30th

2022 STUDENT SYMPOSIUM

A Celebration of Scholarship and Creative Achievement

30th Annual Linfield University

STUDENT SYMPOSIUM

A Celebration of Scholarship and Creative Achievement

May 20, 2022

Contents

SCHEDULE AT A GLANCE

	JERELD R. NICHOLSON LIBRARY		VIVIAN A. BULL MUSIC CENTER	FORD HALL	MILLER FINE ARTS CENTER
	Grand Avenue	Austin Reading Room	Delkin Hall	Marshall Theatre	Linfield and Lou Galleries
9 a.m.	9 a.m.-3 p.m. POSTERS AVAILABLE FOR VIEWING #1-33	9-9:45 a.m. STUDENTS STAND BY POSTERS #1-33			9 a.m.-3 p.m. ART EXHIBITS AVAILABLE FOR VIEWING
9:15 a.m.			9:15-9:45 a.m. LIVE VIRTUAL POSTER #31, 33		
9:30 a.m.					
9:45 a.m.			9:45-10 a.m. ORAL PRESENTATION #35 DAVID MAGNELLO		
10 a.m.					
10:15 a.m.				10-11 a.m. THEATRE PERFORMANCE #37 "DID I GET THE PART?"	
10:30 a.m.					
10:45 a.m.					
11 a.m.					
11:15 a.m.		10 a.m. - 2 p.m. ORAL PRESENTATION #40 UNDERGRADUATE LITERATURE AND CREATIVE WRITING CONFERENCE		11 a.m.-12 p.m. DEBATE #30 FORENSICS TEAM SHOWCASE	
11:30 a.m.					
11:45 a.m.					
12 p.m.			11:45 a.m.-12:45 p.m. ORAL PRESENTATIONS #34, 38 DEREK TRIPP LLAELTN SIERRA-CORTEZ		
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 #41 STUDENT SHOWCASE RECITAL		
1:30 p.m.					
1:45 p.m.					
2 p.m.					
2:15 p.m.		2-3 p.m. STUDENTS STAND BY POSTERS #1-33	2:15-2:45 p.m. ORAL PRESENTATION #36 CAITLIN FISHER		
2:30 p.m.					
3 p.m.					

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

PRESENTATION SCHEDULE

TIME	TYPE	LOCATION	PRESENTATION
9:45-10 a.m.	Oral Presentation	Delkin Hall	35 Valencian and Castilian: A Panorama of Urban and Rural Diglossia in the Valencian Community of Spain
10-11 a.m.	Theatre Performance	Marshall Theatre	37 “Did I get the Part?”
10 a.m.-2p.m.	Oral Presentation	Austin Reading Room	40 The Linfield University Undergraduate Literature and Creative Writing Conference
11 a.m.-12 p.m.	Debate	Marshall Theatre	39 Linfield Forensics Team Showcase
11:45 a.m.-12:15 p.m.	Oral Presentation	Delkin Hall	34 A Senior Capstone Conducting Recital: Journey of Life
12:15-12:45 p.m.	Oral Presentation	Delkin Hall	38 Annotation of Rheb (Ras homolog enhanced in brain) and its Genomic Neighborhood in Two Species of Drosophila
1-2 p.m.	Music Performance	Delkin Hall	41 Student Showcase Recital
2:15-2:45 p.m.	Oral Presentation	Delkin Hall	36 Clarinet vs. Clarinetist: Design, Performance, and Potential Injury

PRESENTATIONS BY DEPARTMENT

DESCRIPTION #

Biochemistry and Molecular Biology

Influence of Reactive Oxygen Species on Mitochondrial Transcription **2**
Hanna Shields
Faculty Sponsor – Megan Bestwick

Is Retinoid X Receptor Alpha a mtDNA Transcription Factor? **9**
James Weiser
Faculty Sponsor – Megan Bestwick

Mitochondrial DNA Disease Mutations Effect on In Vitro Transcription **18**
Madeline Hedberg
Faculty Sponsor – Megan Bestwick

Biology

Elucidating the Role of Exo1 and Mre11 Mutations in DNA Damage Response **23**
Frances Remmick, Andrea Morales, Kylie Davis, Ariel Miyama and Sreerupa Ray
Faculty Sponsor – Sreerupa Ray

Annotation of Rheb (Ras homolog enhanced in brain) and its Genomic Neighborhood in Two Species of Drosophila **38**
Llaeltn Sierra-Cortez
Faculty Sponsor – Catherine Reinke

Chemistry

Optimization of Copper-Catalyzed Oxidative Alkylboron Homocoupling **13**
Abigail Northrop
Faculty Sponsor – Andrew Baggett

Progress Towards Synthesis of Azaindole Derivatives of Arp2/3 Complex Inhibitor CK-666 **22**
Tingting Zhang , Andrew Baggett and Brad Nolen
Faculty Sponsors – Andrew Baggett and Brad Nolen

Economics

Impacts of R&D Funding and Climate Change on Agricultural Output Within the U.S. **7**
Margaret Lippsmeyer
Faculty Sponsor – Eric Schuck

English

Global Languages and Cultural Studies

Health, Human Performance and Athletics

Journalism and Media Studies

Mathematics and Computer Science

Music

Physics

Psychology

Sociology and Anthropology

Theatre and Communication Arts

PROJECT DESCRIPTIONS

1

Assessing News Source Credibility: Digital Natives vs. Traditional News Natives
Ben O'Loughlin
JOURNALISM AND MEDIA STUDIES

This study examines how individuals evaluate the credibility of news sources, whether 'digital natives' are better at this evaluation than 'traditional news natives,' and a person's perception of their credibility evaluation. For the survey, traditional news natives are those born before 1996, and digital natives are those born after 1996. Data from the pilot survey prepares us for national data collection.

