NORTH CENTRAL COLLEGE

HONORS DAY

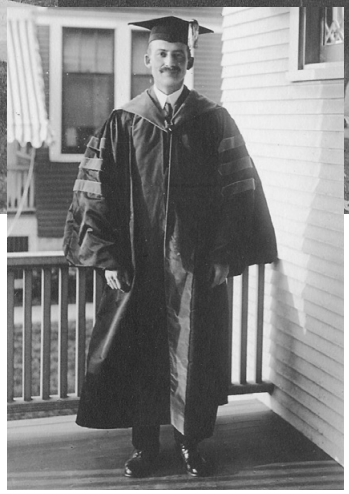
THURSDAY, APRIL 20
8 a.m. - 7 p.m.

2023

NORTH CENTRAL COLLEGE 1861

THE RALL LEGACY

The Rall name has held a special place in North Central's history since 1917, when Dr. Edward Everett Rall (pictured right) was inaugurated as the College's fifth president.

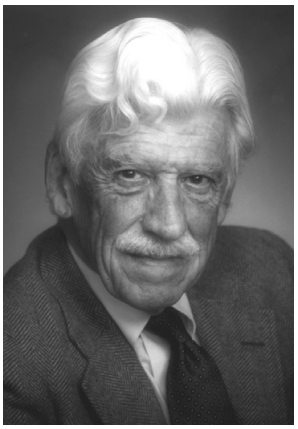


During his three decades of service to the College, Rall steered North Central through two World Wars and the Great Depression, and doubled enrollment from 447 to 929. He also directed a major campus expansion that included Pfeiffer Hall, Kaufman Hall and Merner Field House. In 1930, the Rall House on South Brainard St. was purchased by Charles Rall, Edward's brother, for the Rall family. Since then, five College presidents have resided in the house with their families and it is now home to academic programs.

The Rall legacy continued with Rall's sons, graduates of the College who both earned an M.D. and a Ph.D. Today's Symposium is named for Joseph '40 (see below). David '46 is considered the founder of modern environmental medicine. He identified ways to prevent leukemia from spreading to the brain and headed both the National Institute of Environmental Health Sciences and the National Toxicology Program.

President Rall died in 1975, but the College still honors his vision of the ideal education—one that "develops the power to think, produces the open mind, destroys prejudice, and inculcates a genuine love of truth and hatred of sham or intellectual hypocrisy."

DR. JOSEPH E. RALL '40 1920-2008



The annual Rall Symposium for Student Research was named in 1998 to honor Joseph Edward "Ed" Rall '40, M.D., Ph.D., an internationally renowned research scientist whose half-century career at the National Institutes of Health (NIH) included serving as director of all intramural research. Before joining the NIH, Rall was a fellow at the Mayo Foundation in Rochester, Minn., and taught at Cornell University Medical College and the Sloan-Kettering Institute.

A thyroid specialist, Rall helped devise therapies to prevent thyroid disease. He authored more than 160 scientific papers and books and earned numerous awards from the medical and scientific communities. He received honorary doctorates from North Central College, the Free University of Brussels and the University of Naples. The University of Minnesota Mayo Foundation honored him with an Outstanding Achievement Award, and North Central awarded him the Distinguished Alumnus Award in 1966.

Rall took a leadership role in the College's 1995 Kresge Science Challenge that brought $2 million in new support to his alma mater's science program. He also inspired the creation of the Rall Symposium. For many years, Rall invited esteemed scientists to speak at the symposium and collaborated with students on their research projects.

2023 HONORS DAY

8 a.m. ..... **Coffee and Conversation**
Wentz Concert Hall Lobby, Fine Arts Center

8:30 a.m. ..... **Keynote Program**
Wentz Concert Hall

Anthony Grammich '23
Introduction

Dr. Donna Carroll
Interim President
North Central College
Welcome

Dr. Charlton McIlwain
Vice Provost for Faculty Engagement and Development, New York University
Professor of Media, Culture, and Communication, NYU Steinhardt School of Culture, Education, and Human Development
The Color of Research: Lessons Learned Searching for the Internet's Origin Story

9:30 a.m. to 12:30 p.m. ..... **25th Annual Rall Symposium for Student Research**

9:30 to 11:15 a.m. ..... **Poster Presentations**
Judy G. Stevenson Hall, Wentz Science Center
9:30 - 10:20 a.m. .....Students with last name A - L
10:25 - 11:15 a.m. .....Students with last name M - Z

11:20 a.m. to 12:30 p.m. ..... **Oral Presentations**
Wentz Science Center

Noon ..... **Luncheon**
Kaufman Dining Hall

1:30 p.m. ..... **47th Annual Honors Convocation**
Wentz Concert Hall

3:30 p.m. ..... **Reception**
Wentz Concert Hall Lobby, Fine Arts Center

4:30 to 7 p.m. ..... **Honor Society Events**
Locations listed below

HONOR SOCIETY EVENTS

4:30 p.m.

GAMMA IOTA SIGMA
Actuarial Science
Room 101, Wentz Science Center

ALPHA ETA
Allied Health Professions
Room 202, Wentz Center for Health Sciences & Engineering

LAMBDA ALPHA
Anthropology
A.A. Smith House

BETA BETA BETA
Biology
Room 254, Wentz Science Center

LAMBDA PI ETA
Communication and Media
Smith Hall, Old Main

OMICRON DELTA EPSILON
Economics
Room 200, School of Business & Entrepreneurship

KAPPA DELTA PI
Education
Judy G. Stevenson Hall, Wentz Science Center

SIGMA TAU DELTA
English
Koten Chapel, Kiekhofer Hall

SIGMA NU TAU
Entrepreneurship
Room 200, School of Business & Entrepreneurship

FINANCIAL MANAGEMENT ASSOCIATION
Finance
Room 200, School of Business & Entrepreneurship

PHI ALPHA THETA
History
Student Lounge, 2nd floor, Harold & Eva White Activities Center

SIGMA BETA DELTA
Management
Room 200, School of Business & Entrepreneurship

MU KAPPA TAU
Marketing
Room 200, School of Business & Entrepreneurship

PI MU EPSILON
Mathematics
Room 101, Wentz Science Center

PHI SIGMA IOTA
Modern & Classical Languages
Room 244, Language Resource Center, Oesterle Library & Learning Commons

NU RHO PSI
Neuroscience
Judy G. Stevenson Hall, Wentz Science Center

PI SIGMA ALPHA
Political Science
Theatre at Meiley-Swallow Hall

PSI CHI
Psychology
Judy G. Stevenson Hall, Wentz Science Center

ALPHA KAPPA DELTA
Sociology
A.A. Smith House

SIGMA DELTA PI
Spanish
Campus Store

5:30 p.m.

CHI ALPHA SIGMA
Athletics
Third Floor, Residence Hall/ Recreation Center

PI DELTA PHI
French
Room 244, Language Resource Center, Oesterle Library & Learning Commons

TAU SIGMA
Transfer Students
Smith Hall, Old Main

6 p.m.

BLUE KEY
Leadership
Judy G. Stevenson Hall, Wentz Science Center

6:30 p.m.

ALPHA ALPHA ALPHA
First Generation
Wentz Concert Hall, Fine Arts Center

April 26 at 5 p.m.

DELTA PHI ALPHA
German
Koten Chapel, Kiekhofer Hall

April 27 at 12:30 p.m.

JAPANESE NATIONAL HONOR SOCIETY
Japanese
Room 244, Language Resource Center, Oesterle Library & Learning Commons

2023 RALL SYMPOSIUM FOR STUDENT RESEARCH

An institution of the liberal arts and sciences, North Central College provides an impressive array of opportunities for students to design and conduct independent scholarly research projects in the sciences, social sciences, humanities, business, preprofessional disciplines and fine arts. Undergraduate and graduate students can examine their own disciplines and make interdisciplinary connections as they plan, collect and evaluate data, document results and present their findings.

Students can collaborate with faculty in their ongoing research, or students can design and implement their own independent projects under faculty supervision. A number of these projects are carried out as part of the College Scholars Honors Program, and many have been funded by the Richter Grant program. North Central students regularly present the results of their scholarly and artistic work at local, regional and national professional meetings.

North Central College celebrates the 25th year of the Rall Symposium* for Student Research in 2023. The Symposium is named for Joseph Edward "Ed" Rall '40, M.D., Ph.D. Rall was involved in the Symposium from its inception until his death in 2008 and played a critical role in attracting Nobel Laureates and other distinguished scholars to speak to attendees. Students who were part of Beta Beta Beta, the American Chemical Society and Pre-Health Organization initiated the first Rall Symposium in 1998. They were supported by President Emeritus and Life Trustee Harold R. Wilde, Ph.D., and Professor of Mathematics and Dean of Faculty Emeritus R. Devadoss Pandian, Ph.D.

The Rall Symposium has previously welcomed the following distinguished keynote speakers**:

1998 – DR. BARUCH S. BLUMBERG
Professor of Medicine at the University of Pennsylvania, 1976 Nobel Laureate in Medicine

1999 – DR. MARSHALL W. NIRENBERG
Chief of the Laboratory of Biochemical Genetics, National Heart, Lung & Blood Institute, National Institutes of Health, 1968 Nobel Laureate in Medicine

2000 – DR. LEON LEDERMAN
Director Emeritus of Fermi National Laboratory, 1988 Nobel Laureate in Physics

2001 – DR. ROBERT C. GALLO
Two-time winner of the prestigious Albert Lasker Award in Medicine

2002 – DR. DAVID R. DAVIES
Chief of the Section on Molecular Structure at the National Institutes of Health

2003 – DR. JACOB ROBBINS
Scientist Emeritus, National Institute of Diabetes and Digestive and Kidney Diseases

2004 – DR. HUGO F. SONNENSCHEIN
Professor of Economics and Adam Smith Distinguished Service Professor at the University of Chicago; President Emeritus, the University of Chicago

2005 – DR. HOLLY J. HUMPHREY '79
Professor of Medicine and Dean of Medical Education, Pritzker School of Medicine, the University of Chicago

2006 – DR. DANIELLE ALLEN
Dean of the Division of Humanities, the University of Chicago

2007 – DR. ERIK FALCK-PEDERSEN '75
Professor of Microbiology and Immunology, Co-Chair of the Graduate Program in Molecular Biology, Weill Medical College of Cornell University

2008 – DR. WILLIAM CRONON
Frederick Jackson Turner & Vilas Research Professor of History, Geography and Environmental Studies, the University of Wisconsin-Madison

2009 – DR. GIL STEIN
Director, Oriental Institute and Professor, Department of Near Eastern Languages and Civilizations, the University of Chicago

2010 – DR. HERMAN B. WHITE JR.
Senior Scientist, Fermi National Accelerator Laboratory

2011 – DR. DORIS MANGIARACINA '81 BENBROOK
Professor, Director of Research and Chair in Gynecologic Oncology, Department of Obstetrics and Gynecology, University of Oklahoma Sciences Center

2011 – DR. K. DARRELL BERLIN '55
Regents Professor, Department of Chemistry, Oklahoma State University

2012 – DR. HEATHER A. CARLSON '91
Professor of Medicinal Chemistry and Professor of Chemistry, University of Michigan

2013 – DR. DAVID FUENTES
Professor of Composition and Theory, Calvin College

2014 – DR. SATYAN DEVADOSS '93
Professor of Mathematics, Williams College

2015 – DR. DAVID PRITCHARD
Cecil and Ida Green Professor of Physics, Massachusetts Institute of Technology

2016 – DR. JULIO J. RAMIREZ
R. Stuart Dickson Professor of Psychology (Chair), Davidson College

2017 – DOUG SISTERSON
Research Meteorologist, Argonne National Laboratory

2018 – DR. NERGIS MAVALVALA
Curtis and Kathleen Marble Professor of Astrophysics, Associate Department Head of Physics at Massachusetts Institute of Technology

2019 – DR. DAVID W. BLIGHT
Class of 1954 Professor of American History; Director of the Gilder Lehrman Center for the Study of Slavery, Resistance and Abolition, Yale University; 2019 Pulitzer Prize Winner

2022 – DR. DAVID KEITH
Gordon McKay Professor of Applied Physics for Harvard University's Paulson School of Engineering and Applied Sciences; Professor of Public Policy for the Harvard Kennedy School, Harvard University

**The Rall Symposium was cancelled in 2020 due to COVID-19. It was held virtually in 2021, but without a keynote speaker.*
***Professional titles were current at time of keynote address.*

KEYNOTE SPEAKER

Dr. Charlton McIlwain

Vice Provost for Faculty Engagement and Development, New York University

Professor of Media, Culture, and Communication, NYU Steinhardt School of Culture, Education, and Human Development

Author of the recent book "Black Software: The Internet & Racial Justice, From the AfroNet to Black Lives Matter," Dr. Charlton McIlwain is vice provost for faculty engagement and development at New York University, and professor of media, culture, and communication at NYU's Steinhardt School of Culture, Education, and Human Development. His scholarly work focuses on the intersections of race, technology, and racial justice activism.

He has served as an expert witness in landmark U.S. Federal Court cases on reverse redlining/racial targeting in mortgage lending and recently testified before the U.S. House Committee on Financial Services about the impacts of automation and artificial intelligence on the financial services sector. He is a regular contributor to outlets such as The Guardian, Slate, and the MIT Technology Review on the topic of race and technology.

McIlwain is founder of the Center for Critical Race & Digital Studies, president of the Board for Data & Society Research Institute, head of NYU's Alliance for Public Interest Technology, and NYU's designee to the Public Interest Technology University Network.

He received his doctorate degree in communication and master's degree in human relations from the University of Oklahoma, and his bachelor's degree in family psychology from Oklahoma Baptist University.

2023 HONORS CONVOCATION

*Processional. . . . . "Proud Heritage" by William Latham
North Central College Concert Winds . . . . . Dr. Lawrence Van Oyen, Conductor
Audience will please stand.

Invocation. . . . . .Rev. Eric Doolittle, Chaplain

Welcome . . . . . Dr. Donna Carroll, Interim President

Awards Introduction. . . . . Dr. Abiódún Gòkè-Pariolá, Provost and Vice President for Academic Affairs

COLLEGE OF ARTS & SCIENCES

ART and DESIGN
Diane Duvigneaud Senior Art Award: **Sara Donis** . . . . . Ms. Hale Ekinci
Outstanding Major in Art and Design: **Justin Decanio** . . . . . Ms. Hale Ekinci

BIOCHEMISTRY . . . . . Dr. Nancy Peterson
Outstanding Major in Biochemistry: **Olga Giza**

BIOLOGY . . . . . Dr. Steve Johnston
Outstanding Major in Biology: **Esther Lim**

CHEMISTRY and PHYSICS
Outstanding Major in Chemistry: **Sienna Alicea** . . . . . Dr. Rebecca Sanders
Outstanding Major in Physics: **Joseph Kaminski**. . . . . Dr. Susan Kempinger

COMMUNICATION and MEDIA STUDIES . . . . . Dr. Steve Macek
John Madormo Outstanding Student Broadcaster: **Megan Kordik**
Outstanding Major in Communication Studies: **Olivia Rosenberg**
Outstanding Student in Forensics: **Diego Mateo**
Outstanding Major in Interactive Media Studies: **Isabella Mahoney**
Outstanding Major in Journalism and Media Communication: **Adrian Martinez-De la Cruz**
Outstanding Major in Organizational Communication: **Paulina Bogdan**

COMPUTER SCIENCE and ENGINEERING . . . . . Dr. Nnamdi Nwanze
Outstanding Major in Computer Science: **David Rudenya**

ENGLISH STUDIES . . . . . Dr. Jennifer Smith
Outstanding Major in English: **Julianne Billings**
Outstanding Major in Literature: **Kara Brace**
Outstanding Major in Writing: **Imaan Ali**

HISTORY . . . . . Dr. Luke Franks
Outstanding Major in Social Science/History: **Luke Kwiatkowski**
James Henry Breasted Class of 1890 Outstanding Major in History: **Allison Gammons**

**Audience will please stand.*

MATHEMATICS . . . . . Dr. Katherine Heller

Outstanding Major in Actuarial Science: **Emily Walden**
Outstanding Major in Applied Mathematics: **Brennan Sweeney**
Outstanding Major in Mathematics: **Griffin Chapman**

MECHANICAL and ELECTRICAL ENGINEERING

Outstanding Major in Mechanical Engineering: **Javier Suarez Balsera** . . . . . Dr. Shan-Ju Chiang
Outstanding Major in Electrical Engineering: **Gavin Bauknecht** . . . . . Dr. Daniel Rico-Aniles

MODERN and CLASSICAL LANGUAGES . . . . . Dr. Norval Bard

Outstanding Major in Chinese: **Dominika Szczepaniak**
Outstanding Major in French: **Nathan Schwartzkopf**
Outstanding Major in German: **Laura Krambeer**
Outstanding Major in Japanese: **Mary Rasmussen**
Outstanding Major in Spanish: **Monserrat Parra González**

MUSIC . . . . . Dr. Jonathon Kirk

Clarence Juhnke Outstanding Music Major Award: **MaKayla Wilson**
Outstanding Major in Music Education: **Teyah Schweig**

PHILOSOPHY and RELIGIOUS STUDIES

Outstanding Major in Philosophy: **Brittany Battaglia** . . . . . Dr. Greg Lynch
Outstanding Major in Religious Studies: **Sophia Hiatt** . . . . . Dr. Shelley Birdsong

POLITICAL SCIENCE . . . . . Dr. Sean Butorac

Outstanding Major in Political Science: **Anthony Grammich**

PSYCHOLOGY and NEUROSCIENCE

Outstanding Major in Psychology: **Allison Grady** . . . . . Dr. Leila Azarbad
Outstanding Major in Neuroscience: **Allysha Donnelly** . . . . . Dr. Michael Stefanik

SHIMER GREAT BOOKS SCHOOL . . . . . Dr. Stuart Patterson

Outstanding Student in the Shimer Great Books School: **Claire Mikulcik**

SOCIOLOGY and ANTHROPOLOGY

Outstanding Major in Sociology: **Grace Watson** . . . . . Dr. Raleigh Blasdell
Outstanding Major in Anthropology: **Megan Sands** . . . . . Dr. Matthew Krystal

THEATRE . . . . . Dr. Laura Lodewyck

Outstanding Major in Musical Theatre: **Demie Anderson**
Outstanding Major in Theatre: **Benjamin Weiss**
Outstanding Major in Theatrical Design and Technology: **Trevor Frueh**

SCHOOL OF BUSINESS & ENTREPRENEURSHIP

ACCOUNTING
Outstanding Major in Accounting: **Molly Whitlock** ..... Dr. David Gray

ECONOMICS and FINANCE ..... Dr. Gwendolyn Tedeschi
Outstanding Major in Economics: **Colin Johnson**
Outstanding Major in Finance: **Mason Semmler**

HUMAN RESOURCE MANAGEMENT ..... Dr. Jeffrey Anstine
Outstanding Major in Human Resource Management: **Emily Silva**

MANAGEMENT and MARKETING
Outstanding Major in Management: **Cole Gregorio and Jan Mueller** ..... Dr. Jeffrey Anstine
Outstanding Major in Marketing: **Margaret McInnis** ..... Dr. Donnavieve Smith

SCHOOL OF EDUCATION & HEALTH SCIENCES

EDUCATION ..... Dr. Bruce Spitzer
Outstanding Major in Elementary Education: **Kelly Guagenti**
Outstanding Major in Secondary Education: **Faith Brouwer**

KINESIOLOGY ..... Dr. Kendall Selsky
Outstanding Major in Exercise Science: **Hannah Kirby**

HEALTH SCIENCES
Outstanding Major in Health Science: **Kylie Bechtold** ..... Dr. Kristin Paloncy-Patel
Outstanding Major in Sport Management: **Abigail Triebe** ..... Dr. Krystina Sarff

INTERDISCIPLINARY STUDIES

EAST ASIAN STUDIES ..... Dr. Brian Hoffert
Outstanding Major in East Asian Studies: **Thanh Huynh**

ENVIRONMENTAL STUDIES ..... Dr. Reed Perkins
Outstanding Major in Environmental Studies: **Olivia Cichowlas**

INTERDISCIPLINARY STUDIES ..... Dr. Reed Perkins
Dr. Francine G. Navakas Student in Interdisciplinary Studies: **Molly Whitlock**

RECOGNITIONS

Class of 2023 College Scholar Honors Theses [see page 35] . . . . . Dr. Nicholas Boaz

Scholar All-Americans [see page 36] . . . . . Dr. Daniel VanHorn

Lincoln Laureate . . . . . Dr. Margaret Gill
Award Recipient: **Adrian Brown**

COLLEGE AWARDS

Outstanding Service to Student Life Award . . . . . Dr. Jessica Brown
Award Recipient: **De'Janae Phililps**

Margaret Youel Award . . . . . Dr. Jessica Brown
Award Recipient: **Olivia Cichowlas**

Harold R. Wilde Distinguished Service Award . . . . . Ms. Paulina Bogdan

Megan Sweeney '01 Award . . . . . Dr. Suzanne Chod
Award Recipient: **Trevor Mohrmann**

Outstanding Senior Awards . . . . . Dr. Donna Carroll

Closing Remarks . . . . . Dr. Donna Carroll

Alma Mater

North Central is the school we love,
To her we sing this praise,
And from the East and from the West
You hear the voices raise...
Hail! Hail! North Central Hail!
Our Alma Mater true,
We'll always, always loyal be
To you, to you, to you.

