023** **15**  
*Devin Thacker and Derek Long*  
Faculty Sponsor – Eric Schuck

**Apple vs. Google** **16**  
*Maya Nakasone and Mariah Ohman*  
Faculty Sponsor – Eric Schuck

**Incorporating Macroeconomic Indicators and the Baker-Wurgler Investor Sentiment Model to Forecast Market Returns** **17**  
*Jacob Straessle and Evan Neitling*  
Faculty Sponsor – Eric Schuck

**The Increasing Price of Automobiles Through Time** **18**  
*Samuel Brinda and Romario Mendoza*  
Faculty Sponsor – Eric Schuck

**Oregon State Labor Force Participation Rate: A Self-Fulfilling Prophecy** **19**  
*Jackson Horner and Katelyn Schmitt*  
Faculty Sponsor – Eric Schuck

## **English**

**The Linfield University Undergraduate Literature and Creative Writing Conference** **41**  
Helika Campbell, Victoria D'Angelo, Jordan Simmons, Sofi Spratt, Caroline Calvano, Thomas Wysocki, Elena Lundby, Ethan Smith, Davia Guzman and Willow Kvittek  
Faculty Sponsors – Dave Sumner and Jesse Donaldson

## **Health, Human Performance and Athletics**

**The Effects of Active Pool Recovery on Fatigue and Athletic Performance Following Intense Physical Activity** **20**  
*Kelsey Jordan and Nathan Herde*  
Faculty Sponsor – Sarah Coste

## **Law, Rights, and Justice**

**Ending Law Enforcement's Accountability Crisis: The Case Against Qualified Immunity** **21**  
*Mikayla Minton*  
Faculty Sponsor – Patrick Cottrell

## Mathematics and Computer Science

**Predicting the Guess Distributions and Number of Reported Plays for Wordle** **22**

*Brendan Perez and Boyu Liu*

Faculty Sponsor – Kate Lorenzen

**Reimagining Maasai Mara** **23**

*Liam Welk, Colin Gale and Mills Weerasinghe*

Faculty Sponsor – Kate Lorenzen

## Music

**“Slap!” (2023) for String Quartet** **24**

*Elana Gatien*

Faculty Sponsor – Andrea Reinkemeyer

**“Erlkönig”** **25**

*Thomas Sagers, Carl Loewe, and Johann Wolfgang von Goethe*

Faculty Sponsor – Julie Cross and Anton Belov

**If You Hadn’t But You Did** **26**

*Daria Jones*

Faculty Sponsors – Anton Belov and Julie Cross

**“Simple Gifts Suite”** **27**

*Alexis Peck, Hannah Johnston, James Weiser, Zoey Ahl and Avery Shankland*

Faculty Sponsor – Florian Conzetti

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*Robert Turner and Hannah Barlow*

Faculty Sponsor – Anton Belov

**“My White Knight from The Music Man”** **29**

*Hannah Barlow*

Faculty Sponsor – Anton Belov

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*Thomas Sagers and Heather Pool*

Faculty Sponsors –

lie Cross and Anton Belov

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<i>Alex Landry</i>	
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<b>Realized Lighting Design for the Musical “Firebringer”</b>	<b>37</b>
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<i>Sydney Monroe</i> Faculty Sponsor – Derek Lane	
<b>Paper Project - Scenic Design for “Cabaret”</b>	<b>40</b>
<i>MJ Rinehart</i> Faculty Sponsor – Derek Lane	



# PROJECT DESCRIPTIONS

## 1

### **Entre Madres, Putas y Buchonas: A Content Analysis of Narco Shows and their Representation of Women**

*Salma Galván Pelayo*

#### SOCIOLOGY AND ANTHROPOLOGY

This research analyzed female characters in four Narco shows to aim to understand if there's a correlation between the glorification of Narco culture and discourse on violence against women in Mexico. The word "Narco" refers to drug lords or traffickers, which are individuals, typically male, who have immense power and influence in Mexican society. I argue that the glorification of Narco culture, and in this case, the consumption of Narco shows, creates a discourse that normalizes the subordination of women in Mexican society while ultimately creating a desensitization of street violence and subsequently femicide. For this research, I completed a content analysis of four different Latin American Narco shows. In this process, I analyzed the role of female characters and identified the themes of sexualization, humanization, victimization, and power. This work is valuable because as Narco media and shows continue to grow in popularity, it is important to understand the deeper implications of this media, and how discourse shapes our world and can have impactful consequences in public opinion and policy.

