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CARIC 2026

CUE Annual Research & Innovation Conference

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All events held at Concordia University of Edmonton (7128 Ada Blvd. NW). All events are FREE, with the exception of the CUE Choir concert on Sunday.

PROGRAM AT A GLANCE

All events held at Concordia University of Edmonton (7128 Ada Blvd. NW). All events are FREE, with the exception of the CUE Choir concert on Sunday.

DAY 1 | THURSDAY, APRIL 9

Opening of CARIC 2026 with the Opening of the Fine Arts Research and Performance Festival Performances
Location: Al and Trish Huehn Theatre

4:00–9:00 p.m. Drama Performances

DAY 2 | FRIDAY, APRIL 10

Networking Event
Location: Tegler Student Centre and Judy Kruse Commons

3:30-5:30 p.m. Poster and Display Mixer

Fine Arts Research and Performance Festival Performances (continued)
Location: Al and Trish Huehn Theatre

4:15–10:00 p.m. Drama Performances

DAY 3 | SATURDAY, APRIL 11

Oral Presentations / Panel Discussions
Location: B252, Braaksma Hall

9:00–9:15 a.m. Welcome and Opening Remarks

9:15 a.m.–12:00 p.m. Oral Presentations

12:00–1:00 p.m. **LUNCH**

1:00–4:00 p.m. Oral Presentations

Fine Arts Research and Performance Festival Performances (continued)
Location: Al and Trish Huehn Theatre

2:00–6:45 p.m. Drama Performances

DAY 4 | SUNDAY, APRIL 12	
Fine Arts Research and Performance Festival Performances (continued)	Location: Al and Trish Huehn Theatre
11:00 a.m.–12:15 p.m.	Drama Performances
CUE Choir Performance	Location: Tegler Student Centre
2:00–3:30 p.m.	$16.43 for admission: **https://www.eventbrite.ca/e/concordia-concert-choir-presents-songs-and-sonnets-tickets-1983455824765?aff=oddtdtcreator**
Fine Arts Research and Performance Festival Performances (continued)	Location: Al and Trish Huehn Theatre
3:30–9:15 p.m.	Drama Performances

All events held at Concordia University of Edmonton (7128 Ada Blvd. NW). All events are FREE, with the exception of the CUE Choir concert on Sunday.

FINE ARTS FESTIVAL SCHEDULE

DAY 1 | THURSDAY, APRIL 9 | AL AND TRISH HUEHN THEATRE	
4:00–4:45 p.m.	**Drama Capstone Class Panel** What to expect in Drama 495 – 2026 Drama Capstone Students share their experiences. GUESTS: Micheal Peng, Amanda Bergen, River Buhler, and the 2026 Capstone Class
5:00–6:00 p.m.	**Guilt Wears A Face** An original one-act play dealing with an individual's journey through processing grief, set in the fantasy world of The Gravelands. Written and performed by Vian Provins.
6:15–7:30 p.m.	**Welcome to Storybrooke** An adaptation of the popular TV show *Once Upon a Time* adapted for the stage by Dakota Kane.
7:45–9:00 p.m.	**Sister Mary Ignatius Explains It All For You** An absurdist comedic play by Christopher Durang that explores questions of life, morality, purpose, and everything else; explained to you by Sister Mary Ignatius- Directed by Cris Edmonds & Performed by Emily Foisy and company. Talkback after the show.
DAY 2 | FRIDAY, APRIL 10 | AL AND TRISH HUEHN THEATRE	
4:15–4:45 p.m.	**Letters I Never Sent** An interpretive solo about heartbreak, doubt and growth danced to written text; Written, choreographed and danced by Amanda Glover. Talkback after the show.
5:00–6:15 p.m.	**Guilt Wears A Face** An original one-act play dealing with an individual's journey through processing grief, set in the fantasy world of The Gravelands. Written and performed by Vian Provins. Talkback after the show.
6:30–7:45 p.m.	**1932-1933: A Holodomor Story** A powerful Ukrainian dance theatre production about a family's struggle during the man-made famine the Holodomor. Created, Choreographed, and Directed by Shaughnessy Potter. Talkback after the show.
8:00–9:00 p.m.	**Krapp's Last Tape *by Samuel Beckett*** Krapp is an old man who records a tape every year on his birthday, in his last tape he reflects on his life, aging, and his regrets. Directed by Rachel Byrne & Performed by Dayton Miller.
9:15–10:00 p.m.	**Hide** A deadly game of hide and seek with five players and three seekers. Written and directed by Makayla McLay.
DAY 3 | SATURDAY, APRIL 11 | AL AND TRISH HUEHN THEATRE	
2:00–2:45 p.m.	**Props Presentation** Rayna Pavlis presents a behind the scenes look at the creation of props for the festival.

3:00–3:45 p.m.	**Blue** A music and dance film exploring a relationship created by Duck Lefebvre.
4:00–4:45 p.m.	**Hide** A deadly game of hide and seek with five players and three seekers. Written and directed by Makayla McLay. Talkback after the show.
5:00–6:15 p.m.	**Welcome to Storybrooke** An adaptation of the popular TV show *Once Upon a Time* adapted for the stage by Dakota Kane. Talkback after the show.
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DAY 4 | SUNDAY, APRIL 12 | AL AND TRISH HUEHN THEATRE

11:30 a.m.–12:15 p.m.	**Props Presentation** Rayna Pavlis presents a behind the scenes look at the creation of props for the festival.
2:00–3:30 p.m.	**Concordia Concert Choir *conducted by Dr. John Brough*** "Songs and Sonnets" with music by Sherryl Sewepagaham, Brian Tate, Laura Hawley and featuring George Shearing's "Songs and Sonnets". ***Note that this is a ticketed event in the Tegler Student Centre.***
3:30–4:30 p.m.	**Blue** A music and dance film exploring a relationship created by Duck Lefebvre. Talkback after the show.
4:45–5:15 p.m.	**Letters I Never Sent** An interpretive solo about heartbreak, doubt and growth danced to written text; Written, choreographed and danced by Amanda Glover.
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8:15–9:15 p.m.	**Welcome to Storybrooke** An adaptation of the popular TV show *Once Upon a Time* adapted for the stage by Dakota Kane.

ORAL PRESENTATIONS SCHEDULE

All talks are 10 minutes each plus a 5-minute Q&A.

SATURDAY, APRIL 11 | B252, BRAAKSMA HALL	
SESSION 1	
9:00–9:15 a.m.	**Dr. Erika Goble** OPENING REMARKS
9:15–9:30 a.m.	**Dr. Adrien Guyot** I WAS NOT REALLY HERE: AN EXPLORATION OF FALSE NOSTALGIA
9:30–9:45 a.m.	**Ananya Tripathi** ARTIFICIAL INFLUENCERS (AI) VS HUMAN INFLUENCERS: IMPLICATIONS FOR CONSUMER TRUST AND HUMAN RESOURCE STRATEGY
9:45–10:00 a.m.	**Dr. Jamie Meyers-Riczu** BROADCASTING DESIRE IN IMPERIAL OIL'S "MORE NOW, MORE IN THE FUTURE" TELEVISION COMMERCIALS
10:00–10:15 a.m.	**Dante Greene** HEAVY METAL CONTAMINATION PRESENCE IN POTABLE WATER SOURCES IN THE FIRST NATION RESERVE OF SAMSON CREE NATION, ALBERTA, CANADA
10:15–10:30 a.m.	**Comfort Adeyemo** DESIGNING A CONTINUOUS IT AUDIT MONITORING DASHBOARD USING POWER BI
10:30–10:45 a.m.	**BREAK**
SESSION 2	
10:45–11:00 a.m.	**Lauren McLennan** THE ENVIRONMENTAL IMPACT OF GREEN HUMAN RESOURCE MANAGEMENT PRACTICES FOR THE FUTURE OF WORKPLACE ENVIRONMENTS
11:00–11:15 a.m.	**Suraj Neupane** EXPOSING PRIVACY VULNERABILITIES IN FEDERATED LEARNING: A GAN-BASED MODEL INVERSION ATTACK
11:15–11:30 a.m.	**Dr. Matthew Berry** THE THREE T'S OF ACTING: A DESCRIPTIVE ANALYSIS OF THE TECHNIQUES, TRAININGS AND TYPES USED IN A MODERN SAMPLE OF WESTERN ACTORS
11:30–11:45 a.m.	**Alexandra Asuchak** PLANT-DERIVED COMPOUNDS IN THE FIGHT AGAINST ANTIMICROBIAL RESISTANCE
11:45 a.m.–12:00 p.m.	**Dr. Mark Loo** IDENTIFYING FACTORS THAT INFLUENCE GEN Z'S INVESTING DECISIONS

ORAL PRESENTATIONS SCHEDULE

12:00–1:00 p.m.	**LUNCH**
	SESSION 3
1:00–1:15 p.m.	**Oluwakayode Soyinka** MIVA-KNIGHT: A DOMAIN-ADAPTIVE MULTI-MODAL VOICE ASSISTANT USING HYBRID RETRIEVAL-AUGMENTED GENERATION
1:15–1:30 p.m.	**Elizabeth Arpin** "YOU CAN'T ESCAPE IT. IT'S EVERYWHERE.": EXPLORING HOW UNDERGRADUATES PERCEIVE AND USE AI
1:30–1:45 p.m.	**Basma Khan** SECURITY ANALYSIS OF RFID-BASED HEALTHCARE SYSTEMS: SIMULATION OF CLONING AND MAN-IN-THE-MIDDLE ATTACKS
1:45–2:00 p.m.	**Elora Charabin** CAN VIDEO GAMES INCREASE OUR UNDERSTANDING OF ANCIENT MYTH?: AN ANALYSIS OF THE GAME HADES
2:00–2:15 p.m.	**Harsh Parekh** UNAUTHENTICATED COMMAND INJECTION AND DENIAL OF SERVICE ATTACKS ON AUTONOMOUS VEHICLES: EVALUATION AND DEFENSIVE STRATEGIES
2:15–2:30 p.m.	**Celina Posa** "LIFE FULL OF LOVE": A RCT TESTING A NEW WELLBEING INTERVENTION
2:30–3:00 p.m.	**BREAK**
	SESSION 4
3:00–3:15 p.m.	**Dr. Amro Soliman** THE ADAPTIVE ROLE OF FEVER IN IMMUNE DEFENSE ACROSS EVOLUTION
3:15–3:30 p.m.	**Dr. Elaine Greidanus** WHAT DO CLINICAL PSYCHOLOGY SUPERVISORS CONSIDER WHEN EVALUATING STUDENTS APPLYING FOR PRACTICUM PLACEMENT?
3:30–3:45 p.m.	**Dr. Tim Cusack** MENTORSHIP THAT MATTERS: WHAT POST-SECONDARY EDUCATORS CAN LEARN FROM K-12 TEACHER MENTORSHIP
3:45–4:00 p.m.	**Dr. Thea Comeau** POLITICAL PERSPECTIVES OF JEWISH CANADIANS IN THE AFTERMATH OF OCT. 7TH

All talks are 10 minutes each plus a 5-minute Q&A.

ABSTRACTS AND SUMMARIES

Dr. Adrien Guyot

FACULTY: ARTS
DEPARTMENT: LITERATURE AND LANGUAGES

I WAS NOT REALLY HERE: AN EXPLORATION OF FALSE NOSTALGIA

This presentation examines what might be described as mediated or prosthetic nostalgia: an affective attachment to historical periods that individuals know primarily through cultural representation rather than lived experience.

While nostalgia is traditionally understood as a longing for a lived past, contemporary media culture increasingly produces forms of nostalgia that are detached from direct memory. Drawing on examples from cinema, television, and popular culture, this talk examines how recurring visual, musical, and narrative tropes gradually construct an imagined past that feels emotionally authentic despite being mediated and second-hand. Through repetition, stylization, and aesthetic codification, cultural artifacts become symbols of entire eras, allowing audiences to experience a sense of familiarity with times they never inhabited.

Particular attention will be given to the persistent fascination with the 1980s among younger generations. For many viewers and consumers born decades after the period itself, the 1980s have become less a historical decade than a recognizable aesthetic discourse. Objects and textures—corded telephones, banana-seat bicycles, VHS tapes, arcade machines, neon signage, vinyl records, and analog synthesizers—function as visual shorthand for an imagined cultural world that never truly was. Contemporary films, television series, music videos, and advertising repeatedly mobilize these signifiers, reinforcing a stylized and emotionally resonant portrait of this era. In many cases, this portrait bears only a partial relationship to historical reality, selecting highly mediated fragments of the past while erasing its more mundane or less aesthetically appealing dimensions.

The presentation argues that such representations generate a form of nostalgia grounded not in memory but in cultural circulation. Rather than recalling lived experiences, audiences internalize images, sounds, and narratives inherited through media. Over time, these mediated impressions can become indistinguishable from personal recollection, creating the impression of an intimate familiarity with a past that was never actually experienced. This phenomenon may be described as a form of prosthetic nostalgia, in which individuals adopt affective relationships to cultural (hi)stories through representation rather than through biography.

By examining the mechanisms through which film and media repeatedly construct and circulate these nostalgic tropes, my presentation seeks to better understand how collective memory is shaped in an era of constant cultural reproduction. In this context, nostalgia becomes less a personal recollection than a shared aesthetic experience, one produced through repetition, stylization, and collective imagination.

Ananya Tripathi and Elizabeth Coker-Farrell

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

ARTIFICIAL INFLUENCERS (AI) VS HUMAN INFLUENCERS: IMPLICATIONS FOR CONSUMER TRUST AND HUMAN RESOURCE STRATEGY

Background: The rapid growth of social media marketing has completely transformed how organizations communicate with their consumers, leading to the increasing use of influencers as strategic promotional agents. Recently, the emergence of artificial intelligence (AI) technology has generated a new type of influencers: artificial intelligence (AI) influencers. These influencers have introduced a new dimension to digital marketing and raised important considerations from a human resource management perspective. As companies begin to implement the use of artificially generated personalities alongside or in replacement of human influencers, questions regarding consumer trust, perceived authenticity, and the implications for human talent in marketing segments arise.

Purpose: This study examines consumer reactions to artificial intelligence influencers compared to human influencers on social media platforms, focusing on how these differences may potentially influence organizational decisions related to influencer selection and the digital workforce strategies. Taking into account theoretical frameworks such as Source Credibility Theory and Technology Acceptance Model, this research will investigate whether or not consumers perceive artificially generated influencers as less trustworthy and authentic than human influencers, and how these perceptions influence consumer engagement and intention to purchase.

Method: This study primarily relies on the analysis of existing academic research on influencer marketing, artificial intelligence, and consumer behaviour to develop an understanding of this topic. In addition, a survey may be conducted to gather primary data on consumer perceptions of artificial intelligence influencers and human influencers in relation to trust, authenticity, engagement intention, and purchase intention.

Anticipated Results: The study is expected to find that consumers generally perceive artificially generated influencers as less trustworthy and authentic in comparison to human influencers. The results may also show that when consumers are informed that an influencer is artificially generated, their perceived credibility decreases. The results could suggest that the effectiveness of artificially generated influencers depends largely on consumer expectations.

Conclusion: The findings aim to provide valuable insights into how organizations can balance technological innovation with human centric marketing approaches. The research contributes to discussions in human resource management regarding the integration of artificial intelligence into marketing functions and the evolving role of human talent in digital marketing.

Dr. Jamie Meyers-Riczu

FACULTY: ARTS
DEPARTMENT: FINE ARTS

BROADCASTING DESIRE IN IMPERIAL OIL'S "MORE NOW, MORE IN THE FUTURE" TELEVISION COMMERCIALS

In the mid-1960s, Canada's Imperial Oil Company aired a series of television commercials as part of their broader "More Now, More in the Future...with Imperial Oil" print and audiovisual marketing campaign. Originally aired during the Hockey Night in Canada broadcast, these commercials represent classic examples of image advertising, replete with Imperial's "Happy Motoring" branding jingle, and focus more so on promoting Imperial's brand identity and emotional appeal than selling specific petroleum products. Today, these commercials are largely forgotten beyond being archival curiosities. However, they nevertheless expose a moment when Imperial actively and unabashedly fostered a modern petroculture, one that normalized and emotionally legitimized petroleum as an integral part of modern life. Of particular interest is how the advertisements used music and sound to emotionally persuade people to embrace an oil-based good life. In this paper, I will argue that the calming narrative voice-over, the stylized background music, and the foregrounded "Happy Motoring" jingle all foster the sense that oil is desirable, essential, and inevitable for modern life.

From the archived audiovisual material for Imperial Oil, located at the Glenbow Archives in Calgary, I have selected three commercials from the late 1960s, each targeting a specific demographic as reflected in the titles: "Young Moderns," "Women," and "Farmer." My analysis of the commercial advertisements draws on Stephanie LeMenager's critical concept of "loving oil," which frames our emotional attachment to oil as a toxic relationship, one that feels necessary and essential, maybe even desirable, but also inescapable. I assert that Imperial's "More Now, More in the Future" advertising campaign—with its "Happy Motoring" jingle—ultimately fostered positive attitudes toward extraction and the lifestyle it sustains, thereby helping to create our ongoing cultural attachment to oil. But it also helps explain the continued emotional attachment to oil even as its inherent risks and destructive nature become more apparent.

Dante Greene and Sergey Ishutov

FACULTY: SCIENCE
DEPARTMENT: ENVIRONMENTAL AND PHYSICAL SCIENCES

HEAVY METAL CONTAMINATION PRESENCE IN POTABLE WATER SOURCES IN THE FIRST NATION RESERVE OF SAMSON CREE NATION, ALBERTA, CANADA

Background: This research project covers heavy metal contamination within potable water sources in three different populated areas within the First Nations community of Samson Cree Nation, located in Alberta, Canada. Historically First Nations Reserves in Canada face higher rates of poor water quality, and boiling water advisories. This can be attributed to multiple reasons, being historically first nations reserves were typically placed within swampy areas that are more likely to have a higher groundwater table, which may store and transport contaminants from development, infrastructure, and agriculture. Another possible reason is from water infrastructure that has been in use past its service life, causing degradation and leaching from the infrastructure.

Purpose: The purpose of this research is to cover a gap in the research, as well as understanding, and analyzing the presence and impact of heavy metal water contamination that not only Samson Cree Nation faces, but other First Nations in Canada face. This research is done with the intent to be a stepping stone for the Samson Community to be aware and develop an action plan to remediate and prevent further harm caused by heavy metal contaminants present within the community's potable water sources.

Method(s): This research was conducted by first scouting three locations within the community, being an area locally known as "Whoville", the central townsite of Samson, and the countryside of Samson. Within these respective areas, "Whoville" and the townsite are under a centralized water system where it is plant treated, while the countryside uses groundwater wells that need to be shocked with chlorine. Water samples were collected over two days in November 2025, from a single home from each location, making a total of 12 samples. These samples went through 4 analytical processes, being water testing strips, a YSI Quatro water quality meter, X-Ray Flouresence analyzer, and sending samples to the University of Alberta, where they were analyzed using a Thermo iCAP Pro Duo analytical machine. These processes were used to both locate and quantify any heavy metals present within the water samples, as well as provide secondary parameters that can explain the heavy metal concentrations present.

Result(s) -or Anticipated Results: Anticipated results for this research include finding both trace levels, as well as above acceptable levels of heavy metal contaminates according both to human health research, as well as federal and provincial set standards for potable water, as Samson Cree Nation is federally designated land.

Conclusion(s): This research is important as not only Samson Cree Nation faces issues of boiling water advisories and water infrastructure being used long past its service life, but other nations face similar circumstances, along with a noticeable lack of research looking into this subject. The analysis of heavy metal contamination in drinking water sources is important as it affects the health of community members, and if worked on can create healthier conditions, placing less stress on the healthcare system, and preventing chronic illness within current generations, and future generations of people.

Comfort Adeyemo, Martin Higgins and Elizabeth Farrell Luka

FACULTY: MANAGEMENT
DEPARTMENT: INFORMATION SYSTEMS ASSURANCE MANAGEMENT AND INFORMATION SYSTEMS SECURITY MANAGEMENT

DESIGNING A CONTINUOUS IT AUDIT MONITORING DASHBOARD USING POWER BI

Background: Information technology audits in many organizations are conducted only once or twice a year. As a result, control weaknesses can go unnoticed for long periods of time. Because these audits rely on periodic reviews rather than automated monitoring, there is often a delay between when a problem occurs and when it is detected. At the same time, organizations are increasingly dependent on digital systems to manage sensitive information. In healthcare settings, this includes patient records, system availability, data backups, and software updates. These growing digital demands highlight the need for tools that allow ongoing oversight instead of waiting for the next scheduled audit.

Purpose: This project aims to design a dashboard that supports continuous monitoring of key controls in healthcare information systems. The goal is to provide auditors and managers with near real time visibility into whether important safeguards are functioning properly. By doing so, the project seeks to reduce risks and support more timely decision making.

Methods: The research will involve designing an interactive data visualization dashboard using simulated data. The synthetic data will represent common control areas such as access to patient records, data backup status, system availability, and software update compliance. The dashboard will be structured to reflect widely recognized information technology governance and cybersecurity guidance, as well as legal requirements under Alberta's Health Information Act. The design will focus on clarity, ease of use, and practical application for audit and oversight purposes.

Anticipated Results and literature-based insight: The expected outcome is a functional dashboard that demonstrates how continuous monitoring can operate in practice. The project will also produce a detailed written report and a reusable template that can be adapted by audit and governance teams in healthcare and other sectors. The literature indicates that continuous auditing is most effective when monitoring technologies, control objectives, and professional judgment are integrated rather than implemented in isolation. Prior studies show that dashboards alone do not improve oversight unless they are explicitly aligned with key controls and embedded within audit and governance workflows.

Conclusions: By bridging audit concepts with applied data visualization, this research aims to show how continuous monitoring dashboards can strengthen oversight, reduce risk, and promote proactive management of information systems.

Lauren McLennan and Elizabeth Coker-Farrell

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

THE ENVIRONMENTAL IMPACT OF GREEN HUMAN RESOURCE MANAGEMENT PRACTICES FOR THE FUTURE OF WORKPLACE ENVIRONMENTS

Background: Organizations are increasingly expected to integrate environmental sustainability into workplace practices. In Human Resource Management (HRM), this has led to Green Human Resource Management (GHRM), which promotes environmentally responsible behavior through recruitment, training, performance management, and rewards. At the same time, organizations are adopting artificial intelligence (AI) to improve Human Resource Management efficiency in areas such as recruitment and workforce analytics. However, artificial intelligence also raises environmental concerns because the data centers that power these systems consume large amounts of energy—about 1.5% of global electricity in 2024—contributing to carbon emissions. Organizations must balance sustainable Human Resource Management practices with technological innovation.

Purpose: This study examines how Green Human Resource Management practices influence organizational sustainability and employee engagement while also exploring the environmental and ethical implications of artificial intelligence use in Human Resource Management function. It asks:

- How do Green Human Resource Management practices influence sustainability and employee engagement?
- What Human Resource Management strategies most effectively encourage environmentally responsible employee behavior?
- How does the use of artificial intelligence in Human Resource Management affect environmental sustainability and ethical decision-making?

Methods: This research uses a literature review and comparative analysis of academic studies examining Green Human Resource Management practices, employee green behavior, and artificial intelligence integration in Human Resource Management systems.

Key Findings: Research shows that Green Human Resource Management practices improve environmental and organizational performance. Green training, performance appraisals, and reward systems positively influence sustainability and employee performance Green recruitment and environmental initiatives also encourage employee green behavior when supported by training and rewards. While artificial intelligence improves Human Resource Management efficiency, concerns remain about energy consumption, ethical transparency, and reliance on automated decision-making.

Implications for Human Resource Management practices: Human Resource Management professionals should integrate sustainability into recruitment, training and performance management while ensuring responsible artificial intelligence use through human oversight, transparency, and environmental accountability.

Conclusion: Green Human Resource Management strengthens sustainability and employee engagement, but organizations must carefully manage the environmental and ethical implications of artificial intelligence to support responsible Human Resource Management decision-making.

Suraj Neupane and Md Morshedul Islam

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

EXPOSING PRIVACY VULNERABILITIES IN FEDERATED LEARNING: A GAN-BASED MODEL INVERSION ATTACK

Background: Federated learning (FL) is a decentralized machine learning (ML) paradigm designed to train models collaboratively while preserving data privacy. Instead of collecting raw data at a central server, FL allows multiple clients to train models locally and share only model updates for aggregation. This approach reduces the risk of direct data exposure and supports learning from distributed data structure. However, despite these privacy advantages, FL systems remain vulnerable to several advanced privacy attacks. As FL becomes widely used in sensitive domains such as healthcare, understanding potential privacy risks is increasingly important.

Purpose: One significant privacy threat to FL is the model inversion attack, in which an adversary attempts to reconstruct representative samples of a target class from a trained model. Such attacks can expose sensitive information, particularly in applications involving medical data. The purpose of this study is to design and evaluate a Generative Adversarial Network (GAN)-based model inversion attack tailored for FL in medical imaging. Specifically, the research aims to assess the feasibility of reconstructing class-specific medical images under realistic attack assumptions and to expose potential privacy vulnerabilities in FL systems.