Our research raises three important questions about how individuals evaluate the credibility of a news article. First, how do individuals evaluate the credibility of news sources in the first place? Second, are younger voters, those that are digital natives, better at evaluating the credibility of news sources than traditional news natives? Third, how does an individual's perception of their credibility evaluation stack-up against their actual accuracy?

2

Influence of Reactive Oxygen Species on Mitochondrial Transcription
Hanna Shields
BIOCHEMISTRY AND MOLECULAR BIOLOGY

Many factors influence the expression of mitochondrial DNA (mtDNA) which is a circular DNA molecule present in multiple copies per mitochondrion. Our aim is to understand the effect of various factors such as protein-DNA binding behavior and the production of reactive oxygen species (ROS) on mitochondrial transcription under different conditions. We have experimentally observed changes to mitochondrial DNA transcription in both S. cerevisiae and mammalian HepG2 cells under conditions of increased reactive oxygen species and oxidative stress. The introduction of naphthoquinones such as menadione into S. cerevisiae cultures show increased oxidative stress, and results in changes to transcriptional output. Understanding these types of transcriptional regulatory processes in mitochondria provides insight into mitochondrial dysfunction related to disease and aging.

3

Hawai'i is NOT Your Escapist Fantasy: Varying Perspectives Surrounding Misconceptions and Representations of Hawai'i in the Tourism Industry

Shannon Hussey
SOCIOLOGY AND ANTHROPOLOGY

Tourism is a dominating industry for Hawai'i, in which a falsified and glamorized reality is presented. Hawai'i ceases to escape the "brand of paradise" and is often limited to an idealized representation. In this study, varying perspectives from non-Native and Native Hawaiians are examined to understand how representations of Hawai'i are framed and to recognize that Hawai'i is more than a vacation spot. It is a home, a people, and a culture.

4

I-Beam Stringer Deflection in Bridge Falsework Design

Thomas Kolander
PHYSICS

Bridge falsework is a vital step in building a permanent bridge. Different loads and mass moments of inertia directly affect the deflection of stringer I-beams, which is the greatest indicator of vertical load strength of bridge falsework. Experiments were done to three different I-beams the W24x68, the W30x124 and the W36x300. Results found in simulations done in SolidWorks found that all beams passed the dead load minimum requirements, but the W24x68 did not meet the live load requirements for the concrete box girder in question. The W30x124 I-beam would be the best choice for this design due to its strength and cost ratio.

5

Perceived Realism as a Moderator of the Association Between Media Exposure and Beliefs About Sexual Interactions and Assault

Madison Aradine, Sofia Nelson, Madelyn Foltz, Sophia Collins, Nissa Jensen and Melissa Gutierrez
PSYCHOLOGY

Survey research with young adults (N= 119) examined the associations among media exposure, perceived realism of media, and beliefs about sexual interactions and assault. Viewers who reported higher perceived realism of media were more likely to endorse the heterosexual script and several rape myths, above and beyond media exposure.

6

The Effects of Icing as a Recovery Method Between Two Bouts of Exercise

Molly Shields, Shoma Okita, Kora House and Chad Haley

HEALTH, HUMAN PERFORMANCE AND ATHLETICS

PURPOSE: The purpose of the study was to examine whether ice pack application, following a short bout of exercise, would improve subsequent running-performance 5-6 hours later. METHODS: Fifteen college athletes were split into experimental and control groups; both completed a dynamic warm-up and then a timed ¾ mile run. After finishing the run, all the participants performed a static stretch. The experimental group then iced both legs (calves and quadriceps) for 15 min. All participants returned 5-6 hours later and performed the dynamic warm-up, a timed ¾ mile run, and static stretch again. Participants were surveyed for their beliefs about recovery methods. RESULTS: Both the icing and control groups showed significant improvement in run time in the second bout of running. We found that icing did not impact run performance time. Interestingly, survey results showed that most participants believed that ice packs would be an effective recovery method. This eliminates the possibility of a placebo effect in our run time results. CONCLUSION: We conclude that ice pack cooling did not have a significant effect on a second bout of running performed later in the day.

7

Impacts of R&D Funding and Climate Change on Agricultural Output Within the U.S.

Margaret Lippsmeyer

ECONOMICS

In recent years, record amounts of natural disasters have occurred, decreasing profitability of farming operations and jeopardizing sufficiency of international food supplies. We believe climate change to be at the forefront of these issues. With rapid changes in climate occurring, one would expect public sector research and development funding to increase, in attempt to develop new technologies that could compensate for productivity losses. The research examines the relationship between public research and development funding and aggregate agricultural output in the United States. Through extensive data analysis, this study has found that research and development funding have a positive relationship with aggregate output, whereas climate change indicators have a negative relationship with aggregate agricultural output. Regressions were designed to explain aggregate agricultural output as a function of climate change indicators, public sector research and development funding, fertilizer use, agricultural total factor productivity, labor inputs, and more. With uncertainty ahead in global food supply, increasing population, and changing environment, the findings of this study stress the importance of increased investment in agriculture within the United States and throughout the world.

8

Faith or Falsehoods: Christianity's Influence on Sex Education

Maya Pillon
SOCIOLOGY AND ANTHROPOLOGY

Religion has been a crucial part of societies since the beginning, which has allowed it to become ingrained in many areas of social life. Education has also managed to affect society.