## 2

### **Transitional Periods in Japanese Honorific Language**

*Grace Curry*

#### SOCIOLOGY AND ANTHROPOLOGY

Entering the workforce and going through business etiquette training is a significant part of gaining cultural capital and receiving recognition as a participant within Japanese society. This can be represented through the linguistic forms, "son-keigo" and "kenjougo", which signify humility and restraint in respect to the speaker's relationship with the listener. However, young adults have reported distress around their usage of advanced "keigo". This study aims to better understand the transitional period into adulthood by observing the attitudes and experiences of young adults entering the workforce, concluding that honorific speech is a compulsory performance of Japanese business culture that youth are beginning to opt out of by choosing opportunities presented by international relations and new technology.

## 3

### **Navigating Resources and Risks with Celiac Disease**

*Grace Curry and Salma Galvan*

#### SOCIOLOGY AND ANTHROPOLOGY

A collaboration of projects documenting the lived experiences of those with celiac disease, including risk management when going out and the navigation of resources and health information. Salma interviewed individuals with celiac disease over Zoom and analyzed their responses to better understand how they measure risk related to living with celiac disease. In total Salma conducted more than a dozen interviews from individuals from three different countries. She also analyzed through Twitter how people talk about risk and managing social situations.

Grace compared literature and conducted interviews to investigate the generational gap in regard to how celiac patients navigate resources, information, and community in online spaces. Her research included factors such as internet literacy, how people discern reliable information, and what motivates people to become involved in online celiac discussions from both “digital natives” and older populations.

## 4

### **Self Presentation and Blended Identity in the Everyday Virtual Life: A Case Study of Fallout 76**

*Dmitri Sofranko*

#### SOCIOLOGY AND ANTHROPOLOGY

Engagement with the online realm has become an inescapable sensation over the last few decades. Social media, blogs, chatrooms, and online video games are just a few ways in which we are actively engaged with the ever-growing online world around us. This online presence has generated new conversations about the creation of “identity” and the “self”. In this study, players within the online space “Fallout 76” are examined to better formulate a contemporary understanding of the many ways in which we go about recreating the self within these spaces. Further, this study also seeks to understand the altruistic behaviors players formulate within the game and the ways in which the attempts of recreating the self-help perpetuate this online community’s norms.

## 5

### **The Effect of Low concentrations of Copper on Mitochondria and Activity in Yeast Cells**

*Emma Sammartino*

#### BIOCHEMISTRY AND MOLECULAR BIOLOGY

Mitochondria are essential organelles in both yeast and human cells due to their role in metabolism, ATP production via the oxidative phosphorylation (OXPHOS) pathway, and other regulatory cellular processes. Using yeast as a model organism to study mitochondrial function in a chronological lifespan assay allows experiments to be conducted over a shorter timeframe and allows for connections to be made to human cells. Our aim is to investigate how exogenous copper in the mitochondria of yeast affects the production of reactive oxygen species (ROS), protein expression, and enzyme activity during yeast lifespan. Small amounts excess copper added to growth media (0.25 mM copper sulfate in restricted nutrient media) extend yeast chronological lifespan, but yeast lifespan is reduced when added copper levels are increased to 2.0 mM copper sulfate or higher. These results indicate that low levels of exogenous copper in the media is beneficial for yeast in these restricted media conditions. To extend these findings, we assessed how added copper changes mitochondria within these cells over the course of the yeast lifespan (14 days growth). Using MitoTracker Green and fluorescence detection we showed an increase in mitochondria in copper treated cells. This is consistent with previous studies showing mitochondria in mammal and yeast cells contain a labile copper pool located in the matrix, which is used in the metalation of the copper containing enzyme of the OXPHOS pathway Complex IV, Cytochrome C Oxidase (CcO), and superoxide dismutase (Sod1p). Our most recent work focuses on assessing CcO protein complex expression during yeast lifespan, specifically looking at cytochrome c oxidase subunits using western blotting; and assessing Sod1p activity using in-gel activity assays. The results of this research allow us to better understand the role of copper in mitochondrial activity across the lifespan of yeast.