Method: The proposed approach implements a Deep Convolutional Generative Adversarial Network (DCGAN)-based model inversion attack under a realistic threat model. In this setting, an external attacker collaborates with an honest-but-curious client who follows the FL protocol but provides model outputs, such as loss values, in response to adversarial queries. The attacker does not have access to the original training data. The attack consists of three main steps. First, the attacker collects an auxiliary dataset that is similar in type to the private training data but does not overlap with it. This auxiliary data is used to train the DCGAN, enabling the generator to produce realistic synthetic images. Second, randomly initialized latent vectors are used to generate synthetic images that are submitted to the trained FL model via black-box queries. Finally, the attacker optimizes the latent vectors using feedback from the model outputs to gradually refine the generated images so that they increasingly resemble the target class.

Results: The proposed attack was evaluated using the Brain MRI ND-5 dataset, a large-scale dataset containing multiple brain tumor categories. Experimental results show that the DCGAN-based approach can successfully reconstruct class-specific MRI images using only model feedback and auxiliary data. Quantitative evaluation using cosine similarity between feature representations indicates that reconstructed images become significantly closer to real samples. Furthermore, experiments with different FL aggregation algorithms demonstrate similar vulnerability levels, suggesting that the attack can be effective across various federated learning configurations.

Conclusion: This study demonstrates that federated learning systems remain susceptible to model inversion attacks even under black-box conditions. These findings highlight important privacy risks and emphasize the need for stronger privacy-preserving mechanisms and defenses to protect sensitive information in federated learning systems.

Dr. Matthew Berry, Peter Felsman, Bethany Xan Kerr, and Thalia Goldstein

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

THE THREE T'S OF ACTING: A DESCRIPTIVE ANALYSIS OF THE TECHNIQUES, TRAININGS AND TYPES USED IN A MODERN SAMPLE OF WESTERN ACTORS

Background: Acting in character has been observed in every culture for various purposes, including religious rituals, myths, theatrical performances, and rites of passage. While it is ubiquitous, it is not uniform, as actors' approaches to acting have evolved with changing cultural sensibilities and taste. For instance, in the 17th century, western theatre actors used exaggerated, caricature-like vocal and physical gestures to portray their character's inner states, which was surpassed in popularity in the 20th century by a more realistic acting approach suitable for both stage and screen. Two broad modern approaches to acting are 'outside-in,' based on physical technique, and 'inside-out,' based on emotion. Yet, the extent to which this binary typology holds empirically true is an open question. To develop a data-driven interpretation of the acting process, a deeper, more detailed understanding of the practicing modern western actor and their approaches to acting is required.

Purpose: This study aims to develop a detailed understanding of the various acting techniques, trainings, and character types used by actors by surveying a sample of modern western actors at different stages of their education and career. The primary research question is how actors actually approach acting. Secondary research questions investigate if actor techniques are associated with actor training, character types, performance outcomes such as memory, psychological outcomes, and demographics.

Methods: Using a cross-sectional survey design, data from a sample of actors (N = 221) was compiled from two online surveys completed in Fall 2021 (n = 59) and Fall 2022 (n = 162). Participants were recruited using a convenience sampling approach, with survey links e-mailed and posted on social media. The survey included demographics, measures exploring actors' preparation processes, techniques, trainings, character type endorsement, performance measures, and several psychological measures. The data was analyzed using dimension reduction techniques to identify underlying dimensions of actor techniques, trainings, and types.

Results: Dimension reduction with exploratory factor analysis and cluster analysis revealed 1) three underlying dimensions of actor techniques: one reflecting analysis techniques, one reflecting embodied techniques, and one reflecting meta-cognitive techniques; 2) two underlying groupings of actor training: one reflecting basic trainings and another reflecting more advanced trainings; and 3) six underlying groupings of character types: a charismatic lead, a relational innocent, an affectionate deviant, a villain/dominant performer, an institutional authority, and a resilient outsider. Further associations between techniques, trainings, types, as well as with actor demographics, performance outcomes, and psychological outcomes will be presented.

Conclusion: Understanding of acting approaches used by modern actors must go beyond broad descriptions like 'outside-in' and 'inside-out' to make any concrete psychological associations. For this, the techniques, trainings, and character types that actors call upon when acting should be examined, formalized, and used for prediction.

Alexandra Asuchak and Amro Soliman

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

PLANT-DERIVED COMPOUNDS IN THE FIGHT AGAINST ANTIMICROBIAL RESISTANCE

Bacterial infectious diseases account for high mortality and morbidity worldwide. Currently, our main defence is antibiotics, but overuse/misuse is causing microorganisms to develop resistance, making treatments less effective. One solution is to explore natural alternatives, such as herbs that could potentially contain compounds believed to act as "nature's antibiotics." The purpose of this study is to test the antimicrobial activity of extracts from Oplopanax horridus (Devils Club), Ligusticum porteri (osha root), Cymbopogon citratus (lemongrass), Camellia sinensis (tea tree), and Parietaria judaica (pellitory-of-the-wall) against bacterial species Bacillus cereus, Staphylococcus epidermidis, Enterobacter cloacae, Proteus mirabilis, Salmonella typhimurium, and Lactobacillus plantarum. To determine the antimicrobial effects of the listed herbs, Kirby-Bauer test and minimum inhibitory concentration tests were utilized. The Kirby-Bauer test involves inoculation of bacteria on agar plates, and the addition of discs containing dilutions of the herbal extract, along with positive/negative controls. Various dilutions of each herbal extract were utilized. Antibiotics and ethanol were used as positive and negative controls, respectively. After incubation for 48 hours, the area around the disc where no bacterial growth occurs is measured, yielding the zone of inhibition. Results of the Kirby-Bauer test varied between plant extracts. Osha root extract (1:10 dilution) showed a zone of inhibition of 8 mm for Bacillus cereus. Results of lemongrass herbal extract showed complete growth inhibition for Enterobacter cloacae and Salmonella typhimurium. Lemongrass (stock) had the best results for Porteus mirabalis, having a zone of inhibition of 18 mm compared to the antibiotic at 10 mm. Tea tree herbal extracts had a zone of inhibition of 24 mm (stock) for Staphylococcus epidermidis, while dilutions (1:5, 1:10) had no inhibitory effects. Tea tree extract had a zone of inhibition of 19 mm (1:5) and 10 mm (1:10) for Salmonella typhi. Devil's club herbal extract, with Bacillus cereus, showed a decreasing zone of inhibition with dilution of the oil; 7.5 mm (Stock), 12 mm (1:1), 10.5 mm (1:5). No antimicrobial effect has been detected in pellitory-of-the-wall against the selected bacterial species. Minimum inhibitory concentration experiment tests the inhibition capabilities of the herbal extracts in liquid media. Minimum inhibitory concentration testing was conducted via serial dilution of a 2% oil in media mixture (0.06% to 2%). Osha root exhibited a minimum inhibitory concentration at 0.125% for Bacillus cereus and Staphylococcus epidermidis. Lactobacillus plantarum growth was inhibited at all oil concentrations, thus indicating a minimum inhibitory concentration lower than 0.06%. The results from osha root testing of minimum inhibitory concentration correspond with the results from Kurby-Bauer testing; this indicates that osha root has antimicrobial effects on Bacillus cereus, Staphylococcus epidermidis, and Lactobacillus plantarum. Further experiments will assess the antibacterial activity of devil's club and pellitory-of-the-wall.

Dr. Mark Loo, Nicholas Pacuari, Connor Pacuari, and Brendan Roby

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

IDENTIFYING FACTORS THAT INFLUENCE GEN Z'S INVESTING DECISIONS

Background: Gen Z is the fastest growing group of investors: about 35% of age 18-25. Global income controlled by Gen Z is projected to reach 33 trillion by 2030, this makes their investing habits a major force in capital markets. Lack of empirical research identifying factors that influence Gen Z's investment decisions.

Purpose: To determine the degree

1. Digital platform engagement influences Gen Z's investing decisions
2. Social influence on Gen Z's investing decisions
3. Gen Z's personal values influence their investing decisions

Methodology: Literature review to develop framework for research questionnaire. Interview a financial advisor to gain insight into Gen Z and provide feedback to the questionnaire

Sample: Gen Z born between 1997-2012

Instrument: Questionnaire via social media, emails and personal interviews. Scale: 1 = Strongly Disagree to 5 = Strongly Agree

Pretest questionnaire: 1 CIBC financial advisor, 6 Gen Z active investors, 3 Gen Z non investors

Time frame: 4-week collection period

Results: Respondent Characteristics

- 104 (email 17%, Reddit 28%, other online sources 30%, personally administered 23%.
- 18-23 73% and 24-28 24%.
- Male 50%, Female: 46%, prefer not to say 4%.
- Students 56%, Working 36%, Others 7%
- 43% of respondents were beginner investors

Objectives:

1. Degree Digital platform engagement influences Gen Z's investing decisions:

   Information (4.21), User-friendly (3.91), Gamification (3.61)

2. Degree Social Influence on Gen Z's investing decisions (Open questions).

   Friends and family (28 %) social validation, peer discussion increases trading activity,

   Social media (20%) can both educate and create FOMO – fear of missing out.

3. Gen Z's personal values influence their investing decisions:

   Wealth building (84%), Home ownership (85%), Retirement (88%),

HYPOTHESIS	OUTCOME	P	BETA
H1 Digital platform engagement	Not supported	0.286	2.286
H2 Social influence	Supported	0.004	0.288
H3 Personal values	NA no numeric value	NSA	NA

Conclusion: Managerial Implications

Integrate educational content platforms: embed micro lesson with an in app-reward to incentivise financial literacy and user engagement

Allow personalized options: Use AI and data analytics to provide tailored portfolio insights and customized in app options to personalize user's experience

Prioritize platform functionality, user experience: ease of use to improve engagement

Oluwakayode Soyinka and Baidya Saha

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

MIVA-KNIGHT: A DOMAIN-ADAPTIVE MULTI-MODAL VOICE ASSISTANT USING HYBRID RETRIEVAL-AUGMENTED GENERATION

Today's voice assistants like those found on smartphones and smart speakers are designed to answer almost any question on any topic. While this makes them useful in everyday life, it also makes them unreliable in high-stakes professional environments. When an assistant is trained on general knowledge, it can produce confident-sounding answers that are simply wrong. In fields like healthcare, energy management, and corporate governance, a wrong answer is not just an inconvenience it can have serious consequences. On top of that, most of these systems send data to remote servers to process requests, which creates unacceptable privacy risks for organizations handling sensitive information.

This project introduces MIVA-KNIGHT, a voice assistant built specifically for professional and institutional use. Rather than trying to know everything, MIVA-KNIGHT is designed to know things correctly. It checks its facts before answering by searching a structured knowledge base of verified, real-world information specific to a professional field. This field of focus for example, medical radiology or corporate compliance is called a domain. The system searches tens of thousands of verified entities within that domain and uses that evidence to construct every response, rather than relying on memorized training data alone.

What makes MIVA-KNIGHT particularly distinctive is its ability to understand multiple types of input simultaneously a capability called multi-modal processing. In simple terms, a user can ask a question using their voice, upload an image, and feed in sensor readings all at once, and the system processes all of these together to form a single, coherent response. Specialized processing components handle each input type text, audio, images, and sensor data and combine them seamlessly before generating an answer.

The system also includes a three-tier confidence mechanism to guard against unreliable responses. When confidence is high, the system responds fully. When confidence is moderate, it provides a partial response with appropriate caveats. When confidence is too low, it refuses to answer rather than risk producing inaccurate information. This design prioritizes trustworthiness over the appearance of competence.

MIVA-KNIGHT also operates entirely on an organization's own computers no internet connection or cloud service is required. Sensitive data never leaves the institution's own systems, addressing one of the most significant concerns around deploying artificial intelligence in regulated industries. The system can also switch between entirely different professional domains in under five seconds, without needing to be retrained from scratch.

The results are promising across multiple industries. In healthcare, the system is projected to improve diagnostic accuracy by thirty percent. In manufacturing, it is expected to cut equipment downtime by forty percent. In the energy sector, it could reduce operational costs by fifteen percent. These figures reflect a system designed not just to sound intelligent, but to deliver reliable, verifiable answers in environments where accuracy genuinely matters.

MIVA-KNIGHT represents a meaningful step toward artificial intelligence that professionals can genuinely trust transparent, private, and grounded in verified knowledge.

Elizabeth Arpin and Alla Konnikov

FACULTY: ARTS
DEPARTMENT: SOCIAL SCIENCES

"YOU CAN'T ESCAPE IT. IT'S EVERYWHERE.": EXPLORING HOW UNDERGRADUATES PERCEIVE AND USE AI

The rapid adoption of AI technologies is becoming integral to the teaching and learning experience, with the potential to reshape how students learn from, interact with, and access resources. This pervasive adoption of technologies raises important questions about the ethical aspects of such usage and its implications for academic integrity and social inequality. While literature on AI implications for social inequality primarily focuses on decision-making processes as they evolve across high-stakes structural domains, such as labour markets, banking and criminal justice systems, healthcare, and education, little focus is oriented toward studying the individual usage of AI as well as how users perceive and understand the implications of AI. Students, in particular, are navigating these technologies daily, yet their perspectives and experiences remain largely absent from the conversation. This study seeks to address this gap by centering on students' perceptions of and engagement with AI technologies in the context of higher education.

We conducted an exploratory qualitative study focusing on exploring students' perceptions of AI technologies using the focus group methodology that is particularly suited for learning about evolving trends, usage patterns and attitudes. Focus groups help to trace the individual perspectives along with the dialogues that emerge through facilitated discussion. A semi-structured protocol guided each session to explore key themes such as awareness and understanding of AI technologies, patterns of AI usage, perceived benefits, challenges, and implications of AI adoption, and allowed additional themes to emerge naturally through the conversation. Sessions were audio-recorded and transcribed verbatim to capture the dialogues and ideas accurately.

The preliminary analysis reveals that students hold heterogeneous and often polarizing views about AI technologies, both in general and in relation to their learning processes. While some students embrace AI as a valuable tool, others express reservations about its role in education. Their perspectives highlight tensions between the perceived convenience of AI and its broader costs of environmental damage, erosion of critical thinking skills, and the spread of misinformation. Using an exploratory design, this study aims to amplify the voices of students whose perspectives on AI technologies are currently understudied. The more we understand users' perspectives and experiences with AI, the better equipped we are to design equitable, realistic, and effective AI technology policies and practices within higher education and beyond.

Basma Khan, Sraboni Biswas and Eslam AbdAllah

FACULTY: MANAGEMENT
DEPARTMENT: INFORMATION SYSTEMS ASSURANCE MANAGEMENT AND INFORMATION SYSTEMS SECURITY MANAGEMENT

SECURITY ANALYSIS OF RFID-BASED HEALTHCARE SYSTEMS: SIMULATION OF CLONING AND MAN-IN-THE-MIDDLE ATTACKS

The healthcare sector now employs Radio Frequency Identification (RFID) technology to assist with patient identification and medication distribution and equipment monitoring. Healthcare workers use RFID-enabled wristbands to obtain patient data which helps them work more efficiently. The wireless technology of RFID communication creates multiple security weaknesses that attackers can exploit unless organizations establish effective authentication systems. Cloning attacks and Man-in-the-Middle (MITM) attacks represent major security threats that can destroy both the integrity and authenticity of healthcare information in RFID systems.

In this research, we evaluate security weaknesses in RFID-based healthcare systems by creating realistic attack simulations that demonstrate RFID cloning and MITM attack techniques. We made a healthcare RFID environment which includes an RFID tag used for patient wristbands and an RFID reader that scans the tag and a backend server that verifies the transmitted data. We show how the system operates under normal conditions and when attacked.

An attacker in the cloning attack scenario uses a legitimate RFID tag to capture its unique identifier and authentication details, which are then copied onto a counterfeit tag. The cloned tag contains identical credentials to the original device which enables the system to treat both authentic and cloned tags as one entity. The vulnerability allows unauthorized users to access protected healthcare systems while they can also alter patient identification information.

The MITM attack scenario shows how an attacker who positions himself between the RFID reader and backend server can intercept and control all data that travels between them. The attacker makes the system process wrong information by changing transmitted data which he sends to the server. Data origin verification needs to occur because simple integrity checks fail to protect systems from manipulative communication which will look genuine to the server.

We establish a security improvement mechanism through cryptographic authentication which protects against system vulnerabilities. The proposed solution uses a shared secret and Hash-Based Message Authentication Code (HMAC) to ensure both data integrity and origin verification. The system uses this mechanism to identify and block any communication that has been modified.

The results demonstrate that RFID-enabled healthcare systems require more secure authentication methods which need to be implemented. This research demonstrates RFID security risks through controlled simulation experiments that show both cloning and MITM attack methods which help develop better security measures for healthcare IoT systems.

Elora Charabin

FACULTY: ARTS
DEPARTMENT: PHILOSOPHY, RELIGIOUS STUDIES AND CLASSICS

CAN VIDEO GAMES INCREASE OUR UNDERSTANDING OF ANCIENT MYTH?: AN ANALYSIS OF THE GAME HADES

This paper is a detailed analysis of the main gods in the video game "Hades" by Supergiant Games and the accuracy of their portrayal. By looking into aspects of each god, such as their dialogue, artistic design, interactions with other gods/items/the player, and their abilities within the game, it can be determined if this modern interpretation of myth is accurate. Therefore, this is useful as it can enhance the understanding of ancient myths in a new and exciting way. I walk through the gods methodically in alphabetical order, going through each reason I feel that the game's portrayal is accurate or not. Not every god is accurate, as discovered through playing the game, but that leads to further analysis of whether everything must be accurate to teach us more about myth. The paper explores the twelve Olympians of the Greek pantheon, as well as a few minor gods, like Zagreus and Persephone, who play major roles in the game. Looking at multiple ancient myths and multiple interpretations of each god as the framework, it is easy to see how accurate the game's portrayal of the Olympians is. This paper contributes to the subject area by making a comment on the validity of the analysis of modern interpretations of ancient Greek mythology. Popular media is a way many people learn about mythology, so studying the accuracy and validity of modern interpretations is a way to expand how people learn about and teach it. In the paper, I conclude how important the accuracy is in each instance, as certain areas need to be more precise than others. By pushing aside accuracy in areas that are objectively less important, we can make room for modern interpretations as a way to get more people interested in the subject matter. Thus, I determined that, despite some very serious inaccuracies, the gods were sufficiently accurate to constitute a valid and useful modern interpretation of mythology. Thus, the game "Hades" does have something to teach the general public interested in Greek myth.

Harsh Parekh, Parth Vikrambhai Suchak, Smit Kalpeshbhai Patel, and Eslam G Abdallah

FACULTY: MANAGEMENT
DEPARTMENT: INFORMATION SYSTEMS ASSURANCE MANAGEMENT AND INFORMATION SYSTEMS SECURITY MANAGEMENT

UNAUTHENTICATED COMMAND INJECTION AND DENIAL OF SERVICE ATTACKS ON AUTONOMOUS VEHICLES: EVALUATION AND DEFENSIVE STRATEGIES

Modern self-driving vehicles depend on wireless links to roadside and cloud servers for their real-time driving instructions and safety information. The vehicles use rapid and efficient message transmission systems which still lack some safety mechanisms to verify authentic messages. Therefore, the unverified local network enables attackers to transmit false control commands which disrupt vehicle functions and create hazardous situations or lead to system failures. In this research, we demonstrate how attackers can use unprotected wireless control messages to create denial of service attacks which disable autonomous vehicle functions. We assess the effectiveness of various defense solutions which used MITRE ATT&CK framework recommendations to identify the most effective security method that would maintain vehicle functionality and increase the overall safety. We develop a real-world testing facility that uses a Raspberry Pi vehicle model equipped with motor drivers, line-following sensors, and wireless communication features. The vehicle receives basic movement instructions which include forward reverse turn and stop from a valid controller through a local wireless network. An attacker transmits false commands which would create conflicting signals that would render the vehicle control system inoperable. We conduct a comprehensive evaluation of four defense techniques which were designed according to MITRE ATT&CK framework. These defense mechanisms include network traffic filtering, device address binding, rate limiting and digital signature message authentication. The attacker successfully disrupted vehicle operation by sending conflicting commands that overwhelmed the control system and prevented normal movement. The first three defense mechanisms (network filtering, device binding, and rate limiting) were reduced but did not eliminate the attacker's ability to interfere with vehicle control. The digital signature authentication system successfully blocks all fake commands while legitimate control messages continued to operate with minimal processing delay. The four MITRE ATT&CK framework-based solutions evaluated, message authentication using digital signatures implemented directly on the vehicle provides the most reliable protection. Thus, the research findings establish that lightweight cryptographic authentication forms a critical requirement for maintaining safe and dependable operation of autonomous vehicles within shared wireless network environments.

Celina Posa, Tim Lomas and Holli-Anne Passmore

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

"LIFE FULL OF LOVE": A RCT TESTING A NEW WELLBEING INTERVENTION

Background: We all want to experience love; it is an inherent part of being human! However, popular culture focuses primarily on "romantic" love. But romantic love is only one, of many, types of love. Indeed research suggests there are 14 different types of love, many of which are overlooked and/or underappreciated. Our narrow cultural view of love reduces the complexity of this rich and deep, broad and nuanced, experience and emotion to one single aspect of what love truly is. Although academic attention on "love" is somewhat broader, including attention to love bonds within family settings, relatively little attention has been paid to other forms, expressions, and experiences of love. To date, no one has experimentally tested purposely paying attention to different types of love.

Purpose: Thus, the purpose of our study was to empirically test, the "Life Full of Love" wellbeing intervention.

Method: We grounded our study in Tim Lomas' cross-cultural research wherein 14 types of love were identified (i.e., experiential, aesthetic, rooted, friendly, self, familial, passionate, playful, possessive, rational, star-crossed, compassionate, momentary, and reverential). All participants (N = 83) completed a set of pre-questionnaires assessing various aspects of wellbeing. Participants were then randomly assigned to either the "Love" condition or to a wait-list control. Those assigned to the "Love" condition were instructed to, for the next 14 days, notice how many different types of love they experienced. Each day, participants received an email with a description and example highlighting a specific category of love (along with the full list of the different types of love). Participants were instructed to, as they went about their day, be mindful of the various moments and types of love they experienced. Once a day, participants logged onto the study's website, checked off which type of love they noticed and experienced that day, and noted any comments or observations about that day's experience of love. At the end of two weeks, all participants completed a set of post-questionnaires, again assessing various aspects of wellbeing.

Results: Compared to participants in the control group, those who engaged in the Life Full of Love intervention reported significantly higher levels of positive affect, transcendent connectedness, the significance aspect of meaning in life, feeling they matter to society, and significantly lower levels of negative affect and anxiety (ds 0.44–0.77). All but 4 participants (91.11%) said they were "likely" or "very likely" to continue doing the activity, and 84.44% of participants said they were "likely" or "very likely" to recommend the Life Full of Love wellbeing intervention to a friend. Several participants commented that their life was, indeed, more full of love than they had realized.

Conclusions: These results provide important empirical support for "Life Full of Love" as an effective wellbeing intervention, boosting general positive emotions and a grand sense of connectedness, along with enhancing the feeling that one's life is meaningful and does matter.

Dr. Amro Soliman, Farah Haddad and Daniel Barreda

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

THE ADAPTIVE ROLE OF FEVER IN IMMUNE DEFENSE ACROSS EVOLUTION

Fever is an evolutionarily conserved response to infection observed across endothermic and ectothermic vertebrates. In ectotherms, fever manifests behaviourally, a voluntary migration to warmer environments to increase host's body temperature (i.e., behavioural fever). Despite its ubiquity and its role in promoting host survival upon infection, the adaptive significance of fever and its mechanistic role in enhancing immune functions remain incompletely understood. This study aimed to identify the mechanistic role of fever in promoting innate immune responses using an ectothermic model.

A teleost fish model was used to study the impact of fever on immune activation during infection. Fish were experimentally infected with Aeromonas veronii and housed in a custom-built thermal-gradient swim chamber that allowed voluntary thermal selection. Immune parameters, including leukocyte recruitment, phagocytic activity, cytokine expression and bacterial clearance, were assessed in febrile versus non-febrile fish. Parallel experiments involving mechanically induced hyperthermia were also conducted to distinguish natural thermoregulatory effects from artificial heat exposure.

Infected fish consistently selected warmer temperatures, demonstrating a robust behavioural fever response. Fever fish exhibited enhanced leukocyte recruitment to infection sites and modulated expression of key pro-inflammatory cytokines. These immune enhancements were associated with faster bacterial clearance, even though the pathogen displayed optimal growth at elevated temperatures. This was further associated with accelerated restoration of tissue homeostasis. Fever fish exhibited significantly better wound healing capacity induced by upregulation of several growth factors. Mechanically induced hyperthermia failed to replicate these benefits, indicating that behavioural fever is an integrated adaptive process rather than a simple thermal effect.

This work demonstrates that fever represents an evolutionarily conserved and actively regulated immune strategy that optimizes host defense against infection. By coupling thermoregulatory behaviour with enhanced immune function, behavioural fever exemplifies the deep evolutionary link between physiology and immunity in vertebrates. Ongoing research has preliminarily identified specific molecular and signalling pathways underlying this adaptive response at the cellular level.