*Recessional . . . . . "Proud Heritage" by William Latham

Please stand and remain in seats until faculty process out.

An Honors Reception will be held in the Wentz Concert Hall Lobby immediately following the Convocation.

**Audience will please stand.*

POSTER PRESENTATIONS: SESSION I *9:30 - 10:20 a.m.*

Judy G. Stevenson Hall, 2nd Floor, Dr. Myron Wentz Science Center, 131 S. Loomis St.

Unexplored Missense Mutations in Human COX10, Gene Linked to Leigh Syndrome, Observed to be Partially Functional in *Saccharomyces cerevisiae*
Fatima Alauddin '23, Biology: Biomedical Science
Advisor: Steve Johnston

Unexpected Product Indicates a New Synthesis of 4-aminophenoxazin-3-ones From Commercially Available Phenols
**Maria Alvarado '24, Chemistry*
**Hector Torres '24, Biochemistry*
Advisor: Nicholas Boaz

Designing a User-Centric Public Transportation App for Chicago Suburban Trains
Kristin Arvanites '23, Graphic Design
Advisor: Hale Ekinci

1920s: A Radical Time for Women's Rights at North Central College
Julia Benes '25, Secondary Education and History/Social Science
Advisor: Ann Durkin Keating

The Effectiveness of Investment into Education on Average Earned Wages
Logan Benson '23, Business Economics
Advisor: Brenden Mason

Inclusivity in Environmental Education
Olivia Cichowlas '23, Environmental Studies
Advisor: Mary Beth Ressler

Defendant Occupation Effects on Jurors' Judgments in Sexual Assault Cases: Are Officers and Veterans Held to a Different Standard?
Eve Cyncar '23, Psychology and Philosophy
Advisors: Liana Peter-Hagene, Greg Lynch

Remembrance: Comic Book of the Complexities of a Young Man's Mental Health
Justin DeCanio '24, Art Education
Advisor: Hale Ekinci

Visualizing Modern Design Problems
Sara Donis '23, Graphic Design
Advisor: David Cordero

Effects of Sub-Anesthetic Doses of Ketamine on the Incubation of Oxycodone Craving and the Neural Activity in the Basolateral Amygdala in Male and Female Sprague-Dawley Rats
**Allysha Donnelly '23, Molecular Neuroscience*
Margaret Sim '23, Molecular Neuroscience and Psychology
Joshua House '23, Behavioral Neuroscience and Psychology
Juri Hoda '23, Molecular Neuroscience
Nicole Kwilosz '24, Behavioral Neuroscience and Psychology
Kelsey Morrison '24, Molecular Neuroscience
Jessica Chan '24, Behavioral Neuroscience
Avinash Moses '25, Molecular Neuroscience
Advisor: Michael Stefanik

Does Personality Make a Difference? The Effects of Introversion-Extraversion on Proactive Interference (PI) and Release From PI in Short-Term Memory
**Claire Eaton '24, Psychology*
**Alexia Bustamante '24, Psychology*
**Allison Grady '23, Psychology*
Advisor: Mary Jean Lynch

Crystal Structures of Large-Volume Commercials Pharmaceuticals
Tawnee Ens '24, Biology
Advisor: James Kaduk

Sharing the Air: Comparing the Effects of Individual Versus Group Mindful Breathing
Jeffrey Erl '22, Psychology
Advisor: Leila Azarbad

Fringe Magnetic Fields in the Muon g-2 Experiment
**Kalen Fellows '23, Physics*
**Javier Suarez Balsera '23, Mechanical Engineering*
Advisor: Paul Bloom

The Seven Saints: An Exploration of Morality and Identity Politics Through Text, Image, and Retired Superheroes
Molly Fisher '23, Literature
Advisor: David Cordero

Blossoming to Burnout: An Analysis of How Higher Achieving College Students Experience Stress
Kylee Frey '23, Psychology
Advisors: Nicole Rivera, Kathleen King

The Struggle from Afar: Mexican Catholics in Chicago and Los Angeles During the Cristero War and Its Aftermath
Allison Gammons '23, History
Advisors: Luke Franks, Ann Durkin Keating

The Effect of Exhausted Coffee Ground Particle Size on Metal Ion Adsorption Rates and Capacities
**Elizabeth Gora '23, Biochemistry*
**Olga Giza '23, Biochemistry*
Samuel Saldana '23, Chemistry
Lauren Casper '23, Biology and Environmental Studies
Victor Coll '22, Biology
Advisor: Rebecca Sanders

The Effects of Ketamine on the Incubation of Oxycodone Craving in the Nucleus Accumbens on Behavior and Fos in Male Rats
**Juri Hoda '23, Molecular Neuroscience*
Allysha Donnelly '23, Molecular Neuroscience
Joshua House '23, Behavioral Neuroscience and Psychology
Margaret Sim '23, Molecular Neuroscience and Psychology
Kelsey Morrison '24, Molecular Neuroscience
Nicole Kwilosz '24, Behavioral Neuroscience and Psychology
Avinash Moses '25, Molecular Neuroscience
Jessica Chan '24, Behavioral Neuroscience
Advisor: Michael Stefanik

Neural Activity Within the Lateral Habenula of Male Sprague-Dawley Rats Following Extended Use of Oxycodone, and the Effects of Ketamine on the Incubation of Oxycodone Craving and Activation of the Lateral Habenula
**Joshua House '23, Behavioral Neuroscience and Psychology*
Allysha Donnelly '23, Molecular Neuroscience
Margaret Sim '23, Molecular Neuroscience and Psychology
Jessica Chan '24, Behavioral Neuroscience
Avinash Moses '25, Molecular Neuroscience
Nicole Kwilosz '24, Behavioral Neuroscience and Psychology
Juri Hoda '23, Molecular Neuroscience
Kelsey Morrison '24, Molecular Neuroscience
Advisor: Michael Stefanik

Mutations in Singed, Forked, and Shavenoid Result in Altered Height and Width in Drosophila Denticles
**Hannah Jones '24, Biology: Biomedical Science*
Mary Leskovec '23, Molecular Neuroscience
Advisor: Jennifer Sallee

Foot Strike Patterns and Lower Extremity Injury Risk in Runners: A Critically Appraised Topic
Ellie King '24, Master of Athletic Training
Advisor: Taylor Arman

**Denotes presenters*

POSTER PRESENTATIONS: SESSION I *9:30 - 10:20 a.m.*

Judy G. Stevenson Hall, 2nd Floor, Dr. Myron Wentz Science Center, 131 S. Loomis St.

Simulating Magnetic Systems with MuMax3
**Joseph Klaips '23, Physics and Mathematics*
**Joseph Kaminski '23, Physics*
**Ryan Elliot '25, Physics*
Advisor: Susan Kempinger

Comparing Running Economy Between Carbon-Plated Road Racing Shoes
Jacob Kluckhohn '24, Exercise Science
Advisor: Rachel Luehrs

The Perpetuation of Institutional Barriers in the Image of the First Lady
Hannah Kohl '23, Political Science
Advisor: Suzanne Chod

National Socialist Propaganda in the Third Reich: The Iconography of Youth
Laura Krambeer '24, Biology and Secondary Education
Advisor: Gregory Wolf

Urban Amphibian Diversity in Restored and Unrestored Wetlands in Cook County, IL
Ian LaPat '24, Biology and Environmental Studies: Science
Advisors: Chandreyee Mitra, Melissa B. Youngquist (John G. Shedd Aquarium)

No Man Left Behind: A Deeper Look Into NCC's Humanitarian Efforts from 2001 & 2005
Megan Lemley '25, Secondary Education and Social Science
Advisor: Ann Durkin Keating

Utilization of Spent Coffee Grounds as a Fuel Source
Christiana Lenzer '23, Biology
Advisor: Jeffrey Jankowski

Investigating the Roles of Flare, Twinstar, and Twinfilin in Drosophila Denticle Formation
**Mary Leskovec '23, Molecular Neuroscience*
Hannah Jones '24, Biology: Biomedical Science
Advisor: Jennifer Sallee

Phenotype Testing Mutant Alleles of the Human COX10 Gene Using *Saccharomyces cerevisiae*
**Esther (Eun Bi) Lim '23, Biology*
**Thomas-Shadi Voges '24, Biochemistry*
Advisor: Steve Johnston

The Role of Differential Rearing Influencing Cocaine Seeking and Reinstatement
**McKenzie Linden '23, Behavioral Neuroscience and Psychology*
Adrian Brown '22, Behavioral Neuroscience
Lucy Vera '23, Molecular Neuroscience
Kevin St. Clair '24, Psychology and Shimer Great Books (Humanities)
Kara Froidcoeur '22, Behavioral Neuroscience
Ben Klemm '25, Psychology
Advisor: Margaret Gill

POSTER PRESENTATIONS: SESSION II *10:25 - 11:15 a.m.*

Judy G. Stevenson Hall, 2nd Floor, Dr. Myron Wentz Science Center, 131 S. Loomis St.

Multihost Pathogen Creates Ecological Links Between Its Hosts and Thus Influence Host Population Dynamics
Maisha Marzan '25, Biology; Biological Sciences and Applied Mathematics
Advisor: Gregory Ruthig

Epiphyte Diversity of Old- And New-Growth Forests in the Ecuadorian Amazon
Amber Maurer '23, Environmental Studies: Science and Biology
Advisor: Gregory Ruthig

Does Your Vote Matter? Assessing Presidential Election Models
Jacob Mersch '23, Political Science
Advisor: William Muck

Does the Department of Justice Look Like the People?: Lack of Racial, Ethnic, and Gender Diversity of the Clinton-Trump Administrations' US Attorneys and Marshals
**Trevor Mohrmann '23, Political Science*
**Samantha Selakovich '23, Political Science*
Advisor: Suzanne Chod

An Autoethnography of Self-Expression While Navigating Milanese Fashion and Culture
Emaan Mohsinuddin '23, Psychology and Behavioral Neuroscience
Advisor: Nicole Rivera

Ventral Tegmental Area Amylin Receptor Activation Does Not Alter Prefrontal Cortex Dopamine Activity
**Avinash Moses '25, Molecular Neuroscience*
Maxine Loh (University of Illinois Chicago)
Advisor: Mitchell Roitman (University of Illinois Chicago)

How Children Museum's Exhibit Design Affects Social Emotional Learning in Preschoolers
**Noah Obermeyer '24, Psychology and Behavioral Neuroscience*
**Samia Islam Saba '25, Neuroscience and Psychology*
**Emma Browne '24, Biology: Biomedical Science*
Advisor: Nicole Rivera

Comparing Mental Health Literacy & Perceptions of Mental Health Support Between Coaches & Student-Athletes
Allison Pearson '23, Psychology and Exercise Science
Advisor: Leila Azarbad

Career Transition Study
**Madelyn Pickering '23, Psychology*
Isabella Canedo '24, Psychology
Advisor: Nicole Rivera

Extracorporeal Shockwave Therapy for the Treatment of Plantar Fasciitis in the Physically Active: A Critically Appraised Topic
Stefanie Podock '24, Master of Athletic Training
Advisor: Taylor Arman

Bias in Professional Interview
**Sasha Prinos '23, Psychology*
**Jillian Richer '23, Psychology*
**Samantha Kaczmarek '25, Psychology, Criminology, and Sociology*
Advisor: Karl Kelley

Does Studying Abroad Influence Cultural Competency?: A Critically Appraised Topic
Jennifer Quintas '24, Master of Athletic Training
Advisor: Taylor Arman

**Denotes presenters*

POSTER PRESENTATIONS: SESSION II *10:25 - 11:15 a.m.*

Judy G. Stevenson Hall, 2nd Floor, Dr. Myron Wentz Science Center, 131 S. Loomis St.

Injury Prevention and Access to Athletic Training Services in Tactical Athletes: A Critically Appraised Topic
Monica Rapciak '24, Master of Athletic Training
Advisor: Taylor Arman

A Liminal Space for Forgotten Memories
Brianna Roy '23, Studio Art
Advisor: Christine Rabenold

Retinal Vessel Detection with Improved RIPPER and CVS
**David Rudenya '23, Computer Science*
**Mark Bucaro '23, Computer Science*
Advisor: Nnamdi Nwanze

Grandparents and Museum Visits
**Samia Islam Saba '25, Neuroscience and Psychology*
**Eliana Whitcomb '23, Psychology and Neuroscience*
**Ellie Gosselin '24, Psychology*
**Cristian Moreno '23, Psychology*
**Nanci Sarmiento '23, Political Science and Psychology*
Advisor: Nicole Rivera

Stochastic Control with Deep Reinforcement Learning
Robert Sabum '23, Computer Science
Advisor: Sun-il Kim

A New Method for Counting and Identifying Water Molds in Field Samples
**Justyn Salas '24, Biology: Biomedical Science*
**Courtney Mayeda '24, Biology*
Advisor: Gregory Ruthig

The Effect of Exhausted Coffee Ground Particle Size on the Filtering Capability of Dyes from Contaminated Water
**Samuel Saldana '23, Chemistry*
Elizabeth Gora '23, Biochemistry
Olga Giza '23, Biochemistry
Advisor: Rebecca Sanders

James Henry Breasted: Life and Legacy
Megan Sands '23, Anthropology
Advisor: Dale Simpson Jr.

Adsorption of Argon into Zeolite Al-MFI
Colin Scherry '23, Physics
Advisor: James Kaduk, Winnie Wong-Ng (National Institute of Standards and Technology)

The Development of A Mindful Eating Program for Children
Erika Schoeller '23, Entrepreneurship
Advisor: Leila Azarbad

Tennis At NCC: Club Sport To Collegiate Competition
Ethan Sherman '24, History
Advisor: Ann Durkin Keating

Quantifying Neuronal Activity in the Dorsomedial Striatum and the Dorsolateral Striatum Following Oxycodone Self-Administration
**Margaret Sim '23, Molecular Neuroscience and Psychology*
Allysha Donnelly '23, Molecular Neuroscience
Joshua House '23, Behavioral Neuroscience and Psychology
Juri Hoda '23, Molecular Neuroscience
Kelsey Morrison '24, Molecular Neuroscience
Nicole Kwilosz '24, Behavioral Neuroscience and Psychology
Jessica Chan '24, Behavioral Neuroscience
Avinash Moses '25, Molecular Neuroscience
Advisor: Michael Stefanik

The Effectiveness of Dry Needling in Athletes with Shoulder Pain: A Critically Appraised Topic
Jasmine Smith '24, Master of Athletic Training
Advisor: Taylor Arman

Cold War Mobilization of Students, 1945-1970s
Jenny Smith '24, Secondary Education and Social Science/History
Advisor: Ann Durkin Keating

Complementing Phosphodiesterase Gene BinA in *Vibrio fischeri*
Robert Szabad '23, Biology
Advisor: Jonathan Visick, Karen Visick (Loyola University Chicago)

Too Many Faces in the Crowd? Do Introverts Overestimate Group Sizes?
**Joe Talbot '23, Psychology*
**Evan Gray "G" '24, Psychology and Philosophy*
Advisor: Mary Jean Lynch

Robert Durst and the General Strain Theory
**Kathryn Wagner '25, Design and Philosophy*
**Morgan George '25, Health Science*
Advisor: Raleigh Blasdell

The National Socialists' Use of Visual Propaganda: Defining Identity
Alexander Wickersheim '26, German and Secondary Education
Advisor: Gregory Wolf

Diagnostic Test for Lateral Ankle Instability: A Critically Appraised Topic
Jasmine Williams '24, Master of Athletic Training
Advisor: Taylor Arman

Betty Broderick and Frustration-Aggression Theory
**Morgan Williams '23, Psychology*
**Olivia Rosenberg '25, Communication and Sociology*
**Natalie Peters '25, Psychology*
Advisor: Raleigh Blasdell

**Denotes presenters*

ORAL PRESENTATIONS *11:20 a.m. - 12:30 p.m.*

Dr. Myron Wentz Science Center, 131 S. Loomis St.