## 6

### Is RxR Alpha a Mitochondrial Transcription Factor?

*James Weiser*

#### BIOCHEMISTRY AND MOLECULAR BIOLOGY

Mitochondria are important organelles in most eukaryotic cells due to their essential role in metabolism. Within the matrix of the organelle, they also have their own genome (mtDNA) which encodes many of the protein subunits for complexes within the oxidative phosphorylation (OXPHOS) pathway. The remaining OXPHOS protein complex subunits are encoded in the nuclear genome, translated in the cytosol, and imported into mitochondria. Transcriptional coordination between these two genomes to produce functional OXPHOS complexes is critical to maintaining cellular homeostasis. This process likely requires regulatory proteins/transcription factors that determine the expression of these genes. Retinoid X receptor alpha (RXR $\alpha$ ) is a protein that has many functions in human cells and is a ligand activated nuclear receptor. It can also translocate to the mitochondria where its purpose is unknown. The goal of this project is to determine the role of RXR $\alpha$  as a mitochondrial transcription factor. We have expressed and purified the RXR $\alpha$  protein from bacteria for use in an in vitro mitochondrial transcription assay. Using an electrophoretic mobility shift assay (EMSA) we have also shown the purified protein binds to DNA with canonical binding sequences (DR1 repeats) and spacing as well as non-canonical spacing and have concluded RXR $\alpha$  binds as a dimer with a single nucleotide space between the binding sites being optimal. We have applied these results to assess changes in mitochondrial transcriptional output based on RXR $\alpha$  binding. Our aim is to investigate RXR $\alpha$  binding to mtDNA using atomic force microscopy (AFM). In doing so we will better understand the mechanisms that are involved in mtDNA transcription. If RXR $\alpha$  is a transcription factor that is another protein that we can regulate to increase or decrease transcription. Being able to increase or decrease transcription in mitochondria is important as mitochondrial dysfunction causes a wide array of diseases and plays a part in aging.

## 7

### Does a *Drosophila Melanogaster* Mutant Exhibit a General Defect in MicroRNA-Mediated Gene Silencing?

*Ruthanne Zareyna*

#### BIOLOGY

Mature microRNAs (miRNA) are ~22 nucleotide long single-stranded ribonucleic acids encoded by the genome and essential for gene silencing. Silencing occurs when miRNAs are processed and subsequently associate with the miRNA-induced silencing complex (miRISC). miRISC binds via complementary base pairing to target mRNAs, and target mRNAs are silenced by either mRNA degradation, translational block, or both. MicroRNA-based therapeutics are being developed and deployed to treat diseases caused by altered gene expression.

We aim to characterize the molecular mechanisms of microRNA-mediated gene silencing. We have *Drosophila melanogaster* mutant fly lines with disrupted gene silencing as visualized by a GFP-based fluorescent reporter of silencing. We are now curious as to whether the observed change in fluorescence is the result of a disruption to microRNA-mediated gene silencing in general, or if the observed change in fluorescence reflects a disruption of a subset of microRNAs or microRNA targets. We are building fly lines and appropriate controls that will enable us to test for changes in microRNA-mediated gene

silencing using a different and vetted reporter of gene silencing that is active in developing neurons. Recent efforts have introduced the nerfin-GFP sensor into our mutant fly line and a control line, setting the stage for comparative analysis of gene silencing.

## 8

### **Sponge Unknown: Identifying Oregon Coast Sponges**

*Myron Manera*

#### BIOLOGY

This project is about identifying sponges from the Oregon Coast that are unknown. Sponges were collected from Newport, Oregon tide pools. These sponges that were collected, we don't know what the species name is so we collected the sample and ran some tests on it like DNA extraction, PCR, ran a gel electrophoresis, and get it the samples sequenced. Once that sequence gets back, we will know what type of species it.