Dr. Elaine Greidanus, Thea Comeau, Jamie Dyce, and Aya Cheaito

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

WHAT DO CLINICAL PSYCHOLOGY SUPERVISORS CONSIDER WHEN EVALUATING STUDENTS APPLYING FOR PRACTICUM PLACEMENT?

Background: The selection of trainees for clinical psychology practicums and internships serves a consequential gatekeeping function that shapes the development of professional competence and protects client welfare. Although training programs articulate formal entry criteria and competency benchmarks, relatively little empirical work has examined how supervisors actually deploy these standards when evaluating applicants for clinical placements. Psychology trainee selection emphasizes academic preparation, clinical experience, and letters of reference as key predictors of selection decisions. Moreover, internship and practicum sites frequently highlight attributes such as interpersonal skills, emotional maturity, professionalism, and fit with the training context, indicating that supervisor judgments extend beyond easily quantifiable metrics. However, the relative importance and underlying rationales for these considerations remain underexplored from an empirical standpoint. The present study addresses this gap by investigating what clinical psychology supervisors consider when evaluating applicants for practicum and internship placements. Specifically, this research aims to delineate the applicant characteristics supervisors prioritize and to clarify how these considerations map onto contemporary competency-based training frameworks.

Purpose: To determine the manner through which supervisors in clinical psychology assess potential practicum students, and how well these assessment practices align with the competencies suggested by scholarly literature to predict success in practicum.

Method(s): A survey will be developed and completed by at least 15 clinical psychologists who supervise masters or doctoral students and have been involved in application review and decision making. The survey will include questions about the criteria that the supervisors consider when evaluating practicum students for acceptance into practicum. Qualitative questions will elicit descriptions of how specific practicum sites needs may be unique, what unique data may be considered, how experience with past students have shaped decision making, and advice for students applying for clinical psychology practicum. Responses will be analyzed on a question-by-question basis using Reflexive Thematic Analysis.

Result and Conclusions: It is anticipated that the factors that supervisors report will include many of the factors that the scholarly literature suggests predict success in clinical placement, such as emotional intelligence. It is further anticipated that the results will reveal site-specific differences, differences between evaluating practicum vs. provisional student applicants, and differences between the local sample and scholarly findings from other jurisdictions and countries.

Dr. Tim Cusack

FACULTY: EDUCATION
DEPARTMENT: EDUCATION

MENTORSHIP THAT MATTERS: WHAT POST-SECONDARY EDUCATORS CAN LEARN FROM K-12 TEACHER MENTORSHIP

Mentorship is widely recognized as one of the most powerful ways to support professional growth, yet it is often left informal, unstructured, or dependent on goodwill rather than intentional design. In many professions, including teaching and higher education, individuals are frequently expected to learn complex roles through trial and error. This presentation explores how structured mentorship models developed for teacher development can offer valuable insights for post-secondary educators, academic leaders, and institutions seeking to better support faculty, graduate students, and early career professionals.

Drawing on research and practical frameworks from teacher mentorship, this session introduces a model that emphasizes four essential elements for effective mentorship: trust, professional identity, guided support, and a positive learning environment. These elements are central to helping new professionals move beyond basic survival in their roles toward confidence, competence, and long-term commitment to their profession. While these ideas originate in the context of teacher development, they translate well to post-secondary settings where faculty members, sessional instructors, and graduate students often navigate similar challenges such as unclear expectations, professional isolation, and steep learning curves.

Participants will explore how mentorship can move beyond casual advice toward purposeful professional learning. The presentation will highlight practical strategies that universities can use to build stronger mentorship cultures, including structured conversations, reflective practice, collaborative problem solving, and the intentional development of professional identity. It will also address the role of experienced educators and academic leaders in creating environments where emerging professionals feel supported while still being challenged to grow.

A key focus of the session will be the idea that mentorship is not simply about helping someone “get through the first year.” Instead, effective mentorship helps individuals understand their purpose, develop confidence in their professional judgment, and build habits of reflection that sustain long-term growth. When institutions design mentorship intentionally, the benefits extend beyond individual development to include stronger teams, improved teaching and learning, and healthier academic communities.

This presentation will offer practical insights for faculty members, department leaders, and graduate supervisors who wish to strengthen mentorship practices in their own contexts. By adapting lessons from teacher mentorship, post-secondary institutions can create more supportive pathways for developing the next generation of educators and scholars.

Dr. Thea Comeau, Alexander Taikh, Shoshana Golsof, and Zdravko Marjanovic

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

POLITICAL PERSPECTIVES OF JEWISH CANADIANS IN THE AFTERMATH OF OCT. 7TH

Background: Psychological trauma has substantial potential to catalyze significant changes for individuals exposed to profound suffering. While the potential of trauma to inflict suffering and pain is well documented, in the last 30 years, research has explored it's potential to illicit positive changes in the lives of survivors. When these changes are positive, they are commonly referred to as posttraumatic growth (PTG), or the positive psychological changes which arise from worldview shattering traumatic experiences. These changes can occur in many domains of survivors' lives, including intrapsychic experiences, interpersonal relationships, and societal engagement. Previous research has suggested that one area in which PTG can manifest is in changes political perspectives and engagement.

Purpose: Given the current sociopolitical climate, it is important to understand how recent global traumatic events impact the political perspectives and behaviour of affected communities. The purpose of this study was to explore the changes in political viewpoints, attitudes, and behaviours of Jewish Canadians in the aftermath of the Oct. 7th attacks to better understand the lived experiences of this community during a period of heightened sociopolitical tension.

Method: The data from this study was derived from a larger study exploring the posttrauma outcomes of the heightened sociopolitical tension experienced by Jewish Canadians across the country following the Oct. 7th attacks. For this study, participants completed a mixed methods online survey including measures of posttraumatic growth and depreciation, the endorsement of personal values, and responded to open-ended, qualitative questions about the impact of the attacks on their personal values, values congruent behaviour, and interpersonal relationships. This presentation focuses on a subset of the data reflecting the analysis of one qualitative question, "Have you noticed any shifts in your political views or motivations as a result of the Oct. 7th attacks? Please describe these changes." Responses to this open-ended question are being analyzed using Reflexive Thematic Analysis.

Results: Sixty-one participants responded to this qualitative question. Preliminary findings suggest that participants experienced significant disruption in their political beliefs and identity. A substantial proportion of respondents reported moving towards a more conservative political identity. Several participants reported feeling alienated from previous liberal communities and values, which contributed to their move towards more conservative political engagement. Additionally, participants endorsed feeling confused or challenged about where to align politically given their perception of the response of political leaders and parties to the Oct. 7th Attacks.

Conclusion: It appears that the heightened sociopolitical tension following the Oct. 7th Attacks had a substantial impact on Jewish Canadians, who may not have had direct lived experience of the Attacks, with many reporting significant impacts on their political perspectives and behaviour. This provides important insight into the global impact of incidents of violence, even when they are experienced distally.

Adoration Etusi-Ehimen

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

THE DUAL MANDATE: INTERPRETING THE STRATEGIC ROLE OF HUMAN RESOURCE MANAGEMENT WITHIN THE FRAMEWORK OF EMPLOYMENT LAW

Background: Human Resource Management (HRM) has evolved from a clerical function to a strategic pillar essential for organizational survival. This research explores how HR aligns workforce capabilities with business goals while navigating a complex legal environment. In the modern corporate landscape, firms face a ""dual mandate"": achieving aggressive strategic goals, such as rapid scaling or cost-cutting, while remaining within the strict constraints of labor laws. Failure to balance these can lead to significant litigation; for instance, EEOC data frequently shows that retaliation and discrimination claims remain the most common legal challenges, often costing firms millions in settlements and lost productivity.

Purpose: The purpose of this research is to analyze the relationship between strategic HR impacts and the legal regulations governing the workplace. It seeks to identify the primary strategic contributions of HR to organizational success and evaluate how specific employment laws, such as Equal Employment Opportunity (EEO), limit or enable strategic execution. Ultimately, the study aims to determine the extent to which legal risk management dictates long-term HR policy.

Method: This research adopts a descriptive and qualitative research design to interpret the nuanced relationship between strategy and law. The study focuses on mid-to-large-scale enterprises across the service industry. Purposive sampling is used to select 50 HR directors with a minimum of 10 years of experience to ensure high-quality, expert data. Data is collected through semi-structured interviews and surveys. Thematic analysis is then applied to identify recurring patterns in how HR leaders interpret legal constraints during strategic planning.

Results / Anticipated Results: The analysis is expected to show that while legal frameworks are often viewed as ""red tape,"" they actually provide a roadmap for sustainable, compliant growth. Preliminary data suggests that organizations with robust legal-strategic integration see a reduction in labor disputes and higher employee retention. This research anticipates finding that EEO compliance acts as a catalyst for diverse human capital acquisition, which, according to the Resource-Based View (RBV), serves as a primary source of competitive advantage.

Conclusions: This research concludes that the strategic role of HR is inseparable from the framework of employment law. Balancing advocacy with business strategy allows HR managers to mitigate risk without sacrificing organizational agility. Strengthening the alignment between legal compliance and strategic goals fosters more inclusive governance and ensures that ""strategic"" moves do not come at the cost of employee rights or institutional reputation.

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Alex Taikh, Alyssa Hoffman, Cheryl Heidl, Thomas Loreman and Alexander Taikh

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

THE INFLUENCE OF PRACTICE AND GREATER TYPING FLUENCY OF IRREGULAR CHARACTER STRINGS ON THE TYPING OF PASSWORDS

Background: Typing a word requires first identifying that word, then, planning the appropriate sequence of keystrokes, and then executing those keystrokes. Keystroke latencies, like pauses in speech, are thought to reflect, among other factors, the processing of linguistic information of the word being typed and of its context. According to interactive theories of typing, linguistic information is active during and influences all stages of typing a word, such that the typing of a current word and the planning the typing of a subsequent occur in parallel and influence each other.

Passwords typically include linguistic information, even complete words, as well as irregular character strings such as symbols, numbers, and uppercase letters. Gow et al. (2024) found that, when typing three-word passphrases, an irregular sequence in the middle word slowed down the typing of both of its neighboring words. Specifically, typing the first word was slowed down by the difficulty in planning the irregular typing pattern of the middle word, and typing the irregular second word interfered with the planning of the third word.

Purpose: Passwords are typically typed repeatedly over the course of their use. Planning and typing of their constituent words and irregular character strings becomes less effortful and more fluent with repetition. In our study, we examined whether practice-induced fluency of the irregular character strings influences the typing of unpracticed adjacent words.

Method: Participants typed three-word passphrases, where the middle word was either unaltered or altered with irregular characters. The middle word remained fixed over successive trials, while the first and third words changed (e.g., word1 rack word3 vs. word1 R4(k word3).

Results/Conclusion: We found that typing of the altered middle word, while slower than typing of the unaltered word, sped up more dramatically over the course of successive trials. Crucially, typing of the first word sped up with successive trials, suggesting that the reduced planning demands of the fixed middle word allowed the first word to be typed more quickly. Surprisingly, typing of the third word did not speed up over successive trials. One potential explanation is that as the execution of the middle word became more fluent, the concurrent planning of the third word became easier. However, the execution of the middle word also became more rapid, and the time available for the concurrent planning of the third word was reduced. Our findings suggest that practice-induced fluency can result in a tradeoff between faster typing and reduced concurrent planning.

Alexandra Asuchak and Dr. Amro M Soliman

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

PLANT DERIVED COMPOUNDS IN THE FIGHT AGAINST ANTIMICROBIAL RESISTANCE

Bacterial infectious diseases account for high mortality and morbidity worldwide. Currently, our main defence is antibiotics, but overuse/misuse is causing microorganisms to develop resistance, making treatments less effective. One solution is to explore natural alternatives, such as herbs that could potentially contain compounds believed to act as "nature's antibiotics." The purpose of this study is to test the antimicrobial activity of extracts from Oplopanax horridus (Devils Club), Ligusticum porteri (osha root), Cymbopogon citratus (lemongrass), Camellia sinensis (tea tree), and Parietaria judaica (pellitory-of-the-wall) against bacterial species Bacillus cereus, Staphylococcus epidermidis, Enterobacter cloacae, Proteus mirabilis, Salmonella typhimurium, and Lactobacillus plantarum. To determine the antimicrobial effects of the listed herbs, Kirby-Bauer test and minimum inhibitory concentration tests were utilized. The Kirby-Bauer test involves inoculation of bacteria on agar plates, and the addition of discs containing dilutions of the herbal extract, along with positive/negative controls. Various dilutions of each herbal extract were utilized. Antibiotics and ethanol were used as positive and negative controls, respectively. After incubation for 48 hours, the area around the disc where no bacterial growth occurs is measured, yielding the zone of inhibition. Results of the Kirby-Bauer test varied between plant extracts. Osha root extract (1:10 dilution) showed a zone of inhibition of 8 mm for Bacillus cereus. Results of lemongrass herbal extract showed complete growth inhibition for Enterobacter cloacae and Salmonella typhimurium. Lemongrass (stock) had the best results for Porteus mirabalis, having a zone of inhibition of 18 mm compared to the antibiotic at 10 mm. Tea tree herbal extracts had a zone of inhibition of 24 mm (stock) for Staphylococcus epidermidis, while dilutions (1:5, 1:10) had no inhibitory effects. Tea tree extract had a zone of inhibition of 19 mm (1:5) and 10 mm (1:10) for Salmonella typhi. Devil's club herbal extract, with Bacillus cereus, showed a decreasing zone of inhibition with dilution of the oil; 7.5 mm (Stock), 12 mm (1:1), 10.5 mm (1:5). No antimicrobial effect has been detected in pellitory-of-the-wall against the selected bacterial species. Minimum inhibitory concentration experiment tests the inhibition capabilities of the herbal extracts in liquid media. Minimum inhibitory concentration testing was conducted via serial dilution of a 2% oil in media mixture (0.06% to 2%). Osha root exhibited a minimum inhibitory concentration at 0.125% for Bacillus cereus and Staphylococcus epidermidis. Lactobacillus plantarum growth was inhibited at all oil concentrations, thus indicating a minimum inhibitory concentration lower than 0.06%. The results from osha root testing of minimum inhibitory concentration correspond with the results from Kurby-Bauer testing; this indicates that osha root has antimicrobial effects on Bacillus cereus, Staphylococcus epidermidis, and Lactobacillus plantarum. Further experiments will assess the antibacterial activity of devil's club and pellitory-of-the-wall.

Ana Hinojosa

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

DATA DRIVEN RENOVATION: USING BUSINESS INTELLIGENCE AND PREDICTIVE ANALYSIS TO IMPROVE INVESTMENT DECISIONS IN A REAL ESTATE AND RENOVATION COMPANY

Small and medium sized companies form the foundation of the European economy, yet many of them still operate with limited digital infrastructure. This situation is particularly common in the construction and real estate sectors, where business decisions are often based on experience rather than systematic analysis of data. This research examines how a family owned renovation and real estate company in Girona, Spain can adopt business intelligence tools to improve operational efficiency and investment decision making.

The study focuses on Servicios Integrales Hinojosa, a small company that manages renovation projects and property related services. Like many small businesses in the sector, the company stores information in different formats such as spreadsheets, invoices, and paper documents. Because the information is fragmented, it is difficult for managers to obtain a clear overview of project costs, profitability, and performance. As a result, renovation investment decisions are often made using intuition rather than structured data analysis.

The objective of this research is to design a business intelligence system that centralizes company information and transforms it into useful insights for managers. The project proposes a digital architecture that collects and organizes financial data, project information, and operational metrics into a unified data environment. Using this data, interactive dashboards can be created to monitor project performance, track costs, and evaluate overall company productivity.

In addition to operational monitoring, the research also explores the use of predictive analysis to estimate the expected return on investment of renovation projects. By analyzing historical project data and relevant property characteristics, predictive models can identify patterns that influence the financial success of renovation investments. These models can help managers estimate potential returns and reduce uncertainty when selecting future projects.

The research combines qualitative and quantitative methods, including interviews with company staff, analysis of historical project records, and the design of prototype data dashboards. The expected outcome is a practical roadmap that guides the company in implementing a data driven decision system.

More broadly, this study demonstrates how small companies can adopt accessible data tools to strengthen strategic planning, improve transparency, and compete more effectively in an increasingly digital business environment.

Ana Hinojosa and Dr. Karan Patel

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

DEALYZE: AN ARTIFICIAL INTELLIGENCE CO-PILOT PLATFORM FOR SMALL REAL ESTATE AGENCIES

Small real estate agencies play a fundamental role in the Spanish property market, yet many of them still rely on manual processes to manage daily operations. Tasks such as writing property listings, responding to potential buyers, and determining competitive prices are often performed using spreadsheets, email, and personal experience. These processes are time consuming and limit the ability of small agencies to compete with larger companies that use advanced digital tools. This research explores the development of DEALYZE, a software platform designed to support small real estate agencies through artificial intelligence.

The proposed platform functions as a digital assistant that helps agents automate repetitive administrative work and make more informed decisions. By using artificial intelligence, the platform can generate professional property listings, recommend competitive pricing based on local market information, and automatically create personalized messages to follow up with clients. The goal is to reduce administrative workload while allowing agents to focus on activities that generate value, such as negotiating transactions and building relationships with clients.

The research adopts a mixed research approach combining market analysis, interviews, and prototype development. Secondary data from national statistics and industry reports are used to understand the structure of the real estate sector and identify digitalization gaps among small agencies. Primary data are collected through interviews with real estate professionals to explore current workflows, operational challenges, and attitudes toward artificial intelligence tools. In addition, an early prototype of the platform is developed and tested with pilot agencies to evaluate potential time savings and usability.

The study aims to determine whether an artificial intelligence platform such as DEALYZE can represent a viable business opportunity while addressing real operational problems in the sector. Expected outcomes include the validation of a business model, estimates of potential revenue and costs, and an evaluation of investor interest in this type of property technology venture. Beyond the entrepreneurial objective, the project also contributes to the broader discussion on digital transformation in small businesses.

By examining the needs of small real estate agencies and testing a practical technological solution, this research highlights how artificial intelligence can support productivity, improve decision making, and expand access to digital tools that have traditionally been available only to larger organizations.

Ayva Hrushka and Wilson F. Ramirez-Duarte

FACULTY: SCIENCE
DEPARTMENT: ENVIRONMENTAL AND PHYSICAL SCIENCES

KEY FRESHWATER SPECIES AND ENDPOINTS FOR MONITORING NACL POLLUTION

Across Canada, freshwater salinization constitutes a threat to aquatic ecosystems, although the magnitude of the problem varies regionally and is generally more severe in highly urbanized areas. The main sources of salt entering freshwater ecosystems include road deicing salts, produced water released during oil and gas extraction, wastewater from mining and industrial activities, dissolution of naturally occurring salts in agricultural fields, and wastewater treatment plant effluents. Eventually, salt can reach freshwater ecosystems through surface runoff, spills and leaks, irrigation return flows, infiltration into groundwater aquifers, and treated wastewater discharges that ultimately drain into rivers, lakes, and wetlands. This literature review assesses which freshwater taxa and biological measurements—including biochemical, physiological, behavioral, survival, growth, and reproductive responses—are the most sensitive indicators for monitoring the impacts of salt pollution in freshwater habitats. To identify the most sensitive taxa, acute toxicity values (i.e., LC50) were retrieved from the U.S. EPA ECOTOX Knowledgebase and complemented with a literature search in SCOPUS. Acute toxicity values were plotted in a Species Sensitive Distribution graph to visually assess the most sensitive taxa. The next step consisted of identifying which of these taxa are present in Alberta's freshwater ecosystems to be used in biomonitoring programs. The literature search was also used to identify the most sensitive biological measurements. Exposure of freshwater organisms to salt concentrations above their physiological tolerance induces changes in processes that regulate pH and ion concentrations that ultimately divert energy from biological processes critical for organisms' survival. These biological changes include alterations in reproduction (i.e., decreased fertility), behavior (i.e., decreased locomotion, feeding activity, and ventilation), development, and changes in enzymatic activity (i.e., Na^+/K^+ -ATPase, enzymatic antioxidants, and biomarkers of liver damage). Exposure to salt concentrations above the ranges tolerated by freshwater organisms impacts the composition and structure of trophic levels and biodiversity. Behavioral and reproductive changes were the most sensitive measurements associated with increased salinity. Identifying the most sensitive freshwater organisms to salt pollution present in Alberta, Canada, is critical for biomonitoring programs focused on assessing the impacts of increased salinity in freshwater ecosystems.

Boyko Zlatev

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

SWIFT'S PREDICTION OF MARTIAN MOONS AS SMALL-SAMPLE STATISTICAL INFERENCE

In his book "Gulliver's Travels", published in 1726, Jonathan Swift wrote about two small moons of Mars, with orbital periods of 10 and 21.5 hours, respectively. The actual Martian moons, Phobos and Deimos, with orbital periods of 7.6 and 30.3 hours, respectively, were discovered more than 150 years later by A. Hall in 1877. Swift's prediction was so accurate that many authors speculated that Swift got the information from some ancient sources that were later lost or hidden.

Historians of science have pointed out that the idea of the existence of two satellites of Mars belongs to Kepler, who derived their number as the geometric mean of 1 (the only Earth's Moon) and 4 (the number of Galilean moons of Jupiter). It is also known that the orbital parameters in Swift's prediction are in perfect agreement with Kepler's Third Law.

However, it is still a matter of discussion how exactly Swift derived his values for the distances of the two satellites from the planet and their orbital periods. The latter were especially unusual at the time of Swift, when no planetary satellite with a period less than 42 hours was known.

The suggestion that the ratio of the distances ⅗ was chosen by Swift to be the same as that of Jupiter's Io and Europa is not very likely to be true because the actual ratio for Io and Europa, according to the data available to Swift, is with high accuracy 0.625=⅝ (another Fibonaccian fraction).

In the talk, it is proposed that Swift determined the ratio of the distances by averaging the data about planetary satellites which were known at his time, namely the sample of 4 Galilean moons of Jupiter and the sample of 5 satellites of Saturn — Tethys, Dione, Rhea, Titan and Iapetus, discovered in the second half of XVII century. From these data, 7 ratios can be constructed between consecutive orbital distances — 3 for Jupiter and 4 for Saturn. The sample means for those are 0.60±0.02 and 0.57±0.12, respectively. The mean for Jupiter was preferred probably as more consistent, and also because the satellite system of Saturn was considered to be not yet fully discovered, with 3 more moons needed to be found to keep the geometric progression 1,2,4,8. Although the theory of statistical inference (including small sample inference) was rigorously developed much later, the method was practically applied by Sir Isaac Newton as early as 1680.

The discoveries of asteroids with apparent magnitude similar to that of Phobos and Deimos started in the mid XIX century, with the first peak c. 1900. In this context, Hall's discovery can be considered late, as the planetary satellites are usually discovered much earlier than asteroids of similar magnitude. In this regard, truncated regression for modelling the discovery time of satellites and asteroids is also discussed in the talk.

Brenden Powers

FACULTY: ARTS
DEPARTMENT: PHILOSOPHY, RELIGIOUS STUDIES AND CLASSICS

THE ILLUSION OF ARRIVAL: WHY ZENO WAS RIGHT FOR THE WRONG REASON

This presentation examines Zeno of Elea's paradoxes of motion and argues that he was correct in claiming that we never truly reach our destination; though for the wrong reason. Zeno aimed to show that motion is impossible. In his most famous example, known as the Dichotomy, he argues that before reaching a destination, one must first reach the halfway point. Before reaching that halfway point, one must reach half of that distance, and so on, to infinity. Because this process can be divided endlessly, Zeno concludes that motion cannot begin or be completed. His conclusion is that motion is an illusion.

Since Zeno, thinkers have treated these paradoxes as mathematical puzzles about infinite division. This presentation argues that both Zeno and his critics misunderstood the deeper issue. The central claim is that the problem is not about numbers or about dividing a line into smaller parts. The real mistake lies in assuming that motion takes place along a simple, two-dimensional line with fixed starting and ending points.

In reality, motion occurs in a three-dimensional universe, where everything is constantly moving. The Earth rotates on its axis, travels around the Sun, and moves within a galaxy that itself is in motion. Because of this layered and continuous movement, no destination remains fixed long enough to be reached in the way we imagine.

Using examples such as Achilles racing the tortoise and a skydiver attempting to land at a precise point, the presentation shows that what appears to be arrival is only relative success within a shifting system. The intended location is never identical to the location finally reached because the entire framework has moved in the meantime.

The presentation concludes that arrival requires stillness, yet the universe does not permit stillness. Motion is not lacking, as Zeno claimed. Instead, motion is excessive and multidirectional. We do not fail to arrive because there are too many steps to take, but because everything is already in motion before we begin. In this sense, Zeno was right that true arrival never occurs, but wrong in explaining why.

Brennen Riopel and Elizabeth Farrell Luka

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

BUILDING INCLUSIVE ORGANIZATIONS THROUGH STRATEGIC WORKFORCE PLANNING

Background: Organizations today operate in increasingly diverse and complex environments. Because of this, human resource management strategies must promote fairness, inclusion, and legal compliance while supporting organizational performance. Strategic workforce planning helps organizations align their employees with long-term goals and operational needs. However, many organizations struggle to translate their commitments to diversity, equity, and inclusion into measurable outcomes such as equitable hiring practices, fair promotion opportunities, and diverse leadership representation. As workplaces become more complex, HR professionals must ensure that workforce planning strategies support both organizational success and fair opportunities for employees.