Promoting Access and Representation

Moderator: Sophie Hand *Location: WSC 254*

All Eyes on Me: The Relationship Between Classroom Layout and Participation
Joseph Talbot '23, Psychology
Advisor: Annie Wegrzyn

Universal Design: Introductory Course Syllabi as a Tool for Student Accommodation in Political Science
Trevor Mohrmann '23, Political Science
Advisor: Suzanne Chod

Drapetomania to Degrees: Learning Representation Through a Lens of Black Students and School Faculty Members
De'Jah Phillips '23, Psychology
Advisor: Nicole Rivera

Is That Enough Levity For You?
Diego Mateo '23, K-12 Music Education
Advisor: John Stanley

Educating the Future

Moderator: Georgine Maisch *Location: WSC 354*

Studying the Impact on Elementary Teaching Strategies Since the COVID-19 Pandemic
Elena Buscher '24, Elementary Education
Advisor: Lindsay Wexler

The Effects of Youth Team and Individual Sport Participation on Self-Esteem Development
Shelby Ottum '24, Elementary Education
Advisor: Krystina Sarff

Empathy: A Critical Social-Emotional Learning Component of Bullying Prevention
Avalon Dufkis '23, Elementary Education
Advisor: Bruce Spitzer

Dissecting USA Issues Past and Present

Moderator: Michelle Boule Smith *Location: WSC 101*

Towards a Sustainable Future: Carbon Pricing in the United States
Molly Whitlock '23, Accounting and Environmental Studies
Advisor: Jeff Anstine

The Mythology of Baseball: How the New York Yankees Used the American Dream to Achieve Cultural Ubiquity
Vicoria Monte '24, Sport Management
Advisor: Gregory Wolf

Understanding the Factors That Mobilized Black Voters in Georgia During the 2020 Presidential Election
Rola Goke-Pariola '23, Global Studies
Advisor: William Muck

Liberty and Justice for All? Gender Differences in Emotional Reactions and Perceptions of Safety in Response to the Overturning of Roe v. Wade
Taylor Bartels '23, Psychology
Advisor: Leila Azarbad

Investigating Gender Roles

Moderator: Jennifer Smith *Location: WSC 256*

The Gender of God in Christianity and Islam: How Feminists Perceive God Beyond the Patriarchy
Miriam Safford '23, Anthropology, Religious Studies
Advisor: Wioleta Polinska

New Platform Old Story: Traditional Sexual Script on Snapchat
**Julia Babinec '24, Master in Higher Education Leadership*
**Monserrat Valerio '23, Psychology and Sociology*
Advisor: Anne Groggel

From Hatshepsut to Queen Victoria: Understanding the Glass Ceiling
Tahbata Zuniga Diaz '24, Political Science and Writing
Advisor: Suzanne Chod

Questioning the Power of Perception

Moderator: Tim Woods *Location: WSC 356*

The Acute Effects of Resistance Training on Mood Among Adults
Alison Tasso '23, Exercise Science
Advisor: Rachel Luehrs

Trust Me, I'm a Dietician: Sportswomen, Eating Disorders, and Social Media's "Recovery Lite"
Allison Grady '23, Psychology
Advisor: Carly Drake

The Games Are Not the Same: Evaluating Participant Experiences When Taking Tests of Executive Function
Amber Kulpinski '22, Psychology, Neuroscience
Advisor: Karl Kelley

A Coherent Interview: A Construct Validation Study of the Sense of Coherence Scale (SOC-29)
Nadia Baraglia '23, Psychology, Sociology
Advisor: Karl Kelley

Exploring Global Issues

Moderator: Sean Kim Butorac *Location: WSC 015*

China's New Colonialism
Claire Mikulcik '23, Political Science and Shimer: Social Science
Advisor: Sean Kim Butorac

Resolving Financial Crises
Jaclyn Logan '23, Accounting
Advisor: Brenden Mason

Global Oil Demand: Analysis and Outlook
Jan Mueller '23, Management
Advisor: Brenden Mason

Race and Self-Determination in Progressive Era America: The American Anti-Imperialist League and the Question of the Philippines, 1898-1928
Jackie Drover '23, History
Advisor: William Barnett

**Denotes presenters*

ORAL PRESENTATIONS *11:20 a.m. - 12:30 p.m.*

Dr. Myron Wentz Science Center, 131 S. Loomis St.

Improving Our Environment

Moderator: Esen Andic-Mortan *Location: WSC 104*

Collaborating With the Conservation Foundation for Long-Term Community-Supported Agriculture (CSA)

**Jess Valete '23, Environmental Studies*
**Camryn Liberio '23, Environmental Studies*
**Derek Olson '23, Environmental Studies*
**Grey Riedl '23, Environmental Studies, Biology*
**Amber Maurer '23, Environmental Studies*
Advisors: Reed Perkins, Dale Simpson Jr.

Desalination of a Salty Situation

**Ian LaPat '24, Environmental Studies and Biology*
**Carly Casper '23, Environmental Studies and Biology*
**Lauren Casper '23, Environmental Studies and Biology*
**George Queisser '23, Environmental Studies*
Advisors: Reed Perkins, Dale Simpson Jr.

Conservation@NCC – An Environmental Partnership Between The Conservation Foundation and our North Central College Campus

**Molly Whitlock '23, Accounting and Environmental Studies*
**Anna Jensen '24, Environmental Studies*
**Thomas Rutter '23, Business Economics*
**Gabriel Aguado '23, Environmental Studies*
**Katrin Prohorova '23, Environmental Studies*
Advisors: Reed Perkins, Dale Simpson Jr.

Solar Panel Adoption: An Examination of Agent's Behaviors and Environmental Consciousness

Colin Johnson '23, Economics, Finance
Advisor: Esen Andic-Mortan

Finding Common Ground

Moderator: Steve Macek *Location: WSC 042*

Progress and Setbacks in New Mexico: An Analysis of Local 890

Anthony Grammich '23, Political Science
Advisor: Suzanne Chod

"Outside the Works": A Podcast About the Hawthorne Works Factory in the 1920s

Adrian Martinez-De La Cruz '23, Journalism and Media Communication
Advisor: Ann Durkin Keating

Understanding China: Debunking Myths and Exploring Realities

Elie Imani '25, Political Science, Economics
Advisor: Jinai Sun

Understanding China: The Inductive East and the Deductive West

Spencer Mulso '25, International Business and Chinese
Advisor: Jinai Sun

Developing New Models and Measurements

Moderator: Joanna Weremijewicz *Location: WSC 013*

Improving Satellite Imagery-Based Estimates of Crop Residue Cover in the Pacific Northwest by Integrating Moisture Dependency Effects

**Sienna Alicea '23, Chemistry*
Kirti Rajagopalan (Washington State University)
Siddharth Chaudhary (Washington State University)
Haly Lury Neely (Washington State University)
Advisor: Kirti Rajagopalan (Washington State University)

Developing an Infectious Disease Modeling Program

Robert Szabad '23, Biology
Advisor: Marco Martinez

Quantifying the Relationship Between Arbuscular Mycorrhizal Fungi and a Native and Invasive Thistle

**Nicole Baker '24, Biology*
**Lucia Vera '24, Neuroscience*
**Ian Rosales '25, Biology*
Advisor: Joanna Weremijewicz

Geochemical Analyses of Rapa Nui (Easter Island) Geological and Archaeological Materials: Using Cutting-Edge Technology to Model Economic, Ideological, and Sociopolitical Interaction During the Polynesian Pre-contact Period (1200-1722 C.E.)

**Grace Watson '23, Anthropology and Sociology*
Laure Dussubieux (The Field Museum)
Jean Milot (The Field Museum)
Chris Stevenson (Virginia Commonwealth University)
Advisor: Dale Simpson Jr.

**Denotes presenters*

Unexplored Missense Mutations in Human COX10, Gene Linked to Leigh Syndrome, Observed to be Partially Functional in *Saccharomyces cerevisiae*

Fatima Alauddin '23, Biology: Biomedical Science *Advisor: Steve Johnston*

Leigh syndrome is a rare mitochondrial disorder without a definitive treatment; sufferers of the disease experience severe, fatal symptoms. Alterations in human COX10 (HsCOX10) are associated with Leigh Syndrome as it affects the formation of cytochrome c oxidase (COX) in the electron transport chain (ETC). In our experiment, we examined mutations HsCOX10R58H and HsCOX10L84F which were of particular interest due to the eminent amino acid substitution and conservation of amino acid positions in COX10 over several species. These mutations were implemented into HsCOX10 and expressed in Saccharomyces cerevisiae. Phenotypic measurements including growth on glycerol and oxygen consumption were conducted to assess the functionality of these mutations in yeast. In our study, HsCOX10L84F and HsCOX10R58H were observed to be partially functional in yeast. More information on mutations associated with Leigh Syndrome will be helpful in clinical settings; specifically, providing insight into etiologies and treatments.

Unexpected Product Indicates a New Synthesis of 4-aminophenoxazin-3-ones From Commercially Available Phenols

**Maria Alvarado '24, Chemistry* *Advisor: Nicholas Boaz*
**Hector Torres '24, Biochemistry*

The ability to form carbon-nitrogen bonds in molecules is vital for a range of industries given their ubiquity in molecules of societal importance. This work focuses on efforts to produce a one-pot synthesis of amino phenols utilizing the Baudisch reaction. The Baudisch reaction is used to synthesize nitrosophenols from commercially available phenols utilizing a copper(II) ion. Efforts to reduce and purify Baudisch compounds to their corresponding amino phenols were not successful due to poor solubility. Rather, treatment with weak reductants yielded the production of 6-amino-5H-dibenzo[a,h]phenoxazin-5-one, a brilliant purple compound. Compounds with this aminophenoxazine-3-one core have been shown to have antibiotic and antitumor properties.

Designing a User-Centric Public Transportation App for Chicago Suburban Trains

Kristin Arvanites '23, Graphic Design *Advisor: Hale Ekinci*

Public transportation in the USA has a poor reputation for a long list of reasons including traffic management, long commutes, and ineffective ticketing technology. Using User Experience (UX) design methodology, I've built and designed an interactive prototype of my own public transportation app as an alternative to the existing Ventra app for the local Metra train system. UX designers use several design processes that integrate and test interactions between human users and a product. Based on interviews and surveys of public transportation users, my application contains features that meet the needs of the users such as providing all services in a single platform and crowd-sourcing user information. To create an interactive high-fidelity prototype, I conducted research and built a comprehensive UX case study, including user personas, empathy maps, site maps, and low-fidelity wireframes. Thus giving insight into the issues of Metra users while tackling them meticulously and systematically in my new app.

1920s: A Radical Time for Women's Rights at North Central College

Julia Benes '25, Secondary Education and History/Social Science *Advisor: Ann Durkin Keating*

The 1920s was truly a pivotal moment in society for women at North Central College as well as in America. In 1920, with the passage of Women's suffrage, women gained fuller citizenship rights. Throughout this decade, North Central welcomed the changes, and shift in women's role in society. Its advancements of women's opportunities on campus, helped kickstart all of the opportunities that women gained in the future, and have on campus today. In the earlier part of the decade the Women's Athletic Association began to really take off, and the ability to practice sports recreationally led to the establishment of the 1st women's sports team on campus. Other extracurriculars like Coed Varsity debate began to launch with the purpose of training women to take on roles in politics. The President at the time, Edward Rall, pushed for the construction of the first women's dormitories.

The Effectiveness of Investment into Education on Average Earned Wages

Logan Benson '23, Business Economics *Advisor: Brenden Mason*

This paper looks at the relationship between average wages and investment in education, both public and private. To do so, I will utilize the two-way fixed effects model to most effectively utilize and analyze the balanced panel dataset made up of values from thirteen different countries, across eight years. A majority of the data is obtained from the OECD, with the other values being obtained from The World Bank. Other than total education expenditures significantly leading to an increase in wages, the most consistently significant findings were that secondary education spending had the highest impact out of primary, secondary, and tertiary education.

**Denotes presenters*

Inclusivity in Environmental Education

Olivia Cichowlas '23, Environmental Studies *Advisor: Mary Beth Ressler*

People with disabilities and others who've been systemically marginalized are often excluded from immersive environmental education programs due to lack of access. Both during my summer internship with the Wisconsin Department of Natural Resources at Lakeshore State Park (LSP) as an environmental educator and through a fall independent study, I focused on inclusive educational practices — an area in which I have experience and passion, and in which LSP recognized as a need. Throughout this work, I sought to answer the questions: In what ways does LSP teach visitors about environmentalism? In what ways can this work be enhanced through inclusive lesson plans? When the fall semester began, I researched various environmental education materials, environmental topics, lesson plan literature, and examples to create six inclusive lesson plans on several topics. This ability-inclusive curriculum has now been adopted by LSP to formalize their educative approach for all visitors to the park.

Defendant Occupation Effects on Jurors' Judgments in Sexual Assault Cases: Are Officers and Veterans Held to a Different Standard?

Eve Cyncar '23, Psychology and Philosophy *Advisors: Liana Peter-Hagene, Greg Lynch*

Police officers and veterans hold a special status in society, eliciting both trust and suspicion. Recent data shows overall positive public perceptions of officers/veterans, and research supports that pre-existing attitudes influence juror decisions. Thus, when police officers and veterans are on trial, they will benefit from their profession. This mock juror experiment tests the prediction that defendants who are officers and veterans would elicit more lenient verdicts compared to civilians. Online participants read summaries and excerpts from a sexual assault trial (a "he said, she said" scenario where the victim's consent was the primary issue) and were randomly assigned to learn that the defendant was an a) officer, b) veteran, or c) mechanic. Statistical comparisons among the three groups will reveal 1) whether officers/veterans elicit more moral outrage and convictions compared to civilians; and 2) how jurors' attitudes toward the three professions and endorsement of rape myths shape their verdicts.

Remembrance: Comic Book of the Complexities of a Young Man's Mental Health

Justin DeCanio '24, Art Education *Advisor: Hale Ekinci*

Remembrance is a comic book illustrating the complexities of mental health. Through fantastical imagery embedded into everyday situations, the book provides a glimpse into a young man's mundane life. Pulling from personal journal entries, I created these comic strips through traditional and digital illustrations. The book is connected through the central theme of mental health and the main character's environment. There is no text to encourage deeper and more universal interpretation through visual language. Instead of words, metaphors such as black holes and quicksand are used to communicate the character's psyche. By sharing my experiences through this work, I hope that others with similar experiences feel heard, understood, and could relate to these moments within the comic book.

Visualizing Modern Design Problems

Sara Donis '23, Graphic Design *Advisor: David Cordero*

Graphic designers in the 21st century make use of social media to share, motivate, and learn within their respective creative communities. Nevertheless, designers face various professional challenges that influence their experience on creative, social platforms like Instagram. As a response to these emerging issues I created a series of digital illustrations that highlight threats in the profession using support from five semi-structured interviews with working designers and a review of literature. The main challenges highlighted in these illustrations include copyright infringement, impostor syndrome, oversaturation in the creative space, and loss of opportunity. These illustrations and their text discuss the issues and implications on the design profession and visually captivate the nuances of these problems. They aim to urge young designers to think about their own positions on these topics as they explore their role as members of a larger creative community.

Effects of Sub-Anesthetic Doses of Ketamine on the Incubation of Oxycodone Craving and the Neural Activity in the Basolateral Amygdala in Male and Female Sprague-Dawley Rats

**Allysha Donnelly '23, Molecular Neuroscience* *Advisor: Michael Stefanik*
Margaret Sim '23, Molecular Neuroscience and Psychology
Joshua House '23, Behavioral Neuroscience and Psychology
Juri Hoda '23, Molecular Neuroscience
Nicole Kwilosz '24, Behavioral Neuroscience and Psychology
Kelsey Morrison '24, Molecular Neuroscience
Jessica Chan '24, Behavioral Neuroscience
Avinash Moses '25, Molecular Neuroscience

Oxycodone is one of the most prescribed opioids and is also responsible for a large fraction of drug overdoses seen each year. Both males and females are subject to addiction, but the drug seeking behaviors and effective treatments between them may differ. This study aimed to examine the differences in behavior and neuronal activity in the basolateral amygdala in male and female rats after treatment of daily sub-anesthetic doses of ketamine during forced abstinence following oxycodone self-administration. It was

**Denotes presenters*

hypothesized that females would show a decrease in drug seeking, but not as significant as the males; however, only male rats that received ketamine during forced abstinence exhibited a significant decrease in drug seeking. The results indicate that there are sex differences in drug seeking behavior following ketamine-aided forced abstinence and may suggest a difference in neural activity in many of the brain regions that are key players in addiction.

Does Personality Make a Difference? The Effects of Introversion-Extraversion on Proactive Interference (PI) and Release From PI in Short-Term Memory

*Claire Eaton '24, Psychology
*Alexia Bustamante '24, Psychology
*Allison Grady '23, Psychology
Advisor: Mary Jean Lynch

Previous research suggests that extraverts use semantic processing and introverts use non-semantic processing. We hypothesized that PI will hurt recall of extraverts from semantic categories and of introverts from nonsemantic categories. When category information changes, extraverts should experience a greater release from PI with semantic categories, but introverts should experience it with nonsemantic categories. Participants (n=147) completed two Brown-Peterson memory tasks consisting of four trials. In one task the words were from the same semantic category for three trials; in the other, the words were non-semantically related. On the fourth trial, the category stayed the same (PI) or changed (release). After the memory tasks, participants completed the Eysenck Personality Inventory to determine extraversion level. Recall declined significantly across the first three trials and improved on the fourth for the semantic category. There was no significant main effect of, or interactions with, introversion-extraversion.

Crystal Structures of Large-Volume Commercials Pharmaceuticals

Tawnee Ens '24, Biology
Advisor: James Kaduk

The crystal structures of three commercial pharmaceuticals have been solved and refined using synchrotron X-ray powder diffraction data, and optimized using density functional theory techniques. Meglumine diatrizoate, $(C_7H_{18}NO_5)(C_{11}H_8I_3N_2O_4)$, (Renografin-60) is a common radiography contrast agent. The crystal structure consists of alternating double layers of cations and anions. Hydrogen bonds link the cations and anions into a 3-dimensional framework. Danofloxacin mesylate, $(C_{19}H_{21}FN_3O_3)(CH_3O_3S)$, (Advocid) is a veterinary antibiotic. There are two independent cations and anions. The crystal structure consists of alternating layers of cations and anions. The expected cation-anion hydrogen bonds are not present, but there are cation-cation H-bonds. Anthraquinone-2-carboxylic acid, $(C_{15}H_8O_4)$, is an anti-inflammatory drug. The crystal structure consists of alternating layers (each of which contains two independent molecules) of molecules pointing in different directions. There are O-H···O hydrogen bonds among the carboxylic acid groups.