## 9

### **Mutations in Mre11 Induce Genomic Instability**

*Hannah Karp, Frances Remmick, and Andrea Quintana*

#### BIOLOGY

Exogenous agents such as ionizing radiation that challenge the DNA and produce various DNA lesions lead to genome instability. These lesions at the DNA level led to changes in genetic information, leading to mutagenesis, which can propagate in subsequent rounds of replication, eventually resulting in the disruption of normal cell function, and uncontrolled cell growth thus forming tumors. DNA double strand breaks (DSBs) are the most lethal type of DNA damage that cells combat. One of the pathways to repair DSBs is homology-dependent repair (HDR). The 3' to-5' exonuclease activity of Mre11 generates protruding 3'ssDNA at DSBs. Further, Rad51, a factor that performs homology search and strand invasion, then binds the ssDNA. Mre11 is responsible for the initial short-range resection which is followed by the long resection by Exo1 before strand invasion in HDR. The purpose of this study is to test the hypothesis that "MRE11" gene variants contribute to genomic instability by aberrant DNA repair. This project seeks to understand the potential role of disease-associated variants of Mre11 in defective resection function thus inducing genomic instability.

## 10

### **Annotation of the Microtubule Star (mts) Gene in Drosophila Ananassae Using Drosophila Melanogaster as a Reference Organism for Comparative Genomics**

*Danesh Khazaei*

#### BIOLOGY

Our lab is using comparative genomics protocols to explore the evolution of the insulin-like signaling pathway in "Drosophila" species spanning 40M years of evolution. This project aims to annotate an ortholog of the "Drosophila melanogaster gene" microtubule star "mts" in the incompletely characterized "Drosophila ananassae" genome. Genome annotation is the process of creating gene models, or labelling areas of interest in a species' genome for further investigation, using genome comparisons and large data sets characterizing gene expression, which is the production of RNA from select regions of genomic DNA. We are using comparative genomics and bioinformatics protocols to identify and build

a detailed gene model of the putative “mts” gene in “*D. ananassae*” We will annotate all unique protein-coding isoforms of this gene in “*D. ananassae*”. Our research tools include a custom mirror of the UCSC Genome Browser, NCBI BLAST, the model organism database FlyBase, and custom bioinformatics tools developed by the Genomics Education Partnership. Annotation of many insulin-like signaling pathway genes will enable further investigation of the evolution of these genes and their regulatory regions in the context of their action within the insulin-like signaling pathway.

## 11

### Putative Roles of Parasitoid Wasp Venom Proteins in the Modulation of Biological Pathways

*Riley Omonaka*

#### BIOLOGY

Parasitoid wasp reproduction depends upon wasps infecting *Drosophila* (fruit fly) hosts. The wasps infect *Drosophila* larvae, depositing eggs and venom proteins which inhibit the host immune response, direct nutrition distribution, and inhibit host growth and development. Ultimately, the *Drosophila* succumbs to the wasp infection as the wasp develops within the fly larva.

*Drosophila* and humans share conserved antibacterial, antiviral, and anti-parasitic responses, as well as many conserved underlying biological signaling pathways. Thus, *Drosophila* can be used to better understand diseases in humans because disruptions and modulations to conserved cell-signaling pathways result in phenotypically similar outcomes. Understanding how parasitoid wasp venom proteins can modulate the host immune system may provide the insight for the development of therapies to treat human diseases.

Wasp venom peptides identified by mass spectrometry of proteins isolated from the wasp venom apparatus have provided a starting point for wasp venom gene annotation and comparative genomic analysis. The goal of annotation is to generate gene models for wasp venom proteins that can be used for the molecular cloning needed to perform protein purification and activity characterization. Current experiments aim to clone newly annotated wasp venom genes into expression plasmids for the purification and analysis of wasp venom protein activity.