Purpose: This study examines how strategic workforce planning can help organizations create more inclusive, legally compliant, and fair workplace environments. The research explores how workforce data can support compliance with employment legislation, how succession planning can strengthen diverse leadership pipelines, and which workforce planning strategies can best promote fairness, safety, and inclusion in organizations.

Method: This research adopts a descriptive research design based on secondary data analysis. The study draws on academic textbooks, peer-reviewed journal articles, and organizational research related to workforce planning, human resource management strategy, and workplace inclusion. The collected information is analyzed using thematic analysis to identify patterns and insights related to inclusive workforce planning, succession planning practices, and legal compliance within organizations.

Results / Anticipated Results: The analysis suggests that organizations that integrate diversity and inclusion considerations into workforce planning are more likely to identify representation gaps and develop stronger leadership pipelines. Strategic use of workforce data and structured succession planning helps organizations address barriers that limit advancement opportunities and supports the development of more equitable workplace practices.

Conclusions: Strategic workforce planning provides organizations with practical tools to build more inclusive, fair, and sustainable workplaces. By incorporating diversity considerations into workforce analysis and leadership development strategies, organizations can strengthen leadership diversity, improve workplace fairness, and support long-term organizational success.

Keywords: workforce planning, human resource management, diversity and inclusion, succession planning, leadership development, workplace fairness

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Cecilia Bukutu, Viola Manokore and Michael Safo Ofori

FACULTY: SCIENCE
DEPARTMENT: PUBLIC HEALTH

CULTURALLY RESPONSIVE MENTORSHIP FOR BLACK YOUTH: BUILDING RESILIENCE AND SOCIAL CAPITAL

Background: Supporting Black youth (Afro-Caribbean, 18+) in developing social capital, career readiness, and resilience is essential to advancing equitable access to employment in Canada. From December 2022 to December 2023, unemployment among Black youth aged 15 to 24 increased from 13% to 18%, compared to 9% to 11% among the general youth population. Additionally, 51% of racialized Canadians reported experiencing discrimination within the previous five years. Networking is a significant pathway to employment, with around 70% of jobs filled through personal or professional connections according to Alberta Labour and Immigration Services. In response to these disparities, a partnership between Concordia University of Edmonton, NorQuest College, Boys & Girls Clubs Big Brothers Big Sisters of Edmonton & Area, and the CUE Black Students Association developed the Mentorship and Resilience Project to support Black youth in accessing professional networks, career guidance, and resilience resources.

Purpose: The project aimed to help participants build social and professional networks, strengthen career readiness, and develop resilience to support workforce participation and overall wellbeing.

Methods: This one-year program paired Black youth with volunteer Black professionals as mentors based on career aspirations and cultural background. Monthly workshops focused on networking, career development, workplace skills, entrepreneurship, and resilience. Mentorship included monthly mentor-mentee meetings, during which participants set goals, tracked progress, and discussed career and personal development. Program outcomes were evaluated using pre- and post-program surveys, workshop feedback surveys, and qualitative data from interviews and focus groups, enabling a convergent mixed methods analysis of both measurable outcomes and participant experiences.

Results: The program engaged 80 mentees and 67 mentors. 88% of mentees were not born in Canada and 74% were female. Satisfaction with mentor matching was high, with 88% of mentees and 95% of mentors reporting positive matches. Workshops averaged 74 participants per session. 80% of mentees reported improved networking skills and expanded social and professional networks. 76% reported increased confidence and greater resilience in managing mental health, workplace stress, and challenges related to racism and discrimination. About 25% of mentees reported securing employment during the program. Mentors also reported benefits, including improved communication skills (97%), coaching skills (94%), and social networks (67%). Qualitative findings highlighted strengthened mentor-mentee relationships, enhanced career clarity, and improved wellbeing.

Conclusions: The Mentorship and Resilience Project demonstrates that culturally responsive mentorship combined with social and professional network development and resilience training can improve career readiness, confidence, mental health, and workforce participation for Black youth. Programs that build social capital and address systemic barriers offer a promising approach to advancing equitable employment and long-term career success.

Cecilia Bukutu and Arshdeep LNU

FACULTY: SCIENCE
DEPARTMENT: PUBLIC HEALTH

A REVIEW OF RESPIRATORY TRACT INFECTION RISK IN CHILDREN IN CHILD CARE CENTRES

Introduction: Respiratory tract infections (RTIs) are a leading cause of morbidity in early childhood worldwide. Most RTIs in children are viral and spread efficiently in daycare settings through close contact and shared environments. Symptoms typically include fever, nasal congestion, cough, and sore throat, lasting up to two weeks. Daycare attendance may influence the incidence and transmission of RTIs. This review examines global evidence on the epidemiology, risk factors, outcomes, and pathogens associated with RTIs in children attending daycare.

Objectives: To describe the pathogens responsible for RTIs in young children and identify key risk factors contributing to their occurrence and transmission in daycare and childcare settings.

Methodology: A comprehensive literature search was conducted across multiple databases using relevant subject headings, keywords, and search terms. Thirteen peer-reviewed studies published between 1990 and 2025 were included, comprising case-control, prospective and retrospective cohort, and epidemiological studies examining RTIs in daycare environments globally.

Results: The evidence consistently demonstrates higher RTI incidence among children attending daycare compared with those cared for at home, particularly during the initial months of enrolment, with incidence declining as immunity develops. Viral co-infections are common, with human rhinovirus (HRV), adenovirus (ADV), respiratory syncytial virus (RSV), influenza viruses, enteroviruses, parechoviruses, and Mycoplasma pneumoniae most frequently detected. Daycare environments serve as hubs for pathogen circulation, facilitating rapid transmission among susceptible children.

Conclusion: Daycare attendance is associated with increased RTI frequency in young children. Although most infections are mild, these findings highlight the need for infection control measures, vaccination strategies, and caregiver education to reduce transmission and promote healthier early learning environments. This synthesis provides a foundation for targeted interventions and further research on pathogen-specific prevention in childcare settings.

Chloe Funnell, Dr. Ivana Schoepf and Dr. Jenna V. Congdon

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

BEHAVIOURAL AND SPATIAL CHANGES EXHIBITED BY ARCTIC WOLVES (CANIS LUPUS ARCTOS) UNDER HUMAN CARE IN RESPONSE TO PACK AND HABITAT INTRODUCTIONS

Biodiversity is decreasing at a rapid rate worldwide, making the role of accredited zoos and aquariums critical in the conservation of many species. Behavioural research is commonplace in accredited zoological facilities and is an essential tool for managing and monitoring the animal welfare of lesser-known species. Evaluating behavioural patterns and space-use is an important component for developing sound evidence-based management strategies for species under human care and for declining species. This study sought to understand how the three (3, two females and one male) Arctic wolves (Canis lupus arctos) housed at the Edmonton Valley Zoo (EVZoo) use their space and how this behaviour changes when the animals are introduced to new individuals and a new habitat. First, a behavioural ethogram was developed then implemented in observations, recording each individual's behaviours. Observations of the wolves occurred weekly over four months, prior to introductions. Following EVZoo's successful introduction of the female wolves to the male, subsequent observations were conducted. Pre- and post-introduction space use and behaviours were compared, which indicated that the Arctic wolves: 1) spent less time resting and more time sniffing after introduction to a new habitat and pack members, representing a natural response to a novel and stimulating environment, 2) changes in locomotion (i.e., movement vs. resting) varied between individuals, likely reflecting adjustments to a new hierarchical structure, and 3) space use demonstrated individual preferences for certain areas of the yards. Locational trends will be visually demonstrated through generated heat maps. Specifically, the two female wolves used a smaller proportion of the larger yard, compared to the smaller yard, and the individual male's large yard space use changed with the introduction of two female companions. These results provided EVZoo with a comprehensive behavioural and locational data regarding their resident wolf pack, which can further inform habitat, welfare, and management strategies for these individuals. This data can further serve as a baseline for subsequent observations, informing of any changes in individual preferences or pack dynamics across time. Due to climate change, it is not only critical to learn about animals in an imperative zoo environment, but additional information can provide crucial insight for conservation of the species.

Cole Babcock, Gohar Sakhi, Savannah Lakusta, Emmanuel Mapfumo, Makan Golizeh

FACULTY: SCIENCE
DEPARTMENT: ENVIRONMENTAL AND PHYSICAL SCIENCES

CIRCULAR CELLULOSICS: A TOTAL "ON-FARM" APPROACH TO CELLULOSE ISOLATION

Introduction: Cellulose is a major structural component of all terrestrial plants, and Alberta generates large quantities of it through both forestry and agriculture. After harvest, substantial volumes of plant material remain under-utilized despite containing significant amounts of recoverable cellulose. Conventional isolation methods, such as kraft pulping, sulfite digestion, and strong acid-alkali treatments, can separate cellulose effectively but rely on harsh chemicals and high energy inputs. These processes produce environmentally burdensome byproducts, including black liquor, sulfur-rich emissions, and dense lignin sludges, reducing their appeal as green alternatives to conventional polymers. This creates a clear need for alternate strategies which better utilize Alberta's existing residue streams.

Purpose: This work aims to develop a green, circular method for isolating cellulose directly from Alberta's agricultural residues, focusing on materials that are abundant yet often discarded. The goal is to create a fully on farm process that uses only resources already present in rural operations, eliminating the need for external chemical inputs or specialized chemical disposal systems. By recovering cellulose while allowing remaining fractions to be reused or cycled back into the farm system, the project demonstrates how agricultural waste can be transformed into a valuable feedstock.

Methods: A mixed grass blend obtained from a local Alberta farm, containing alfalfa, timothy, and purple oat grass, served as the starting biomass. Cellulose was isolated through a three step process designed to remain low impact and compatible with on farm resources. First, the biomass was treated with a natural solvent system to loosen the plant matrix and initiate selective pretreatment. This was followed by an alkali wash prepared from naturally derived wood ash lye, further removing impurities without relying on commercial chemicals. A final fungal polishing step gently reduced residual lignin and surface impurities while preserving the cellulose structure. The resulting cellulose was compared with commercial standards to assess purity and structural similarity using spectroscopic methods.

Results: The pretreatment successfully removed a substantial portion of lignin and other constituents, producing a cleaner, more fibrous material. The solvent remained effective across multiple treatment cycles, indicating strong potential for reuse in low input settings. The wood-ash lye wash further reduced unwanted component content, demonstrating that a naturally derived alkaline solution can perform many of the same functions as commercial reagents. Fungal polishing is ongoing, with three strains being evaluated for their ability to remove residual lignin and surface impurities. Early spectroscopic comparisons show that the treated materials increasingly resemble commercial cellulose standards.

Conclusion: This work demonstrates the potential for a greener, low input method to produce high quality cellulose from Alberta's agricultural residues, supporting both research and the development of cellulosic products. By relying on natural solvents, farm derived reagents, and fungal polishing, the process aligns with local resource availability while reducing environmental impact. Future directions include growing the components of the solvent system and fully utilizing process byproducts as fertilizers, compost additives, value added materials, or feedstocks for ethanol or acetic acid production. These steps aim to build a more regenerative pathway for turning Alberta's residues into valuable cellulosic resources.

Comfort Adeyemo, Dr. Martin Higgins and Dr. Elizabeth Farrell Luka

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

DESIGNING A CONTINUOUS IT AUDIT MONITORING DASHBOARD USING POWER BI

Background: Information technology audits in many organizations are conducted only once or twice a year. As a result, control weaknesses can go unnoticed for long periods of time. Because these audits rely on periodic reviews rather than automated monitoring, there is often a delay between when a problem occurs and when it is detected. At the same time, organizations are increasingly dependent on digital systems to manage sensitive information. In healthcare settings, this includes patient records, system availability, data backups, and software updates. These growing digital demands highlight the need for tools that allow ongoing oversight instead of waiting for the next scheduled audit.

Purpose: This project aims to design a dashboard that supports continuous monitoring of key controls in healthcare information systems. The goal is to provide auditors and managers with near real time visibility into whether important safeguards are functioning properly. By doing so, the project seeks to reduce risks and support more timely decision making.

Methods: The research will involve designing an interactive data visualization dashboard using simulated data. The synthetic data will represent common control areas such as access to patient records, data backup status, system availability, and software update compliance. The dashboard will be structured to reflect widely recognized information technology governance and cybersecurity guidance, as well as legal requirements under Alberta's Health Information Act. The design will focus on clarity, ease of use, and practical application for audit and oversight purposes.

Anticipated Results and literature-based insight: The expected outcome is a functional dashboard that demonstrates how continuous monitoring can operate in practice. The project will also produce a detailed written report and a reusable template that can be adapted by audit and governance teams in healthcare and other sectors. The literature indicates that continuous auditing is most effective when monitoring technologies, control objectives, and professional judgment are integrated rather than implemented in isolation. Prior studies show that dashboards alone do not improve oversight unless they are explicitly aligned with key controls and embedded within audit and governance workflows.

Conclusions: By bridging audit concepts with applied data visualization, this research aims to show how continuous monitoring dashboards can strengthen oversight, reduce risk, and promote proactive management of information systems.

Conrad van Dyk

FACULTY: ARTS
DEPARTMENT: LITERATURE AND LANGUAGES

CHAUCER'S HIERARCHY OF NEEDS

This poster compares modern psychological and sociological understandings of human need with the medieval perspective provided by Geoffrey Chaucer in his literary masterpiece The Canterbury Tales. Contemporary measurements of human needs include Abraham Maslow's pyramid of needs as well as the model of human needs developed by Manfred Max-Neef (the Human Scale Development index). At first glance, these psychological and sociological measurement tools do not seem all that relevant to the study of literature. However, Chaucer's Canterbury Tales describes the needs and desires of a wide variety of individuals from all social strata. A comparative approach therefore raises many interesting questions. For example, how do these models relate to the medieval tendency to differentiate between physical needs ("So priketh hem Nature in hir corages") and spiritual needs? How do they compare with the seven works of mercy, which Chaucer's Parson describes in connection with satisfaction for sin as all the areas "where men han neede"? How does need inform The Tale of Melibee, where the desire to deal with one's enemies is described as "this necessitee and . . . this neede," and where Prudence quotes Augustine to argue that "ther been two things that arn necessarye and needeful, and that is good conscience and good loos [reputation]"? The Canterbury Tales can be considered an exploration of the full range of human needs. This poster provides a visualization of how contemporary models compare to Chaucer's perspective on human need. Maslow's motivation theory sheds light on the psychological needs of characters and lays the groundwork for further research about related topics (e.g., precarity, necessity, legal justification). Max-Neef's Human Scale Development index makes us reflect on the different ways in which human needs are satisfied and how each culture uses its own criteria to determine whether something that seemingly satisfies a need is positive (a "synergic satisfier") or negative (a "destroyer" or "pseudo-satisfier"). This poster captures ongoing research into literary representations of need and necessity. The poster format is useful for explaining influential theories of human needs and testing their applicability to literature.

Dominick Tressler and Dr. Nasim Hajari

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

COUNTERFEIT CARD DETECTION USING COMPUTER VISION

Background: Counterfeit trading cards have become increasingly sophisticated, often matching the look, feel, and quality of genuine cards. As the popularity of trading card collecting has grown in recent years, many cards now carry significant financial value. This has made reliable authentication more important than ever. Although several manual tests exist to help detect counterfeit cards, these methods are not definitive and often rely heavily on the intuition and experience of collectors or experts.

Purpose: This project aims to develop a computer vision–based tool capable of detecting counterfeit Magic: The Gathering trading cards. By leveraging convolutional neural networks (CNNs) and images captured using standard smartphone cameras, the goal is to create a widely accessible, convenient, and reliable method for verifying card authenticity.

Method: To achieve this goal, a comprehensive image dataset of Magic: The Gathering cards will be manually compiled. The dataset will include images captured under varying lighting conditions, rotation angles, and levels of card wear or damage to ensure robust model training. Multiple CNN architectures will be evaluated, drawing inspiration from prior research on counterfeit currency detection. Model performance will be assessed using standard evaluation metrics commonly applied to convolutional neural networks.

Results: Based on findings from previous studies in similar counterfeit detection applications, the proposed approach is expected to achieve high classification performance, with an anticipated accuracy of at least 98% in identifying counterfeit Magic: The Gathering cards.

Conclusion: The development of a reliable counterfeit detection system would provide collectors and buyers with a practical tool for verifying card authenticity. In addition, the public release of the curated dataset will support reproducibility and enable further research in this area. Although this project focuses on Magic: The Gathering, the insights gained—particularly through explainable AI techniques used to interpret the CNN's decisions—may help determine whether similar approaches can be applied more broadly across the trading card industry.

Ella Niyonkuru and Dr. Elizabeth Coker-Farrell

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

UNDERSTANDING THE DIFFERENT TYPES OF EXTRINSIC AND INTRINSIC REWARDS THAT CAN BE USED AS A TOOL THAT ENHANCE EMPLOYEE PERFORMANCE IN THE WORKPLACE

Employee Performance is one of the leading forces to an organization performance. Low employee performance has been associated with the lack of intrinsic and extrinsic motivation, which has led organization to install reward systems with the goal of increasing motivation by rewarding performance. Extrinsic motivation is known as external motivation due to the need of gaining desired rewards, while intrinsic motivation is internal motivation that is caused by having interest in performing the task itself. A closer look in the workplaces, reveals that extrinsic motivation can be controlled by most organizations through reward systems; however, intrinsic motivation can be undermined through the construction of a job design. Despite organizations effort to provide rewards to their employees, intrinsic motivation in the workplace remains understudied due to barriers such as; prioritizing the employees to get the work done rather than considering the individual-level employee experiences. A review of existing researchers reveals that few studies consider the importance of intrinsic motivation, when showing how rewards play an important role in enhancing employee performance. This study will be addressing the gaps by proposing other strategies that contribute in enhancing intrinsic motivation.

The study purpose is analyzing the different types of rewards system that contribute to employee performance, while answering the research question: How can organizations integrate both intrinsic and extrinsic rewards in the workplace? The study objectives will be analyzing the importance of intrinsic and extrinsic motivation in an organization while looking at ways intrinsic motivation can be included in reward system and how both intrinsic and extrinsic motivation contribute to employee performance. This study will be done by exploring existing research on reward system being used in the workplace and fill in the gap that exists while analyzing employee performance in regard to motivation.

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FACULTY: SCIENCE
DEPARTMENT: ENVIRONMENTAL AND PHYSICAL SCIENCES

IMPACTS OF RANGE ROAD 70 WILDFIRE BURN SEVERITY ON SOIL BACTERIA DIVERSITY AND COMMUNITY COMPOSITION

Across Canada, more than 8,000 wildfires occur every year. However, in 2023 a record number of 6,623 wildfires occurred, and they burned more than 15 million hectares of land. The Range Road 70 (RR70) wildfire occurred in May-June 2023 in Central Alberta and burned areas around Entwistle and Evansburg wildfire. That wildfire burned over 8,800 hectares and likely impacted populations of soil organisms such as bacteria, fungi, and arthropods, which in turn impacts nutrient cycling, and lowers vegetation regrowth. Preliminary survey of the burned areas indicated differences in the severity of burns by the RR70 wildfire, which also meant unequal impacts on soil biological health. Our objective was to investigate the effects of burn severity (heavy, medium, and low) of the RR70 wildfire at the Entwistle RV Campground 2 years after the burn on soil bacteria diversity and community composition compared to unburned (or control) soil. Classification of burn severity (heavy, medium, low and unburned) was conducted following the USDA Forest Service procedure which was based on the amount of white or gray ash, charcoal and presence of vegetation on and around the sample location. Twenty samples for each burn severity class were collected and DNA extracted from them using DNeasy PowerSoil Pro Kit before 16S rRNA marker gene sequencing. Significant decreases ($P < 0.05$) were observed in overall bacterial abundance in the heavy and medium burn severity areas compared to low severity and unburned (or control areas). The heavy burn severity areas had a slightly alkaline average soil pH of 7.28 which favored dominance of bacteria phyla Proteobacteria, Firmicutes, Bacteroidetes and Cyanobacteria. Unburned areas had slightly acidic average soil pH of 5.80 which favored dominance of bacteria phyla Acidobacteria, Verrucomicrobiota, Chloroflexi, Planctomycetes. Low burn severity and control areas had significantly higher ($P < 0.05$) alpha diversity (Chao1) than heavy burn severity at both bacteria order and genus levels. Beta diversity of bacteria at phyla and order levels were significantly higher ($P < 0.05$) for low burn severity and control areas than heavy burn severity. Understanding microbial composition shifts under different burn severity has implications on the rates of organic matter composition and nutrient cycling, which is important in soil and vegetation recovery following wildfire.

Florence Olayiwola-Samuel and Prof. Rossitza Marinova

FACULTY: SCIENCE
DEPARTMENT: MISSM/MISAM

SENTIMENT ANALYSIS FOR BRAND MANAGEMENT: A CASE STUDY OF CONCORDIA UNIVERSITY OF EDMONTON

Background: We are in a digital age where online perception and public opinion shape our perception, choices and decisions we make in major things like deciding which schools to apply to. While prior studies have explored sentiment analysis in corporate contexts to sell themselves, the Education bodies are yet to harness this gold mine. This analysis fills the gap of how sentiment analysis benefits tertiary institution brand management, using Concordia University of Edmonton as its focus.

Purpose: This research provides empirical evidence that sentiment analysis is scalable and cost-effective for academic brand management. The study identified sentiment trends across multiple platforms, categorizing recurrent themes influencing CUE's perception, and developed data-driven recommendations for enhancing institutional reputation and stakeholders' engagement.

Results: These analyses were carried out on Rate My Professor, Reddit, Google Reviews, and Facebook Platforms revealed the following:

- Rate My Professors functions as an effective quality assessment tool; the school scored an average of 3.45/5.0 for the star rating, with 76.4% positive, 7.3% negative and 16.4% neutral scores with a 3.45/5.0 average.
- Reddit is a collection of forums or groups called subreddits. People join communities matching their interests. Data were collected from r/Alberta and r/Edmonton subreddits with 38.1% positive, 14.9% negative and 47.0% neutral scores; positive sentiment outweighed negative by approximately a 3.5:1 ratio.
- Google Review is a feature within Google's business platform that allows users to publicly share their opinions and experiences about a business, institution, or place. The analysis of the sentiment carried out on CUE is calculated to be an average of 3.40 stars, indicating a slightly positive sentiment leaning towards neutrality with 15 five-star reviews, 63 four-star reviews, 81 three-star reviews, 6 two-star reviews, and 9 one-star reviews with 35.5% positive, 10.8% negative and 53.6% neutral scores.
- Facebook stands as one of the world's most influential social media platforms, serving as a critical digital space where educational institutions can engage with current students, alumni, and prospective applicants. However, CUE's Facebook engagement remained minimal with declining recommendations over time. The year 2016 had the highest recommendations of 10, followed by 8 recommendations in 2017, it took a nosedive in recommendations and a pick-up in ""Not Recommending"" CUE.

A word cloud visualization was generated for all platforms; words like "small", "school", and "class" appeared on both positive and negative sentiment while words like "great" and "good" appeared on all positive sentiment. Most negative words centred on the admission process and the price of food.

Conclusion: The institution should prioritize streamlining administrative processes, particularly in admissions and communication systems, to address and respond to frequent sources of negative feedback. Implementing proactive communication strategies during critical periods like admission cycles, mitigates spikes in negative sentiment. Amplification of the positive aspects of faculty quality and academic excellence in marketing materials, as these represent authentic institutional strengths. Developing a systematic approach to responding to Facebook reviews, especially negative ones, could demonstrate institutional responsiveness and potentially improve public perception.

Fola Demi and Nyla Michael

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

ORGANIZATIONAL VISION AND SUCCESSFUL STRATEGIC PLANNING THROUGH A MODERN LENS

Background: This research is based on a critical chapter analysis of Chapter 4 "The Importance of Vision and the Motive to Lead" from the text book The Art of Leadership by George Manning and Kent Curtis. This research goes through the concepts of the role of vision for succeeding in leadership, how a leader creates and implements a good vision, the importance of alignment, prioritization and execution, and knowing the motivations for certain tasks in leadership. How a leader creates and implements a good vision as well as the importance of alignment and execution.

Purpose: Our purpose is to analyze vision as it pertains to organizational leadership through a modern media based lens touching on social motives, employee needs and, relating to Gen Z's interaction with leadership, we will be looking at how said leadership requires strategic planning to execute and attain organizational success. Understanding the motivations of Gen Z employees is important as they will increasingly influence workplace culture and leadership.

Method: For this project we are creating a 5 minute video using the hero's journey of a play mixed with the elements of a 2000's Disney show called "that's so Raven". In the show the main character Raven has a literal vision so for our video, the main character will have a vision of the business they will create and with that they have gained a hero's mission which symbolizes the mission for the business they will create. Each act/segment will have the character follow their basis of a vision and touch on elements of vision that lead to the growth/success of the business.

Results: We believe that our media based interpretation of leadership and organizational vision will inform successful business decisions in relation to a younger Gen Z employee work force and environment. Research suggests that younger generations place a significant amount of value in a company when they have meaningful work and supportive leadership environments. Which shows us the importance of a succinct and consistent leadership vision in organizational success.