One subject where these two institutions intertwine is sexual education. There is much controversy regarding how/if sex education should be taught (Young, 2017; Fields, 2012; Lamb, 2013). This topic gets increasingly heated when religion is introduced (Taragin-Zeller & Kasstan, 2021; Bijelic, 2008).

The aim of this study is to examine how religious institutions effect the teaching of sex education, focusing specifically on the Christian faith and its influences.

By investigating religious and secular organization's websites, it was found that religious organizations focused on abortion, prioritized family, and heavily focused on religion rather than educating about sex topics. Secular organizations provided more medical resources, did not address opposing arguments, and pushed the selling of educational programs.

This research shines a spotlight on some of the power structures in our society and how they are influencing institutions' as well as individuals' decisions. Hopefully, by pointing this out, people will examine their opinions more closely and improve social policy, like sex education, to make it more inclusive.

9

Is Retinoid X Receptor Alpha a mtDNA Transcription Factor?

James Weiser
BIOCHEMISTRY AND MOLECULAR BIOLOGY

Mitochondria are important organelles in eukaryotic cells due to their role in metabolism. They also have their own genome (mtDNA) which encodes many of the protein subunits within the oxidative phosphorylation (OXPHOS) pathway. The remaining protein 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. A major control point is transcription, this process requires regulatory proteins that determine the expression of these genes. Retinoid X receptor alpha (RXRα) 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 RxRα as a mitochondrial transcription factor. We have expressed and purified the RXRα protein, and then also assessed its DNA binding affinity with various mtDNA sequences. We concluded RXRα binds as a dimer with space between the binding sites. Our aim is to investigate RxRα binding the mtDNA using atomic force microscopy (AFM). In doing so we will better understand the mechanisms that are involved in mtDNA transcription. If RxRα 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.

10

Did She Ask for It?: A Content Analysis of Sexual Assault Myths in Popular Television
Zee Nace, Emily Gehrig and Sofia Nelson
PSYCHOLOGY

Research on media effects indicates that viewers develop sexual attitudes and beliefs consistent with what they see on the screen. The goal of this research was to investigate the accuracy of sexual assault portrayals in media. Popular television shows among college students were coded for the presence of common rape and perpetrator myths about sexual assault. A team of six undergraduate research assistants coded 48 episodes of 26 popular shows. This poster will highlight themes that were found in this content analysis.

11

Magnetic Field Strengths of Stars
Rebekah Smith
PHYSICS

The magnetic field strength of Ap stars provides insight on the early stages of stellar evolution. Ap stars have stable magnetic fields theorized to have formed as a consequence of how they formed. In my research I determine the magnetic field strength of stars by resolving absorption line splitting with the Zeeman effect.

12

Identifying Causes of the Changes in U.S Per Capita Consumption of Fluid Cow's Milk
Megan Sweeney
ECONOMICS

USDA, Economic Research Service data reveal a downward trend in U.S. per capita consumption of fluid cow's milk. Using data collected between 1975 and 2020 through various databases, we identify changes over time in the average amounts of fluid cow's milk consumed by Americans as a function of changes of population among school-aged children, the average American income, the price per gallon of milk, the average consumer price index for all urban consumers: food and beverages in America, and greenhouse gas emissions in America. Results reveal that Americans are consuming less milk while also reflecting a combination of demographic changes in the U.S. population.

13

Optimization of Copper-Catalyzed Oxidative Alkylboron Homocoupling
Abigail Northrop
CHEMISTRY

This project optimizes a reaction that uses boron substrates and copper to form sp3-sp3 carbon-carbon bonds. This research project had three main goals: to develop a GC (gas chromatography) method that would allow us to calculate how much of the final product was formed, to optimize the model reaction, and to explore the diversity of other boron substrates that could be used. Working with the GC involved trouble shooting different methods as well as testing our internal standard, cis-decalin, to ensure that the solvent wouldn't cause any side reactions. Standard curves were created to allow us to calculate how much cis-decalin remained after going through the GC, which in turn would help calculate the percent yield of the molecule with the sp3-sp3 carbon-carbon bond from the model reaction. Many elements of the model reaction were explored, like a change in solvent, temperature, time, molar ration of the reactants, and which copper additive was used. In comparing the results from the GC, we can figure out which of these methods work the best for obtaining the highest yield possible. To determine if this methodology would work for other boron substrates, different substrates must be tested with these conditions. B(dan) was chosen as the next test substrate, as it can be synthesized in lab. Once the B(dan) is synthesized, a Grignard reaction can be used to generate a library of B(dan) substrates.

14

Optimizing Forest Harvest Cycles for Carbon Sequestration
Alex Landry, Margaret Lippsmeyer and Casey Wong
MATHEMATICS AND COMPUTER SCIENCE

Our mathematical model aims to depict optimal harvest times for different types of forests based on the value they provide for carbon sequestration. We have developed three different models for the main forest types throughout the world, boreal forests, temperate forests, and tropical forests. For the model, we implemented a manipulated sine function for one period. By using a manipulated sine function, we are able to 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

Social Movement Framing: The Case of the Anti-Vaccination Movement
Sophia Collins
SOCIOLOGY AND ANTHROPOLOGY

This research examines the sociological area of study, being social movements. Social media platforms will be examined to assess pro-vaccination and anti-vaccination groups' thoughts on the COVID-19 pandemic, vaccines, their overall feelings surrounding these topics, and the ways they frame their discourse. Sociological theories will be applied to the results to aid in examining trends observed related to social movements.