Sharing the Air: Comparing the Effects of Individual Versus Group Mindful Breathing

Jeffrey Erl '22, Psychology
Advisor: Leila Azarbad

Though research shows benefits in both individual and group mindful breathing settings, a limited number of studies compare the two. This study sought to examine the differences between those taking part in a 15-minute guided mindful breathing session on outcomes of anxiety, social connectedness, mindfulness, and affect in the context of an individual or group setting. Participants consisted of 72 NCC students, of which 45 were in the group condition and 27 in the solo condition. Mixed ANOVA results indicated that across both conditions, social connectedness and positive emotions significantly increased before and after mindful breathing, whereas anxiety and negative emotions significantly decreased. Mixed ANCOVA results indicated a significant increase in social connectedness and a significant decrease in negative emotions after controlling for social interaction anxiety. No significant main effect of condition was found. These findings suggest that both an individual and group setting are effective in promoting mindful/meditative practices.

Fringe Magnetic Fields in the Muon g-2 Experiment

*Kalen Fellows '23, Physics
*Javier Suarez Balsera '23, Mechanical Engineering
Advisor: Paul Bloom

The Muon g-2 experiment attempts to measure the magnetic dipole moment of a fundamental particle called the muon. A deviation of this value from the value predicted by theory could imply new physics. Measuring the magnetic field in all regions of experiment is crucial for making a precise determination of the dipole moment. So far, only simulations have been made of the field in the region of the particle trackers. We have constructed a mapping magnetometer to measure those fields. The magnetometer employs single axis Hall effect probes to measure the magnetic field strength and relies on linear actuators for probe positioning. LabVIEW is used for detector control and data acquisition. Helmholtz coils and a variable gap magnet were used to calibrate and test the instrument. The data has shown promising results, and the magnetometer will soon be taken to Fermilab to perform in-site measurements.

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The Seven Saints: An Exploration of Morality and Identity Politics Through Text, Image, and Retired Superheroes

Molly Fisher '23, Literature *Advisor: David Cordero*

The human brain is wired to react faster to the meanings of images than text, giving us instant comprehension when staring at pictures. Because of this, the human brain can retain more information presented from aesthetically-pleasing images and symbols rather than words. Since the 1930s, Superheroes have acted as metaphors for social change–an illustrated personification of ethics emphasized through a larger-than-life, colorful hero's journey. Good defeats evil, justice is served, and society is at equilibrium once again. This project–The Seven Saints–is a standard-issue 36-paged comic book, acting as a visual vehicle to explore morality, identity politics, and all the grey areas that fall in between. Fifteen years after the Vietnam War, faced with a rising communist threat from the Soviet Union, the veteran super soldiers must decide whether or not to take up arms once more. . .or face nuclear devastation.

Blossoming to Burnout: An Analysis of How Higher Achieving College Students Experience Stress

Kylee Frey '23, Psychology *Advisors: Nicole Rivera, Kathleen King*

Mental health on college campuses has become a growing concern due to an increase of anxiety, depression, and burnout rates among students. This may be true because of the stress they feel towards academics. It may be greater for "gifted" students because of a possible differing perception they have of the stress they experience. Previous research suggests that higher achieving students feel various pressures and stress overwhelmingly compared to other students. This led to the development of researching how honors students at a small midwestern college handle stress. In a series of interviews conducted with participants, students explained their experiences in the honors program, handling schoolwork, and what drives their effort. The students perceived their stress to be high due to their own internal success motivators and/or from outside influences creating pressure. This is important to know when establishing better support for gifted individuals.

The Struggle from Afar: Mexican Catholics in Chicago and Los Angeles During the Cristero War and Its Aftermath

Allison Gammons '23, History *Advisors: Luke Franks, Ann Durkin Keating*

The Cristero War was a political and religious conflict that occurred between the Mexican government and the Catholic Church of Mexico from 1926-1929. Catholics rebelled against the government's suppression of church power and influence. Religious studies are no longer bound by nation, and historians now view the transnational nature of Catholic activism. Chicago and Los Angeles are excellent examples of the transnational effects of the Cristero War because each city attracted many Mexican immigrants and exiles. I have used newspaper articles and personal letters to explore the experiences of Mexican immigrants in Chicago and Los Angeles and their relationship to the war. These diasporic communities provided them with the resources to continue supporting the Cristeros and express their Catholic devotion with the aid of the U.S. Catholic Church and their social groups.

The Effect of Exhausted Coffee Ground Particle Size on Metal Ion Adsorption Rates and Capacities

**Elizabeth Gora '23, Biochemistry* *Advisor: Rebecca Sanders*
**Olga Giza '23, Biochemistry*
Samuel Saldana '23, Chemistry
Lauren Casper '23, Biology and Environmental Studies
Victor Coll '22, Biology

Heavy metal contamination of water is a global problem. Among the methods to remove these contaminants from water are the use of biosorbents such as spent coffee grounds. Exhausted coffee grounds (ECGs) are readily available waste products that have been shown to be capable of adsorbing heavy metal contamination from water. Studies have investigated the capabilities of ECGs to remove metal contamination, however few have analyzed the effects of particle size. In this study, ECGs were sieved into four particle size ranges (106-300, 300-500, 500-710, 710-1000 µm). Batch adsorption experiments were run with 0.3 mM lead (II) ions to observe how different particle sizes affect adsorption rates and capacities of ECGs. Under limited time conditions, smaller particles function to adsorb metal ions faster, however with unlimited time, particle size of ECGs does not affect adsorption capacity.

The Effects of Ketamine on the Incubation of Oxycodone Craving in the Nucleus Accumbens on Behavior and Fos in Male Rats

**Juri Hoda '23, Molecular Neuroscience* *Advisor: Michael Stefanik*
Allysha Donnelly '23, Molecular Neuroscience
Joshua House '23, Behavioral Neuroscience and Psychology
Margaret Sim '23, Molecular Neuroscience and Psychology
Kelsey Morrison '24, Molecular Neuroscience
Nicole Kwilosz '24, Behavioral Neuroscience and Psychology
Avinash Moses '25, Molecular Neuroscience
Jessica Chan '24, Behavioral Neuroscience

Unconsumed prescription opioids are a cause of opioid use disorder (OUD) in the last few decades. Oxycodone is one commonly abused prescription substance. Currently, there are few treatments to prevent relapse to opioid use. Ketamine has recently gathered attention for its efficacy in reducing drug-seeking behaviors. Where ketamine is acting in the brain to produce behavioral

**Denotes presenters*

improvements is unknown. One potential site of action is the nucleus accumbens (NAc), a region critical for drug craving. We trained rats to self-administer oxycodone, administered daily sub-anesthetic ketamine during withdrawal, and then tested for drug seeking behavior after either 1 or 15 days (WD1; WD15). We found that ketamine reduced craving on WD15 after oxycodone self-administration compared to saline controls. Ongoing studies are assessing neural activity in the NAc using Fos immunohistochemistry. We hypothesize that rats that received ketamine will show reduced NAc activity versus saline treated controls. Immunohistochemical studies are ongoing.

Neural Activity Within the Lateral Habenula of Male Sprague-Dawley Rats Following Extended Use of Oxycodone, and the Effects of Ketamine on the Incubation of Oxycodone Craving and Activation of the Lateral Habenula

**Joshua House '23, Behavioral Neuroscience and Psychology* *Advisor: Michael Stefanik*
Allysha Donnelly '23, Molecular Neuroscience
Margaret Sim '23, Molecular Neuroscience and Psychology
Jessica Chan '24, Behavioral Neuroscience
Avinash Moses '25, Molecular Neuroscience
Nicole Kwilosz '24, Behavioral Neuroscience and Psychology
Juri Hoda '23, Molecular Neuroscience
Kelsey Morrison '24, Molecular Neuroscience

Relapse to drug seeking is a major feature of opioid addiction. A region implicated in relapse to other drugs of abuse is the lateral habenula (LHb), which is involved in encoding reward states. Little is known about its role in oxycodone relapse. To investigate this, we trained male rats to self-administer oxycodone and then measured their drug-seeking behavior after two weeks of forced abstinence. We attempted to reduce drug craving with sub-anesthetic doses of ketamine and measured neural activity in the LHb using cFOS immunohistochemistry. We hypothesized that LHb activity would be the highest in oxycodone-exposed rats after forced abstinence and that ketamine injections would reduce drug-seeking behavior. We also hypothesized that cFOS expression in the LHb would mirror behavioral responses. We found that oxycodone-seeking was highest after 15 days of withdrawal and that ketamine injections could reduce this increase. Current studies are underway examining cFOS expression in the LHb.

Mutations in Singed, Forked, and Shavenoid Result in Altered Height and Width in Drosophila Denticles

**Hannah Jones '24, Biology: Biomedical Science* *Advisor: Jennifer Sallee*
Mary Leskovec '23, Molecular Neuroscience

Denticles, found on the ventral epidermis of *Drosophila melanogaster* embryos, are composed of actin filament bundles. Denticles are a useful model system to understand the proteins involved in actin bundle formation. Previous research shows that the motor protein Myosin VIIA (MyoVIIA) is responsible for proper denticle formation, and we hypothesize it transports cargo such as essential proteins. We examined denticle height, width, and area in mutant singed, forked, and shavenoid genes in combination with mutant myoVIIA to investigate possible cargos needed in denticle formation. Our data show that mutations to shavenoid (sha1 and shaVAI51) drastically reduce denticle area, while singed and forked (sn3f36a) double mutations cause elongated heights and widened bases compared to wildtype controls. The severe morphological abnormalities with shavenoid mutants showcase the gene's importance in proper denticle formation and suggest a role as a cargo protein for Myosin VIIA.

Foot Strike Patterns and Lower Extremity Injury Risk in Runners: A Critically Appraised Topic

Ellie King '24, Master of Athletic Training *Advisor: Taylor Arman*

Running is becoming one of the most popular physical activities. Given the load on the lower extremity, the relationship between foot strike and running-related injuries has been studied. The focus of this critically appraised topic is to answer, in runners, does foot strike pattern affect their risk of lower extremity injuries? The studies done showed that runners with heel strike tendencies experience more impact at the hip and knees compared to runners with forefoot and midfoot. The most beneficial pattern is midfoot because it takes load off structures in lower extremities leading to reduced risk of injuries. Using the Oxford Centre for Evidence Based Medicine, three articles scored Level 1, showing there is adequate evidence, and one scored Level 3. Therefore, improving foot strike patterns to reduce stress on the lower extremity can lead to reduced risk of stress-related running injuries. This can be done using a gait retraining program.

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Simulating Magnetic Systems with MuMax3

*Joseph Klaips '23, Physics and Mathematics
*Joseph Kaminski '23, Physics
*Ryan Elliot '25, Physics
Advisor: Susan Kempinger

The ability for MuMax3 software to simulate base units of Artificial Spin Ice (ASI) systems makes it useful for running simulations that examine how ASI systems behave when exposed to external magnetic fields. For these particular simulations, magnetic multilayers composed of platinum, cobalt, and permalloy were arranged into circular "islands" to imitate the constituents of ASI and the interactions between these islands were examined. In addition to studying the interactions between the islands when exposed to an external magnetic field, the islands were connected by a structure of similar material called the "neck". Of great interest in these simulations was examining how variations in the length and width of the neck affected island interactions and behavior. Notably, energy differences between islands with neck length fixed at 800 nm were independent of change in neck width when the external magnetic field was ± 90°, and dependent when the field was 0°.

Comparing Running Economy Between Carbon-Plated Road Racing Shoes

Jacob Kluckhohn '24, Exercise Science
Advisor: Rachel Luehrs

High-cushion, carbon-plated road racing shoes (CPRRS) have sparked debate over their effectiveness. Limited research has compared efficiency of different brands of CPRRS. This study aimed to compare running economy across multiple CPRRS to each other and a control shoe. Ten male collegiate distance runners participated in two testing sessions. The first involved a VO_2 max test, the second compared running economy across shoes. Participants wore five testing shoes and a control shoe in a random order. VO2 and heart rate were averaged from the last two minutes of each shoe trial. The Nike Vaporfly Next% 2 was more efficient than the control shoe, as indicated by lower VO2 and HR. Other brands/models of CPRRS showed no significant differences compared to the control shoe. Our conclusion is that the Nike Vaporfly may improve running economy, but other brands/models of CPRRS do not show additional benefits compared to a traditional racing shoe.

The Perpetuation of Institutional Barriers in the Image of the First Lady

Hannah Kohl '23, Political Science
Advisor: Suzanne Chod

The institution of the First Lady has continued to perpetuate gender-based stereotypes modern-day society expects of women in power. This perpetuation is caused by the media, political advisors, and public opinion. Some politicians and the public would argue the First Lady's primary role is to support her husband's presidency, be a mother to their children, and play a passive role by advocating for "soft" issues. My project poses the question of how the Office of the First Lady would change if all constraints and expectations were lifted, allowing her more agency in her role. My data explores the nine constraints of the Office, precedents set by modern First Ladies, and the institutional standards preventing appointments of female leaders. In my research, I discovered how the absence of these constraints would enhance the First Lady's political power, image, and identity, substantially advancing women's collective influence and status.

National Socialist Propaganda in the Third Reich: The Iconography of Youth

Laura Krambeer '24, Biology and Secondary Education
Advisor: Gregory Wolf

The National Socialists used many tools to achieve and maintain their power, but among the most important was propaganda. A previously unexplored facet of this is their manipulation of the iconography of German youth to achieve their propagandistic messaging goals. The German youth became a tool with which party leaders maneuvered German adults into conforming while simultaneously becoming the generation that was molded from their inception. Children were the perfect vessel with which the National Socialists could mask their insidious agenda of racial hygiene behind the guise of "protection" from the impending doom of the other. These youth became both a weapon of objective violence and the victim of subjective violence. Having compiled party posters, video footage, and informed by the tactics of the National Socialist Party and Slavoj Žižek's works, I have crafted a critical analysis of the German youth's role in the propagandistic success of the Third Reich.

Urban Amphibian Diversity in Restored and Unrestored Wetlands in Cook County, IL

Ian LaPat '24, Biology and Environmental Studies: Science
Advisors: Chandreyee Mitra,
Melissa B. Youngquist (John G. Shedd Aquarium)

The objective of our study was to explore the differences in species richness of larval amphibians between sites of varying characteristics to expand our understanding of how conservation practices affect amphibian communities. We sampled five sites in Cook County and compared the distribution and abundance of amphibian species across sites. We tested for effect of vegetation, habitat type, restoration stage, site size, and green space proximity. Preliminary observations suggest that un-restored sites host less diversity than fully restored and long-term managed sites. Un-restored and recently restored sites typically supported two species. Restored prairie sites supported three species. Restored forested sites had the highest diversity and supported four to five species. We noted that toads are present across nearly all sites, but tiger salamanders and blue spotted salamanders are only present in fully restored forested sites. Our initial results indicate a need for long-term restoration, placing focus on vegetation removal in vernal pools.

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No Man Left Behind: A Deeper Look Into NCC's Humanitarian Efforts from 2001 & 2005

Megan Lemley '25, Secondary Education and Social Science *Advisor: Ann Durkin Keating*

When the year 2000 came upon Americans, there was widespread hope and excitement for a new millennium. However, those hopes were effectively flattened on September 11, 2001, and August 23, 2005. These dates mark the beginning of America's war on terror and the terrorist attacks on New York City, along with the disastrous arrival of Hurricane Katrina to coastal states. While these events had a largescale impact on all of America and the rest of the world, they also affected North Central. Using the NCC student newspaper and the alumni magazine, it was found that student led organizations like Cardinals in Action (now Breakaway) and the Student Governing Association responded with fundraisers, memorials, and blood drives. The NCC community also remembered the son of a long-time faculty member and a graduate student who lost their lives on 9/11.

Utilization of Spent Coffee Grounds as a Fuel Source

Christiana Lenzer '23, Biology *Advisor: Jeffrey Jankowski*

Coffee is the second most consumed product worldwide behind petroleum, producing roughly 6.49 million tons of spent coffee grounds (SCG) yearly. Efforts to reduce this waste product have been placed in the fuel industry and in producing coffee logs. However, coffee logs contain binders, which release volatile chemicals and raise production costs. Wood pellets are another commercial biofuel but do not incorporate binders. Our research asked if SCG pellets could be utilized as an alternative fuel source without the addition of binders and if they perform comparatively to commercial wood pellets. We found with high pressure and lignin composition we were able to form 100% w/w SCG pellets. SCG pellets were also found to perform similarly to wood pellets in ignition time, burn time, heating characteristics, energy, as well as carbon dioxide emission levels, which produce promising results for SCG pellets as an alternative energy product.

Investigating the Roles of Flare, Twinstar, and Twinfilin in Drosophila Denticle Formation

**Mary Leskovec '23, Molecular Neuroscience* *Advisor: Jennifer Sallee*
Hannah Jones '24, Biology: Biomedical Science

Denticles are actin-based protrusions on the abdomen of a Drosophila embryo. The proteins flare (flr), twinstar (tsr), and twinfilin (twf) are needed to form actin-based protrusions in Drosophila, but their role in denticle formation is unknown. Using loss-of-function mutations we tested whether these proteins are necessary in denticle formation. Homozygous mutant Drosophila embryo denticles were measured for their height and width. A one-way ANOVA compared differences between each genotype. flr4 had no significant differences from the wild type control in both height or width, but morphologically the denticles look different. The flr4 mutation resulted in shorter and thinner denticles in row 4 only compared to the wild type. The double mutant twf-tsr resulted in both thinner and shorter denticles, but individually had no effect. These proteins are involved in denticle formation, but do not contribute as strongly to the wild type phenotype as they do in other protrusions.

Phenotype Testing Mutant Alleles of the Human COX10 Gene Using *Saccharomyces cerevisiae*

**Esther (Eun Bi) Lim '23, Biology* *Advisor: Steve Johnston*
**Thomas-Shadi Voges '24, Biochemistry*

Leigh syndrome is a rare genetic disease associated with mitochondrial loss of function due to mutations that affect the function of proteins involved in the electron transport chain and/or oxidative phosphorylation. Cox10p is one of such proteins, and it normally modifies a heme group necessary for the function of the cytochrome c oxidase protein complex in the mitochondria. Currently, over 200 alleles of the COX10 gene have been identified in human patients, many with unknown or unclear functional capabilities. Considering the biochemical and evolutionary significance, we chose to study four alleles of COX10- K138fs, R142N, T221A, and A328T- documented in patients. We constructed corresponding mutant strains of yeast and investigated Cox10p function in vivo using growth on glycerol, oxygen consumption, and cytochrome c oxidase assays. We found K138fs and T221A to be nonfunctional and R142N and A328T to have at least partial function.