## 12

### Development of Copper Catalyzed Alkylboron Oxidative Homocoupling

*Katie Russell*

#### CHEMISTRY

Carbon-carbon bonding is considered one of the most important chemical reactions in organic chemistry. The goal of this project is to perform a new carbon-carbon coupling reaction using copper to catalyze a radical boron reaction to form a  $sp^3$ - $sp^3$  C-C bond. In the past, boron has been used to form C-C bonds. However, what is new about this research is the geometry of the two carbon atoms being joined. Many experiments have successfully coupled two  $sp^2$  carbons, and one experiment was able to couple a  $sp^2$  carbon and an  $sp^3$  carbon; however, this experiment seeks to couple two  $sp^3$  carbons. As far as the researchers are aware, this is the first presentation of  $sp^3$ - $sp^3$  C-C bonding using the proposed mechanism.

# 13

## Speech and Performance Showcase

*Ethan Smith, Clara Johansen, Mari Stewart and Zackery Olson*

### THEATRE AND COMMUNICATION ARTS

The Linfield Forensics team will showcase several different public speaking and performance of literature events drawn from selections that were presented at intercollegiate competitions throughout the year. Please join us for this celebration of the art of public speaking that highlights the talents and interests of our students.

# 14

## Debate Showcase

*Clara Johansen, Ethan Smith, Katie Jones, and Ally Nicklous*

### THEATRE AND COMMUNICATION ARTS

The Linfield Forensics team will present a demonstration debate on the motion, "Governments should set maximum age limits for national leaders." Please join us for what promises to be a lively debate on a topic that speaks powerfully to current issues in U.S. and global politics mented a manipulated sine function for one period. By using a manipulated sine function, we can model the amount of carbon dioxide a tree is able to sequester over its lifetime as well as show the release of carbon dioxide back into the atmosphere when the tree dies and decomposes in the forest.

# 15

## Degrees Conferred in 2023

*Devin Thacker and Derek Long*

### ECONOMICS

It is increasingly important in our society that people receive a post-secondary education. The number of degrees that are conferred within a nation translates to higher income, more labor force mobility, and overall better standards of living (Kazakis and Fagian, 2017) . Using basic economic and education data, an accurate projection of the number of degrees conferred in 2023 can be made for the United States of America. Using personal consumption expenditures for college, the number of students currently enrolled in post-secondary institutions, the wage ratio between those with bachelor's degrees and without, and a recession variable; an accurate depiction of conferral rates can be predicted. The basic theory behind this analysis is based on the wage premium earned by a bachelor's degree, and the relative costs to earn that degree. An accurate projection must contain wage variables that determine the opportunity cost of earning a degree. As it takes skill and ability to earn a bachelor's degree, we must add in a variable that predicts how well students will perform throughout college. In this case, SAT results will be used to predict academic ability. We have researched previous studies to get an accurate grasp around factors that impact the cost of college, wages of graduates, and impacts of dual enrollment on college enrollment.

# 16

## Apple vs. Google

*Maya Nakasone and Mariah Ohman*

### ECONOMICS

We are investigating the stock price of Apple and what variables cause it to vary from year to year. As we look at Apple, we are also looking at consumer preferences and comparing it to the next highest technology competitor, Google. We chose to see whether Apple stock lagged, U.S. household income, investor sentiment, earnings per share, bond options, interest rates, and Steve Jobs or Sundar Pichai as CEO influences stock prices. With these variables, we expect to learn what influences Apple's and Google's stock price and how consumer preferences affect stock price. We would be able to look at the changes in the independent variables and understand how that affects the stock prices.

# 17

## Incorporating Macroeconomic Indicators and the Baker-Wurgler Investor Sentiment Model to Forecast Market Returns

*Jacob Straessle and Evan Neitling*

### ECONOMICS

The ability to predict rises and falls in financial markets has long been studied, with multiple models developed. This research seeks to develop a new model by extending the Baker-Wurgler Investor Sentiment Model to include macroeconomic variables while giving respect to differences in financial regulations. Through Ordinary Least Squares Regression, we seek to predict market returns, proxied by the S&P500 Index, through variables such as the Consumer Price Index and Gross Domestic Product (among others), while adjusting for the enactment of the Dodd-Frank Wall Street Reform Act, Gramm-Bliley-Leach Act, and the near-full repeal of the Glass-Steagall Act.