16

The Effects of Caffeine on Reaction Time and Sprint Performance

Meghan Guy, Josie Rutschman and Chloe Muller

HEALTH, HUMAN PERFORMANCE AND ATHLETICS

Caffeine is a popular aid for improving performance in athletes because of its ability to block adenosine, leading to more sustained and forceful contractions (Goods, Landers, and Fulton, 2017). The purpose of this study was to examine the effects of caffeine on reaction time to an auditory stimulus and sprint performance in D3 college athletes. Student-athletes from Linfield University were recruited to participate in the study. During the first week participants were given a cup with either 8 ounces of caffeinated or decaffeinated coffee. Fifteen minutes after consumption, each participant performed a standardized warm up, and then performed three 20-meter sprints. Auditory reaction time was then tested. Participants returned the following week to perform the same procedure with the opposite treatment. The results of this study showed that caffeine caused a significant decrease in sprint time in the third sprint ($p=0.05$), as well as a significant decrease in total mean sprint time compared to the decaffeinated trial in those who drank one cup of caffeine daily ($p=0.04$) and a decrease in the dominant, random reaction time test in those who reportedly had 2-3 cups of caffeine per day ($p=0.02$). There was no significant difference in any other sprint or reaction time trials. Future studies should include a larger sample size and include a longer absorption period.

17

Updating the Beckarian Approach to Marriage: Divorce Rates in the United States from 1990-2020

Maggie Fiocchi

ECONOMICS

The perception of rising divorce rates has become a concern within the United States. Colloquially, people attribute the decline in marriage to a variety of factors many associated with women's economic autonomy. However, the belief that women's rising employment has increased their economic independence and decreased their desirability of marriage also known as the 'independence hypothesis' has limited empirical evidence (Oppenheimer 1997). Within economics, Gary Becker is recognized as one of the first researchers to apply economic concepts to marriage in his two-part paper titled 'A Theory of Marriage'. However, Becker's work, first published in 1973, contains a problematic perspective on the assumption of marriage roles. Additionally, Becker's paper tends to focus on the formation rather than the dissolution of marriage. Therefore, this study updates Becker's assumptions and aims to investigate the prevalence of divorce rates in the United States as a function of education level, access to birth control, female labor force participation rates, mean personal income, marriage rates, and average number of children from the years 1990-2020.

18

Mitochondrial DNA Disease Mutations Effect on in vitro Transcription

Madeline Hedberg
BIOCHEMISTRY AND MOLECULAR BIOLOGY

Mitochondria are traditionally known for their essential roles in cellular metabolism and energy production. In humans, approximately 80 protein subunits make up the oxidative phosphorylation (OXPHOS) pathway in the mitochondrial inner membrane, 13 of which are encoded by the mitochondrial DNA (mtDNA) and the remaining encoded by the nuclear genome. The mtDNA is circular molecule present in multiple copies per mitochondrion, and the two strands of human mtDNA are categorized as the heavy strand and light strand. The light strand has one promoter region (LSP), while the heavy strand has two (HSP1 and HSP2). These promoter regions are essential for the transcription of the 13 proteins encoded by mtDNA that are essential for the OXPHOS pathway. Mutations in mtDNA have been known to cause diseases and disorders, some of which can arise from mutations in the non-coding promoter regions.

We generated known point mutations in the promoter regions of mtDNA with the aim to observe the effects on mitochondrial transcription in vitro. The point mutations we selected are at the 195 and 309 base pair locations upstream of the LSP. The T196C mutation is associated with bipolar disorder, and the C309CC mutation is weakly associated with Alzheimer's disease. Our work utilizes an in vitro recombinant human mitochondrial transcription assay to assess changes in mitochondrial transcription with these mutations compared to wild type. Understanding mitochondrial transcriptional changes in the presence of these mutations potentially gives insight into underlying contributions to these neurological disorders.

19

Interaction of Personality Traits on Behavioral Choices in Economic Games

Maya Pillon and Maggie Fiocchi
PSYCHOLOGY

Individuals' reasons and motivations for volunteering (or not) often differ depending on their personality. 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).

Multiple papers have investigated the influence of personality traits on an individual's behavior in various economic games such as the dictator game and prisoner's dilemma. However, limited research has been conducted on the association between personality traits and the propensity to contribute within the volunteer's dilemma game.

We aim to investigate how personality traits according to the Big Five framework predict decisions in the volunteer's dilemma (n=400). By conducting an online survey, it was found that choice to contribute was highly influenced by what the player thought most people in the game do, higher scorers on the VFI Values scale were more likely to contribute, as were those higher in Intellectual Curiosity, Anxiety (N) was associated with a decrease in contribution rates, and those higher in responsibility (C) were less likely to contribute.

20

The Effects of an Arm Care Training Protocol on Shoulder Strength, Mobility, and Pain in Collegiate Softball Players

Riley Sykes, Katie Phillips and Chloe McDaniel
HEALTH, HUMAN PERFORMANCE AND ATHLETICS

The purpose of this study was to determine whether an arm care program would improve shoulder strength and mobility while decreasing shoulder pain in female collegiate softball players. Participants (n=13) completed a 4-week training program, meeting 3 times per week (70-90 minutes per session). A variety of exercises were performed (internal/external rotation, scapular pushups, thoracic spine rotations, paloff press, etc.). Pain, internal rotation strength and mobility of the shoulder were tested before and after the 4-week training program. When compared to the pre-test, post-test results showed that mean glenohumeral internal rotation strength significantly increased by 4.8 lbs and mean gleno-humeral internal rotation mobility increased by 8.5 degrees. In addition, mean reported shoulder pain decreased by 1.16 on the universal pain scale. In conclusion, this training regime proved to be very successful in both strengthening the shoulder, increasing overall mobility and also aiding in the decrease of perceived shoulder pain.