The Role of Differential Rearing Influencing Cocaine Seeking and Reinstatement

**McKenzie Linden '23, Behavioral Neuroscience and Psychology* *Advisor: Margaret Gill*
Adrian Brown '22, Behavioral Neuroscience
Lucy Vera '23, Molecular Neuroscience
Kevin St. Clair '24, Psychology and and Shimer Great Books (Humanities)
Kara Froidcoeur '22, Behavioral Neuroscience
Ben Klemm '25, Psychology

Environmental influence can impact cocaine seeking. To investigate this, a differential rearing paradigm was used consisting of enriched (EC), impoverished (IC) and social (SC) conditions. This study is interested in the role of differential rearing on cocaine seeking behavior. It is hypothesized that rats reared in the EC context will display attenuated cocaine seeking during self-administration and reinstatement compared to IC and SC rats. Rats were differentially reared for 30-days prior to self-administering saline or cocaine, then underwent extinction and cue-induced reinstatement. No significance differences were found between rearing conditions or treatment groups during self-administration or extinction. During cue-induced reinstatement, IC and cocaine rats displayed greater cocaine seeking than SC and EC rats but no significant differences were observed in the saline condition.

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Multihost Pathogen Creates Ecological Links Between Its Hosts and Thus Influence Host Population Dynamics

Maisha Marzan '25, Biology; Biological Sciences and Applied Mathematics *Advisor: Gregory Ruthig*

Pathogens infecting multiple species create ecological links between species, even if those species don't directly interact. To understand how Multihost pathogens influence disease transmission dynamics, we mathematically and computationally modeled an ecological community with one common pathogen (Saprolegnia) and multiple hosts, including hosts that were only infected after they die (saprobic) and hosts that did not suffer from infection (tolerant). We considered multiple host species, and a single environmental pool of infective Saprolegnia propagules. Our focal host was the American Bullfrog (Lithobates catesbeianus). We have completed a conclusive deterministic mathematical model for the population of susceptible, infected, and dead hosts, along with the pathogen, using a four linear differential equations system. Using this model, we can conclude that alternative host species had indirect negative effects on each-other by amplifying the number of infective propagules.

Epiphyte Diversity of Old- And New-Growth Forests in the Ecuadorian Amazon

Amber Maurer '23, Environmental Studies: Science and Biology *Advisor: Gregory Ruthig*

During NCC's May Term of 2022, I conducted research on epiphyte diversity in Ecuador's Amazon Rainforest. Previous research finds that epiphyte diversity in terms of richness and abundance are higher in primary forests and in longstanding undisturbed habitats. The research surrounding epiphyte diversity in new-growth and disturbed habitats is under-investigated, yet hugely important due to rising disturbances in the Amazon from resource extraction efforts. Using ten plots of either old-growth or new-growth forests including one recently disturbed old-growth forest plot, I recorded epiphyte diversity through species richness and evenness. A total of 49 species were recorded. Old growth forest plots were found to have higher species richness and possessed an overall higher score calculated in the Shannon-Weiner diversity index. My discussion of the factors affecting epiphyte diversity describes the future directions of this research as it relates to conservation of both old and new growth tropical forests.

Does Your Vote Matter? Assessing Presidential Election Models

Jacob Mersch '23, Political Science *Advisor: William Muck*

This project explores the state of democracy in the United States and whether Americans believe their vote for president "matters." Specifically, I assess the level of support for the Electoral College and if registered voters are receptive to alternative models of electing the president. This was facilitated by developing and distributing a survey among students at North Central College. The results indicate respondents possess overall positive views of American democracy, however, remain highly critical of the Electoral College. Further results suggest widespread support for shifting towards a national popular vote model, but little to no support for an electoral system based on proportional representation. In general, broad support exists across the political spectrum for electoral reform although those views are influenced by political party and whether one resides in a rural, suburban, or urban community. This project offers an inside look at registered voters' perception of their own democratic process.

Does the Department of Justice Look Like the People?: Lack of Racial, Ethnic, and Gender Diversity of the Clinton-Trump Administrations' US Attorneys and Marshals

**Trevor Mohrmann '23, Political Science* *Advisor: Suzanne Chod*
**Samantha Selakovich '23, Political Science*

Previous research reflects on how the Executive Branch's demographic makeup affects policymaking and implementation. To examine this, undergraduates at North Central and Swarthmore Colleges and Inclusive America built the Executive Branch Diversity Data Portal, a demographic dataset of Senate-confirmed and presidential-appointed positions in the Executive Branch from the Clinton-Trump Administrations. We focus on the department that connects the representative bureaucracy research on policy outcomes and implementation: The Department of Justice (DOJ). Descriptive analysis of the pattern of racial, ethnic, and gender diversity of US Attorneys and Marshals from the Clinton-Trump Administrations, suggests there are partisan differences in the diversity across administrations, with Presidents Clinton and Obama having more women, Black, and Latin/Hispanic US Attorneys and Marshals than Presidents George W. Bush and Trump. Across all administrations, there were few Black women or Latinas, and when a diverse appointee left or was fired, all were replaced with white men.

An Autoethnography of Self-Expression While Navigating Milanese Fashion and Culture

Emaan Mohsinuddin '23, Psychology and Behavioral Neuroscience *Advisor: Nicole Rivera*

Fashion is more than the surface level act of clothing the body or conforming to the latest trends; an embodiment of our personalities, it allows people express themselves to the world. Through a feminist lens, the research at hand organizes qualitative data into an autoethnographic format, which provides reflective data analysis based on personal observations taken during time spent abroad in Milan, Italy, fashion capital of the world. Autoethnography is a qualitative research method used to systematically analyze a researcher's experiences when interacting with a specific community to understand the culture. The importance of beauty

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idealization, status, and self-expression were found to be the most defining features when exploring the value of fashion to oneself and to society. This autoethnography adds to the growth of an emerging conversation about changing the narrative through which fashion is used in relation to self-exploration and perceived power.

Ventral Tegmental Area Amylin Receptor Activation Does Not Alter Prefrontal Cortex Dopamine Activity

**Avinash Moses '25, Molecular Neuroscience* *Advisor: Mitchell Roitman (University of Illinois Chicago)*
Maxine Loh (University of Illinois Chicago)

The World Health Organization estimates that around 650 million adults worldwide suffer from obesity, and these numbers are rapidly growing. The drug amylin can treat this condition, likely by activating dopamine (DA) neurons in the ventral tegmental area (VTA) to reduce mesolimbic DA release and thus food intake. Little is known about downstream mediators, but we hypothesized that prefrontal cortex (PFC) DA activity is likely altered by VTA amylin. After non-contingently training food-deprived rats to retrieve palatable pellets, we infused amylin or a vehicle into the VTA and used in-vivo fiber photometry to capture phasic medial PFC (mPFC) DA release. While DA activity during pellet drops is potentiated and latency to retrieval decreases with training, VTA amylin infusion did not alter DA dynamics during the task. As such, PFC DA likely has a role in reward learning, specifically in learning the availability of reward, but not in producing amylin-induced hypophagia.

How Children Museum's Exhibit Design Affects Social Emotional Learning in Preschoolers

**Noah Obermeyer '24, Psychology and Behavioral Neuroscience* *Advisor: Nicole Rivera*
**Samia Islam Saba '25, Neuroscience and Psychology*
**Emma Browne '24, Biology: Biomedical Science*

Informal learning spaces, such as children's museums, support social emotional learning. The goal of this study was to determine the nature of three different exhibit designs: collaborative, loose parts, and pretend play and how they affect social emotional learning in preschoolers. 1,179 observations were collected by trained research assistants on children aged 4-5 in 12 museums throughout the United States, including four mid-western children's museums. The observation utilized four dimensions: emotional expression and regulation, behavioral regulation, and peer relationship skills. Children in loose parts exhibits were found to express more individual positive affect while also expressing more negative affect directed at others. Children in loose parts exhibits were also found to follow directions more often as well as have overall more prosocial behavior. Our observational findings can increase understanding in how exhibit designs affect different social emotional behavior dimensions.

Comparing Mental Health Literacy & Perceptions of Mental Health Support Between Coaches & Student-Athletes

Allison Pearson '23, Psychology and Exercise Science *Advisor: Leila Azarbad*

Mental health literacy (MHL) refers to the knowledge and attitudes that aid the recognition, management, and prevention of mental health disorders. Though previous research has studied the MHL of coaches and their student-athletes independently, few studies have directly compared them. This study aimed to 1) compare the MHL of NCC coaches and student-athletes, and 2) compare perceptions of support provided by coaches/received by student-athletes. Coaches and student-athletes completed the MHL Scale and additional self-devised survey questions about the supports that coaches provide /students receive. Results indicated student-athletes have greater MHL than coaches. Additionally, student-athletes perceived less support than the amount of support coaches perceived to provide for their student-athletes. This research shows there are discrepancies between the support student-athletes are feeling and the support coaches perceive to be providing and can help to inform recommendation to improve the coach-athlete relationship.

Career Transition Study

**Madelyn Pickering '23, Psychology* *Advisor: Nicole Rivera*
Isabella Canedo '24, Psychology

Recent college graduates are faced with many options for how they choose to proceed with their career. In this time of transition, graduates need to draw upon previous experience to help them achieve their next step. The goal of this study was to gain a better understanding of how college experiences translate to the professional world for psychology and neuroscience students. 15 psychology and neuroscience alumni participated in semi-structured interviews to gain insight about their undergraduate experiences, transition to career, and perceptions of how the department can better support current and future students. Data indicates that while professionalizing undergraduate experiences provided students with needed skills and tools, participants experienced a lack of information specific to their options of a career with a bachelor's degree in psychology or neuroscience and indicated a need for additional preparation for workplace behaviors. These findings will inform future curriculum development.

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Extracorporeal Shockwave Therapy for the Treatment of Plantar Fasciitis in the Physically Active: A Critically Appraised Topic

Stefanie Podock '24, Master of Athletic Training *Advisor: Taylor Arman*

Plantar fasciitis is a condition that results in pain and is very common among the active population. There has been limited evidence to support the effectiveness of extracorporeal shock wave therapy (ESWT) for treating plantar fasciitis. While ESWT is new and not commonly used, some studies have shown effectiveness in pain reduction. Therefore, the focus of this critically appraised topic was to answer the clinical question: Does extracorporeal shock wave therapy reduce pain in physically active patients with PF? After reviewing three studies, results showed a decrease in pain that was statistically significant after ESWT for the treatment of PF by utilizing the Visual Analogue Scale (VAS). Ultimately, evidence supports the use of extracorporeal shockwave therapy for treating PF among the physically active population. ESWT has been shown to improve the quality of life for patients with PF.

Bias in Professional Interview

**Sasha Prinos '23, Psychology* *Advisor: Karl Kelley*
**Jillian Richer '23, Psychology*
**Samantha Kaczmarek '25, Psychology, Criminology, and Sociology*

Previous research has found that, even with training, recruiters hold implicit biases toward candidates during professional interviews. The goal of this thesis is to find if the microphone quality of a candidate can produce bias in a professional interview. The empirical part of the thesis will focus on providing a mock interview for which participants will decide how likely they are to hire a given candidate, then provide a general rationale for their decision. Different aspects of the candidate's work ethic, intrapersonal, and interpersonal qualities will also be measured. Three interview conditions were implemented: an interview where the candidate has high microphone quality, medium quality, and low quality. There were significant effects found between the high and low quality conditions, suggesting that there are differences between how a recruiter attributes a candidate with different microphone qualities.

Does Studying Abroad Influence Cultural Competency?: A Critically Appraised Topic

Jennifer Quintas '24, Master of Athletic Training *Advisor: Taylor Arman*

Cultural competency (CC) is defined as a healthcare provider's ability to understand and incorporate cultural differences to provide medical services that respect the individual. When a healthcare provider shows CC, three things happen: CC yields higher patient satisfaction, patients are more open and trusting, and third, patients are more willing to listen to their healthcare providers. Therefore, it is important to understand what can help a clinician build CC. This critically appraised topic looked to answer the question of if studying abroad helps athletic training students (ATS) gain an understanding of cultural competency to help improve patient care. Limited evidence exists on the topic. Two articles were critically appraised using the CEBM LOE and were determined to be Level 4. For ATS to develop CC and help improve outcomes of patients with different cultural backgrounds, studying abroad should be implemented as part of the program's curriculum.

Injury Prevention and Access to Athletic Training Services in Tactical Athletes: A Critically Appraised Topic

Monica Rapciak '24, Master of Athletic Training *Advisor: Taylor Arman*

Tactical athletes (TAs) are individuals who are a part of the armed forces, emergency medical services, and public safety. TAs experience a diverse number of occupational hazards including but not limited to stress, prolonged inconsistent work hours, medical emergencies, and hazardous environments. Therefore, it is important to understand access to health care services and the benefit an Athletic Trainer (AT) can provide to the tactical setting. Three studies were appraised and consisted of well-designed randomized controlled trials and prospective studies (Level 1) and a cohort study (Level 2). Based on this critical appraisal, evidence supports access to ATs in tactical settings. ATs provide professional services consisting of injury prevention, rehabilitation, evaluation, and immediate and emergency care. By having access to an AT, not only does the AT benefit, but so does the employer.

A Liminal Space for Forgotten Memories

Brianna Roy '23, Studio Art *Advisor: Christine Rabenold*

Over the spring semester, I experimented and researched on the topic of nostalgiacore. Nostalgiacore is an aesthetic that focuses on someone's childhood, such as television shows or a location. I focused more on the melancholy side, in which it includes another aesthetic called liminal space. Liminal space portrays empty spaces photographed and edited in a way that makes it feel eerie and unnerving. These aesthetics can be found over the internet, sometimes compiled in video montages with a gloomy soundtrack. It is also possible to find these aesthetics in real life by visiting empty or abandoned places, some of these places being closed down grocery stores or malls. The question I asked was, "why do we feel so nostalgic yet melancholy when viewing these photos of our childhood?" Based on my personal experiences and reading other people's thoughts, it is because these things we enjoyed as kids are long gone.

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Retinal Vessel Detection with Improved RIPPER and CVS

*David Rudenya '23, Computer Science
*Mark Bucaro '23, Computer Science
Advisor: Nnamdi Nwanze

The relationship between blood vessels health and cardiovascular disease has been well documented. A non-invasive way to gain access to the body's blood vessels has been to study the vessels within the eye. As such, there have been numerous attempts to categorize and quantify the retinal vessels. Modern methods for retinal vessel detection use machine learning. The most widely used data set is the DRIVE (Digital Retinal Images for Vessel Extraction) dataset which contains 40 photographs and corresponding vessel segmentation constructed by experts. We were able to improve on an image pre-processing technique, RIPPER (Retinal Image Pre-Processing using Equalization and thResholding), which showed that the experts missed approximately 20% of the vessels and misclassified 14% of the identified vessels. We also improved upon a segmentation technique, CVS (contour-based vessel segmentation) which allowed us to detect missed vessels and eliminate noise from the images.

Grandparents and Museum Visits

*Samia Islam Saba '25, Neuroscience and Psychology
*Eliana Whitcomb '23, Psychology and Neuroscience
*Ellie Gosselin '24, Psychology
*Cristian Moreno '23, Psychology
*Nanci Sarmiento '23, Political Science and Psychology
Advisor: Nicole Rivera

Informal learning spaces, such as museums, help in the educational development of both children and their families. The goal of this study is to explore the motivations and barriers grandparents encounter while attending museums with their grandchildren. 208 surveys were collected from grandparents of children ages birth to 10 at two suburban museums. The survey utilized a 5-point Likert scale. 12 statements assessed motivations to attend museums with their grandchildren and 13 statements assessed barriers. The top five motivators were: quality time, family time, learning about children's interests, opportunities to do things not available at home, and exploration of educational subjects. The top five barriers were: physically demanding, not comfortable taking my grandchildren by myself, other places available, expense, and related costs. Overall results indicated a significant effect based on demographic settings including gender, level of education, and location. Findings can increase institutional understanding of the needs of grandparent visitors.

Stochastic Control with Deep Reinforcement Learning

Robert Sabum '23, Computer Science
Advisor: Sun-il Kim

This research paper explores the use of deep reinforcement learning (DRL) to solve stochastic control problems. Stochastic control problems arise in a variety of fields, including finance, engineering, and robotics. Traditional methods for solving these problems rely on mathematical modeling and optimization techniques, which can be computationally intensive and may not scale well to high-dimensional systems. In contrast, DRL combines reinforcement learning with deep neural networks to learn optimal control policies directly by interacting with the environment. In this paper we test DRL on a variety of stochastic control problems, including asset portfolio construction, urban transportation planning, and stochastic game strategy. The results of the experiments show that using DRL can effectively learn satisfactory control policies and be applied to a wide range of stochastic control problems.

A New Method for Counting and Identifying Water Molds in Field Samples

*Justyn Salas '24, Biology: Biomedical Science
*Courtney Mayeda '24, Biology
Advisor: Gregory Ruthig

Water molds are aquatic multi-host pathogens that infect many species of amphibians and aquatic invertebrates. We developed a method for counting the zoospores responsible for transmission between hosts in aquatic habitats using Microwell Plates (MWP). We found a close relationship between hemocytometer counts and microwell plate counts. The MWP method was precise and repeatable when water samples from field locations were assessed. We used molecular methods to identify the species of water molds in our MWP counts. A DNA extraction method using squishing buffer and proteinase K was successful in extracting water mold DNA. We will test specific probes and primers in a quantitative polymerase chain reaction (qPCR), and restriction fragment length polymorphisms (RFLP) in a restriction enzyme digest to identify our strain. This method will be a valuable tool for counting and identifying water molds in field and laboratory experiments.

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The Effect of Exhausted Coffee Ground Particle Size on the Filtering Capability of Dyes from Contaminated Water

**Samuel Saldana '23, Chemistry*
Elizabeth Gora '23, Biochemistry
Olga Giza '23, Biochemistry

Advisor: Rebecca Sanders

Clean water is finite and the importance of keeping it clean is of utmost concern. Some contamination comes from dye manufacturers and textile mills that dump the dye waste into the environment surrounding them. Coffee can be a source of remediation to this issue, used as a biosorbent, it can adsorb the dye and coffee is unique as an everyday waste product. This experiment was used to determine if a different size particle of coffee can change the rate and amount of dye removed from simulated dye contaminated water. Four sizes: 1000-710, 710-500, 500-300 and 300-105 µm were used in 50 ppm methylene blue and methyl violet solutions. The smallest grounds were able to adsorb the dyes 8-10 faster than larger sized grounds. Overall capacity is nearly identical at the end, but methylene blue also had a slightly larger affinity towards the larger grounds when compared to the methyl violet.

James Henry Breasted: Life and Legacy

Megan Sands '23, Anthropology

Advisor: Dale Simpson Jr.

Ancient Egypt is a famous civilization. From its still-standing architecture to its hieroglyphic writing system, it is alluring to archaeologists as these remains give a potential look into the lives of ancient humans in the region. One such archaeologist was James Henry Breasted, well known for being a pioneer in Egyptology. This Rall presentation highlights his time at North Central College through uncovered and unpublished archival documents from the Oriental Institute at University of Chicago and North Central College Archives. These discoveries highlight how a liberal arts education made a successful archaeologist; an important lesson indeed. As well, through examination of Breasted's Egyptian culture history timeline, and what archaeologists know today, this research has discovered that Breasted was correct on his assessment of Egyptian chronology; however, due to methods that were not available in the early 20th century, his findings on Pre-Dynastic and early Dynastic chronology were much too simple.