# 18

## The Increasing Price of Automobiles Through Time

*Samuel Brinda and Romario Mendoza*

### ECONOMICS

The automobile has become an integral part of the United States over the last 100 years. Not only is the car a tool that increases the likelihood of employment and job retention, but it can also be used as symbol of status and socioeconomic standing. However, with increased safety, efficiency and quality standards, the automobile is quickly becoming a much more expensive item than it was before. This analysis works to find the key factors which affect new vehicle sales in the U.S. and how the automobile market has changed because of those factors.



## 19

### **Oregon State Labor Force Participation Rate: A Self-Fulfilling Prophecy**

*Jackson Horner and Katelyn Schmitt*

#### ECONOMICS

Multiple external factors influence a person's decision to enter the labor force, but are there also internal factors? Our research tests whether a worker's impression of the economy will determine their participation in the labor force. Our economic model uses a time-series regression to consider the shocks that the pandemic and childcare costs have had on the labor force, while still measuring the distinct impact that Consumer Sentiment Index has on future labor force participation rates. Understanding labor force participation and why people may not choose to go to work is important to governments and organizations that aim to support employees in the state of Oregon.

Previous research has found that individuals with more "resilient" personalities are more likely to volunteer. (Zhao et al. 2016). Traits held by people who are considered good citizens, like politeness and honesty-humility, tend to further fair into cooperative behaviors that can lead to increases in volunteerism (Zhao et al. 2017).

## 20

### **The Effects of Active Pool Recovery on Fatigue and Athletic Performance Following Intense Physical Activity**

*Kelsey Jordan and Nathan Herde*

#### HEALTH, HUMAN PERFORMANCE AND ATHLETICS

Any athletic performance or sustained physical activity, whether it be a sporting event, resistance training or cardiovascular exercise, can induce significant muscle fatigue and/or delayed onset muscle soreness. Insufficient recovery from fatigue can impact subsequent athletic performance, particularly when the time frame between events is short. Cold water immersion is a commonly used recovery technique. Some sports teams have utilized the campus pool to allow for immediate cool water immersion for an entire team. However, surprisingly, limited studies have examined whether active movement and stretching in the pool reduces muscle soreness and fatigue (Dawson et al. 2005; Ghetto & Golden, 2013).

The purpose of this study was to examine whether a 20-minute active pool recovery following a 60-minute, fatigue-inducing match of Ultimate Frisbee would reduce fatigue and improve athletic performance. Vertical jump, 20-meter sprint, and fatigue was assessed in 10 male participants before, immediately after, and 24-hours after the Ultimate Frisbee game. We found that there was statistically no group effect between the control and pool groups. For the sprint, there was no statistically significant difference at the three time points, but there was for the vertical jump. The pre-jump average was statistically higher than the 24-hour jump average. While pool recovery did not impact the reduction in athletic performance due to fatigue, the study did show that ultimate frisbee induces fatigue without the use of weightlifting protocols or extended treadmill running or cycling. As an experimental method, this could be utilized to induce fatigue in a more engaging, game-simulating manner in future studies.

## 21

### Ending Law Enforcement's Accountability Crisis: The Case Against Qualified Immunity

*Mikayla Minton*

#### LAW, RIGHT AND JUSTICE

People have been marching in the streets to speak up against police brutality, and many people care about reducing police misconduct, but not everyone knows about qualified immunity. In some cases, courts can excuse officers' unconstitutional actions to prevent officers from being held accountable in civil proceedings. Almost all police misconduct is excused and incentivized by one legal doctrine: qualified immunity. 42 U.S. Code § 1983 states that the doctrine "protects a government official from lawsuits alleging that the official violated a plaintiff's rights, only allowing suits where officials violated a 'clearly established' statutory or constitutional right." In this essay, I am going to use an eclectic mode of argument to suggest that qualified immunity is illegitimate. The multiple methods of my eclectic argument are an originalist constitutional interpretation and an examination of the incentive structures implicated by this doctrine.