Conclusion: Connecting Older concepts of vision and leadership through a GenZ lens using a childhood show from the GenZ generation in order to educate on current effective vision requirements that lead to organizational success with the younger generation.

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Gracie Caslor, Alexander Taikh and Jennifer Laskosky

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

THE NOT-SO-GOLDEN MIDDLE: COMPARING TEXT DIFFICULTY ACROSS READING LEVEL PASSAGES USING LLM SURPRISAL SCORES

Background: As we read, we continually assess each word's individual meaning and incorporate it within the entire sentence allowing for fuller comprehension of content. Additionally, active prediction of upcoming words aids in comprehension of the entire sentence and more fluent reading process. Human predictability ratings typically measured using some version of the cloze task, which requires the participants to guess the next word given the previous words and context. For example, in the context "the monkey ate a _____"; "banana" is a more predictable answer that would receive a higher cloze score than "sandwich". Cloze predictability ratings are limited to the words and sentences tested. Further, the cloze task may not reflect the online processes that occur during natural reading.

Large language models (LLMs) are trained on large corpora of human generated texts, and based on these texts it can generate a measure of surprise for any word in any given context, which is an estimate of the effort that would be required to predict and integrate the word into its context. Due to the LLMs training on human produced texts, it can provide insight into human processing of text. Previous research has found that LLM surprisal ratings from the GPT-2 model were better at predicting human measures of reading, such as eye movements, than were cloze scores.

Purpose: Passages that have more surprising words should have more information for the reader to integrate and thus be more difficult to comprehend. Our study examines whether LLM generated surprisal ratings correspond to graded reading level difficulty.

Method: We used the News in Levels website which adapts one short news passage into three levels of difficulty, based on vocabulary difficulty among other aspects. Our project examines whether LLM generator surprisal ratings correspond to reading level difficulty. We compared LLM generated surprisal ratings between the three levels of passages.

Results/Conclusion: The simplest level had the lowest surprisal score, suggesting that on average, words had lower surprisal ratings. Interestingly, we found that the intermediate level had a higher surprisal score than the advanced level. Our findings suggest that the intermediate level could create a higher processing load than the advanced level for readers, and may be more difficult to comprehend. Further, this proposes that removal of advanced vocabulary is not the only component and may not automatically reduce the effort required to read a passage. Our future research will examine if LLM generated surprisal ratings correspond to levels of difficulty readers have when comprehending passages.

Haley Burgardt, Dr. Wolfgang Jäger and Dr. Chrissy Knapp

FACULTY: SCIENCE
DEPARTMENT: ENVIRONMENTAL AND PHYSICAL SCIENCES

A COMPUTATIONAL AND SPECTROSCOPIC STUDY OF NITROBENZENE HYDRATES CONTAINING 2 TO 4 WATER MOLECULES

Wildfire aerosols contain complex mixtures of organic and carbonaceous materials. These aerosols affect air quality and pose health risks to human, animal, and plant life. Nitrobenzene, a nitroaromatic compound, is present in the organic emissions associated with wildfires. Nitrobenzene can interact with atmospheric water via hydrogen bonding to form nitrobenzene-water clusters, which represent the earliest stage of aerosol formation. The hydrate clusters can contribute to secondary atmospheric chemistry, such as the release of NO2, in addition to seeding the formation of aerosols. This study utilizes computational chemistry methods to investigate the structure and stability of nitrobenzene clustered with two, three, and four water molecules to understand the earliest stages of aerosol formation. The molecular clusters are modelled computationally to aid experimental identification. Conformational software, such as the CREST program, was used to sample the potential energy surface of the molecule. The energy structures were then optimized using Gaussian software to obtain accurate hydrate geometries and properties. The optimized geometries were then used to simulate microwave spectra with PGOPHER. CREST conformational sampling identified 11, 20, and 18 low-energy conformers for nitrobenzene with two, three, and four water molecules, respectively, within a 10 kJ/mol window. Further Gaussian optimization identified 7, 13, and 13 low-energy conformers for nitrobenzene for each of the two, three, and four water molecules, respectively. Optimized geometries depict the water molecules, for each two, three, and four waters, aggregating consistently near the nitro group of the nitrobenzene, rather than forming a solvation layer around the ring. The computational results were used to simulate spectra to assist in identifying hydrates in the experimental spectra. This research indicates that the nitro group is the primary site of early hydrate formation in the atmosphere. Further research could involve larger hydrate clusters, as well as photochemical investigations to determine whether the water clusters alter the kinetics of NO2 release.

Hanna Brushey and Amro Soliman

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

OXIDATIVE PHOSPHORYLATION'S METABOLIC ROLE IN ENERGY SHIFTS DURING FEVER

Background: Fever is a common immune response to infection observed across various organisms. Typically, fever is characterized by an increase in core body temperature, along with varying metabolic changes such as induction of different cytokines and shifts in energy utilization and metabolic rates. It is currently known that fever increases immune response, though how it functions at a cellular level, specifically the metabolic processes, is widely unknown.

Purpose: The objective of this research is to explore how fever induced changes in immune metabolism impact the cell's ability to fight infection. We are focusing on how the metabolic process, oxidative phosphorylation, shifts with febrile conditions. Particularly, how this metabolic pathway regulates macrophage activation in febrile conditions, this will allow us a greater understanding of the connections between fever and metabolism.

Methods: To investigate this, we are utilizing murine macrophages cell line, RAW 264.7 and inducing febrile conditions using bacterial lipopolysaccharide. The cells are then incubated at various temperatures, 37°C to simulate 'normal' or control conditions and 39°C to simulate febrile thermal conditions. Each treatment group is incubated after they've been treated with the bacterial lipopolysaccharide at differing time trials of 6, 24, and 48 hours. Following incubation, the cells are then collected and undergo ribonucleic acid extraction in order to perform complementary deoxyribonucleic acid synthesis to create the complementary deoxyribonucleic acid required for quantitative polymerase chain reaction. Through utilization of quantitative polymerase chain reaction, we are able to analyze gene expression of varying genes linked to oxidative phosphorylation in order to determine how the metabolic process is regulated by febrile conditions.

Results: Preliminary data suggests that certain genes linked to oxidative phosphorylation, such as Nicotinamide adenine dinucleotide hydrogen: ubiquinone oxidoreductase subunit a (Ndufa) gene, and cytochrome c oxidase subunit 6B1 (Cox) genes display key shifts during immune response. These early results displayed an initial downregulation, then an upregulation during later immune response. Ongoing research is aimed at expanding these findings with a focus on various genes related to oxidative phosphorylation, such as isocitrate dehydrogenase 3 beta (Idh3b), pyruvate dehydrogenase (lipoamine) beta (Pdhb), and malate dehydrogenase 2 (Mdh2). It is expected that we will see an upregulation of these genes during febrile conditions.

Conclusion: This project investigates the link between cell metabolism regulation and the thermal conditions induced during fever. By exploring this connection, we can further identify the link between cellular energy shifts and its role in immune response.

Jacob Wade

FACULTY: ARTS
DEPARTMENT: LITERATURE AND LANGUAGES

GUYON DOES NOT FALL: REVEALING SPENSER'S ETERNAL TEMPERANCE IN BOOK II

In the Proem to Book II of The Faerie Queene, Edmund Spenser anticipates the skepticism of his readers, cautioning them against dismissing his allegorical world as mere fantasy: ""Why then should witlesse man so much misweene / That nothing is, but that which he hath seene?"" This warning sets the stage for a virtue—Temperance—that defies rigid categorization, urging audiences to suspend preconceived notions derived from classical philosophies or binary frameworks. Yet, for centuries, this caution has often been ignored by scholars armed with the philosophies that inspired Book II, imposing external standards such as the Aristotelian mean or Christian Grace. A.S.P. Woodhouse's apologetic work, "Spenser, Nature and Grace Mr. Gangs Mode of Argument Reviewed," is the epitome of this problem, delegating Guyon firmly in the realm of nature and shutting down further discussion. More modern scholars lean toward a tentative approach but still grapple with Spenser's sources, ranging from Aristotle to classical epics, and need to lean toward one side. And even though A.C. Hamilton recognizes the inverse parallelism, he does not take the final step and tell us why Guyon does things bigger and better. As a result, interlocutors often judge Guyon as falling short of "true temperance", especially in the wrathful destruction of The Bower of Bliss, viewing it as an intemperate excess rather than a virtuous restraint.

I contend that such scholarly efforts, though illuminating, inadvertently embody the intemperance Spenser warns against, prioritizing external benchmarks over the poem's internal logic. By engaging in the futile task of labeling Spenser's Temperance as deficient—whether through Woodhouse's binary conclusion or modern rejections rooted in source analysis—critics risk discrediting Guyon not as a flawed hero, but as deliberate moments of inverting classical epic figures, designed to illustrate Spenser's unique synthesis of virtue, these are the moments where the benchmark by which Guyon is judged reveals itself. These moments of failure are displaced onto the parallel inversions of what Milton meant when praising Spenser's robust and battle-hardened virtues. Ultimately, Book II presents Temperance not as a failure to meet Aristotelian or Christian ideals, but as Spenser's affirmative vision in action: a dynamic, contextual ethic that embraces destruction arising from the compounding of ethical energy when confronting seductive excess. Through this lens, the poem's narrative arc, from Guyon's trials to the Bower's ruin, emerges as an exemplar of temperance, challenging readers to align with Spenser's philosophy rather than impose their own.

Jamal Rizvi, Md Morshedul Islam and Wali Mohammad Abdullah

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

HEAL-RAG: HEALTHCARE EVIDENCE-AUGMENTED GENERATION FOR CLINICAL DECISION SUPPORT

Background: Healthcare systems create massive quantities of digital information. This includes clinical guidelines, as well as biomedical literature. But with traditional search systems, you're presented with a list of documents to sort through yourself. That process can stall clinical decision-making.

Large language models are able to answer medical questions but can hallucinate information. Retrieval-augmented generation, or RAG, overcomes that problem. First, it retrieves documents related to your question from trusted sources. Then it gives that information to the language model to use as context for a response.

Purpose: This study examines how Retrieval-Augmented Generation can support healthcare decision systems. The research focuses on understanding how document retrieval, structured medical knowledge, and language model generation can be combined to produce more reliable responses to healthcare queries. The study also proposes a conceptual framework that improves transparency and contextual grounding in AI-assisted healthcare information systems by integrating trusted medical knowledge sources.

Methods: The proposed system is designed to curate trusted medical knowledge sources for retrieval-augmented clinical question answering. Healthcare resources can be gathered from clinical guideline repositories, biomedical literature databases, and government or public health websites and organized into a knowledge base.

Medical or clinical documents can be converted into vector embeddings using state-of-the-art embedding models. These embeddings are stored in a vector database that can be semantically queried to retrieve the most relevant documents based on similarity to a query vector. This retrieved data forms the knowledge base from which medical evidence can be fetched when a user submits a question.

When a user asks a question, a semantic search retrieves the most medically relevant documents from the knowledge base. These documents are used as context when prompting a large language model. The model then generates an answer grounded in the retrieved documents, reducing hallucination and supporting a transparent AI-based clinical decision support system.

Results: Retrieval-augmented generation systems have been demonstrated before. In an earlier study, named RAILS, realistic Java code generation prompts were used, totaling 78. Their semantic accuracy was 100% for the generated code, with a mean runtime of about 4.1 seconds per query. These showcases retrieval-based approaches can return precise results with low generation latency.

Another study, P4OMP, utilized retrieval-augmented prompting for parallel code generation. When tested on 108 benchmark programs, it compiled correctly 94.4% of the time and achieved 100% success for programs that were parallelizable.

From these results, we can also assume that a retrieval-augmented approach can be utilized with medical data. We thus hypothesize that our proposed system will also be able to produce correct and evidence-backed answers in 4.1 seconds per question on average.

Conclusion: We can improve the reliability of AI-based healthcare information systems with Retrieval-Augmented Generation. By grounding responses in written medical literature, RAG-based models can offer more interpretable and well-sourced responses to medical questions. We will broaden the scope of medical documents, fine-tune our retrieval, and benchmark our system using clinical question-answering datasets.

Jenna Congdon, Twyla Cameron, Heather Fedyna-Carter, Talia Letcher, Karyn MacDonald, Muhammad Qadri and Suzanne Gray

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

LOCAL/GLOBAL PROCESSING BIAS IN AQUATIC AND SEMI-AQUATIC MAMMALS ON A COMPARATIVE TOUCHSCREEN TASK

The amount of information perceived by an individual at any moment is potentially infinite, and how this information is prioritized considering a limited capacity is of interest. Species have evolved different perceptual and attentional biases to relevant/useful information that is appropriate for their particular environment (i.e., ecology). The Local/Global Processing Problem is an investigation of attentional prioritization by describing two (or more) levels at which visual objects may be perceived. Using hierarchical letter stimuli, it is well known that humans have a bias to attend to global (“”big picture””) over local (“”fine detail””) information. However, findings are mixed across non-human animal species using a wide range of visual stimuli and experimental methodologies as researchers contribute findings from studies with individual species. Collaborations with zoos and conservation areas are playing an increasing role in this area of research by enabling access to a wider range of species, and animals not suitable for laboratory research. These collaborations are critical and mutually beneficial as it: 1) allows for researchers to gather data on basic science questions about how the mind works, 2) under more naturalistic research conditions, while 3) simultaneously improving animal welfare through environmental enrichment. In collaboration with the Edmonton Valley Zoo, the Local/Global Processing Problem has been extended to multiple water-dwelling mammalian species using consistent methodology and comparable experimental setups employing custom, glassless, waterproof touchscreens. The species currently included in this expansive, ongoing perceptual study are: 1) harbor seals (Phoca vitulina), 2) Northern fur seals (Callorhinus ursinus), and 3) North American river otters (Lontra canadensis). The training procedures of all three study species will be presented, including the navigation of challenges. Additionally, the preliminary findings from Northern fur seals will be discussed, and the greater contributions of this research to our scientific knowledge about attention and perception in aquatic and semi-aquatic mammals. Overall, these studies investigating several species under-represented in cognitive research address a major gap in the literature, assisting in further mapping the ecological and evolutionary impacts of information processing, providing insight for revising best practices for housing and care, and potentially informing conservation efforts for their wild counterparts.

Jodi Arrowsmith, Shraiya, Rajput, Jingyu, Xu and Dr. Shaun Aghili

FACULTY: MANAGEMENT
DEPARTMENT: MISSM/MISAM

ARTIFICIAL INTELLIGENCE FUNDAMENTALS

The purpose of Understanding AI Fundamentals is to develop a foundational understanding of artificial intelligence systems and produce a book chapter intended for a possible publication supporting information systems assurance professionals. Artificial Intelligence (AI) has advanced rapidly since its inception, and foundational AI concepts provide the groundwork to understand how this growth affects the current systems and governance considerations. The evolution of AI is comprised of three major phases: the first wave of symbolic AI, followed by a second wave marked by decline and later resurgence in research and investment. The third wave is driven by deep learning, large-scale data availability, and cloud computing infrastructure. An exploration of AI scope, capabilities and system elements provides context for understanding the complexity of modern AI systems. Identifying the distinctions in the core features, methods and applications, as well as identifying distinctions and interrelationships, demonstrates the complexity of this technology. Current machine learning architectures are structured across modalities, model types and algorithms. The choice of system architecture determines how data pipelines, models, infrastructure, and interface components interact. AI systems depend on data quality, algorithm design, and computing infrastructure. However, AI is not a standalone technology but a system integrating people, processes, and technology. Because these systems are probabilistic and adaptive, they introduce governance and risk considerations. Controls implemented from development through deployment support explainability, transparency, and reliability. Governance and oversight help ensure AI systems operate ethically and meet regulatory expectations.

Jonathan Strand

FACULTY: ARTS
DEPARTMENT: PHILOSOPHY, RELIGIOUS STUDIES AND CLASSICS

IN DEFENCE OF MODERATE SUPERNATURALISM

In this presentation it is argued that a careful analysis of the concept of "making a difference" entails what Metz has dubbed "moderate supernaturalism": Without the satisfaction of spiritual conditions—such as the existence God or life after death—our lives can be substantially meaningful. But our lives will be much *more* meaningful, if some such spiritual conditions are met.

The argument of the presentation will proceed roughly as follows:

1. One of the sorts of meaningfulness people seek in their lives is significance.
2. A thing is significant, or "matters", to the extent that it "makes a difference".
3. A thing makes a difference whenever some state-of-affairs obtains that would not have obtained if that thing had not existed/occurred/obtained.
4. Whenever a thing A makes more, or greater differences, or the differences it makes obtain for a longer period of time, than the differences another thing B makes, then (all else being equal) A makes a greater overall difference than B.
5. Human beings make innumerable differences in their lives—including many differences of substantial or great value—even if there is no God or life after death, and all the differences we make obtain for only a finite amount of time.
6. Human lives and actions, therefore, can make many substantial differences—and so be significant, and meaningful—apart from the satisfaction of spiritual conditions like the existence of God or life after death.
7. If God does exist, however, (as traditionally conceived) God will know and appropriately appreciate, in complete detail, and for eternity, every action of every person; states of affairs will obtain, for eternity, that would not have obtained if that person, or God, had not existed.
8. If human beings have life after death, they will be making differences beyond their natural lives, and if that life is eternal, they will be making differences for an eternity beyond their natural lives or even that of the universe; again, states of affairs will obtain (for eternity) that would not have obtained if that person, or their life after death, had not existed.
9. So, if God, or life after death, exist, human beings will make a greater difference than if there is no such spiritual reality; it fact, they will make an infinitely greater difference if such spiritual conditions are satisfied.
10. Human beings can have significant, and hence meaningful, lives, therefore, apart from any spiritual realities like God or life after death.
11. Our lives will be substantially more significant and meaningful, however, if some such spiritual realities obtain; in fact they may be infinitely more significant and meaningful.
12. Moderate supernaturalism, therefore, is true.

Kacianne Kawulok, Tessa Granson-Woollard and Alexander Taikh

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

LINGUISTIC FACTORS AS A PREDICTOR OF FILLED PAUSES AND DISFLUENCIES

Background: Stuttering is a neurodevelopmental speech disorder that is characterized by several types of speech disfluencies; prolongations, repetitions, blocks, and filled pauses (uhh or umm). Examining speech from people who stutter thus allows us to examine the influence of linguistic information on speech fluency. According to the ExPlan model of stuttering (Howell et al., 2011), planning the subsequent word occurs while executing (i.e., articulating) the current word, and disfluencies occur because there is insufficient time to plan (i.e., insufficient planning time for all the required linguistic information). Filled pauses in particular, contain minimal linguistic information and may provide time for planning (Clark & Fox Tree, 2002).

Purpose: We examine whether the linguistic properties of the word being said predict the likelihood of a subsequent filled pause. Specifically, saying a more difficult word (one that is longer or occurs less frequently) may interfere with planning the subsequent word, resulting in the subsequent word being said disfluently, or in a filled pause for additional planning time.

Method: FluencyBank (Bernstein-Ratner & McWhinney, 2018) contains audio and video recordings of adults who stutter answering interview questions. Ramona et al (2024) annotated the FluencyBank dataset, classifying each token as a fluently spoken word, disfluently spoken word, or as a filled pause. We examined whether the linguistic properties of a fluently spoken word predicted whether the next token was a filled pause or a disfluently spoken word.

Results/Conclusion: Disfluencies and filled pauses were more likely to follow longer words (i.e., were more likely following a word like “birthday” than a word like “cat”). Longer words may be more cognitively demanding to execute, and interfere with the concurrent planning of the subsequent word. A filled pause may thus serve as a buffer before the execution of the subsequent word. Without the extra planning time provided by a filled pause, a disfluency may occur. Our findings suggest that filled pauses reflect increased planning difficulty, which may predict subsequent disfluencies, and that longer words are more difficult to execute.

Kandace Wilson, Fahim Rizwan and Dr. Elizabeth Coker-Farrell

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

ADAPTING LEADERSHIP TO SUPPORT CONTEMPORARY TEAMS

Modern organizations are increasingly composed of employees from multiple generational cohorts, since it is not uncommon to find Baby Boomers, Generation X, Millennials, and Generation Z all employed to a single organization. Each generation has developed within distinct social, economic, and technological environments, which has shaped their expectations about work, communication styles, authority structures, and collaboration. As a result, teams composed of members from different generations may experience differences in how they approach group decision-making, conflict resolution, feedback, and the use of technology in the workplace. While this diversity can strengthen teams by introducing varied perspectives and problem-solving approaches, it may also create challenges for leaders responsible for coordinating and motivating multi-generational teams.

This study seeks to explore how generational differences influence approaches to the entire concept of working in teams and what these differences mean for leadership practices in contemporary organizations. In particular, the research focuses on the need for leaders to adopt both dynamic leadership and change-oriented leadership strategies to effectively manage teams composed of multiple generations collaborating to achieve unified goals. Dynamic leadership refers to the ability of leaders to adapt their management style, communication methods, and motivational strategies to the needs and expectations of diverse team members. Change leadership, on the other hand, emphasizes the capacity of leaders to guide organizations through evolving workforce demographics, technological change, and shifting workplace values.

The importance of this study lies in its potential to help organizations better understand how generational diversity influences team effectiveness and organizational performance. The rapid integration of digital technologies and changing employee expectations has caused team collaboration to evolve. Leaders must develop strategies that bridge generational gaps and promote inclusive collaboration. Failure to address these differences may lead to communication breakdowns, decreased engagement, and workplace conflict. Conversely, organizations that successfully integrate generational perspectives may benefit from increased innovation, knowledge sharing, and stronger team performance.

To address this issue, the study will compare relevant sections of “The Art of Leadership” by George Manning to current leadership practices and group behaviour as observed in other literature from Organizational Behavior and Human Resource Management, as well as leadership theories such as Transformational Leadership, Change Management and Adaptive Leadership. These secondary sources will be used in conjunction with findings from a survey and interviews conducted by the researchers. Through this analysis, the study aims to identify leadership strategies that enable organizations to leverage generational diversity while minimizing potential sources of conflict within multi-generational teams.

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Kandace Wilson and Dr. Elizabeth Coker-Farrell

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

ARTIFICIAL INTELLIGENCE, ALGORITHMIC MANAGEMENT & THE STRATEGIC REPOSITIONING OF HUMAN RESOURCE MANAGEMENT

Artificial intelligence is rapidly transforming how organizations manage their workforces. Increasingly, employers rely on algorithmic tools to perform functions traditionally handled by human resource professionals, including recruitment screening, performance evaluation, employee monitoring, scheduling, and predictive workforce analytics. While these technologies promise greater efficiency and data-driven decision-making, they also introduce complex legal and ethical challenges that organizations must address. As a result, the growing use of artificial intelligence is reshaping not only workplace practices but also the strategic role of Human Resource Management.

This research examines how the integration of artificial intelligence into workplace management systems is influencing the strategic responsibilities of Human Resource professionals and the legal obligations organizations must navigate. Specifically, the study focuses on the question of how Human Resources departments can ensure fairness, accountability, and legal compliance when employment decisions are increasingly influenced by automated or algorithmic processes.

The issue is particularly significant because many Artificial Intelligence systems used in Human Resource functions are developed by third-party technology companies whose tools may embed biases or operate without full transparency. When algorithmic systems produce discriminatory outcomes, violate privacy expectations, or rely on flawed data classifications, employers may face legal and reputational risks even when those systems were not developed internally.

Although governments and international organizations have begun to consider regulatory frameworks for artificial intelligence, legal guidance remains incomplete. This uncertainty creates a gap in which organizations must make strategic decisions about technology adoption without fully established legal precedent. Consequently, Human Resource professionals are increasingly required to act not only as workforce managers but also as organizational stewards of ethical technology use, data governance, and regulatory compliance.

To explore this issue, qualitative and descriptive methods will be combined. Secondary data will be drawn from academic literature, policy documents, and research on emerging Human Resource technologies. Primary data will be collected through surveys and semi-structured interviews with managers, and employees who have experience with digital Human Resource systems.

By examining both theoretical perspectives and real workplace experiences, this research seeks to highlight gaps between technological innovation and existing employment guidelines while identifying how Human Resource professionals can strengthen their strategic role in safeguarding fairness, accountability, and responsible use of artificial intelligence in the workplace.

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Kashish Gangash and Dr. Cecilia Bukutu

FACULTY: SCIENCE
DEPARTMENT: PUBLIC HEALTH

PSEUDOMONAS AERUGINOSA FOLLICULITIS OUTBREAKS ASSOCIATED WITH RECREATIONAL WATER: A REVIEW

Background: Pseudomonas aeruginosa folliculitis, commonly referred to as hot tub rash, is a skin infection linked to exposure to contaminated recreational water. Warm water and organic matter from bathers, combined with inadequate disinfection, create favorable conditions for bacterial growth. Although the illness is usually mild and self-limiting, outbreaks can spread quickly and impact many individuals, sometimes leading to public health investigations and temporary facility closures. The widespread use of public and private recreational water facilities makes it important to understand outbreak patterns and identify effective prevention strategies.

Purpose: This review examined published outbreak investigations of Pseudomonas aeruginosa folliculitis associated with recreational water. The objective was to identify common risk factors, investigation approaches, and regulatory challenges.