21

Our Modern Economy and the Effects on US Homicide Rates

Drew Stogsdill
ECONOMICS

The US economy is huge and includes so many different variables that make up this big entity. However, the US economy can affect many other things outside of it. This is where my research is based off. I explored how unemployment and other demographic variables affect the homicide rates in all 50 US states. I wanted to see if there is correlation between the rise and lowering of the unemployment rate and the statistics of homicide rates. I hoped to answer the question of why a state's homicide rate is as high as they are and what stressors cause add to these rises. The other variables (Stressors) I included are education, male to female ratio, household income, Covid 19 Vaccination percentages. I also added gun statistics of each state. I believed these variables all could help explain my question. The variable that had the most impact was unemployment. Some people who are unemployed make the decision that they can get more "Utility" from killing someone which lifts them to a better state of being than trying to find a legitimate job. I will explain how the other stressors add to this choice and possible solutions to better this problem.

22

Progress Towards Synthesis of Azaindole Derivatives of Arp2/3 Complex Inhibitor CK-666

Tingting Zhang, Andrew Baggett and Brad Nolen
CHEMISTRY

The primary objective of this research is synthesizing a derivative of 2-methyl-7-azaindole and to determine its potency of inhibition of the Actin Related Protein (Arp 2/3) complex. A potent Arp2/3 inhibitor may be of interest in clinical anti-cancer and anti-tumor applications. Additionally, an Arp2/3 inhibitor with nanomolar potency could be used to advance basic actin dynamics research. Herein the organic synthetic efforts towards the 2-methyl-7-azaindole derivative of the known Arp2/3 inhibitor CK-666 are described. Spectroscopy as it informs our continuing efforts to synthesize our target is discussed. Further synthesis plans are discussed as they relate to successfully reaching our target compound.

23

Elucidating the Role of Exo1 and Mre11 Mutations in DNA Damage Response

Frances Remmick, Andrea Morales, Kylie Davis, Ariel Miyama and Sreerupa Ray
BIOLOGY

DNA double strand breaks (DSBs) are one of the most deleterious types of DNA damage that cells combat. DSBs are processed by the 3′-to-5′ exonuclease activity of the DSB repair nuclease, Mre11, to generate protruding 3′ single stranded DNA (ssDNA) at DSBs. Exonuclease 1 (EXO1) is an evolutionarily, well-conserved exonuclease. Its ability to resect DNA in the 5′-3′ direction has been extensively characterized and shown to be implicated in several genomic DNA metabolic processes such as replication stress response, double strand break repair (DSBR), mismatch repair, nucleotide excision repair and telomere maintenance. Both Mre11 and Exo1 play a critical role in the DNA resection in DSBR. Mre11 is responsible for the initial short-range resection, which is followed by the long resection by Exo1 before strand invasion in DSBR. However, the regulation of this switch between Mre11 and Exo1 is not well understood. The purpose of this study is to test the hypothesis that EXO1 and MRE11 gene variants contribute to genomic instability by aberrant DNA repair. This project seeks to understand the potential role of disease-associated variants of Exo1 and Mre11 in defective resection function, thus inducing genomic instability.

24

Unveiling the Mask of Post-Race Legitimacy; Preserving White Supremacy Through the Use of Colorblind Racism in Policy Preference

Vanessa Gonzalez
SOCIOLOGY AND ANTHROPOLOGY

Recent literature has illustrated a shifting form of racism from a Jim Crow, overt form to a colorblind, covert form. Although the latter may present itself as more subtle, both forms have served to reinforce the foundation of white supremacy. In order to preserve this foundation, colorblind ideology has been used to implement coded language and race-neutral explanations in policy, reinforcing the existing racial hierarchy in a powerful, but discreet manner. This study utilizes survey data to analyze the relationship between colorblind attitudes and policy preference. It is hypothesized that 1) higher levels of colorblindness will lead to less support for social policies that would benefit racial and ethnic minorities, and 2) Whites will present higher levels of colorblind attitudes than non-Whites. In an online 'Social Attitudes Survey', a series of questions determined that while Hypothesis 2 was not supported, with whites and non-whites showing similar levels of colorblindness, Hypothesis 1 was supported, with colorblindness and policy preference presenting a correlation of 0.788, $p < .001$. The study ultimately finds that as levels of color-blindness increase, support for social policy that would benefit racial and ethnic minorities decreases, suggesting that racial considerations still serve as an influence in social policy despite how subtle they may seem.

25

Optimal Race Strategies for Cyclists

Brendan Perez, Drew Altringer and Evan Fisette
MATHEMATICS AND COMPUTER SCIENCE

For competitive cyclists, each course presents a unique set of factors and, in turn, leads to difficulty in choosing a racing strategy. Some courses confront cyclists with drastic changes in elevation while others are of a more consistent grade. Similarly, curvature varies from course to course.

Further, riders vary in their areas of strength. A rider's power curve maps their instantaneous powe output P in W/kg over the amount of time that the rider can sustain that power level in seconds. The shape of a rider's power curve indicates their riding style.

In this paper, we model the optimal race strategy based on a rider's power curve through the use of The Skiba Energy Store model and applied kinematics. We then consider the race times of select riders from the 2021 Tokyo Olympics Individual Time Trials and the 2021 UCIWorld Championships Individual Time Trials. The race times of the top finishers indicate their average power output PAVE during the race; we then utilize the expected that world class cyclists can maintain for the full time of a race to calculate a standardized finishing time of top tier riders. This enables us to evaluate the accuracy of our model.