Adsorption of Argon into Zeolite Al-MFI

Colin Scherry '23, Physics

Advisors: James Kaduk, Winnie Wong-Ng (National Institute of Standards and Technology)

As part of a program to identify gas adsorption Standard Reference Materials, the crystal structure of anhydrous zeolite Al-MFI (NH4) containing adsorbed argon has been determined and refined using synchrotron X-ray powder diffraction data taken at 90 K, and optimized using density functional quantum mechanical techniques. Six highly-occupied argon sites nearly fill the pore volume of the zeolite. All six sites have comparable energy. Changing the atmosphere from argon to helium at 90 K decreases the occupancies of all six sites, but two decrease more than the others. Warming the sample from 90 to 295 K in argon atmosphere results in further decreases in site occupancies, but 5/6 sites remain occupied.

The Development of A Mindful Eating Program for Children

Erika Schoeller '23, Entrepreneurship

Advisor: Leila Azarbad

Mindful eating techniques help individuals develop an awareness of hunger cues and emotional states associated with eating and may serve to reduce the development of eating disorders. Although various mindful eating programs exist, none appear to include information on the influence of social media and its impact on body image and eating disorders. This research project designed an empirically supported, five session mindfulness eating program for 4th and 5th grade students that addressed the gap in existing mindfulness eating programs by adding a social media component. This novel program was created with both classroom and at-home activities that included the following modules: introduction to mindful eating, breaking food rules, recognizing hunger and fullness, understanding the impact of social media, and discussing outside societal pressures.

Tennis At NCC: Club Sport To Collegiate Competition

Ethan Sherman '24, History

Advisor: Ann Durkin Keating

The purpose of my project was to understand the role tennis played in the early culture of NCC through the school newspaper. The sport has been played on campus since 1891 and was the primary way students sought athletic sports. The clay and grass courts on campus were almost always full. Frequent inter-class tournaments built the foundation of our athletically-minded college tradition. Tennis was a crucial sport for women on campus. Football and baseball were mostly out of reach for the women, but tennis was open. Mixed-doubles matches starting in 1893 provided a bonding and socialization experience between the male and female students at a time when they could not even dance with each other. In my research I found that women's intercollegiate athletics is five years older than the college currently believes. A match played against Wheaton College in 1916 extends the timeline from the previously understood 1921 date.

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Quantifying Neuronal Activity in the Dorsomedial Striatum and the Dorsolateral Striatum Following Oxycodone Self-Administration

**Margaret Sim '23, Molecular Neuroscience and Psychology* — *Advisor: Michael Stefanik*
Allysha Donnelly '23, Molecular Neuroscience
Joshua House '23, Behavioral Neuroscience and Psychology
Juri Hoda '23, Molecular Neuroscience
Kelsey Morrison '24, Molecular Neuroscience
Nicole Kwilosz '24, Behavioral Neuroscience and Psychology
Jessica Chan '24, Behavioral Neuroscience
Avinash Moses '25, Molecular Neuroscience

Addiction is characterized by the transition from reward-seeking behaviors to drug-seeking compulsions. Susceptibility to relapse is furthered by drug-seeking habitual behavior. The neural circuitry involved in this transition remains unknown; however, the dorsomedial striatum (DMS) is involved in reward-directed behavior, while the dorsolateral striatum (DLS) is involved in habitual drug-seeking. This study sought to identify neural activity in these regions following oxycodone self-administration and withdrawal. Male rats self-administered oxycodone or saline (0.15 mg/kg/infusion, 6h/day) for 10 days. Following self-administration, seeking tests were conducted on withdrawal day 1 and 15 (WD1 and WD15). Oxycodone-treated rats exhibited increased drug seeking on WD15. Studies are underway to quantify active neurons using the neural activity marker Fos. We hypothesize greater Fos expression in the DMS on WD1 relative to WD15, and greater expression in the DLS on WD15 relative to WD1, in line with the acquisition of habitual behaviors.

The Effectiveness of Dry Needling in Athletes with Shoulder Pain: A Critically Appraised Topic

Jasmine Smith '24, Master of Athletic Training — *Advisor: Taylor Arman*

Shoulder pain is a common problem that affects 67% of the population in a lifetime. The most common diagnosis of shoulder pain is shoulder impingement syndrome, which is frequent among overhead-throwing athletes. Dry needling is a therapeutic intervention used to relieve pain and soreness and treat scar tissue. Since shoulder pain is a common issue, it is important to understand how to manage it. This critically appraised topic will explore the clinical question: In athletes with shoulder pain, how effective is dry needling in reducing pain and increasing function? The four studies reviewed demonstrate positive results that endorse the use of dry needling to reduce pain and increase function. However, there is varying quality of evidence to support using dry needling in athletes with shoulder pain. More high-quality studies with larger sample sizes are needed to clinically implement the use of dry needling.

Cold War Mobilization of Students, 1945-1970s

Jenny Smith '24, Secondary Education and Social Science/History — *Advisor: Ann Durkin Keating*

Published histories of North Central College have focused on the ways North Central students mobilized themselves during the Civil Rights movement through voting, protest, and exchange programs. But they did not explore how North Central students mobilized between 1945-1980. Mobilization included student articles written in The Chronicle, reactions to guest speakers, and voting. Throughout the late 1940s and 1950s, students wrote joke articles about communism and the Soviet Union making fun of the red scare mentality. With the Korean War, fear of nuclear war spread at NCC. Students wrote articles and conducted polls about student perceptions of the Korean War. In 1961, North Central students protested against nuclear arms, because of the Cuban missile crisis. These stories reflect, how the Cold War affected the NCC campus climate. By the 1970s students were encouraged to vote for government candidates who planned to stop the Vietnam War.

Complementing Phosphodiesterase Gene BinA in *Vibrio fischeri*

Robert Szabad '23, Biology — *Advisors: Jonathan Visick, Karen Visick (Loyola University Chicago)*

Vibrio fischeri, a marine bacterium, forms a one-to-one symbiosis with the Hawaiian bobtail squid Euprymna scolopes. Squid are colonized by V. fischeri in their symbiotic light organ. Biofilm formation is essential in the colonization process. This behavior is highly regulated by several genes. binA is a gene that acts to degrade cyclic diguanylate; an important intracellular signaling molecule. In this study, we transformed a strain of V. fischeri that had the binA gene deleted, the resulting strain had one intact binA gene at a non-native site. Next, we performed multiple phenotypic assays to categorize the phenotypes of the new strain and found that the wild-type phenotype was replicated, suggesting that the complementing gene was functional. This binA complementation tool may be used in evaluating the role of specific residues and performing experiments determining how BinA functions in the overall picture of V. fischeri biofilm formation.

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Too Many Faces in the Crowd? Do Introverts Overestimate Group Sizes?

Joe Talbot '23, Psychology *Advisor: Mary Jean Lynch*
Evan Gray "G" '24, Psychology and Philosophy

Introverts report feeling overwhelmed in crowds, but this begs the question: can we accurately estimate the size of crowds around us? This study explored personality-based and environmentally induced arousal effects on numerical estimation of faces. Previous research suggested that introverts have higher levels of cortical arousal than extroverts. We hypothesized that high arousal affects estimates of numbers of people; caffeinated introverts will overestimate the numbers of faces, and decaffeinated extraverts will have more accurate estimates. A total of 205 students were randomly assigned to the caffeine or decaf condition. After drinking, participants completed the Eysenck Personality Inventory and other questionnaires to determine introversion-extraversion. Then participants estimated the number of faces that appeared on 60 Powerpoint slides showing 10-100 happy, neutral, or threatening faces. All participants slightly overestimated when there were fewer faces, but increasingly underestimated larger sets ($p<.0001$). There were no significant effects of arousal or facial emotionality.

Robert Durst and the General Strain Theory

Kathryn Wagner '25, Design and Philosophy *Advisor: Raleigh Blasdell*
Morgan George '25, Health Science

Robert Agnew's General Strain Theory seeks to explain why those enduring certain types of strain might commit crimes. In our case study, it was determined that convicted murderer Robert Durst experienced all three types of general strain, as outlined by Agnew: The removal of positive stimuli, the failure to achieve one's goals, and the presence of negative stimuli. In an attempt to explain Robert's criminality, we applied this theory to parts of his life that were potential precursors to his deviant behavior: The death of his mother, pressure to take over the family business, and physical and emotional victimization by his older brother. Our findings highlight the importance of early interventions, as well as the need to improve the efficiency and effectiveness of the U.S. criminal justice system as a whole.

The National Socialists' Use of Visual Propaganda: Defining Identity

Alexander Wickersheim '26, German and Secondary Education *Advisor: Gregory Wolf*

Hitler created the Reich Ministry for Public Enlightenment and Propaganda in 1933, enabling the National Socialists to control the media and propaganda for public consumption. The Ministry distributed Nazi Propaganda intending to provide the "Volk" with an ideological definition of "German Identity" and "Non-German Identity." My research focuses on how the National Socialists crafted propaganda to portray the binary of German "power" and ethnic-German "superiority" against the "sickly", "dangerous", and "inferior" non-ethnic-Germans, specifically the Jews. I examine how the National Socialists constructed visual representations of a distinct German identity, as depicted in propagandistic art, political posters, popular film, public spectacles, and even the 1936 Olympics. Building on Susan Bachrach's ideas on National Socialist propaganda, Peter Kaufman's theories of violence, and Nausikaä El-Mecky's research in Nazi-approved art and "degenerate" art, I argue that these propagandistic visual messages encourage a binary centered around racial hygiene by formulating concrete images of German identity.

Diagnostic Test for Lateral Ankle Instability: A Critically Appraised Topic

Jasmine Williams '24, Master of Athletic Training *Advisor: Taylor Arman*

Lateral ankle sprains (LAS) are common among the active population. Individuals find themselves at risk for re-injury throughout their life, putting them at risk for developing chronic ankle instability (CAI), in about 10-20% of patients. Therefore, it is important to properly diagnose LAS so that the injury can be properly managed. This critically appraised topic will focus on the clinical question: In physically active individuals, which diagnostic test has the best accuracy in diagnosing lateral ankle instability? After a thorough literature search, three retrospective cohort studies were selected to compare diagnostic accuracy of multiple tests. After careful analysis of multiple tests, the manual stress ultrasound had the strongest diagnostic accuracy. The evidence supports that manual stress ultrasound to be used as the primary tool for diagnosing lateral ankle sprains. The studies used were ranked 3/5 based on the Oxford Centre for Evidence-Based Medicine Levels of Evidence.

Betty Broderick and Frustration-Aggression Theory

Morgan Williams '23, Psychology *Advisor: Raleigh Blasdell*
Olivia Rosenberg '25, Communication and Sociology
Natalie Peters '25, Psychology

In an effort to understand the motivations behind Betty Broderick's crimes, this case study applied the Frustration-Aggression Theory to the murder of her ex-husband and his wife. The theory explains that prior frustrations are likely the cause of aggressive behavior towards others. Through research into Frustration-Aggression Theory, it was found that criminal behavior is an easy and immediate release of stress which can be attributed to Broderick's behavior. In the events leading up to the crime as well as the crime itself, Betty Broderick, after a recent separation from her husband, showed indicators of frustration and stress which resulted in her engaging in aggressive and violent behavior. These findings will be useful in recognizing early signs of frustration and aggression in others with the goal of turning them toward healthy outlets and minimizing their behavior.

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Promoting Access and Representation

Moderator: Sophie Hand *Location: WSC 254*

All Eyes on Me: The Relationship Between Classroom Layout and Participation

Joseph Talbot '23, Psychology *Advisor: Annie Wegrzyn*

Due to rapid changes in the classroom environment in the past decade, instructors have felt increasingly pressured to optimize their classrooms to capture the attention of their students. There has been an observed link between student participation and classroom occupancy, as well as student location (i.e., front versus back). This research study sought to extend previous findings to examine another potential variable associated with participation: classroom layout. Five undergraduate, mid-level psychology courses in Wentz Science Center were observed to collect data on classroom participation, classroom layout, and origin of participation (i.e., front versus back half of the classroom). We hypothesized tiered style classrooms (ones in which desk heights ascend towards the back of the classroom) have the lowest per-student participation. Consistent with our hypothesis, preliminary findings suggest an interaction between class size and class layout. Implications for classroom design will be discussed.

Universal Design: Introductory Course Syllabi as a Tool for Student Accommodation in Political Science

Trevor Mohrmann '23, Political Science *Advisor: Suzanne Chod*

Previous literature on Universal Design (UD) focuses primarily on physical accommodations for individuals with disabilities with little application to academia. However, with a lack of consensus on the types of courses that can benefit from UD as well as how the tenets can be implemented, it is evident that UD will not be present in introductory courses in political science. To measure this, eight syllabi from the American Political Science Association's database of syllabi were analyzed for its inclusion of the UD tenet of accessible document design using a scorecard based on its three main principles. Three North Central College professors were interviewed to discuss their introductory syllabi and the elements they prioritize in its design. Based on the evaluated syllabi and professor interviews, there was evidence to support my hypothesis that the three elements of accessible document design were not present.

Drapetomania to Degrees: Learning Representation Through a Lens of Black Students and School Faculty Members

De'Jah Phillips '23, Psychology *Advisor: Nicole Rivera*

Black history being omitted from curriculum creates a disconnect from Black accomplishments, history and culture. It is shown from previous research that representation is crucial in making sure students have a better experience in education. Students at North Central College have this experience. A focus group was held with 7 Black students and individual interviews will be held with five faculty members asking about their experiences receiving or making curriculum at North Central. The data indicates that students feel a disconnect from the campus because of the lack of representation in the curriculum and professors, and this negatively affects the race climate on campus. All of these things create a severely lacking educational experience for Black students overall as they expressed feeling cheated out of a well-rounded education. These findings will contribute to the ongoing conversation about classroom representation on North Central College's campus and help provide solutions.

Is That Enough Levity For You?

Diego Mateo '23, K-12 Music Education *Advisor: John Stanley*

Last year at forensics nationals, I spoke with Simran Chugani and Brendan Kachnowski after watching their final round performances. I praised them for their courage to speak out against the silencing of their voices from white judges across the forensics community. The two encouraged me to conduct my own research to delve conversations further. My research will discuss historically marginalized students of the past and present on their usage of levity in performance spaces. Various surveys and interviews concluded that historically marginalized students are exhausted from having to re-write or accommodate their performances for the white gaze. White audience members and judge panelists often forget that sometimes these specific stories are not necessarily for them or their comfort. We will examine the unfortunate causes of this rewriting practice, the harmful effects of this inauthenticity, and establish days of dialogue to serve as milestones to implement in order to increase advocacy.

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Educating the Future

Moderator: Georgine Maisch *Location: WSC 354*

Studying the Impact on Elementary Teaching Strategies Since the COVID-19 Pandemic

Elena Buscher '24, Elementary Education *Advisor: Lindsay Wexler*

The COVID-19 pandemic has left a lasting impact on the reading comprehension of elementary students. Teachers now have to adapt to the new needs of their students in literacy. Previous research has shown that learning gain will have a dramatic decrease due to the lack of content taught over the pandemic. Teachers must understand the new techniques that are necessary to improve reading comprehension amongst their students. After diving into research on the impact of elementary students in the literacy classroom, I conducted interviews and classroom observations from two kindergarten teachers and two second grade teachers to observe the techniques being used in their literacy lessons. Some major findings from this study are that students have experienced a loss in reading stamina, so teachers must turn to strategies that help improve the reading attention spans of students, as well as techniques that keep students from becoming distracted while reading.

The Effects of Youth Team and Individual Sport Participation on Self-Esteem Development

Shelby Ottum '24, Elementary Education *Advisor: Krystina Sarff*

Self-esteem is an important aspect of mental health because it can help to lead people toward a meaningful, purpose-driven, fulfilling, etc. life. Youth sports have been around since the early 1900s and continue to grow; there are now over 60 million children participating in sports across America. This study's aim is to bring together the concepts of self-esteem and youth sports to answer the question: Does participation in team and individual sports positively affect adolescent self-esteem? The Rosenberg Self-Esteem survey was administered to 32 young athletes who were currently participating in either youth wrestling or youth basketball during the 2022-2023 seasons. The average score on the self-esteem survey was 22.03, which is reported as the upper side of the normal range on the Rosenberg Self-Esteem scale (scores between 15-25). The team sport, basketball, had an average score of 23.25, while the individual sport, wrestling, had an average score of 20.85.

Empathy: A Critical Social-Emotional Learning Component of Bullying Prevention

Avalon Dufkis '23, Elementary Education *Advisor: Bruce Spitzer*

Children more effectively handle life challenges with social-emotional learning (SEL) skills. The study investigated the significance of empathy, an SEL skill, in bullying prevention. 29 fourth-grade students participated in a set of three lessons about empathy. An assessment was administered both before and after that set of lessons to evaluate students' application of empathy in one of three bullying situations. Each student wrote about possible good and/or bad results of showing and not showing empathy, the assumption being the lessons would improve or sustain students' ability to recognize only possible good results of showing and only possible bad results of not showing empathy. 37.9% of students (pre-assessment) and 41.4% of students (post-assessment) supported that assumption. Responses of 90.9% of those pre-assessment students and 75% of those post-assessment students did not mention the victim. While empathy plays a role in bullying prevention, lessons about empathy are not enough to prevent bullying.

Dissecting USA Issues Past and Present

Moderator: Michelle Boule Smith *Location: WSC 101*

Towards a Sustainable Future: Carbon Pricing in the United States

Molly Whitlock '23, Accounting and Environmental Studies *Advisor: Jeff Anstine*

Carbon pricing laws have gained global popularity as they create a market incentive for businesses and individuals to reduce their carbon footprint, either by investing in cleaner technologies, reducing energy consumption, switching to cleaner sources of energy, etc. This paper highlights a carbon fee and dividend policy as the ideal type of carbon pricing for the US. The policy's main goal is to reduce the cost that companies may pass down to consumers when taking on the further cost of a carbon tax while reaping sustainable and economic benefits. The feasibility and different types of successes a carbon fee and dividend policy could present within the US through the analysis of comparison to other country carbon pricing models and application of the triple-bottom line. The paper concludes on measures needed in order for this legislation to pass and how to keep public servants accountable.

The Mythology of Baseball: How the New York Yankees Used the American Dream to Achieve Cultural Ubiquity

Victoria Monte '24, Sport Management *Advisor: Gregory Wolf*

The mythology of baseball is closely linked to that of America in its projection of the ideal meritocracy, self-actualization, and social order. The New York Yankees, one of the sport's most recognizable organizations, provide a prime lens through which to view baseball's relationship with Americana. Existing works of scholarship either solely focus on the connection between American and baseball mythology, or they analyze the cultural implications of the Yankees' competitive repertoire (championships or economic

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dominance). This research project synthesizes those concepts, revealing how the baseball success of the Yankees transcends sport and creates a ubiquitous mythology for the team that reinforces that of baseball. Through the organization's physical iconographic structures, such as Yankee Stadium, as well as their projection of narratives surrounding past and present players, the Yankees are able to craft their image around baseball's American symbology and engrain themselves in the overall cultural atmosphere of America.