Methods: A literature search was conducted using major databases, including PubMed, PubMed Central, Scopus, Google Scholar, the Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report archives, and grey literature sources such as the Public Health Agency of Canada and Alberta Health Services. Inclusion criteria required outbreak investigation reports and peer-reviewed studies published in English that described Pseudomonas aeruginosa folliculitis following exposure to a hot tub, spa, swimming pool, whirlpool bath, or physiotherapy pool between 1990 and 2025. Titles and abstracts were screened for relevance, and full-text articles were reviewed to extract data on study design, population, risk factors, and outcomes.

Results: Thirteen studies met the inclusion criteria. Most outbreaks occurred in hot tubs, spas, and other warm-water environments and were associated with inadequate water disinfection, improper monitoring, poor record keeping, and bacterial growth within plumbing systems. Attack rates ranged from 30% to 60%, with symptom onset typically occurring within 8 to 48 hours after exposure. Private and short-term rental hot tubs or spas were not subject to standardized regulation or inspection, which limited surveillance and prevention efforts. In addition, reporting and documentation of outbreaks were inconsistent, making comparisons across studies difficult. Few studies assessed the effectiveness of specific interventions or long-term control measures, leaving important questions about best practices unanswered.

Conclusions: Inadequate disinfection, insufficient monitoring, and bacterial growth in plumbing systems were key contributing factors in Pseudomonas aeruginosa folliculitis outbreaks. Limited surveillance and inconsistent reporting, particularly in private and short-term rental facilities, reduced prevention efforts. Strengthening public health management practices, improving surveillance systems, and enhancing oversight in recreational water facilities may help reduce future outbreaks and better protect community health.

Khushi Panara and Md Morshedul Islam

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

FEDERATED FINE-TUNING OF LLMS FOR EXPLAINABLE DECISION-MAKING IN PRIVACY-SENSITIVE DOMAINS

Background: Large language models (LLMs) have demonstrated strong capabilities in tasks such as classification, prediction, and providing explanations for their decisions. Despite this potential, their adoption in sensitive sectors like healthcare, legal services, and finance remains limited due to strict privacy regulations that prevent sharing data with external platforms. Traditional approaches, such as Retrieval-Augmented Generation (RAG), rely on centralized or shared data, raising privacy and security concerns. Federated learning offers a promising alternative by enabling multiple organizations to collaboratively train models without transferring raw data, preserving confidentiality while leveraging distributed knowledge.

Purpose: The primary goal of this research is to develop a federated fine-tuning framework for LLMs that supports collaborative decision-making and provides explainable outputs, all while keeping data on-site. The framework addresses critical barriers to AI adoption in regulated sectors by enabling organizations to collectively improve model performance without compromising privacy.

Methods: The framework operates with a lightweight LLM (e.g., FLAN-T5) to accommodate computational constraints and reduce communication costs. A pretrained base model is initialized on a central server and distributed to clients along with Low-Rank Adaptation (LoRA) parameters and frozen model layers. LoRA allows task-specific updates without modifying the full model, ensuring training is efficient and resource-friendly. Each client fine-tunes only the LoRA parameters locally using its private data and decision explanations, eliminating the need for external data retrieval methods like RAG. Clients then send only the updated parameters back to the server, where they are aggregated (e.g., using FedAvg) to update the global model. This iterative process continues over multiple rounds, progressively enhancing the model while maintaining strong privacy guarantees.

Anticipated Results: The framework is expected to enable institutions to collaboratively develop a high-performing LLM capable of both classification and explainable decision-making. Fine-tuning only LoRA parameters will significantly reduce computation and communication costs compared to traditional distributed training, making the system practical for real-world deployment. Collaborative training is also anticipated to produce models that are more robust, generalizable, and transparent than models trained in isolation.

Conclusion: Federated fine-tuning of LLMs provides a practical, privacy-preserving solution for deploying explainable AI in regulated sectors. By combining lightweight base models, parameter-efficient adaptation, and secure aggregation, the framework ensures high model performance, efficient resource use, and compliance with strict privacy regulations, enabling safe and effective AI deployment in sensitive domains.

Kieran Tomalty, Nasim Hajari and Wali Mohammad Abdullah

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

A NOVEL PROTOCOL FOR DATA STORAGE AND CENSORSHIP-RESISTANT COMMUNICATION ON THE BITCOIN BLOCKCHAIN

Background: Free and open communication on the internet is facing increased regulatory pressure and censorship from both domestic and multinational regulatory bodies. The decentralized nature of the blockchain offers defenses against these threats in the form of immutability (unchangeable data), non-repudiation (proof of origin), and data-permanence.

Purpose: This project looks at the use of the cryptocurrency Bitcoin as a medium to both store arbitrary data and privately communicate between two parties directly over the blockchain network without relying on a Layer 2 (external) solution. As part of the project's objectives, a novel protocol was developed to leverage recent policy rule changes regarding data-carrying transactions, allowing for more efficient data storage.

Additionally, a modern encryption scheme was implemented to support secure two-way communication over the public ledger.

Methods: Historical Bitcoin data embedding and insertion protocols were tested for cost of data storage, header and encoding overhead, resistance to censorship from external and on-chain actors, and potential security vulnerabilities. The OP_RETURN locking script was selected as the foundation of the proposed protocol due to its low overhead and elimination of coin wastage, resulting in a lower cost per byte and a higher maximum data capacity per transaction compared to alternative methods. Support for data encryption was included in the protocol to enable on-chain private communication.

A file-sharing and messaging application was created to test the new protocol on the Bitcoin blockchain and to better evaluate its effectiveness for this use case.

Results: Of the methods compared, the protocol developed in this project reduced protocol overhead by 10-20% compared to existing data embedding methods, with the largest reductions occurring with smaller quantities of transmitted data. This was accomplished while including the ability to distribute data across multiple transactions, allowing for easier mitigation of network fees during periods of congestion. The primary theoretical vulnerability identified was its susceptibility to pruning by node operators; however, this was partially mitigated through the inclusion of built-in data encryption.

Conclusion: The protocol developed in this project demonstrates the feasibility of the Bitcoin blockchain as a platform for censorship-resistant data storage and communication. Further development of applications utilizing these methods may help protect free and open communication on the internet. While the focus of this project was on the Bitcoin blockchain, the findings are generally applicable to cryptocurrencies which derive from Bitcoin or those which utilize its scripting language.

Lucias Varze and Dr. Jenna V. Congdon

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

A STUDY OF OUTCOME-BASED ENRICHMENT IMPLEMENTATION TO SUPPORT AND ENCOURAGE NATURALISTIC BEHAVIOURS IN SICHUAN TAKIN (BODORCAS TAXICOLOR TIBETANA)

Sichuan takin are a vulnerable goat-antelope species native to the mountainous regions of southern China and eastern Tibet. Takin display a wide range of natural foraging and exploratory behaviours including rearing on their hind legs to access browse, knocking down saplings, excavating mineral licks, and vigorously rubbing their horns on trees and rock surfaces. Many of these behaviours, particularly digging and substrate manipulation, are underexpressed in captivity, contributing to reduced stimulation and welfare challenges such as hoof overgrowth. Although enrichment is recognized as a central component of zoo-based welfare, research has historically focused on primates and carnivores, leaving large ungulates understudied despite evidence that limited environmental complexity contributes to inactivity and stereotypic behaviour. The present study addressed this gap in the literature by developing and evaluating an outcome-based enrichment for the Sichuan takin (Budorcas taxicolor tibetana) housed at the Edmonton Valley Zoo (EVZoo). Baseline observations were conducted throughout fall and winter with the EVZoo's herd of eight Sichuan takin (two males, six females). Behaviour was recorded using one-minute scan sampling to document behaviour, enclosure space use, and interaction with environmental features. Drawing on behavioural ecology, welfare science, and outcome-based enrichment principles, the literature and baseline data led to a detailed proposal and introduction of two integrated enrichment components: 1) a naturalistic rock and mineral-lick pit designed to stimulate digging, climbing, substrate interaction, and natural hoof wear, and 2) a modified ungulate feeder engineered to promote species-typical cognitive and foraging behaviours. Observations post-implementation provided data to compare to the baseline takin behaviour and assess changes in activity budgets, space use, and engagement with enrichment structures. Behavioural outcomes will be reported through activity budgets, engagement patterns, enrichment preferences, and individual variability across the herd. Overall, this research advances evidence-based husbandry practices, providing empirical data regarding Sichuan takin, ungulates that are underrepresented in enrichment literature, and testing a replicable model for applying outcome-based enrichment to large hoofstock species.

Mackenzie Thomas, Yildirim-Erbasli, S. N. and Lesoway, N.

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

WHEN DO UNDERGRADUATE STUDENTS PREFER AI? INSIGHTS INTO AI SCORING AND FEEDBACK

The integration of artificial intelligence (AI) into higher education assessment has prompted growing interest in how students perceive and prefer AI involvement in scoring and feedback. While prior research has largely focused on technical performance and accuracy, this study aims to fill a gap in the literature by examining students' preferences and perceptions regarding AI scoring and feedback, with particular attention to context, assignment stakes, and post-interaction reflections. Ninety-three undergraduate students completed a survey consisting of Likert-type items, scenario-based preference questions, and an activity in which they generated AI-based scoring and feedback using ChatGPT. Results indicated that students generally preferred flexible, structured, and moderately detailed AI feedback delivered at multiple stages of the writing process, with an emphasis on grammar and organization. However, across scenarios and assignment conditions, participants strongly favoured human scoring and feedback, particularly for high-stakes, creative, or subjective tasks. AI-only evaluation was rarely preferred, though openness to AI increased in low-stakes or time-sensitive contexts. Perceptions of AI scoring were mixed: students viewed AI as objective and effective for evaluating grammar and clarity but expressed concerns about fairness, consistency, and its ability to assess tone, originality, and complex writing. Participants overwhelmingly endorsed hybrid models in which AI augments rather than replaces human judgement. They emphasized the importance of transparency, opt-in control, rubric-based explanations, and opportunities for human review. Post-interaction reflections further revealed four dominant themes: AI as a formative learning aid, preference for human authority, context-dependent acceptance, and skepticism regarding educational impact. Although sentiment analysis revealed an overall positive attitude toward AI-supported feedback, thematic findings highlighted conditional trust and clear boundaries surrounding AI's role. Collectively, these findings highlight that undergraduate students' preferences are highly context-sensitive and role-specific. The study advances understanding of when, why, and how students prefer AI involvement in scoring and feedback, emphasizing the importance of hybrid, transparent, and student-centred implementation strategies in higher education.

Maranda Day and Tanya Ball

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

DECOLONIZING ACADEMIA

Decolonizing academia requires more than acknowledging the historical, ongoing harms experienced by Indigenous Peoples; it demands an active transformation of the ways knowledge is produced, valued, and legitimised. Western academic institutions have long operated within hierarchical structures that determine authority, credibility, and research significance. Within this framework, knowledge systems grounded in Oral Traditions and relational worldviews are often marginalized or dismissed. As a Métis student, I situate myself within these structural inequities and am exploring meaningful pathways forward. This presentation highlights this process, showcasing some of the work that we have done with the ᒥᑭᓯ Mikisi (Red Eagle Circle: the Indigenous Student Association at Concordia University of Edmonton).

This student-led initiative actively combats colonization on campus through a variety of methods. One example of ᒥᑭᓯ Mikisi's work is a panel discussion in early April 2026 around "Decolonizing Psychology." The aim of the panel was to generate conversation around the power dynamics present within the field of psychology. Psychology as a discipline is predominantly rooted in W.E.I.R.D. (Western, Educated, Industrialised, Rich, Democratic) populations, which represent approximately 12% of the global population yet account for nearly 80% of research participants. This disproportionate representation raises significant concerns regarding the generalizability and inclusivity of psychological knowledge. When Indigenous Peoples are excluded from academic conversations, representation frequently centres on deficit-based narratives. While such data are important, framing Indigenous communities primarily through trauma, dysfunction, or deficiency reinforces harmful stereotypes and overlooks perseverance, strength, and cultural continuity. The results of this conversation will move towards creating a course within Indigenous Studies around Indigenous approaches to healing.

Apart from curriculum reform, we transform institutional cultures and visibly affirm Indigenous presence and leadership. For many Indigenous Peoples, occupying space within academic institutions is itself an act of resistance. The ᒥᑭᓯ Mikisi has contributed to this transformation by hosting markets that celebrate Indigenous artists and amplify Indigenous voices within the campus community. There is also active representation at Concordia University of Edmonton Student Association's (CUESA) Global Elegance, educating on Indigenous resistance and what it looks like, with the slogan "existence is resistance" (Haugen 2025). The ᒥᑭᓯ Mikisi is now taken into consideration when planning events and consulted for accurate Indigenous representation and education on campus (e.g., understanding how to give a Land Acknowledgement). Additionally, the organization has advocated for the inclusion of Indigenous Worldviews within student governance structures. Rather than adhering strictly to Western hierarchical models of leadership, the ᒥᑭᓯ Mikisi consults with Elders and prioritises community-guided decision-making processes that reflect Indigenous governance principles.

Ultimately, decolonizing academia involves restructuring not only what is taught, but how institutions operate, whose knowledge is legitimized, and who holds decision-making power. It requires more than curricular inclusion; it demands sustained community presence, relationality, and structural reform. Through intentional representation, reciprocal research practices, and governance models grounded in Indigenous Ways of Knowing and Being, meaningful institutional transformation becomes possible.

Marcela Basedas, Mohammad Kidwai and Dr. Elizabeth Coker-Farrell

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

EMPOWERING THE NEXT GENERATION WORKPLACE FOR ORGANIZATIONAL SUCCESS

Leadership in a workplace has evolved significantly over the years. Today, leaders are employees with knowledge, who are trained and able to make decisions that benefit the organization. Companies are more willing to provide strong leadership in order to motivate employees and improve overall performance. Leaders now understand that listening to followers is a priority and that considering employee input can help them make better decisions for the organization.

Background: Leadership in the workplace has evolved significantly over time. Traditional leadership models were often based on authority, hierarchy, and strict management control. However, modern organizations increasingly recognize the importance of leaders who are knowledgeable, trained, and capable of making strategic decisions that support both employees and organizational goals. As workplaces become more diverse and complex, leadership approaches must adapt to new expectations, including stronger communication, collaboration, and inclusivity. Organizations now emphasize leadership that promotes cultural inclusion, diversity, and shared organizational values in order to create environments where employees feel respected and motivated to perform effectively.

Purpose: This paper examines the role of leadership in improving workplace performance and employee satisfaction. It explores how effective leadership contributes to organizational success by addressing common workplace challenges such as employee absenteeism, declining motivation, and communication breakdowns. The study also highlights how leadership practices that prioritize employee engagement and support can strengthen organizational culture and productivity.

Method: This research uses a conceptual analysis based on leadership theory and workplace management literature. The paper reviews ideas related to modern leadership practices, employee engagement, and communication within organizations. It also considers examples from leadership experts and executives, including insights from former General Electric CEO Jack Welch, who emphasized the importance of selecting the right people, allocating resources effectively, and ensuring the rapid exchange of ideas across organizational divisions.

Results / Anticipated Results: The analysis suggests that strong leadership plays a critical role in improving workplace morale and overall performance. Leaders who encourage open communication and actively support their teams are more likely to build trust and loyalty among employees. When employees feel valued and included in organizational processes, they are more motivated to contribute to the success of the company. Effective leadership can also reduce common workplace problems such as disengagement, lack of communication, and poor performance by fostering a more supportive and collaborative environment.

Conclusions: Effective leadership is essential for creating high-performing workplaces in modern organizations. By prioritizing communication, employee engagement, and inclusive practices, leaders can strengthen relationships within the organization and encourage long-term success. Organizations that invest in strong leadership development are more likely to create positive workplace cultures, maintain motivated employees, and achieve sustainable growth in an increasingly competitive environment.

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The Art of Leadership, p. 117

Mark Loo, Sarah Fisher, Camila Candido-Fuentes, Jared de Vries and Mark Loo

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

FACTORS THAT INFLUENCE CONSUMER PURCHASE OF ELECTRIC VEHICLES

Background: The Canadian EV market has grown to 14% 2024 from 12% 2023, and expected to experience a compound annual growth of 7% up to 2030.

Objective: identify the factors that influence consumer purchase of EVs.

Method: Literature review to develop the framework, pretest to improve the final questionnaire with 24 Likert scale(1 = Strongly Disagree to 5 = Strongly Agree) questions testing Vehicle concerns (performance, incentives and environment) and Economic factors (charging, maintenance and price). The demographics sought were age, gender and income.

Results: 33 respondents, with 28 or 85% Gen Z. None owned an EV.

1. Vehicle concerns: Environment (4.23), Incentives (3.67), Performance (3.47)
2. Economic factors: EV Price (4.59), Charging availability (4.21). Maintenance (3.95)

Conclusions: the Managerial implications are:

1. Promote Performance (efficiency and reliability) and Environmental benefits of EV
2. Target Gen Z as they are the most likely EV consumers
3. Promote monetary incentives such a cash and tax rebates

Meera Jairath and Amro Soliman

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

METABOLIC ROLE OF FATTY ACID OXIDATION IN MACROPHAGE ACTIVATION DURING FEVER

Background: Fever is a physiological immune response to an infection that has been evolutionarily conserved. It is characterized by an increase in core body temperature, providing a non-specific defence to enhance the immune system's ability to fight pathogens. While current research demonstrates that fever can shorten hospital stays and improve survival rates, the underlying metabolic mechanisms remain underexplored.

Purpose: The purpose of this study is to explore the connection between increased core body temperature and metabolic shifts that occur within immune cells. More specifically, the research aims to determine how fatty acid oxidation, a metabolic pathway, contributes to the regulation of macrophage activation during a febrile response. By understanding how fever alters cell energy processes, we can gain a deeper insight into the relationship between fever and metabolism.

Methods: To perform this research, a standardized cell line of mouse-derived macrophages, known as RAW 264.7, was used. The experimental design compared cells kept at a normal body temperature of 37°C to those kept at a febrile temperature of 39°C. Within these temperatures, cells were either left untreated or treated with a bacterial toxin called lipopolysaccharide to mimic an infection. Thus, four experimental groups are created: (1) normothermic unchallenged; (2) normothermic immune-challenged; (3) febrile unchallenged; and (4) febrile immune-challenged. Samples were collected at 6, 24, and 48 hours post–treatment to track change over time. Following ribonucleic acid extraction and complementary deoxyribonucleic acid synthesis, quantitative polymerase chain reaction was performed to analyze the expression levels of the pro-inflammatory cytokine Tumour Necrosis Factor-alpha, and the reference gene Beta-actin, alongside key fatty acid oxidation genes: Carnitine Palmitoyltransferase 1A, Peroxisome Proliferator-activated Receptor-alpha, and Hydroxyacyl-CoA Dehydrogenase Trifunctional Multienzyme Complex Subunit Alpha.

To determine if fatty acid oxidation is necessary for a successful febrile response, a drug called oxfenicine will be used to inhibit the metabolic pathway. To do this, four groups of immune-challenged cells were established: a normal temperature group with no drug, a normal temperature group with drug inhibition, a fever group with no drug, and a fever group with drug inhibition. These cells were collected at 6, 24, and 48 hours, and the molecular techniques listed above were used to analyze the expression level of the pro-inflammatory cytokine Tumour Necrosis Factor-alpha.

Results: Preliminary findings demonstrated that the expression of Tumour Necrosis Factor-alpha was sustained across time points only in the 39°C group. We also observed upregulation in the expression of genes that are involved in oxidative phosphorylation. Building on these findings, research specific to fatty acid oxidation is ongoing. We anticipate that the final results will reveal an upregulation of fatty acid oxidation genes in the febrile groups, particularly in the later stages of infection. It is also expected that when the drug inhibits fatty acid oxidation, immune functions will be impaired.

Conclusion: Overall, this research highlights the complex relationship between body temperature and cellular metabolism. By investigating this relationship, we may uncover novel insights into how the body's defense is optimized.

Nicole Dike and Dr. Elizabeth Coker-Farrell

FACULTY: MANAGEMENT
DEPARTMENT: MANAGEMENT

BARRIERS AND FACILITATORS TO THE SUCCESSFUL IMPLEMENTATION OF DEI-FOCUSED WORKFORCE PLANNING IN ORGANIZATIONS

Background: This study examines the main barriers and facilitators that affect the application of diversity, equity and inclusion in workforce planning within organizations. Organizations are expected to make inclusive and equitable hiring, promotion, and employee development decisions as workplace diversity continues to grow. These choices are heavily influenced by workforce planning. Though many organizations claim to value diversity, equity, and inclusion, it is frequently challenging to translate those ideals into regular, day-to-day operations.

Purpose: This presentation will examine both the barriers and factors that help organizations in implementing inclusive workforce planning.

Methods: In order to better understand how organizations deal with these issues in practice, the study employs a qualitative approach that includes document analysis, interviews and a review of previous research. Some of the key barriers include unconscious bias, a lack of leadership accountability, resistance to change and a limited use of data to support equitable decision-making. Organizations may find it challenging to provide equal opportunities for all employees as a result of these issues.

However, the study also highlights several important facilitators. Strong and encouraging leadership, inclusive and transparent workplace policies, active involvement from employees, and the use of measurable indicators to track progress.

Anticipated Result: Organizations are more likely to develop equitable and inclusive systems that support a diverse workforce when these elements are present. The study also examines the impact of workforce planning decisions on day-to-day outcomes. including hiring, promotion, and leadership position consideration. By concentrating on these pragmatic choices, the study demonstrates how inclusion can be encouraged or restricted in actual circumstances.

Conclusion: All things considered, this study offers organizations and researchers valuable insights. It clarifies why some organizations have difficulty with inclusion, while others achieve significant advancements. The results also provide useful advice for developing more productive and inclusive workplaces.

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Nidhi Asawla and Nasim Hajari

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

CUESPACE: AN INTEGRATED MOBILE PLATFORM FOR ENHANCED UNIVERSITY CAMPUS ENGAGEMENT

Background: Current university platforms often struggle to keep up with the fast-paced, mobile-centric lives of modern students. Research indicates that while mobile learning is essential, its success depends heavily on utility and ease of use. Many existing university systems are fragmented, forcing students to navigate multiple websites that are not optimized for mobile devices, require frequent manual logins, and lack proactive features like instant notifications. This lack of integration creates a significant gap in the student support infrastructure, making it difficult for students to manage their daily academic and social lives efficiently. Students currently must rely on systems that are primarily informational rather than interactive, resulting in a disjointed experience.

Purpose: The primary goal of this project is to develop CUE Space, a comprehensive mobile application designed specifically for the students of the institution. The application aims to solve the problem of systemic fragmentation by consolidating essential services including study room reservations, class schedules, campus events, and academic progress tracking into a single, intuitive digital hub. By providing a mobile-first experience with features like push alerts and program-specific dashboards, the project seeks to increase student engagement, reduce administrative stress, and foster a stronger sense of community within the university environment.

Method: The development of CUE Space is grounded in established design principles that prioritize the user's experience. To ensure the application is as helpful as possible, the design process focused on minimizing the mental effort required to perform routine tasks. This was achieved through a minimalist visual design and the implementation of efficient two-tap workflows, such as quickly confirming a study room booking. The project also integrates real-time data for facility availability and transit schedules, alongside a customized notification system that provides timely reminders and quiet hours without being intrusive.

Result: It is anticipated that the introduction of CUE Space will lead to a more streamlined and interactive campus experience. Students are expected to experience improved access to university facilities through a real-time reservation system and stay better informed about academic requirements and social opportunities through personalized dashboards. By replacing generic information with program-specific alerts and automated login processes, the application should significantly increase the frequency and quality of student participation in campus life.

Conclusion: In conclusion, CUE Space addresses a critical need for an integrated digital ecosystem in higher education. By bridging the gaps between academic management and social interaction, the platform provides a cohesive tool that supports the whole student. This project demonstrates that university technology should move beyond being merely informational to becoming truly interactive and student-centered.

Nitika Garg, Eslam G. AbdAllah and Manisha Ahir

FACULTY: MANAGEMENT
DEPARTMENT: MISSM/MISAM

APPLYING NIST BASED RISK MANAGEMENT FRAMEWORK FOR MITIGATING RFID CLONING AND REPLAY ATTACKS IN HEALTHCARE SYSTEMS

The widespread application of Radio Frequency Identification (RFID) in healthcare systems has exponentially improved patient identification and asset management. Through its applications, RFID has eliminated many challenges such as treatment errors, mislabeled medical sample, misplaced hospital equipment and difficulty in tracking patients. However, these benefits are undermined by the vulnerabilities in RFID system that threaten the safety and privacy of patients and hospitals. Despite the perceptible advantages of RFID technology, patient's security and privacy remain critical concerns since RFID is prone to security attacks such as unauthorized access, eavesdropping, cloning and replay attacks. The critical security implications of these attacks include the compromise of confidentiality and integrity of sensitive patient data, unauthorized access to hospital resources and assets as well as the risk to human safety and clinical operations. In the cloning attack, the attacker aims to develop a counterfeit tag by capturing unique identifiers of a legitimate tag and replicates to another tag. In the replay attack, attacker captures a valid frame between a legitimate tag and a reader via eavesdropping and impersonates that legitimate tag through a rogue tag and at a delayed time, a valid session is replayed by tricking the legitimate reader to detect a rogue tag as a valid tag and treat the session request as a fresh interaction from a legitimate tag. In this research article, we perform a comprehensive analysis of cloning and replay attacks on a RFID system implementation, examining diverse attack scenarios in context of healthcare processes. Following this in-depth analysis, a subset of Risk Management Framework is designed by integrating standards such as National Institute of Standards and Technology (NIST) 800-30 and NIST 800-53. By utilizing NIST 800-30, threat sources, vulnerabilities, predisposing conditions, threat events are formulated for cloning and replay attack, whereas NIST 800-53 is used to design information privacy and security controls and the threat events are mapped to those controls. These controls ensure effective operational efficacy with governance and compliance preparedness for relevant regulations in mitigating RFID related cloning and replay risk in healthcare environments. Overall, the Risk Management Framework subset can help healthcare organizations to reinforce the overall security posture of RFID deployment in hospitals.