## 22

### Predicting the Guess Distributions and Number of Reported Plays for Wordle

*Brendan Perez and Boyu Liu*

#### MATHEMATICS AND COMPUTER SCIENCE

We present our results from this year's Mathematical Contest in Modelling, relating to the popular word-guessing game Wordle. Given historical data for the number of reported plays for Wordle taken over the course of a year, we use a random forest regression model to accurately predict future results. We also predict the guess distribution for a given target word using past data using regression and make a classification scheme to categorize target words by difficulty using a "k" means model.

## 23

### Reimagining Maasai Mara

*Liam Welk, Colin Gale and Mills Weerasinghe*

#### MATHEMATICS AND COMPUTER SCIENCES

Our team was tasked with reimagining the Maasai Mara wild game reserve in Kenya, which is home to hundreds of thousands of animals and 1,200,000 humans living in tribes in the region. We focused on identifying the big five species, lions, elephants, rhinos, buffalo, and leopards, and calculating rough estimates of their population growth over the next 25 years. Our team found that lions, leopards, and humans have linear population growth charts, whereas elephants, rhinos, and buffalos have more exponential growth rates. Our recommendations include establishing two outposts along the Tanzanian border, tracking, and protecting rhinos, leopards, and elephants with multiple teams, setting hard caps on the number of some species allowed in the reserve, and protecting endangered species like elephants, leopards, and rhinos from poachers. We also suggested watching the populations of buffalo and setting a hard cap to prevent them from outgrowing their predators proportionally and overgrazing the land.

## 24

### “Slap!”(2023) for String Quartet

*Elana Gatien*

MUSIC

Written for the Pyxis Quartet as part of the LaCourte Composer Reading and Chamber Music Mentorship Program at Linfield University.

## 25

### “Erlkönig”

*Thomas Sagers*

MUSIC

Thomas Sagers, bass, will sing “Erlkönig”, an art song composed by Carl Loewe. The text is a poem written by Johann Wolfgang von Goethe.

## 26

### “If You Hadn’t But You Did”

*Daria Jones*

MUSIC

Musical performance from Jule Styne’s “Two on the Aisle”.

## 27

### “Simple Gifts” Suite

*Alexis Peck, Hannah Johnston, James Weiser, Zoey Ahl and Avery Shankland*

MUSIC

In this suite, there are four Shaker melodies - a sensuous nature song, a lively dance tune, a tender lullaby, and most famously, “Simple Gifts,” the hymn that celebrates the Shaker’s love of simplicity and humility. In setting these songs, the composer sought subtle ways to preserve their simple, straightforward beauty. Melodic freshness and interest were achieved primarily through variations of harmony, of texture, and especially, of orchestration.

## 28

### “Suddenly Seymour” from “The Little Shop of Horrors”

*Robert Turne and Hannah Barlow*

MUSIC

Musical performance of “Suddenly Seymour” from “The Little Shop of Horrors.”

## 29

### “My White Knight from The Music Man”

*Hannah Barlow*

MUSIC

Hannah will be singing “My White Knight” from The Music Man” by Meredith Willson (1902-1984).

## 30

### **“Lo Conosco a Quegli Occhietti”**

*Thomas Sagers and Heather Pool*

#### MUSIC

Heather Pool, soprano, and Thomas Sagers, bass, will perform a scene from the opera “La Serva Padrona” by Giovanni Pergolesi libretto by Gennaro Federico.

## 31

### **Electrical Scarecrow**

*Boyu Liu*

#### PHYSICS

This poster illustrates the use of audio sensors to detect the response of birds and speakers to startle them. Modern agriculture suffers from frequent losses due to the destruction of crops by birds; thus, inexpensive tools need to be developed to protect crops. The general idea is to detect high-frequency birdcalls which trigger an audio circuit designed to make noise. Consideration of the feasibility for use in the field will be discussed, as well as potential improvements and limitations.