We Got the Power: The Factors that Mobilized Black Voters in Georgia During the 2020 Presidential Election

Rola Goke-Pariola '23, Global Studies *Advisor: William Muck*

Voter suppression, otherwise known as disenfranchisement, is a mechanism that has disproportionality effected Black Americans for centuries. As a result, communities of color have historically had low voter turnout rates. Yet during 2020, a record number of Black voters in the state of Georgia went to the polls. This study examines why this shift occurred, ultimately turning Georgia blue in 2020 and upturning decades of precedent. Specifically, I undertake a content analysis of the social media posts from an organization at the center of this historic development in Georgia, the Black Voters Matter Fund. Findings indicate that the dramatic shift in turnout resulted from the interplay between on the ground tactics and broader societal events of 2020. It is the co-occurrence of these two factors in the months leading up to the presidential election that spurred increased political participation in the Black communities of Georgia.

Liberty and Justice for All? Gender Differences in Emotional Reactions and Perceptions of Safety in Response to the Overturning of Roe v. Wade

Taylor Bartels '23, Psychology *Advisor: Leila Azarbad*

The recent, controversial overturning of Roe v. Wade impacts the bodily autonomy and resources of American women. Previous studies identify negative emotional responses including anxiety, fear, and anger in individuals impacted by laws that limit bodily autonomy, such as abortion and gender-affirming care restrictions. No research to date has investigated these responses regarding the overturning of Roe v. Wade. This study aimed to compare men's and women's perceived stress, anxiety, fear, anger, and safety in response to the overturning of Roe v. Wade. Participants included 122 undergraduates who completed modified versions of established questionnaires after reading a summary of abortion rights to date. T-tests indicated that women reported significantly higher stress, higher negative affect, and lower self-esteem than men in response to the ruling. Pro-choice participants reported higher negative affect than pro-life participants. These results help inform resources to support students affected by this ruling.

Investigating Gender Roles

Moderator: Jennifer Smith *Location: WSC 256*

The Gender of God in Christianity and Islam: How Feminists Perceive God Beyond the Patriarchy

Miriam Safford '23, Anthropology, Religious Studies *Advisor: Wioleta Polinska*

Within both Christianity and Islam, patriarchal conceptions of God, such as the limitation of God to a sole gender, have been used to oppress women throughout history. Despite these violent ideologies present in both traditions, Christian and Muslim women have revitalized old teachings of equality, mutuality, and God's transcendence of gender, as well as developed new conceptions of God that reflect gender equality among all humans. This presentation will focus on overcoming these violent ideologies against women that are present in both faith traditions by providing a feminist perspective on God, specifically arguing that gender-diverse God-talk broadens conceptions of God, liberating both God and humans from the confines of patriarchy.

New Platform Old Story: Traditional Sexual Script on Snapchat

**Julia Babinec '24, Master in Higher Education Leadership* *Advisor: Anne Groggel*
**Monserrat Valerio '23, Psychology and Sociology*

This study examines college students' perceptions of sexual consent based on a flirtatious conversation. Using an experimental survey, over 300 undergraduates from across the country were randomly assigned to read one of four conversations that manipulated the characters' race(Black and White) and whether the conversation was instigated by the male or female. We find that rape myths were positively associated with perceiving the conversation as indicating implicit consent for both characters. When asked to consider what characters would expect when they meet up, students expected them to 'hook up'. These themes embody a traditional sexual script with its inherent gender roles viewing that the male character was driven by sexual desire, whereas students placed a greater burden on the female character to interpret and respond to the male's intentions. Furthermore, the results highlight how traditional sexual scripts remain influential to our expectations and communication of sexual consent online.

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From Hatshepsut to Queen Victoria: Understanding the Glass Ceiling

Tahbata Zuniga Diaz '24, Political Science and Writing *Advisor: Suzanne Chod*

Over thousands of years, women have held positions of political power, yet they remain in the metaspace – where they are held to private sphere expectations when in the public sphere. Hostile sexism theorizes that women in these roles are threatening because there is a fear they will replace men as the hegemon. Even with the evolution of women's rights over time, how is it that after thousands of years, the metaspace still exists? Therefore, this project examines societal countermeasures seven female political figures faced while in power from the ancient to the modern world. These countermeasures include criticism of appearance, marriage and motherhood, historical erasure, villainization, and for some, death. Results show that persistent patterns of oppression and suppression emerge across all of these women in power. These results can also illuminate the necessary next steps to break the highest thickest glass ceiling.

Questioning the Power of Perception

Moderator: Tim Woods *Location: WSC 356*

The Acute Effects of Resistance Training on Mood Among Adults

Alison Tasso '23, Exercise Science *Advisor: Rachel Luehrs*

While previous research indicates the positive effects of exercise on mood, there is a lack of research outlining how long mood is improved following an exercise session. Eleven participants completed the study. The subjects completed an hour long full-body resistance training class lead by the research team after completing a baseline mood survey. Participants then completed six follow up surveys at t=0 hours (h), 0.5h, 1h, 2h, 4h, and 6h. There was a significant difference in mood (P=0.002) across timepoints. Post-hoc analyses demonstrated that overall mood was higher than baseline at 30 minutes (P=0.011), 1 hour (P=0.028), 2 hours (P=0.022), and 4 hours (P=0.048) after the exercise session. There was no difference in mood immediately following (P=0.074) or 6 hours (P=0.131) after the exercise session. Data suggest that resistance training improves mood 30 minutes up to 4 hours of a single bout of exercise.

Trust Me, I'm a Dietician: Sportswomen, Eating Disorders, and Social Media's "Recovery Lite"

Allison Grady '23, Psychology *Advisor: Carly Drake*

In this study, we use a gender-focused theoretical framework to ask (1) how registered dietitians (RDs) communicate with sportswomen in eating disorder (ED) recovery on Instagram, and (2) how this practice implicates RDs' entrepreneurial strategies. We engage with ongoing conversations at the intersection of marketing, psychology, and sociology to conduct a critical visual content analysis of RDs' Instagram posts targeting sportswomen in ED recovery. Our sample includes five RDs oriented towards non-restrictive fueling for sports performance. We gathered 20 recent posts from each RD and engaged in an iterative coding practice aided by qualitative data analysis software. We find that Instagram's RDs present sportswomen with "recovery lite" – a depoliticized, watered-down version of ED treatment. Our findings underscore the tension that emerges when medical professionals share their expertise on social media, providing an opportunity to reflect on best practices in communicating complex health information in spaces that prioritize and reward simplicity.

The Games Are Not the Same: Evaluating Participant Experiences When Taking Tests of Executive Function

Amber Kulpinski '22, Psychology, Neuroscience *Advisor: Karl Kelley*

Despite increased interest addressing executive function research and application, there is no consensus on the definition or measurement of this construct. In general, these tests evaluate processes involved in planning, focusing attention, shifting cognitive sets, and monitoring and inhibiting actions. The current study focused on the client experience of two tests of executive functioning: Trails-X and the Wisconsin Card Sorting Test. It was hypothesized that there would be differences in client experience while being administered these tests. Twenty-two students completed both tests and answered questions pertaining to experience. Participants reported significantly different emotional and cognitive experiences when taking the two tests. It is important for tests to challenge one's abilities, but perceptions of difficulty and feelings of frustration can impact motivation and potentially subsequent scores. Knowing these differences can help administrators more effectively frame the experience before they begin the assessment and increase the overall diagnostic validity of these tests.

A Coherent Interview: A Construct Validation Study of the Sense of Coherence Scale (SOC-29)

Nadia Baraglia '23, Psychology, Sociology *Advisor: Karl Kelley*

Sense of Coherence (SOC) is used to understand how individuals manage and cope with stress and adversity. Some individuals' worlds are coherent because they see things as understandable, manageable, and meaningful; others see the world as variable and random. Previous research lacks addressment of SOC measurement within an interview setting and focuses mainly on clinical psychology. This disregards events common to everyday individuals, such as job interviews. The current study is a content validation of a structured assessment, the SOC-29, that measures SOC upon its three components: comprehensibility, meaningfulness, and manageability.

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This validation occurred through examination of the SOC-29 scores compared to responses in a mock job interview, to examine if they will yield the same results. We hypothesized that participants with high SOC profiles will report themes of comprehensibility, manageability, and meaningfulness in response to standard job interview questions at a higher rate than those with lower SOC profiles.

Exploring Global Issues

Moderator: Sean Kim Butorac *Location: WSC 015*

China's New Colonialism

Claire Mikulcik '23, Political Science and Shimer: Social Science *Advisor: Sean Kim Butorac*

Through the Belt and Road Initiative and the Forum on China-African Relations, China claims to support developing countries through unconditional economic aid. Yet this obscures that China is reinstating colonialism on the African continent. Examining China's relationships with Angola and South Africa, I argue that China's African foreign policy both aligns with—and departs from—core tenants of former European colonialism. China's relationship with Africa aligns with earlier form of economic and racial domination for the purpose of natural resource exploitation that is enacted through monopolies over supply chains, settlers that displace local trade, and a military presence. Yet China departs from these earlier dynamics by framing its relationships as between sovereign nation states in the pursuit of global ideals of democracy and free and fair trade. Unlike European colonizers, China presents its relationship with Africa through these global ideals, even as it undercuts them on the ground.

Resolving Financial Crises

Jaclyn Logan '23, Accounting *Advisor: Brenden Mason*

The aftermath of the Global Financial Crisis inspired questions regarding the effectiveness of economic responses to financial crises. Numerous financial systems including the gold standard, and Bretton Woods were previously used, but weren't effective enough to meet the demands of a global economy. The most recent and current system involved the creation of the Financial Stability Board where international standards are created and enforced. To test the effectiveness of the FSB, data from the Bank of International Settlements (BIS) and the World Economic Forum (WEF) will compare credit-to-GDP gaps and bank stability data between members and non-members. A series of regression analyses will provide evidence of the correlation between being an FSB member and having a better response system to a financial crisis. My conclusion is that there's mixed evidence of the effectiveness of the FSB. Additional factors contributing to financial stability would need to be tested in the future.

Global Oil Demand: Analysis and Outlook

Jan Mueller '23, Management *Advisor: Brenden Mason*

Because oil remains one of the most important resources powering a significant portion of global economic growth, it is important to re-evaluate the primary drivers behind global oil demand. As the basis for forecasts about future trends and developments, including the moment of peak oil demand, this regression-based analysis finds three primary drivers of global oil demand: (1) supply, (2) overall energy consumption, and (3) the previous year's demand. Moreover, some notable regional differences are identified. That is, different dynamics in developed and emerging regional economies can have policy implications for the push to reduce global oil consumption. These findings could be used as the basis of future research and development predictions.

Race and Self-Determination in Progressive Era America: The American Anti-Imperialist League and the Question of the Philippines, 1898-1928

Jackie Drover '23, History *Advisor: William Barnett*

The American Anti-Imperialist League was a political organization in the United States during the progressive era. Formed in the aftermath of the Spanish-American war it primarily became focused with opposing Annexation of the Philippines, and later support for Philippine independence. My research into the AIL has found that tendencies within the AIL due to disagreement on both strategy and rhetoric effected the organization's trajectory eventually causing the organization to fracture. I found these disagreements and differing tendencies within the AIL to be intrinsically linked to the views of race, colonialism, self-determination, and immigration during the progressive era. My research reveals that the views among AIL cadre regarding these social issues reflect the wider contradictions within the Anti-imperialist movement in the United States during the progressive era and that these social issues were core in their relevancy to the movement.

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Improving Our Environment

Moderator: Esen Andic-Mortan *Location: WSC 104*

Collaborting With the Conservation Foundation for Long-Term Community Supported Agriculture (CSA)

**Jess Valete '23, Environmental Studies* *Advisors: Reed Perkins, Dale Simpson Jr.*
**Camryn Liberio '23, Environmental Studies*
**Derek Olson '23, Environmental Studies*
**Grey Riedl '23, Environmental Studies, Biology*
**Amber Maurer '23, Environmental Studies*

In collaboration with The Conservation Foundation (CF), we conducted community- engaged learning (CEL) and designed and implemented community-based research (CBR) regarding community-supported agriculture (CSA). CSA is a system in which a farm operation is supported by stakeholders within the community who share both the benefits and risks of local food production and consumption. Our goal was to create a direct collaboration between the Conservation Foundation and NCC, illustrating that students have direct community relations to make sustainable agricultural choices, whether they are in an environmentally oriented field or not. This would be accomplished by establishing a community outreach team/organization in NCC which can bring new volunteers to the CF. By doing this, not only are we able to support the mission and goals of our partner institution, give educational outreach to NCC students, but also allowed reflection of CEL and CBR when working with undergraduate students, professors, and our community at-large.

Desalination of a Salty Situation

**Ian LaPat '24, Environmental Studies and Biology* *Advisors: Reed Perkins, Dale Simpson Jr.*
**Carly Casper '23, Environmental Studies and Biology*
**Lauren Casper '23, Environmental Studies and Biology*
**George Queisser '23, Environmental Studies*

Our local rivers, including the DuPage, are getting saltier, endangering multiple species of flora and fauna, and the overall health of our waterways and roadways. As such, less damaging practices are needed to reverse this trend. Working with The Conservation Foundation (Naperville, IL) and the Salt Smart Collaborative, our team used community-engaged learning (CEL) and community-based research (CBR) to test the amount of detectable salt in waterways and on land around campus to inform a salt reduction plan for North Central College by developing a specific salt application protocol for NCC grounds crew. This included suggesting the use of alternative applications, educating the community, saving college money, and reducing salt's impact on our overall environment. In addition, our team reported and reflected on the benefits and difficulties of using CEL and CBR with community partners interested in salt reduction.

Conservation@NCC – An Environmental Partnership Between The Conservation Foundation and our North Central College Campus

**Molly Whitlock '23, Accounting and Environmental Studies* *Advisors: Reed Perkins, Dale Simpson Jr.*
**Anna Jensen '24, Environmental Studies*
**Thomas Rutter '23, Business Economics*
**Gabriel Aguado '23, Environmental Studies*
**Katrin Prohorova '23, Environmental Studies*

Our team takes the teachings of the non-profit Conservation Foundation's Conservation@Work program and translates them to the North Central College Sustainability Department's goals on campus while utilizing community-engaged learning and community-based research. Environmental benefits applicable are conserving the rainwater that falls on campus and proper management of invasive species and native plants. Our team proposes types of native species that should be supported and/or added in a specific section of our campus' current rain gardens as a test, as well as breaking ground and putting in a butterfly garden nearby the community garden. Our work highlights who are the key decision makers, feasibility within the grounds crew budget, a student-engagement plan for maintenance, and consideration for the holistic benefits to campus. These project proposals mainly enhance faculty, student, and staff satisfaction and experience. This proposal transitions to next year through collaboration with the student-led environmental organization Green Scene.

Solar Panel Adoption: An Examination of Agent's Behaviors and Environmental Consciousness

Colin Johnson '23, Economics, Finance *Advisor: Esen Andic-Mortan*

Given the preexisting and impending impacts of climate change, it is necessary to move away from fossil-fuel generated electricity in the long-run. Solar panels represent one of the best opportunities the household can theoretically undertake to reduce reliance on fossil-fuel power sources. Unfortunately, solar panels often pose a large upfront cost of installation that can deter adoption, sometimes compounded by irrational decision making. This paper seeks to evaluate different types of economic agents regarding

**Denotes presenters*

their adoption behavior of household solar panels utilizing Monte Carlo simulations and an absorbing Markov process. A novel concept is introduced for categorizing agents based on their environmental consciousness. In analyzing the determinants of solar panel adoption, I find household income, levels of education, and geographic location statistically significant in my preliminary regression analysis.

Finding Common Ground

Moderator: Steve Macek *Location: WSC 042*

Progress and Setbacks in New Mexico: An Analysis of Local 890

Anthony Grammich '23, Political Science *Advisor: Suzanne Chod*

From 1950 to 1952, Local 890 of the Union of Mine, Mill, and Smelter Workers in New Mexico waged the Salt of the Earth strike. The strike denounced pay discrimination on the basis of race and was supported by a coalition of women, people of color, and immigrants. Previous scholarship has suggested the importance of union leadership incorporating labor into larger issues of race, gender, and ethnicity. But while the union did experience some success, it was soon defunct. My study analyzes collective bargaining agreements from Local 890 housed in the University of New Mexico's Center for Southwest Research. I find that in the immediate aftermath of the strike, there were some advancements and empowerment of workers through clauses that conceded some demands surrounding pay and housing. Simultaneously, I also find arbitration clauses that are used to serve management's goal of de-mobilizing workers and removing them from the struggle.

"Outside the Works": A Podcast About the Hawthorne Works Factory in the 1920s

Adrian Martinez-De La Cruz '23, Journalism and Media Communication *Advisor: Ann Durkin Keating*

In its heyday, Hawthorne Works was an enormous industrial complex owned by Western Electric in Cicero, Illinois. Before Hawthorne Works opened in 1905, Cicero was nothing more than undeveloped land and scattered dwellings. 2,000 started off at Hawthorne Works. By 1924, there were 28,000 workers. In less than two decades, the undeveloped land would be replaced with homes, stores, and an expanded factory. Through a variety of primary sources, including newspapers and interviews, I have explored the impact of Hawthorne Works on its employees and the broader community in the late 1920s. I focus on the employee-run building and loan association, which helped many workers earn savings and become homeowners. And the sports leagues and activities clubs that provide recreational opportunities. They demonstrate how Western Electric maintained employee loyalty and prevented union organizing.

Understanding China: Debunking Myths and Exploring Realities

Elie Imani '25, Political Science, Economics *Advisor: Jinai Sun*

The average American is uninterested and has a limited and biased understanding of China, influenced by their own perspectives and limited exposure to diverse information sources. This research comprehensively examines China's advancements and its relations with the US. The study draws from diverse news media and interviews with American students to provide a nuanced understanding of China's ascent and its implications for the US. By exploring China's technological innovations, military capabilities, and "soft power" efforts, the analysis seeks to educate individuals about China's growing global influence from different perspectives, shedding light on its complex role in the international arena. The ultimate goal is to provide a deep understanding of the country so that people can form well-informed opinions on this crucial topic and contribute to a more balanced discussion about China's rise.