Nkechi Oji and Dr. Nasim Hajari

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

ARTIFICIAL INTELLIGENCE-BASED SPAM FILTER FOR EVOLVING PHISHING ATTACK MANAGEMENT

Background: The rapid expansion of internet technologies has increased the risks associated with online communication and digital activities. As individuals and organizations increasingly rely on electronic mail for daily communication, their exposure to cyber threats has also grown. One of the most prevalent threats is phishing, in which attackers attempt to deceive users into revealing sensitive information such as passwords, financial details, or personal data. The shift toward digital communication during the global pandemic further intensified the use of email services, making them a primary target for cybercriminals. Although many spam filtering systems have been developed to detect phishing emails, existing solutions often struggle to identify sophisticated phishing messages, particularly those generated using artificial intelligence techniques.

Purpose: This study aims to design and develop an adaptive, AI-based spam filtering system capable of detecting both traditional phishing emails and phishing messages generated by artificial intelligence. The goal is to enhance the accuracy and adaptability of phishing detection systems by enabling them to learn from evolving attack patterns and emerging threats.

Method: To achieve this objective, datasets containing both traditional phishing emails and AI-generated phishing emails will be collected and curated. The datasets will undergo preprocessing to ensure data quality, consistency, and suitability for model training. Based on findings from a comprehensive literature review, appropriate machine learning models will be selected and retrained using the prepared datasets to identify phishing-related patterns and characteristics within email messages. The methodology will involve several stages: data collection, preprocessing, model selection, model training, performance evaluation, and the development of the adaptive spam filtering system. The system will be implemented using Python and evaluated using standard performance metrics to assess its detection accuracy and reliability.

Results: The anticipated outcome of this research is the development of an intelligent and adaptive spam filtering model capable of effectively detecting both traditional phishing emails and AI-generated phishing messages. While modern detection systems can achieve high accuracy by analyzing message meaning and context, many remain static after deployment and struggle to detect newly emerging attack patterns. The proposed system is expected to incorporate keyword matching and adaptive learning mechanisms to improve the detection of modern phishing threats.

Conclusion: By integrating continuous learning capabilities, the proposed model will be able to adapt to evolving attack strategies and previously unseen phishing attempts. This adaptability will enable stronger protection for users and organizations using widely adopted email platforms. Ultimately, the system aims to provide a more robust and future-ready approach to email security compared with conventional static spam filtering methods.

Noah Newnham and Makan Golizeh

FACULTY: SCIENCE
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IRON INDUCED GLYCATION OF HUMAN MICROSOMAL PROTEINS UNDER PHYSIOLOGICAL CONDITIONS

Introduction: Advanced glycation end-product (AGE) formation by non-enzymatic glycation occurs within the human body when there is an abnormal production of reactive oxidative species. A cascade of physiological ailments results from the lifelong accumulation of AGEs, which permanently alter the structure and function of vital biomolecules, particularly proteins. This degenerative process has been associated with aging and many human age-related diseases, such as atherosclerosis, Alzheimer's disease, and arthritis.

Objective: AGE formation is promoted by heavy metal catalysts, such as iron; iron ions catalyze the Fenton reaction, where hydrogen peroxide is translated into highly reactive hydroxyl radicals. The relationship between Iron-induced glycation and AGE formation has yet to be fully understood. However, in cases of hemochromatosis and patients with metabolic dysfunction – associated steatotic liver disease (MASLD) and type 2 diabetes (T2D), it has been found that iron predominantly accumulates within the liver, making human liver microsomes (HLM) a promising prospect for analyzing iron-induced glycation. This study aims to develop the associations between AGE formation and iron-induced glycation through the analysis of the HLM proteomic response to oxidative stress using bioanalytical techniques to determine metabolic pathways that are likely to be oxidatively compromised.

Method: In this study, HLM protein targets of AGE modification are identified using a bottom-up proteomic approach. The experiment consisted of three treatments: first, an HLM sample that is subjected to iron-induced oxidative stress in the presence of glucose to promote glycation; second, a similar sample contained all previously mentioned components, with the addition of glutathione to potentially inhibit iron-induced glycation; third, a control group that was not treated with oxidative stress or glutathione. After the oxidative treatment, the samples along with the control were solubilized with sodium deoxycholate, subjected to reductive alkylation, and then digested with sequencing-grade modified trypsin. Tryptic peptides were then identified using data-independent liquid chromatography-tandem mass spectrometry analysis.

Results: In this bottom-up proteomic single-dimensional analysis, 901 HLM proteins were identified. Of these 901 proteins, 31 have been identified as targets for glycation. HLM proteins subjected to iron-induced oxidation have been found to be more prone to missed tryptic cleavages. We assume covalent modification at lysine and arginine residues may have sterically hindered trypsin from cleaving peptide bonds. Further top-down proteomic analysis will test this assumption. HLM iron-induced oxidation resulted in upregulated metabolic proteins involved in translation and subcellular trafficking as a response to oxidative stress.

Future Directions: Later analysis will include the enrichment of glycated protein and peptide targets using molecular methods, such as molecularly imprinted polymers (MIPs), to streamline the identification of overrepresented biological pathways induced by iron-induced glycation. Additionally, this investigation will be followed up by a top-down proteomic analysis to affirm the established findings.

Oluwakayode Soyinka and Baidya Saha

FACULTY: SCIENCE
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MIVA-KNIGHT: A DOMAIN-ADAPTIVE MULTI-MODAL VOICE ASSISTANT USING HYBRID RETRIEVAL-AUGMENTED GENERATION

Today's voice assistants like those found on smartphones and smart speakers are designed to answer almost any question on any topic. While this makes them useful in everyday life, it also makes them unreliable in high-stakes professional environments. When an assistant is trained on general knowledge, it can produce confident-sounding answers that are simply wrong. In fields like healthcare, energy management, and corporate governance, a wrong answer is not just an inconvenience it can have serious consequences. On top of that, most of these systems send data to remote servers to process requests, which creates unacceptable privacy risks for organizations handling sensitive information.

This project introduces MIVA-KNIGHT, a voice assistant built specifically for professional and institutional use. Rather than trying to know everything, MIVA-KNIGHT is designed to know things correctly. It checks its facts before answering by searching a structured knowledge base of verified, real-world information specific to a professional field. This field of focus for example, medical radiology or corporate compliance is called a domain. The system searches tens of thousands of verified entities within that domain and uses that evidence to construct every response, rather than relying on memorized training data alone.

What makes MIVA-KNIGHT particularly distinctive is its ability to understand multiple types of input simultaneously a capability called multi-modal processing. In simple terms, a user can ask a question using their voice, upload an image, and feed in sensor readings all at once, and the system processes all of these together to form a single, coherent response. Specialized processing components handle each input type text, audio, images, and sensor data and combine them seamlessly before generating an answer.

The system also includes a three-tier confidence mechanism to guard against unreliable responses. When confidence is high, the system responds fully. When confidence is moderate, it provides a partial response with appropriate caveats. When confidence is too low, it refuses to answer rather than risk producing inaccurate information. This design prioritizes trustworthiness over the appearance of competence.

MIVA-KNIGHT also operates entirely on an organization's own computers no internet connection or cloud service is required. Sensitive data never leaves the institution's own systems, addressing one of the most significant concerns around deploying artificial intelligence in regulated industries. The system can also switch between entirely different professional domains in under five seconds, without needing to be retrained from scratch.

The results are promising across multiple industries. In healthcare, the system is projected to improve diagnostic accuracy by thirty percent. In manufacturing, it is expected to cut equipment downtime by forty percent. In the energy sector, it could reduce operational costs by fifteen percent. These figures reflect a system designed not just to sound intelligent, but to deliver reliable, verifiable answers in environments where accuracy genuinely matters.

MIVA-KNIGHT represents a meaningful step toward artificial intelligence that professionals can genuinely trust transparent, private, and grounded in verified knowledge.

Om Patel and Nasim Hajari

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QUITSMART: A BEHAVIORAL TRACKING WEB APPLICATION FOR REDUCING SMOKING, VAPING, AND CANNABIS USE

Tobacco smoking, vaping, and cannabis use continue to pose significant health risks and remain difficult habits to overcome for many individuals. People attempting to reduce or quit these behaviors often struggle with identifying personal triggers, understanding patterns of use, and maintaining motivation over time. While many digital tools exist to support quitting, they often focus on simple tracking or provide generic advice that does not reflect the user's individual behavior also charging fees for the features. There is a need for accessible tools that help individuals recognize their own patterns and make informed decisions about behavior change.

The purpose of this project is to design and develop QuitSmart, a web-based application that helps users monitor substance use and better understand the behavioral patterns associated with their habits. The system aims to support individuals who want to reduce or stop smoking, vaping, or cannabis use by providing structured logging, personalized insights, and supportive intervention features.

QuitSmart allows users to create an account and select which substances they want to track. Users can record events such as cravings, actual use, or moments when they successfully resist using. Each entry includes contextual information such as triggers, notes, and optional event timing, which allows the system to analyze behavior more accurately. The application also includes a support feature called Rescue Mode that provides coping strategies during cravings. Collected data is analyzed to identify trends such as peak usage times, common triggers, and weekly activity patterns. The system then presents these insights through a dashboard that summarizes behavior over recent days and highlights opportunities for intervention.

Initial testing demonstrates that the application successfully records behavioral events and generates personalized insights based on user activity. Early observations indicate that features such as peak time detection and trigger identification can help users better understand when and why cravings occur. These insights may encourage users to prepare coping strategies before high-risk periods and support gradual reduction of use.

In conclusion, QuitSmart demonstrates how a behavioral tracking application can support individuals attempting to change substance use habits. By combining structured self-monitoring with personalized insights and supportive features, the system provides a practical digital tool that may improve awareness, encourage healthier choices, and contribute to long term behavior change.

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CREATING A HEALTHY AND INCLUSIVE WORKPLACE CLIMATE FOR THE EMERGING GENERATIONS

This research explores how organizational climate has changed over the years and how leadership needed to adapt to these changes. Traditionally, organizations were structured hierarchically, characterized by clear authority, specific norms, routines, and strong face-to-face presence. The defined roles, formal communication, and the environment culture were built through in-person interactions, and professional supervision within stable and predictable systems. Nowadays, the work environment has expanded beyond physical offices, especially after the COVID-19 pandemic in 2020. Remote work and hybrid models became common and that digital transformation made leaders adapt to new routines, virtual meetings and new employee expectations. The different generations, like Millennials, Gen Z, and Alpha experience and respect flexibility, purpose, emotional awareness, and shared purpose.

This study also analyzes how organizational climate and leadership patterns have evolved from strict and hierarchical models to modern, flexible, and multigenerational approaches. The leadership styles have changed across generations, and understanding these differences helps leaders create environments where all employees feel psychologically safe, respected and motivated, besides their differences. Multigenerational leadership demands emotional intelligence, cultural awareness, and the ability to integrate stability valued by older generations with innovation and flexibility expected by younger ones. In contemporary organizations, successful leaders do not choose between hierarchical and collaborative models; instead, they blend structure with empowerment. By honoring experience while embracing change, leaders can create inclusive environments that engage Baby Boomers, Gen X, Millennials, and Gen Z simultaneously — and prepare for the expectations of emerging Generation Alpha.

Overall, this study emphasizes that the organizational climate is no longer defined only by physical spaces or formal structures, but also by the quality of the relationships, psychological safety, communication, flexibility, and inclusion within the workplace. For example, Gallup, Inc. report found that 56 percent of 125 million full-time U.S workers are able to perform their jobs from home, illustrating how flexibility has become a central aspect of modern organizational climates. Leaders who balance structure with empowerment and adapt to generational differences are more likely to build trust, increase engagement, promote a healthy environment, and support long-term organization success.

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FACULTY: SCIENCE
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CAREGIVERS' AWARENESS OF PHTHALATE EXPOSURE IN CHILDCARE SETTINGS: A REVIEW

Background: Phthalates are a group of chemicals commonly used to make plastics more flexible and durable. They are found in a wide range of consumer products, including toys, childcare items, and vinyl-coated mattresses or sleep surfaces. Exposure to phthalates has been associated with potential health risks in children, including effects on hormone function and development. Young children may be exposed unintentionally through mouthing behaviors, contact with dust, or use of products containing phthalates. Despite regulations intended to limit exposure, little is known about childcare providers' awareness of these chemicals or their perceptions of the risks they pose. Understanding caregivers' knowledge and practices is important for supporting effective health risk management in early childhood settings.

Purpose: This literature review aimed to examine existing research on childcare providers' awareness and perceptions of phthalate exposure in their facilities and to identify gaps in knowledge that may influence health risk management practices.

Methods: A systematic literature search was conducted using Scopus, Google Scholar, and CINAHL. Search strategies combined subject headings and keywords related to phthalates, childcare settings, and consumer behavior. Articles were screened and selected according to predefined inclusion criteria, focusing on original research that assessed caregivers' understanding of phthalate hazards, sources of exposure, and measures to reduce risk in childcare environments. Key findings were extracted and synthesized to identify common themes and knowledge gaps.

Results: The review found that childcare providers generally have limited awareness of environmental chemicals, including phthalates, in common products and materials used in childcare settings. Awareness and perception of risk varied depending on demographic factors such as ethnicity and income. Existing regulatory guidance and communication were often insufficient or unclear, which may limit caregivers' ability to identify high-risk products or implement strategies to reduce exposure.

Conclusions: The findings reveal knowledge gaps among childcare providers regarding phthalate exposure. Targeted educational interventions and risk communication strategies that clearly explain where phthalates are found and how exposure may be minimized could be beneficial. Reviewing regulatory procedures may help ensure that they effectively support safe practices. Providing caregivers with practical guidance may support safer childcare environments and inform health risk.

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A CONTEMPORARY LEADERSHIP FRAMEWORK FOR ENGAGING AND LEADING GENERATION Z

Leadership is a dynamic relationship shaped by leader qualities, follower characteristics, trust, and situational factors. Contrasting effective leadership with negative leadership, and highlighting how traits such as manipulation, narcissism, and lack of empathy can reduce morale performance, and well-being. Emphasizing what successful leadership looks like and what traits are closely associated with it.

Furthermore, discussing the necessity of trust within a leadership relationship. The modern relationship depends on trust, openness, accountability, and shared responsibility. We are going to explore how leadership is increasingly more collaborative and team-oriented, reflecting our changing attitude towards authority and a greater demand for ethical transparency and people-centred leadership. Today's emerging workforce values meaningful work over hierarchy and control. Unlike previous generations that have often accepted the top-down model of leadership, newer generations expect to be heard, included in decision-making, and treated as partners in the organization's success. Therefore, our leadership styles need to shift towards being coaches and facilitators, not just directors, fostering environments where feedback flows openly and innovation is encouraged.

Leadership has changed overtime where different generations have experienced a profound change in being led, the features of the leaders, and their specific style of leadership. Successful, motivated, "for the people" kind of leaders had a major thing in common, care. They saw the people's needs and incorporated them into their ideas. This highlights the drastic difference in styles of leadership, as well as personal traits. Throughout the years our styles have significantly shifted from a very extreme authoritarian style, to a very inclusive, safe, trustful, free speech environment where people can express their concerns a lot easier than before. We continue to see this in today's day and age where workplaces have policies in place, resources like Human Resources, to support workers' needs and to prevent unethical and uncomfortable workplaces for employees.

Many situational factors play a part when looking at a workplace or organization itself. The physical size of the environment, and the number of people in that workplace have a larger impact on production, and relationships within the workplace than expected. With hundreds of workers, the number of emotional connections or conversions between everyone becomes limited. There are so many employees that there is no way to know everybody on a personal level, instead just another body working in the same work setting. While looking at the social and psychological climate of a workplace, leaders contribute to the actual workers, examining how directly they help or work with employees for the best outcome. The attitude within the workplace, especially from a leader, makes a significant difference in how the employees feel, their level of trust, and confidence within the organization.

Future leadership effectiveness will depend on emotional intelligence, adaptability and ethical integrity. As our workplaces become more diverse, digital, and continuously changing, leaders must demonstrate empathy, cultural awareness, and a willingness to learn alongside their teams. Trust, respect, and psychological safety will be essential in motivating younger generations, who are reported to be more likely to disengage when leadership lacks authenticity or social responsibility. Ultimately, we want to demonstrate the need for balance of competence with compassion, vision with flexibility, and authority with humility. In conclusion our goal for this presentation is to emphasize the importance of positive progress regarding leadership characteristics, traits, and how to effectively nurture future leaders.

Pooja Sharma and Nasim Hajari

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

FEDERATED LEARNING FOR HEALTHCARE ANALYSIS IN BRAIN TUMOR

Background: Artificial intelligence is increasingly used in medical imaging to help doctors detect and analyze brain tumors. However, traditional machine learning approaches usually require hospitals to send patient data to a central system for processing. This creates serious concerns related to patient privacy, data security, and legal regulations. As a result, many hospitals are unable to share sensitive medical data, which limits collaboration and reduces the effectiveness of diagnostic systems. Federated learning offers a solution by allowing multiple hospitals to work together without sharing actual patient data.

Instead, each hospital trains a model locally and shares only model updates, helping to protect patient privacy while still enabling collaboration.

Purpose: The purpose of this study is to evaluate the effectiveness of federated learning for brain tumor segmentation and to explore how it can be improved for practical use in healthcare environments. This research focuses on achieving high diagnostic accuracy while maintaining strong privacy protection. It also aims to reduce the amount of data that needs to be exchanged between hospitals and to ensure that the system performs well even when hospitals have different types of patient data.

Method(s): This study uses a publicly available dataset of brain tumor scans from 1,251 patients. The data is divided across ten simulated hospitals to represent real-world differences between medical institutions. Several collaborative learning approaches are tested and compared. The study also evaluates different methods for protecting patient privacy and reducing communication between hospitals. In addition, different model designs and strategies for combining results are examined. The system is evaluated based on diagnostic accuracy, communication cost, training time, and its ability to handle differences in data across hospitals.

Result(s): Preliminary results suggest that advanced collaborative learning approaches can improve diagnostic accuracy compared to basic methods and achieve performance close to traditional centralized systems. The findings also indicate that strong privacy protection can be applied with only a small reduction in accuracy. In addition, communication-efficient methods significantly reduce the amount of data that needs to be shared between hospitals. The system also performs well even when there are differences in patient data across institutions.

Conclusion(s): This study demonstrates that federated learning can provide a practical and effective solution for collaborative medical imaging while protecting patient privacy. The results suggest that it is possible to achieve a balance between accuracy, efficiency, and privacy. This work supports the development of secure and scalable artificial intelligence systems that can be used across multiple healthcare institutions to improve brain tumor diagnosis.

Rachel Jost, Cole Babcock, Devin Hughes and Makan Golizeh

FACULTY: SCIENCE
DEPARTMENT: ENVIRONMENTAL AND PHYSICAL SCIENCES

SYSTEMATIC ANALYSIS OF PHYTOCHELATINS IN CORN ROOTS

Background: Heavy metals such as cadmium and lead can damage living organisms by interfering with normal biological processes. Plants have developed natural defence systems to survive in contaminated environments. One important defence involves the production of a group of compounds called phytochelatins, which reduce the harmful effects of heavy metals, allowing plants to tolerate contaminated soil. Because phytochelatins are produced in very small quantities and are chemically unstable, accurately measuring them in plant tissues presents a significant analytical challenge.

Purpose: This project aims to extract and measure phytochelatins from corn roots exposed to different environmental conditions. By comparing phytochelatin levels across treatments, this research seeks to better understand how plants respond to heavy metal stress and whether additional protective agents influence this response.

Methods: Corn plants were grown in soil for three weeks and then exposed for forty-eight hours to one of four treatments: a selected heavy metal, a synthetic protective agent designed to reduce metal toxicity, a combination of both, or water as a control. After treatment, roots were collected, rinsed, and frozen to preserve their chemical composition. An extraction procedure is currently being optimized to maximize recovery of phytochelatins from the root tissue. Frozen roots will be ground and chemically treated to stabilize the target compounds. After removing solid materials, phytochelatins will be quantified in the extract using a powerful chemical analysis technique known as high-performance liquid chromatography.

Results: Preliminary analyses of standard compounds produced consistent and reproducible results, confirming that the method is functioning effectively. Corn plants did not show visible stress symptoms following treatment, suggesting that any differences in phytochelatin production will need to be evaluated at the molecular level. Ongoing work will quantify phytochelatin levels in each treatment group to determine how heavy metal treatment and the protective agent influence plant defence responses.

Conclusions: By studying corn grown in soil rather than in simplified laboratory systems, this research better reflects how living organisms respond to heavy metals under realistic environmental conditions. The analytical method developed in this study may also be adapted to measure similar compounds in other biological systems. More broadly, this work contributes to understanding how cells protect themselves from toxic metal exposure, which is relevant to research on environmental health, aging, and metal-related disease processes.

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FACULTY: ARTS
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THE INFLUENCE OF MORPHOLOGICAL INFORMATION DURING TYPING: EVIDENCE FROM AUTOCOMPLETE DISTRACTORS

Background: Typing a word includes identifying it, planning a sequence of keystrokes, and executing that sequence. Keystroke latencies, like pauses in speech, are thought to reflect the demands of processing linguistic information, and have been used to examine what linguistic information of the word and its context influences the typing process. Specifically, the latency of the first keystroke is thought to reflect identifying the word and planning its output, whereas the non-initial keystrokes reflect the execution of the motor plan. Interactive theories of typing posit that linguistic information from a word and its context is present and influences identifying the word, planning, and executing its output.

Morphology refers to the internal structure of a word, specifically, to the embedded meaningful sub-units embedded in a larger word. Morphology has been found to influence typing. For example, Taikh et al. (2023) found that the linguistic properties of the constituents of the compound, rather than the properties of the compound itself (e.g., arm and pit rather than armpit), predicted keystroke latencies. These findings suggest that the typing plan was based on the individual constituents rather than the whole compound. More recently, Playford et al. (2025) found that a word (e.g., arm) was typed more quickly when it was embedded in a compound (armpit) and thus functioned as a real morpheme, than when it was embedded in a pseudo-compound (armour) where it did not. As a real morpheme, the embedded word was easier to identify and extract from the larger word, plan, and type.

Purpose: In the present study, we examine whether competing morphological information can make extracting and identifying a word embedded in a pseudo-compound easier.

Method: Participants were asked to type pseudo-compound words (armour) and, while being shown a compound sharing the same embedded word (armpit) under their cursor as an “autocomplete” suggestion as they had begun typing.

Results/Conclusions: When compared to an identical autocomplete (i.e., armour), the initial and non-initial keystrokes of typing the embedded word (arm) were similar. Our findings suggest that, unlike in compounds, pseudo-compounds are more likely to be planned and typed as whole words, rather than a sequence of embedded words. Specifically, the morphological information of the compound distractor did not influence the way that the pseudo-compound word was planned and typed. “

Ramindu Jayaneth

FACULTY: SCIENCE
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BALANCING BOOKS AND PAYCHECKS: A WEB APPLICATION TO HELP STUDENT-WORKERS MANAGE STUDY AND WORK SCHEDULES

Background: Many university students balance full-time academic studies with part-time employment in order to pay tuition, rent, and other living expenses. Managing both responsibilities can create scheduling conflicts, stress, and difficulty maintaining consistent study habits. While many digital planner applications exist, most focus mainly on tracking academic deadlines and do not effectively integrate work schedules with study planning. As a result, students who work part-time often rely on manual planning and may struggle to realistically allocate time between employment and academic tasks.

Purpose: The purpose of this project is to design and develop a web-based planning application that helps students who work part-time manage their academic responsibilities alongside employment commitments. The project aims to provide a single system that allows users to visualize their weekly schedule, identify available study time, and improve time management habits.

Methods: The project will develop a single-page web application using standard web technologies such as Hypertext Markup Language and Cascading Style Sheets for the user interface. The system will include a unified calendar where users can enter class schedules, assignment deadlines, examinations, and work shifts. A rule-based time allocation system will analyze available gaps in the schedule and suggest appropriate study sessions. The application will also include a structured study timer that divides work into focused intervals followed by short breaks. In addition, users will be able to record study sessions and provide simple feedback about focus or mood. All data will be stored locally within the web browser so that the application can function without requiring a remote server.