## 32

### **Graphene Biosensors**

*Conner Dooley and Gabrielle Stevens*

#### PHYSICS

We report on early progress to study the graphene-electrolyte interface of a graphene field effect transistor. When voltages are created between the electrolyte and graphene, a small capacitance develops at this interface which can be measured. However, the exact interactions are not well known. The effect of this lack of knowledge may lead to inconsistencies in the interpretations of data from a GFET.

## 33

### **Simulating the Feasibility of an Alternative Space Launch System Using Electromagnetic Acceleration**

*Liam Stewardson*

#### PHYSICS

Coilguns use electromagnetic forces to accelerate a projectile, potentially allowing for a more efficient and cost-effective launch system compared to traditional rocketry. The objective of this study is to build a model that simulates the feasibility of a coilgun launch system and compare its potential advantages and disadvantages to traditional rocket launch systems. The model consists of numerical simulations of a potential coilgun launch system, including the design of the coilgun, projectile parameters, and other factors including the effects of air resistance and other environmental factors.

## 34

### Image Anomaly Detection Utilizing the Normalized Laplacian Matrix

*Jakob Longbottom*

#### PHYSICS

Anomaly detection refers to the process of finding objects that do not conform to patterns, such as locating a red balloon amongst blue balloons. The use of computer algorithms to do this process is becoming more common in practical applications. This paper compares multiple algorithms to compare their effectiveness for detecting anomalies from satellite images.

## 35

### Simulating the Influence of Birefringence for Centrosymmetric Point Groups using Rotational Anisotropy Second Harmonic Generation (RA-SHG)

*Alex Landry*

#### PHYSICS

In certain crystals entering light can be remitted with twice the frequency in a process called Rotational Anisotropy Second Harmonic Generation (RA-SHG). The polarization and propagation direction of this light depends strongly on the crystal's structure. By simulating this process computationally, it is possible to observe the crystal structure based on the outgoing re-emitted light. This poster illustrates several crystals with specific structures and shows their corresponding properties of the re-emitted light.

## 36

### Performance of "Together" from the Musical "Firebringer"

*Chloe Brady and Daria Jones*

#### THEATRE AND COMMUNICATION ARTS

Actors from Linfield Theatre's production of the musical "Firebringer" will present the song "Together." Following the performance, the actors and the director will participate in a brief discussion with the audience about the scholarly and creative process of bringing this production to life on the stage.

## 37

### Realized Lighting Design for the Musical "Firebringer"

*Nikos Rictor*

#### THEATRE AND COMMUNICATION ARTS

A project focusing on the lighting design process for the Linfield Theatre production of "Firebringer." This poster and presentation highlight the collaborative scholarly and creative processes of theatre students, theatre faculty, and theatre professionals.

## 38

### Realized Stage Management for the Musical “Firebringer”

*Tanner Coulter*

#### THEATRE AND COMMUNICATION ARTS

A project focusing on the stage management process for the Linfield Theatre production of “Firebringer.” This poster and presentation highlight the collaborative scholarly and creative processes of theatre students, theatre faculty, and theatre professionals.

## 39

### Realized Publicity Design for “Eco-Tales”

*Sydney Monroe*

#### THEATRE AND COMMUNICATION ARTS

A project focusing on the publicity design for the Linfield Theatre production of “Eco-Tales.” This poster and presentation highlight the collaborative scholarly and creative processes of theatre students, theatre faculty, and theatre professionals.

## 40

### Paper Project - Scenic Design for “Cabaret”.

*MJ Rinehart*

#### THEATRE AND COMMUNICATION ARTS

A project focusing on scenic design for the musical “Cabaret”. This poster and paper highlight the collaborative scholarly and creative processes of theatre students, theatre faculty, and theatre professionals.

## 41

### The Linfield University Undergraduate Literature and Creative Writing Conference

Helika Campbell, Victoria D’Angelo, Jordan Simmons, Sofi Spratt, Caroline Calvano, Thomas Wysocki, Elena Lundby, Ethan Smith, Davia Guzman and Willow Kvitek

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**2023 STUDENT SYMPOSIUM**

A Celebration of Scholarship and Creative Achievement