26

What is an Adult?: Attributes Voted Most Central to the Construct of Adulthood

Katie Russell, Paris Green, Allie Walter, Cara Ray and Maya Pillon
PSYCHOLOGY

To understand the transition into adulthood, it is important to understand people's perceptions of what it means to be an adult. We began this investigation with a bottom-up approach using the prototype analysis methodology (described by Kearns & Fincham, 2004). In Study 1, we asked 137 participants to list up to 20 attributes of adulthood. Results revealed 1,891 total linguistic units (15.5 per participant on average), which were placed into overarching categories such as "employed". The current study is a follow-up (Study 2) where we continued the next step in the prototype analysis methodology. In this study participants rated each of the 96 attribute categories generated from 1 (not important at all to the concept of adulthood), to 5 (very important to the concept of adulthood). It was expected that the most frequently mentioned attributes from Study 1 (such as "responsible", "independent", "pays bills") would be rated as more central in Study 2, and less frequently mentioned attributes in Study 1 (such as "optimistic", "safe", and "self-disciplined") would be rated as less central in Study 2. However, the data indicates that there is no correlation between frequency of the attribute and its centrality ($r=0.05$, $p=0.644$).

27

Navigating a Social World Behind Masks: How the COVID-19 Pandemic Has Affected the Autism Spectrum Disorder Population as Seen in Research Literature

Sofia Nelson
SOCIOLOGY AND ANTHROPOLOGY

As a result of the pandemic, social interactions have had to change. Individuals have had to change the way they navigate their social world and their relationships within these new structural changes, and the discourse surrounding autism spectrum disorder has adapted in a way that now places more emphasis on mental health, while continuing to prioritize intervention and support as key themes in research literature, changing the way autism spectrum disorder is framed.

As expected, a change in discourse was seen in autism literature from before and after the pandemic; autism literature post-pandemic onset referenced mental health at a higher rate than pre-pandemic, and the continued prevalence of the theme intervention emphasizes the importance of social support for those impacted by an autism diagnosis. This change in discursive practices in autism literature has resulted in a new framing of autism spectrum disorder.

28

The Effects of the Menstrual Cycle and Contraceptive use on Injury in Collegiate Athletes

Alyssa Bakkensen, Laura Hoover and Maggie Smith
HEALTH, HUMAN PERFORMANCE AND ATHLETICS

PURPOSE: The purpose of this study was to investigate the role of hormone fluctuations in natural menstrual cycles on the rate of injury in collegiate athletes compared to those with less hormonal fluctuation due to estrogen based hormonal contraceptives (HC). This study hypothesized that athletes on their menses, characterized by low levels of estrogen, will have a lower rate of injury than those athletes not on their menses (higher rates of estrogen near ovulation). In addition, we hypothesized that those on a natural cycle will have higher rates of injury than those on HC. METHODS: Female athletes from Linfield University (n=59, ages 18-22 y/o), participating in a collegiate sport were recruited. Participants completed a weekly survey that tracked onset and completion of menses along with new injury occurrences. Injury type was recorded. RESULTS: The analysis showed that the injury rate tended to be lower in athletes that were on contraceptives (9 injuries versus 15 injuries across 12 weeks). In addition, injury rates were much lower during menses compared to the rest of the menstrual cycle, for those not on contraceptives. CONCLUSION: The results suggest that fluctuating hormone levels may affect injury rate in collegiate athletes. The constant hormone levels of contraceptive use may be beneficial in limiting injury.

29

Characterization of Electronic Behavior Within a 2D FET Using KPFM

Joseph Murphy
PHYSICS

Developing a further understanding of the electronic behavior within 2D devices is a crucial step before implementing their wider use in technology. A 2D Field Effect Transistor (FET) utilizes biasing a graphene back gate to shift the chemical potential of the WSe2 semiconductor above it. In this experiment Kelvin Probe Force Microscopy (KPFM), an indirect work function measurement technique, has been used to generate potential spatial maps of the 2D FET at differing back gate biases. KPFM results are reaffirmed by expected electronic behavior in areas of the h-BN insulative component and the graphene conductive contact component. The measured electrostatic potential of WSe2 coincides with the electronic behavior of ambipolar semiconductors. The relative chemical potential of the WSe2 sample was extracted and an estimated bandgap of 1.26 ±.063 eV was derived, falling outside of reported results.

30

Understanding the Rise in Residential Real-Estate Prices

Peter Oakes

ECONOMICS

Residential real estate prices have risen substantially in the United States since 2000. This paper assumes that observations of real estate prices are in equilibrium, this allows a focus on the demand side drivers to determine what influences prices. Using economic inputs such as interest rates and recessions in union with consumer willingness to pay, this paper regresses variables on the demand side of home buying to identify which are significant drivers and which are not. The adjusted regression found that there was a stronger correlation between consumer inputs on the demand side than economic drivers. Converted supply-side metrics, ie. land prices, also had a strong correlation to home prices as well as income-related drivers.