Understanding China: The Inductive East and the Deductive West

Spencer Mulso '25, International Business and Chinese *Advisor: Jinai Sun*

Cultural, ideological, and value differences between the East and West can lead to misunderstandings and conflicts. However, these differences are not absolute, and there are individual variations within each culture. One major difference is the emphasis on individualism versus collectivism. Western cultures value individualism, while many Eastern cultures prioritize collectivism. Another difference is the approach to communication and conflict resolution, where Western cultures often prefer direct communication and conflict resolution, while many Eastern cultures prefer indirect communication to preserve harmony in relationships. Understanding these differences allows us to bring a more comprehensive perspective for various forms of reasoning such as inductive and deductive reasoning and mindsets. To build a more harmonious relationship between the East and West it requires us to recognize and respect these cultural differences while seeking common ground and effective communication across cultural boundaries. Creating cross cultural competence and awareness can only improve current and future relations.

**Denotes presenters*

Developing New Models and Measurements

Moderator: Joanna Weremijewicz *Location: WSC 013*

Improving Satellite Imagery-Based Estimates of Crop Residue Cover in the Pacific Northwest by Integrating Moisture Dependency Effects

**Sienna Alicea '23, Chemistry* *Advisor: Kirti Rajagopalan (Washington State University)*
Kirti Rajagopalan (Washington State University)
Siddharth Chaudhary (Washington State University)
Haly Lury Neely (Washington State University)

Low-intensity tillage practices are positively correlated with favorable soil health. Regional mapping of tillage practices offers conservation agencies the ability to monitor the implementation and assess resulting benefits. Large-spatial-scale mapping of tillage practices is not regionally available, and satellite imagery analysis has potential as a low-cost method for achieving this. Satellite-based approaches quantify the fraction of crop residue as a proxy for tillage practices. This is based on spectral indices that differentiate reflectances between residues and soils. However, creating these indices is challenging due to the impact of moisture levels on the index. Our objective is to develop adjustments for this moisture dependency and improve satellite-imagery based estimates of crop residue cover for the dryland Pacific Northwest. Laboratory spectrometry experiments produced spectral signatures for five residues and twelve soils at varying moisture levels. Preliminary results indicate that the moisture corrections improve the accuracy of fractional residue cover estimates.

Developing an Infectious Disease Modeling Program

Robert Szabad '23, Biology *Advisor: Marco Martinez*

Infectious disease modeling is a novel and an effective way to use available data and extrapolate on it, giving predictions for the future. These predictions can guide policy makers and public health officials to make educated and well-informed decisions. The use of computers and programing languages has enabled us to create increasingly more complex models and to make more accurate predictions. In this study, we have built a program using the Python programming language to create a digital tool to be able to characterize epidemics based on available data, and to make predictions on how the disease will progress in the populations. The program also allows for users to input events, such as vaccination, and antigenic shift to account for changes in disease behavior in response to these events. This program is useful for individuals wanting to deepen their knowledge of infectious disease behavior and modeling.

Quantifying the Relationship Between Arbuscular Mycorrhizal Fungi and a Native and Invasive Thistle

**Nicole Baker '24, Biology* *Advisor: Joanna Weremijewicz*
**Lucia Vera '24, Neuroscience*
**Ian Rosales '25, Biology*

Arbuscular mycorrhizal fungi (AMF) associate with 80% of vascular plant roots and are an important part of nutrient exchange. Our research quantified the relationship between (AMF) and native Pasture Thistle (Cirsium discolor) and invasive Canada Thistle (Cirsium arvense). We hypothesized that Pasture Thistle would have a stronger relationship with AMF than Canada Thistle because of the degraded mutualism hypothesis, which states that invasive species have reduced relationships with AMF. For our experiment, we grew inoculated and non-inoculated plants at 10 different levels of soil phosphorus concentrations. Pasture Thistle and Canada Thistle were both facultatively dependent upon AMF, meaning that they could grow without AMF at increased phosphorus levels. Pasture Thistle was more responsive to AMF than Canada Thistle, meaning inoculated plants had more growth than non-inoculated plants. In support of our hypothesis, Canada Thistle was not responsive to AMF. This information could help counter Canada Thistle's invasion.

Geochemical Analyses of Rapa Nui (Easter Island) Geological and Archaeological Materials: Using Cutting-Edge Technology to Model Economic, Ideological, and Sociopolitical Interaction During the Polynesian Pre-contact Period (1200-1722 C.E.)

**Grace Watson '23, Anthropology and Sociology* *Advisor: Dale Simpson Jr.*
Laure Dussubieux, The Field Museum
Jean Milot, The Field Museum
Chris Stevenson, Virginia Commonwealth University

Archaeological sourcing studies reveal more about artifacts than the original quarry of extraction. This National Science Foundation supported research was a collaboration with the Field Museum's Elemental Analysis Facility and Virginia Commonwealth University to geologically source Rapa Nui obsidian artifacts (n=105) using portable x-ray fluorescence and laser ablation inductively coupled plasma mass spectrometry technologies. Each artifact was assigned to one of the island's four obsidian quarries: Maunga Orito, Te Manavai, Rano Kau, or Motu Iti. The data generated from this geochemical analysis ultimately informed a model of confederation (re) distribution of obsidian from Maunga Orito, contributing to the knowledge of cultural patterns of access, control, and exchange on the island. It improved analytical precision and accuracy of portable x-ray fluorescence for obsidian archaeological materials from Rapa Nui. It also outlines the first archaeological obsidian life-history model, including stages such as acquisition, material reduction, and artifact manufacture, use, and discard.

**Denotes presenters*

COLLEGE SCHOLAR HONORS THESES

Student	*Director*	*Thesis Title*
Kristin Arvanites	Hale Ekinci	Designing a user-centric public transportation app for Chicago suburban trains
Taylor Bartels	Leila Azarbad	Liberty and Justice for All? Gender Differences in Emotional Reactions and Perceptions of Safety in Response to the Overturning of Roe v. Wade
Jessica Beier	Caroline St. Clair	Analyzing User Experience Quality across Popular English/Chinese Translation Mobile Apps
Paulina Bogdan	Amy Buxbaum	Female Leadership : Aspects of communication that affect women rising to leadership
Eve Cyncar	Liana Peter-Hagene	Defendant Occupation Effects on Jurors' Judgments in Sexual Assault Cases: Are Officers and Veterans Held to a Different Standard?
Sara Donis	David Cordero	Beyond the Screen: Visualizing Modern Design Problems
Avalon Dufkis	Bruce Spitzer	Empathy: A Critical Social-Emotional Learning Component of Bullying Prevention
Jeffrey Erl	Leila Azarbad	Sharing the Air: Comparing the Effects of Individual Versus Group Mindful Breathing
Molly Fisher	David Cordero	The Seven Saints: An Exploration of Morality Through Text, Image, and Retired Superheroes
Kylee Frey	Nicole Rivera	Blossoming to Burnout: An Analysis of How Higher Achieving College Students Experience Stress
Kimberly Garibay	Ryan Decker	Examining Consumer Culture
Rola Goke-Pariola	William Muck	We Got the Power: The Factors that Mobilized Black Voters in Georgia During the 2020 Presidential Election
Anthony Grammich	Suzanne Chod	Playing Their Cards Right: Union Leadership and Organizing Las Vegas Culinary Workers
Natalie Grolmes	Mary Jean Lynch	Greenwashing the fashion industry: How do sustainability and social factors influence individuals' clothing purchases
Tabish Imran	Gwendolyn Tedeschi	An Economic Approach to Hate Crimes
Jaclyn Logan	Brenden Mason	Resolving Financial Crises
Jacob Mersch	William Muck	Does Your Vote Matter? Assessing Presidential Election Models
Trevor Mohrmann	Suzanne Chod	Universal Design: Introductory Course Syllabi as a Tool for Student Accommodation in Political Science
Emaan Mohsinuddin	Nicole Rivera	Fashion, a Mirror of Society
De'Jah Phillips	Nicole Rivera	From Drapetomania to Degrees: Learning through the Lens of Black Students and College Professors
Sophia Summers	Ann V. Dolinko	Sexual Education: A Comprehensive Approach
Molly Whitlock	Jeffrey Anstine	Towards a Sustainable Future: Carbon Pricing in the United States
Adrian Martinez-De la Cruz	Ann Durkin Keating	"Outside the Works": A Podcast About the Hawthorne Works Factory in the 1920s

RICHTER INDEPENDENT STUDY FELLOWSHIP RECIPIENTS

Student	*Thesis Title*
Kristin Arvanites	Designing a user-centric public transportation app for Chicago suburban trains
Anthony Grammich	Playing Their Cards Right: Union Leadership and Organizing Las Vegas Culinary Workers

SCHOLAR ALL-AMERICANS

Men's Soccer 2022
CSC Academic All-American: Aidan Westerberg
USC Scholar All-American: Aidan Westerberg

Women's Soccer 2022
USC Scholar All-American: Ellie Lochbaum, Elle Sutter
Jack Swartz Academic All-Conference Honoree: Ellie Lochbaum

Women's Triathlon 2022
CTCA Scholar All-Americans: Natalie Grolmes, Hailey Poe, Scarlett Schuth

Football 2022
CSC Academic All-American, NCAA Elite 90 Award recipient: Jeske Maples
Jack Swartz Academic All-Conference Honoree: Jeske Maples
CSC Academic All-American: Adam Green, Jeske Maples

Men's Cross Country 2022
USTFCCCA Team Academic Award
USTFCCCA All-Academic: Drew Guimond, Connor Riss, Thomas Rohr, Max Svienty, James McGlashon

Women's Cross Country 2022
USTFCCCA Team Academic Award
USTFCCCA All-Academic: Nicole Brandy, Julia Benes

Women's Volleyball 2022
AVCA Team Academic Award

Men's Wrestling 2021 - 2022
NWCA Scholar All-American: James Nako

Women's Wrestling 2021 - 2022
NWCA Scholar All-American: Amani Jones, Angelina Graff, Fiona McConnell, Kendra Ryan, Mateah Roehl, Riley Aamond, Sara Sulejmani, Sydney Petzinger, Yele Aycock, Yelena Makoyed

Men's Swimming and Diving 2022 - 2023
CSCAA Scholar All-America Team

Men's Swimming and Diving 2022 - 2023
CSCAA Scholar All-America Team

Men's Tennis 2021 - 2022
ITA Division III Scholar Athletes: Andy Hinch, Jacob Mersch, Matthew Sengphommachanh, Ethan Sherman, Javier Suarez Balsera

Women's Tennis 2021-2022
ITA Division III Scholar Athletes: Anna Fox, Laura Fox, Sjana Henderson, Hannah Hougland, Linsy Jante, Katie McGraw, Nina Patience, Sydney Sawyer

Women's Golf 2021 - 2022
WGCA All-American Scholars: Tatiana Cooper, Emma McCluskey, Katelynne Rostis, Sarah Tanny

Women's Bowling 2021 - 2022
NTCA All-Academic: Kelly Heighway, Kaitlin Freudt, Alassandra Mulligan, Talia Roti, Jessica Ramirez, Linsy Jante

Men's Track and Field 2021 - 2022
USTFCCCA All-Academic Team
USTFCCCA All-Academic: Gavin Carr, James McGlashon, Connor Riss

Women's Track and Field 2021 - 2022
USTFCCCA All-Academic Team
USTFCCCA All-Academic: Alexandra Draves, Kathy Mydra, Julia Babinec, Jenna Fiore, Kiarah Horn, Natalie Johnson, Hannah Jones, Lindsey Novak

Men's Volleyball 2021 - 2022
Jack Swartz Academic All-Conference Honoree: Jeremy Cardenas

Softball 2021 - 2022
Easton/NFCA Scholar All-American Scholars: Katie Del Re, Anna Cameron, Mary Leskovec, Sarah Lynch Kylie Ryza, Alyssa Sturino

Baseball 2021 - 2022
2022 CoSIDA NCAA Division III Academic All American Third Team: Luke Lamm
2021 - 2022 ABCA Team Academic Excellence Award

Men's Lacrosse 2021 - 2022
2022 USILA Academic Team Award

NORTH CENTRAL COLLEGE 1861

30 N. Brainard Street • Naperville, IL 60540
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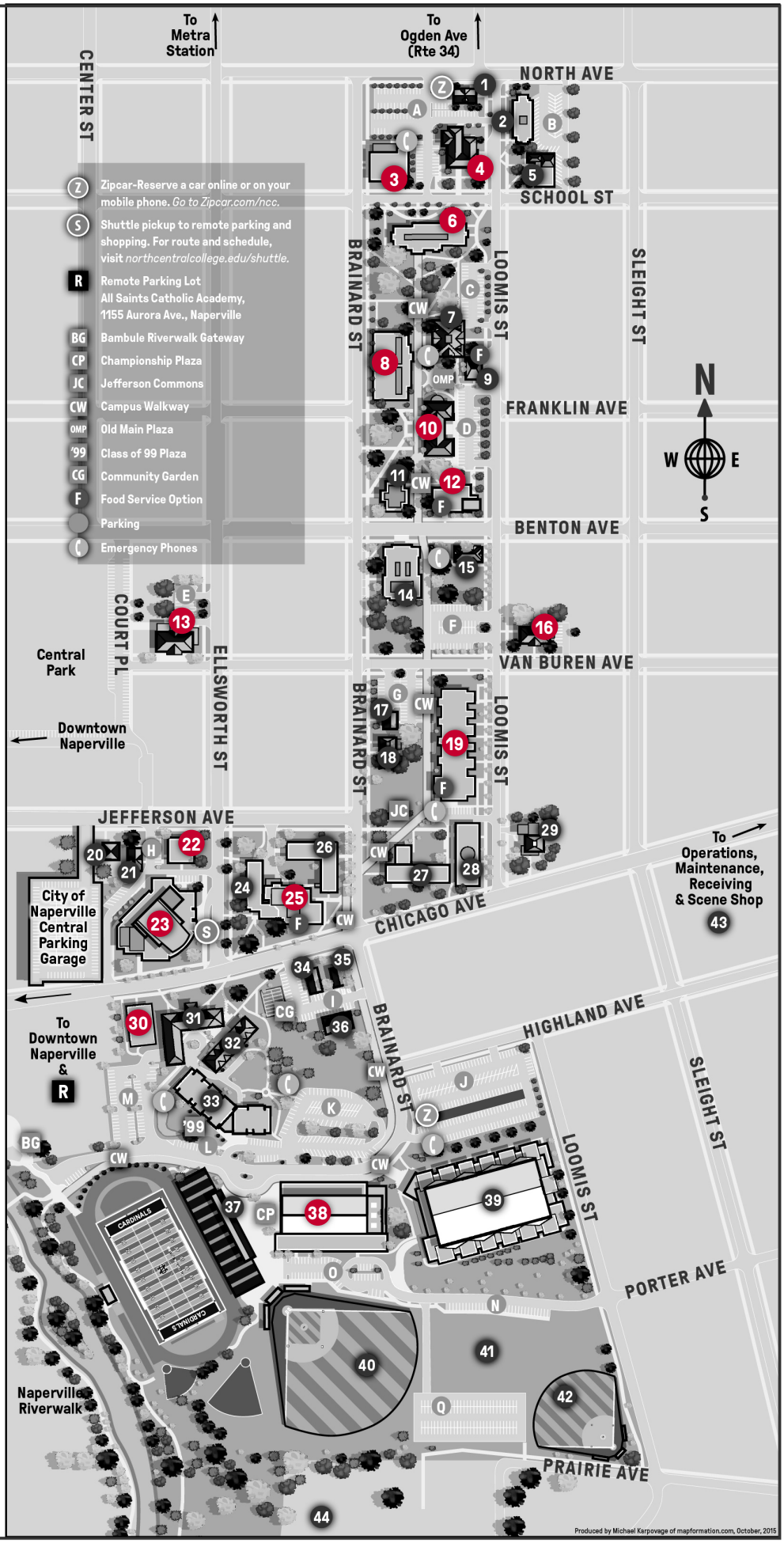
1. **225 N. Loomis House** [H225]
2. **Kimmel Residence Hall** [KL] 224 N. Loomis St.
3. **Larrance Academic Center** [LAC] 309 E. School St.
4. **Kiekhofer Hall and Koten Chapel** [KH] 329 E. School St.
5. **Seybert Hall** [ST] 208 N. Loomis St.
6. **Oesterle Library** [LIB] 320 E. School St.
7. **Goldspohn Hall** [G] 31 N. Loomis St.
8. **School of Business & Entrepreneurship** [BE] 40 N. Brainard St.
9. **Rolland Center Boilerhouse Café** [RC] 29 N. Loomis St.
10. **Old Main** [OM] 30 N. Brainard St.
11. **Carnegie Hall** [C] 10 N. Brainard St.
12. **Harold and Eva White Activities Center** [WAC] 325 E. Benton Ave.
13. **Meiley-Swallow Hall** [MS] 31 S. Ellsworth St.
14. **Pfeiffer Hall** [PH] 310 E. Benton Ave.
15. **326 E. Benton Ave. / 5 S. Loomis St.** [H326/5]
16. **A.A. Smith House** [H28] 28 S. Loomis St.
17. **116 S. Brainard House** [H116]
18. **Hammersmith House** [H120/122] 120/122 S. Brainard St.
19. **Wentz Science Center** [WSC] 131 S. Loomis St.
20. **40 E. Jefferson House** [H40]
21. **Abe House** [H48] 48 E. Jefferson Ave.
22. **Campus Store** [B100] 100 E. Jefferson Ave.
23. **Wentz Concert Hall/Fine Arts Center** [FAC] 171 E. Chicago Ave.
24. **Geiger Residence Hall** [GR] 221 E. Chicago Ave.
25. **Kaufman Dining Hall** [K] 221 S. Brainard St.
26. **Rall Residence Hall** [RL] 211 S. Brainard St.
27. **Seager Residence Hall** [SR] 311 E. Chicago Ave.
28. **Schneller Residence Hall** [SSH] 147 S. Loomis St.
29. **President's House** 409 E. Chicago Ave.
30. **Wentz Center for Health Sciences & Engineering** 160 E. Chicago Ave.
31. **Patterson Residence Hall** [PRH] 180 E. Chicago Ave.
32. **Ward Residence Hall** [WH] 192 E. Chicago Ave.
33. **New Hall Residence Hall** [NH] 451 S. Brainard St.
34. **224 E. Chicago House** [H224]
35. **Oliver Hall** [WONC] 232 E. Chicago Ave.
36. **Edward Everett Rall House** 329 S. Brainard St.
37. **Benedetti-Wehrli Stadium** [STAD] 455 S. Brainard St.
38. **Merner Field House** [MF] 450 S. Brainard St.
39. **Residence Hall/Recreation Center** [RRC] 440 S. Brainard St.
40. **Zimmerman Stadium** 467 S. Brainard St.
41. **Athletics Practice Field**
42. **Shanower Family Field** 435 S. Loomis St.
43. **Operations, Maintenance, Receiving & Scene Shop** [M999] 999 E. Chicago Ave.
44. **Riverview Property**



Indicates building with event

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