31

A Platform to Speak and the World to Listen: Creative Freedom, Government Policy, and Chinese Film

Stefan Burns

GLOBAL LANGUAGES AND CULTURAL STUDIES

When considering the Chinese domestic film industry, debates often arise regarding government involvement and the degree to which this interferes with filmmakers' creative freedom. A common assertion raises concerns of censorship and propaganda with the proposal that state control continues to be overbearing and manipulative, but others challenge this view and maintain that the film industry is closer to a free market now that government intervention has been scaled back. This dissension naturally raises the question: how do Chinese government policies towards their domestic film industry impact filmmakers' creative freedom? This tension is examined with the claim that Chinese government policies towards their domestic film industry constrain narratives in exchange for enabling greater scope. The claim is explored under the lens of Chinese domestic filmmaker Jia Zhangke, who was once a banned director that illegally produced films outside of the government system but was later welcomed into the fold and now produces films officially within the system. Particular focus is given to the underground film Platform and the aboveground film The World to investigate what effects government policy has had on the production of these domestic films.

32

Drinking in the Dark Model to Study Binge-like Consumption of Ethanol and Pharmacotherapies for Alcohol Use Disorder in Outbred Rats

Madison Rodriguez, Jenae Kesey and Olivia Edgington
PSYCHOLOGY

Outbred, genetically heterogenous rats are increasingly used to study ethanol drinking as a nonhuman animal model of alcohol use disorder. However, few studies utilize the drinking in the dark (DID) procedure to study binge drinking in outbred rat models. The DID procedure increases ethanol consumption by providing opportunity to consume solution when animals are the most active, 3 hours after the start of the dark phase of the light:dark cycle. The present study used the DID paradigm with two lines of outbred rats (Sprague Dawley and Long Evans) as a model for binge drinking. The initial phase of drinking provided an opportunity to consume 20% ethanol solution. After the 20% ethanol consumption phase, the effect of naltrexone, an opiate receptor antagonist, on consumption of 20% ethanol solution was examined. Subsequent drinking phases (Phases 2 – 4), allowed consumption of a 20% ethanol solution (Phase 2), a 10% ethanol solution (Phase 3), followed by a fourth and final phase where the 10% ethanol solution was sweetened with supersac (0.125% saccharin and 3% glucose). Additionally, several abstinence periods were inserted between and within select drinking phases to explore the effects of abstinence induced drinking. These adaptations were used to further evaluate the validity of the DID procedure as a model of binge consumption of ethanol with outbred rat strains. Results from the 4 phases indicated Long Evans rats consume more ethanol, achieving higher doses of ethanol consumed when compared to Sprague Dawley rats. Naltrexone was found to attenuate ethanol consumption across both strains using the DID procedure. Importantly, introduction of supersac + 10% ethanol solution increased consumption across both strains, and significantly increased binge-like consumption in Long Evans rats, especially after a brief period of abstinence. The present study suggests that consumption of supersac + 10% ethanol solution promotes binge drinking in the outbred, Long Evans rat line using the DID procedure.

33

An Analysis of the Auger Peak Shift Between Barium and Barium Oxide

Nick Zdroy
PHYSICS

Ion thrusters, an increasingly popular method of space propulsion, have requirements for longevity and efficiency that are unique to the conditions of space travel. Negligible levels of drag in space along with the lack of interstellar gas stations are perfect conditions for the use of low thrust, long-lasting solutions like ion thrusters. These requirements for longevity and efficiency that are unique to the conditions of space travel make it necessary to better understand factors that impact the efficiency of thermionic emission cathodes, an integral element in the anatomy of an ion thruster. A thermionic emission cathode's efficiency is dependent on its chemical composition. For this study, a replica cathode surface was created by barium deposition using a novel method with a resistively heated getter. The surface was depth profiled using Auger electron spectroscopy (AES) to investigate the differences in data obtained from barium in metallically bonded states as opposed to an oxide. Determining a method to accurately measure the relative quantities of these bond types in a cathode is the first step in moving towards a more clinical cathode production process. Qualitative changes in peak shape and size indicating a change in bond type were documented; future studies need only to collect more data so that methods such as Linear Least Squares Fitting (LLSF) can be used to determine the relative quantities of bond types.

34

A Senior Capstone Conducting Recital: Journey of Life

Derek Tripp
MUSIC

Though the journey of life is different for each of us, one of the best ways to bring people together is to make and share music. In our journeys, we go through times of heartache (“April is in my Mistress’ Face”), persecution (“Civitas Sancti Tui”), and a war-torn world (“Earth Song”). Along with the hard times, the music will also be about hope (“Sweet Rivers”), joy (“I am Glad”), love (“Five Hebrew Love Songs”), anticipation (“Die Nachtigall”), and peace (“Sing, My Child”). Each song highlights a different human experience through the various compositional techniques the composers use. As you listen, I encourage you to think about your own life’s journey while the choirs from Newberg High School and Linfield University share the beauty of the world through music.

35

Valencian and Castilian: A Panorama of Urban and Rural Diglossia in the Valencian Community of Spain

David Magnello
GLOBAL LANGUAGES AND CULTURAL STUDIES

In Spain, Castilian (commonly known as Spanish) is the official language nationally. On a regional level, five other languages have been declared co-official languages: Basque in the Basque Country; Catalan and Aranese in Catalonia; Galician in Galicia; and Valencian in the Valencian Community. Two other languages, Asturleonese and Aragonese, are recognized in their respective communities but are not considered official languages. During the Franco dictatorship that lasted 36 years, the national government limited these regional languages to private and domestic spaces. Consequently, the use of and the attitudes towards these languages experienced a sharp decline, resulting in a loss of regional culture and identity.

The present work focuses on the attitudes of people in the Valencian Community towards Castilian and Valencian. In particular, I will focus on the cognitive and behavioral components of attitude and how they shape language usage in the region. An examination of rural and urban sociolinguistic attitudes will illustrate the concept of diglossia by which one language (Castilian) dominates while another language (Valencian) is considered the minority language. Discussion of these topics will demonstrate that Spain remains deeply divided by regional language and culture, but that education and legislation can improve linguistic diversity and attitudes.

36

Clarinet vs. Clarinetist: Design, Performance, and Potential Injury
Caitlin Fisher
MUSIC

This presentation explores the history and evolution of the soprano clarinet regarding instrumental design and performance, as well as treatment and prevention methods of the potential injuries associated with playing the soprano clarinet.

37

“Did I Get the Part?”
Robert Turner, Weston Lawrence, Daria Jones, Hadley Nelson, Sydney Monroe, Moana Andrews, Katie Jones, Danny McCann, Jashae Salon
THEATRE AND COMMUNICATION ARTS

Students will present a general audition, which consists of two contrasting monologues, one of which must be a classical piece, with the option of singing 30 seconds of a song.

38

Annotation of Rheb (Ras homolog enhanced in brain) and its Genomic Neighborhood in Two Species of Drosophila
Llaeltn Sierra-Cortez
BIOLOGY

Genome annotation of related species reveals the principles governing gene and genome evolution. In collaboration with Dr. Laura Reed and the Genomics Education Partnership, we aim to better understand how the positions of genes within well-characterized biological pathways influence the evolution of pathway genes and their regulatory regions. To better understand how genes and regulatory regions in the insulin signaling pathway evolve, annotation of the small GTPase Rheb was attempted in two species of Drosophila, Drosophila yakuba and Drosophila arizonae. Rheb is a Ras homolog that is enriched in the brain. The target gene Rheb was first observed in its genomic context in Drosophila melanogaster, our reference species. Genomic comparisons utilizing the UCSC genome browser, BLAST (Basic Local Alignment Search Tool) and the assumption of synteny revealed putative genomic neighborhoods for Rheb in previously unannotated species. A Rheb ortholog was identified in Drosophila yakuba, and a gene model was created with support from computational, conservation, and expression data. Surprisingly, the genes immediately adjacent to Rheb in Drosophila melanogaster occupy two different chromosomes in Drosophila arizonae, and the adjacent Rheb gene was absent from either location, implying significant genomic rearrangement in Drosophila arizonae as compared to Drosophila melanogaster.

39

Linfield Forensics Team Showcase
Chelsea Armstrong, Caitlin Meek, Joe McDowell, Shayla Wacker, Ethan Smith, Clara Johansen, Marianna Stewart and Sabrina Heizenrader
THEATRE AND COMMUNICATION ARTS

The Forensics Team will demonstrate a short debate for viewers and deliver speeches prepared throughout the course of the 2021-22 year.

40

The Linfield University Undergraduate Literature and Creative Writing Conference
Julia Kellog, Vita Marcantonio, Elena Lundby, Beatrice DeGraw, Shayla Wacker, Amber Chaffee, Lily Marshall, Lucy Gordon and Kerry Grant
ENGLISH

The conference will feature student Creative Writing and Literature panels, Q&A sessions, and a student honors presentation.

41

Student Showcase Recital
Galen York, Leah Ramiah, Raina Parsons, James Weiser, Hannah Barlow, Hanna Shields, Megan Ogasawara, Ben Simpson, Danny Kahn, Lily Sveinbjornsson, The Achelois Collective, Keri Dixon, Alex Torres and Sungmin 'Daniel' Park
MUSIC

"Come Away Sweet Love" (from An Elizabethan Songbook) (1998)
Eric Ewazen (b. 1954)
Galen York, trumpet and Leah Ramiah, bassoon

"V'adoro Pupille" (from Giulio Cesare, 1724)
George Frederick Handel (1685-1759)
Raina Parsons, voice

Sonata for Oboe and Piano, Op. 166 (1921)
Camille Saint-Saëns (1835-1921)
II. Ad libitum - Allegretto
James Weiser, oboe

Luoghi sereni e cari (1918)
Stefano Donaudy (1879-1925)
Hannah Barlow, voice

String Quartet in F major, Op. 96 "American Quartet" (1893)
Antonín Dvořák (1841-1904)
I. Allegro ma non troppo
Hanna Shields, violin, Megan Ogasawara, violin, Ben Simpson, viola, Danny Kahn cello

O Kühler Wald, Op. 72 (1877)
Johannes Brahms (1833-1897)
Lily Sveinbjornsson, voice

Dance of the Bat-Eared Fox for Mixed Quintet (2022)
Élana Gatien '26 (b. 2003)
The Achelois Collective

Bittersweet (2022)
Keri Dixon '22 (b. 1974)
Keri Dixon, voice and Alex Torres, guitar

Trumpet Concerto in E-flat Major, Hob VIIe:1 (1796)
Franz Joseph Haydn (1732-1809)
I. Allegro
Sungmin 'Daniel' Park, trumpet

Acknowledgments

Academic Affairs would like to thank the following people for their hard work in producing this year's symposium:

Beth Garcia
Kathy Foss
Candido Salinas III
Mercedes Rose
Chase Estep
Jill King
Bahram Refaei
James Spears
Christina Frieson
Jason Arnoldt
Vicky Ragsdale
Ginny Blackson
Tim Sofranko
Mike Lempner
Emily Kyzer
Amy Scholer

The symposium is sponsored by the Office of Academic Affairs and the Wendell L. Foote Science Endowment.

Linfield
University

2022 STUDENT SYMPOSIUM

A Celebration of Scholarship and Creative Achievement