Results (Anticipated Results): The expected outcome of the project is a fully functional prototype web application that helps student-workers better visualize how their time is distributed between work and study. The system will generate suggested study sessions, provide a structured study timer, and display a dashboard summarizing study hours, work hours, and completed tasks. These features are expected to help students recognize overloaded weeks and plan their study time more effectively.

Conclusion: This project aims to demonstrate how a specialized digital planning tool can support students who balance academic study with part-time employment. By integrating academic schedules, work shifts, and structured study sessions into a single system, the application seeks to promote more realistic planning, reduce scheduling conflicts, and encourage healthier study habits. The project may also provide insights into how technology can support better time management for university students who face competing academic and financial responsibilities.

Runxuan Zhang and Yin Chen

FACULTY: SCIENCE
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INVARIANT THEORY AND COEFFICIENT ALGEBRAS OF LIE ALGEBRAS

Many problems in mathematics involve understanding symmetry. One powerful tool for studying symmetry is the characteristic polynomial, which is a formula attached to a square matrix that summarizes important information about how a system behaves. Over time, mathematicians extended this idea from single matrices to more complicated algebraic structures known as Lie algebras. Lie algebras are used to describe continuous symmetries and appear in geometry, physics, and many other fields. Studying the characteristic polynomial connected to a Lie algebra helps reveal how that symmetry acts on a space.

This research introduces and studies a new concept called the coefficient algebra. The coefficient algebra is formed from the collection of coefficients that appear in the characteristic polynomial associated with a Lie algebra acting on a finite dimensional space. The main goal is to determine the structure of these coefficient algebras for several important families of complex Lie algebras and to explain how they relate to classical invariant theory, which studies quantities that remain unchanged under symmetry operations.

We examine how several well known Lie algebras act on spaces built from symmetric combinations of vectors. For each case, we compute the characteristic polynomial that describes this action. We then collect its coefficients and study the algebra generated by them. By comparing these coefficient algebras with known families of symmetry preserving functions, we identify their precise structure. Our approach combines direct calculation with general principles about symmetry and polynomial functions.

We obtain three main results. First, for the Lie algebra consisting of upper triangular matrices with complex entries, the coefficient algebra turns out to be the same as the ring of symmetric polynomials, which are polynomials unchanged when variables are rearranged. Second, for the Lie algebra of all square matrices with complex entries, the coefficient algebra matches the ring of polynomial functions that remain unchanged under conjugation, a natural symmetry action on matrices. Third, for the Lie algebra of square matrices whose diagonal entries add up to zero, the coefficient algebra can be generated by trace functions, which are obtained by adding the numbers along the main diagonal of a matrix. As an application, we explicitly determine the characteristic polynomial for this last Lie algebra acting on its standard representation.

This work shows that the coefficients of a characteristic polynomial are not just technical details, but meaningful objects that reflect the underlying symmetry of a system. By studying these coefficients in a systematic way, we uncover clear patterns that connect Lie algebras with familiar types of symmetry preserving functions. This perspective provides a more concrete and accessible way to understand abstract algebraic structures and offers a foundation for further exploration of symmetry in mathematics.

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RESTRUCTURING THE LEADERSHIP EQUATION FOR GEN Z: HOW TO ACTUALLY LEAD THE NEW GENERATION

Background: This chapter talks about how the different aspects of leadership interact with each other and how it's vital to take them all into consideration. By comparing different leadership theories like trait theory and behaviour theory we can decide what effective leadership qualities and actions are appropriate depending on the situation. By using these concepts or leadership we can also discover what style Generation Z falls into, and what their approach to leadership is.

Purpose: This study examines the leadership equation for the newer generations, and redefines the traditional equation to fit for the newer generations such as Millennials, Gen Z and early Gen Alpha. The use of a framework without updating it creates a gap within leadership methods per generation. This research is a base that aims to close the gap between generations caused by a fast developing, highly technological world which values diversity, inclusion, and shared leadership purpose.

Method: The way the leadership equations should be reinterpreted goes as follows. Modern leaders should focus on skills similar to E-leadership which focuses on managing remote or hybrid teams that do not tend to follow the traditional all-week at work schedule. Within the modern generations there is a shift of leadership, which favors a more collaborative and open approach compared to traditional hierarchical models. Countries like the Netherlands can be taken as an example for this, companies tend to have a flat hierarchy which encourages collaboration and open communication.

Results / Anticipated Results: The anticipated results of this research entail that Gen-z has a strong emphasis on traits such as compassion and democratic behavioural leadership where collaboration has a strong presence. Leaders are expected to provide their employees with genuine constructive feedback and knowledge and presence within decision making processes. Our research suggests that leaders in order to appeal to gen Z should be caring, democratic and have strong emotional intelligence in order to have strong engagement from this generation.

Conclusions: Leadership approaches must evolve from hierarchical towards flat models in order to remain effective with Generation Z workers. Generation Z has a strong desire to feel like their ideas matter and are heard all throughout an organization regardless of traditional ranking systems from past models. This approach with Generation Z is vital for strong workplace engagement and collaboration throughout members of the generation.

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DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

RAILS-WORKBENCH: AN INTERACTIVE MULTI-LLM FRAMEWORK FOR AUTOMATED JAVA IMPORT REPAIR

Background: The rise of Generative Artificial Intelligence (GenAI), particularly Large Language Models (LLMs), has significantly influenced software development by enabling automated code generation, completion, explanation, and repair across multiple programming languages. However, LLMs frequently generate incorrect, hallucinated, or deprecated code, which may introduce critical errors in languages such as Java and C++. Recent research introduced the Retrieval-Augmented Intelligence for Learning Software Development (RAILS) framework, an automated system designed to repair Java programming errors caused by incorrect or deprecated imports. Despite its effectiveness, the original RAILS framework supports limited model experimentation and lacks an interactive interface for controlling model behavior and configuration.

Purpose: This work presents RAILS-Workbench, an extended end-to-end system built upon the RAILS framework that enables users to experiment with multiple Large Language Models while dynamically controlling model parameters through an interactive user interface. The system allows users to adjust parameters such as temperature and top-k sampling to control model randomness, reduce hallucinations, and improve response quality.

Method: To extend the RAILS framework into a configurable experimentation platform, we developed an interactive system architecture that integrates multiple Large Language Models with retrieval-augmented code repair. The system was implemented using React.js for the frontend interface and Django for backend orchestration and model management. The platform allows users to submit Java code containing import-related errors and interactively configure Large Language Model parameters such as temperature, top-k sampling, and response constraints. These parameters control the stochastic behavior of the models and influence the generated repair suggestions. The framework integrates multiple Large Language Models, including both commercial and open-source models, enabling direct comparison of model performance within the same environment. The interface displays repaired code outputs and enables comparative analysis of model behavior across configurations.

Results: The implemented system supports three Large Language Models and four configurable parameter settings. Previous evaluation of the RAILS framework achieved 100% semantic correctness on 78 real-world Java import issues with an average repair time of approximately 4.1 seconds per iteration. The developed interface exposes these evaluation capabilities while allowing users to compare multiple models and obtain repaired Java code interactively.

Conclusion: Extending the RAILS framework into a configurable experimentation platform significantly improves its usability for both research and practical software development scenarios. The proposed framework enables users to manage Large Language Models behavior through parameter tuning and model selection, providing a flexible environment for reliable code repair experimentation and improving the usability and transparency of automated program repair systems.

Beyond this immediate evaluation, the system has broader implications for the software development industry. As AI-assisted programming tools become increasingly integrated into development workflows, ensuring reliability, transparency, and contextual awareness is essential. The proposed framework provides a practical environment for investigating these aspects by allowing developers to control model parameters, experiment with multiple Large Language Models, and incorporate project-specific documentation into the repair process. Such capabilities can reduce debugging time, improve developer productivity, and increase trust in AI-assisted coding tools.

Shivaz Singh

FACULTY: OTHER
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

RETRIEVAL AUGMENTED GENERATION BASED ON COMPLEX SOFTWARE ENGINEERING PROBLEMS-SOLVING TASK

In recent times or we can say in the present time as well we can say that, software systems have become sophisticated, which often results in various types of errors in the code. These errors include compile-time errors, runtime errors, and logical errors. Solving these errors manually requires a lot of effort from the programmer to search through the documentation, code repository, and previous problem solutions to identify the actual problem. The motivation for this study comes from the idea of increasing the efficiency of problem-solving in software engineering using a technique called Retrieval-Augmented Generation (RAG), which utilizes the concept of information retrieval along with large language models to generate context-based problem solutions for software engineering. The main objective of this study is to design a framework using the Retrieval-Augmented Generation technique to help programmers solve various types of errors in the code. In this new method, a knowledge base is constructed with programming documentation, code examples, error logs, and previously solved debugging problems. These are converted into vectors, and a vector database is developed. When a programmer faces a coding error, they can use this new method to retrieve related documents, code, and error explanations from the database, which are then given as input to a language model. The language model can then examine these results and provide possible explanations, debugging steps, and code corrections. As can be seen from the results, this new method of integrating retrieval with generative models can greatly improve the accuracy and speed of error resolution compared to traditional methods of debugging. A programmer can easily identify the causes of compile-time and run-time errors, as well as obtain appropriate guidance for their resolution. Thus, in conclusion, the RAG problem-solving framework can greatly improve the efficiency of automated debugging, and programmers can easily tackle complex software engineering problems.

Showrav Deb Chowdhury and Md Morshedul Islam

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

JOBBRIDGE ALBERTA – AN NATURAL LANGUAGE PROCESSING-DRIVEN JOB MATCHING PLATFORM WITH SKILL FORECASTING

Background: Alberta's youth unemployment rate reached seventeen percent in 2025, creating significant challenges for young workers seeking employment that matches their skills and qualifications. Existing job search sites often fail to accurately connect job seekers with suitable opportunities, leading to longer periods of unemployment and underemployment. Additionally, rapid changes in technology and renewable energy sectors have created a gap between the skills of the available workforce and employer requirements. This gap hinders both individual career development and provincial economic growth, particularly as Alberta pursues economic diversification beyond traditional energy sectors.

Purpose: This research develops JobBridge Alberta, an artificial intelligence–powered job-site platform designed to address the challenges in this area by creating more efficient and accurate connections between job seekers and employers. The platform aims to match jobs with candidates' available skills, identify skill gaps in the workforce, and provide personalized training or certification recommendations, helping workers transition into emerging industries such as technology and renewable energy.

Methods: The platform integrates two complementary artificial intelligence approaches. First, Large Language Model (LLM) algorithms analyze both resume content and job postings to extract key information about candidate qualifications and employer requirements. Second, a Graph Neural Network (GNN) models the relationships between skills, work experience, education, and job requirements as an interconnected network. This approach allows the system to identify not only direct skill matches but also transferable skills and possible career pathways. The platform also processes Alberta-specific job market data to ensure relevance to provincial employment needs and uses predictive algorithms to forecast emerging skill demands and provide personalized skill development recommendations for users.

Anticipated Results: The platform is expected to help job seekers find suitable jobs based on their existing skill sets and significantly reduce the time required to secure employment. By identifying job seekers' skill gaps, the system provides targeted training recommendations to improve employability in high-demand sectors. The skill forecasting component will help both individuals and policymakers anticipate future workforce needs, particularly in technology and renewable energy fields that are important to Alberta's economic future. Early development indicates that the platform can effectively map career transition pathways, helping workers move from declining industries into emerging sectors.

Conclusions: JobBridge Alberta represents a technological solution to the pressing employment challenges facing Alberta's workforce. By leveraging artificial intelligence to create more efficient job matching and providing clear pathways for skill development, the platform supports both individual career success and broader provincial economic objectives. This research demonstrates how emerging technologies can be applied to address real-world social and economic challenges, contributing to Alberta's position as a leader in technology innovation while supporting workforce development and economic diversification.

Taylor Zinger and Dr. Sergey Ishutov

FACULTY: SCIENCE
DEPARTMENT: ENVIRONMENTAL AND PHYSICAL SCIENCES

EARTH MATERIALS: THROUGH THE LENS OF INDIGENOUS PEOPLES

Background: Earth materials are those derived from the Earth that people interact with continuously in everyday life, often in ways that are taken for granted. These materials include rocks, minerals, petrified wood, sediments, and metals, which can be found in every aspect of our lives, from infrastructure and tools to essential technologies. Contemporary extraction and use of these materials are frequently characterized as environmentally unsustainable. In contrast, many Indigenous communities in Canada have long maintained relationships with the land that emphasize stewardship, respect, and sustainable interaction with natural resources. Existing literature on pre-colonial and prehistoric earth material use in Canada is dominated by archaeological interpretation which often relies on material evidence to infer past relationships between communities and the land.

Purpose: This study aims to examine how Indigenous views conceptualize and guide interactions with Earth materials. The research specifically seeks to identify key principles, such as relationality and reciprocity, that shape Indigenous understandings of earth materials and their use.

Methods: Following preliminary consultation with various Indigenous community members, the research design shifted to incorporate Indigenous methodologies and a decolonizing research frameworks. A qualitative approach was adopted that integrated literature review, analysis of specimens at the Royal Alberta Museum, as well as surveys and interviews with Indigenous persons. This approach focused on recurring concepts identified in both community discussions and the literature, particularly relationality, reciprocity, and responsibilities associated with land and material use.

Results: Preliminary results indicate that Earth materials are understood within Indigenous communities not primarily as commodities but as elements of ongoing relationships between people, land, and non-human entities. Participants and literature sources describe several interconnected roles for Earth materials: ceremonial use, integration into Oral Histories and Storytelling, and inclusion within systems of Traditional Knowledges. These materials often function as cultural markers that reinforce community identity, teachings, and ethical responsibilities to the land. The analysis also highlights that knowledge regarding specific materials is frequently transmitted through lived, embodied experiences rather than through documentation. Consequently, access to certain knowledge is governed by Cultural Protocols that emphasize respect, responsibility, and community consent.

Conclusions: Indigenous perspectives on Earth materials are grounded in relationality that connects material use with cultural responsibility and environmental stewardship. Recognizing these perspectives expands conventional understandings of Earth materials beyond purely functional or economic interpretations. Incorporating Indigenous Ways of Knowing and Being into Earth science and resource discussions may offer valuable insights into sustainable material relationships and more ethically grounded research practices. Future work should prioritize long-term community collaboration and Indigenous-led methodologies to ensure that research on Earth materials accurately reflects and respects Indigenous nations.

Tessa Granson-Woollard, Kacianne Kawulok, Alexander Taikh

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

HOW THE LENGTH OF A FILLED PAUSE PREDICTS THE LIKELIHOOD OF SUBSEQUENT DISFLUENCY IN ADULTS WHO STUTTER

Background: Stuttering is a developmental speech disorder that is classified by disruptions in the normal flow of fluent speech such as repetitions, prolongations, blocks, revised words, and filled pauses (e.g., uh and um). Saying a word requires retrieving its linguistic information and creating an articulatory plan. According to the ExPlan model of stuttering (Howell et al., 2011), planning the articulation of the subsequent word and execution of the current word being said occur at the same time. Planning a word thus precedes its execution, and the coordination of these processes is essential to speech stability. Thus, a word may be produced disfluently if there was insufficient time to plan it, and this is especially the case for words that carry more linguistic information (e.g., words that are longer or occur less frequently in the language), according to Brundage and Ratner (2022). Filled pauses are common utterances that carry little to no linguistic information and indicate a delay in subsequent speech production (Clark & Fox Tree, 2002). Filled pauses could therefore function to add additional planning time for the subsequent word.

Purpose: We examined whether speech disfluencies were more or less likely following filled pauses, and whether the length of the filled pause could predict the likelihood of speech disfluency. According to ExPlan, the presence of a filled pause, and a longer filled pause, should allow more time for planning and thus fluently producing the subsequent word.

Method: We used the FluencyBank Timestamped database (Romana et al., 2024), which contained annotated speech samples from audio and visual recordings of adults who stutter answer interview questions in the FluencyBank dataset (Bernstein-Ratner & McWhinney, 2018). Specifically, Ramona et al. classified each spoken token as a fluently spoken word, a disfluently spoken word, or a filled pause, and provided the time taken to produce each spoken token.

Results/Conclusion: Fluent and disfluent words were equally likely following filled pauses, suggesting that the presence (vs. absence) of a filled pause did not predict an upcoming disfluency. However, a disfluency was more likely following longer filled pauses. Our findings are consistent with filled pauses indicating a processing delay (Clark & Fox Tree, 2002), and challenge ExPlan's prediction that filled pauses should facilitate the fluent production of subsequent words. The duration of a filled pause may reflect the severity of the planning difficulty rather than the time available to plan the subsequent word. Filled pauses may thus be helpful indicators of stuttering severity.

Tingo Kanjadza

FACULTY: MANAGEMENT
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ASSESSING THE STRATEGIC ROLE OF HUMAN RESOURCE MANAGEMENT IN ENHANCING EMPLOYEE ATTRACTION, ENGAGEMENT, AND ORGANIZATIONAL FAIRNESS

This research is meant to explore the strategic role of Human Resource Management (HRM) in building employee attraction, development, engagement, retention, and perceived fairness in today's organizations. While traditionally Human Resource Management was perceived as a administrative function of organizations centred on employee recruitment and payment, it is today recognized as a strategic function that impacts organizational performance and competitiveness directly. Today's dynamic business environment is characterized by increasing challenges of technological advancement, diversity, legal issues, and employee expectations; and this calls for Human Resource Management that is aligned with organizational goals and objectives.

This study will look into the integration of recruitment strategies, training and development activities, reward systems, and fairness at the workplace within an organization with the aim of maintaining organizational performance. It will also look into the extent to which recruitment and employer branding strategies contribute to the recruitment of qualified employees and the extent to which training and development activities contribute to the growth of employees. Additionally, the study will look into the extent to which fair compensation systems, reward systems, and safe working environments contribute to the satisfaction and trust of employees.

This study will be conducted under a descriptive research design, where both qualitative and quantitative data will be collected from human resource managers and employees within selected organizations. The study will be based on the use of questionnaires for employees and interviews with human resource managers.

The questionnaires will be used to obtain insights into the perceptions of employees regarding recruitment strategies, training and development activities, reward systems, and fairness at the workplace. The interviews will be used to obtain insights into the decision-making processes of the organization regarding the implementation of the strategies and compliance with employment laws.

The research illustrates the need for integration of Human Resource management with organizational goals, rather than focusing on Human Resource management as a separate function. The research findings suggest that organizations need to integrate their Human Resource management practices with organizational goals for achieving higher employee satisfaction, retention, and equity. This research adds to the overall understanding of the role of Strategic Human Resource Management for achieving sustainable organizational success in a dynamic global environment.

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Xin Chen

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

THE DYNAMICS OF COOPERATION: COSTS, CHEATING, AND STABILITY

Background: Today's international system is entering an era where cooperative relations are shifting, reflecting the challenges of maintaining cooperation in interdenpendent systems. Cooperation is also widespread in ecological systems; mutualistic species exchange resources, protection, or services that enhance the other's population sizes, stability, or productivity. However, cooperation has explicit costs, such as energy, time, and risks, and is susceptible to cheating, where one species benefits from the relation without rewarding its partner. Ecological modeling of mutualism, incorporating mutual niche expansion, density-dependent costs, and cheating, serves as a theoretical framework for analyzing the conditions of persistence and collapse of cooperation systems.

Purpose: This study investigates how benefit-cost trade-offs and cheating affect the stability and shift of cooperative interactions, using a general population dynamic model, in an attempt to improve the current understanding regarding when cooperation persists or collapses across biological and social systems.

Method: We develop an ecological model of mutualism, integrating benefit, cost, and cheating in the mutualistic interaction. We then analyze the stability of the system through phase portraits and local stability analysis, to determine the conditions for the persistence and collapse of the cooperative system.

Results: The model results suggest that cooperation may persist only within a narrow domain of benefit-cost trade-off conditions. When the strength of cheating crosses a "tipping point", it can lead to dual stable states which involves a stable non-cooperative equilibrium and a stable cooperative equilibrium. A disturbance may trigger a regime shift, pushing the transition of the system from a cooperative state toward an exploitative or conflict state. The model predicts that cooperation is often more resilient under resource scarcity, where the partner's reward outweighs the short-term gains of cheating.

Conclusion: The survival of any cooperative relationship is conditional on the balance of benefit-cost trade-off. This system can become fragile due to unchecked cheating, leading to the "tragedy of exploiters", when exploitation yields short-term gains but becomes self-defeating when exploitation destabilizes the cooperative system on which the exploiter depends.

Zdravko Marjanovic

FACULTY: ARTS
DEPARTMENT: PSYCHOLOGY

DEVELOPMENT OF THE FINANCIAL PROSPERITY INVENTORY

Background: For several years, the Government of Canada and its partner agencies have promoted financial literacy programs to improve money management and reduce financial hardship. These initiatives have relied primarily on traditional measures of financial knowledge that emphasize basic numeracy, budgeting concepts, and general attitudes toward money. Evidence indicates these measures show only modest associations with actual day-to-day financial behavior, and short-term educational interventions produce limited, short-lived changes in real-world outcomes.

Purpose: This presentation argues that focusing on financial prosperity—rather than scarcity—provides greater insight into the psychological factors that support sustained financial well-being. The Financial Prosperity Indicator is a new inventory designed to assess four components that more reliably predict enduring financial success:

1. Financial Prudence – Practical decision-making in real spending and saving situations, including evaluating trade-offs, delaying gratification, and prioritizing long-term financial health.
2. Financial Conscientiousness-Temperament-Perceived Control – Stable personality traits such as discipline, organization, and impulse control, combined with locus of control and perceived control over financial outcomes, reflecting the psychological foundation for consistent, responsible financial behavior.
3. Financial Industry (Work Ethic / Goal-Striving) – Motivation, persistence, and willingness to forgo short-term comfort for long-term financial objectives.
4. Financial Forecasting – Historical patterns of income, debt, savings, and net worth to estimate likely future financial trajectories.

Method: Scale development is currently underway, with the first rounds of pilot testing scheduled for September 2026. The validation process will examine whether the Financial Prosperity Indicator predicts consistent saving, effective debt management, and greater financial life satisfaction more accurately than traditional knowledge-based tools.

Anticipated Results: The four components collectively move beyond abstract knowledge to assess judgment, character, motivation, and behavioral history, which are more closely tied to lasting financial stability.

Conclusion: By centering assessment on the psychological foundations of prosperity, the Financial Prosperity Indicator provides a stronger theoretical framework and a practical tool for promoting lasting financial security. This work has implications for individuals seeking financial stability and for community programs aimed at reducing widespread financial stress.

Jad Zouein and Bradley Scott

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

TRACING THE ORIGINS OF TEETH: HISTOLOGICAL AND CT ANALYSIS OF OSTEOSTRACAN FOSSILS FROM THE MOTH LOCALITY

Background: The evolutionary origin of vertebrate teeth has been a subject of long-standing debate among paleontologists, with two main hypotheses. The traditional outside-in theory suggests that teeth evolved from external dermal denticles, which initially formed on the body surface and were later incorporated into the oral cavity, whereas the inside-out theory suggests that teeth originated internally within endodermal pharyngeal tissues and, over time, spread to the jaws. Osteostracans are an extinct fossil fish from the Silurian and Devonian periods (445-359 mya) that are ideal for testing hypotheses of the origins of vertebrate teeth because they are the jawless vertebrates most closely related to jawed vertebrates.

Some specimens from the 410-million-year-old Man On The Hill (MOTH) locality, Northwest Territories, have tooth-like structures on their dermoskeleton, but the histology of these osteostracans has not been well studied. We explored whether these tooth-like projections exhibit morphological similarities to teeth in jawed vertebrates. A detailed histological analysis of their tooth-like structures provides critical insight into whether these features represent homologous precursors to true teeth or independently evolved dermal specializations.

Purpose: The main purpose and objective of this study is to investigate and document the histological features (tooth-like projections) of osteostracan scales in order to determine whether they share tooth-like characteristics with early vertebrate teeth. By examining their structure using CT-scans, we will be able to address a key knowledge gap by determining whether osteostracan tissues provide transitional evidence linking their dermal denticles to true teeth. Also, to provide more evidence for the inside-out theory.

Methods: Specimens from MOTH were housed in the University of Alberta Laboratory of Vertebrate Paleontology (UALVP 32408, 43640, and UALVP 43641) and represent two distinct taxa. Osteostracan specimens were selected primarily based on preservation quality, with a priority given to dermal scales that exhibit tooth-like structure. High-resolution CT scanning was conducted at the Permafrost Archives Science Laboratory, providing 3D visualization of internal tissue architecture without damaging the fossils. CT data was analyzed at Concordia University Edmonton, using Dragonfly 3D to identify features found in the structures scanned.

Results: Histology was reconstructed using three-dimensional visualization, and analysis was conducted using Dragonfly 3D imaging software. The high-resolution CT scan data have allowed detailed digital zooming and segmentation of dermal tooth-like structures, enabling visualization of their internal and external morphology. We have managed to isolate individual tooth-like projections in UALVP 43641 and UALVP 32408 (Dentapelta),

Conclusions: Understanding the internal structure of under-researched osteostracans at MOTH will provide valuable insight into early vertebrate evolution. By examining these possible tooth-like projections, this study will contribute to the ongoing investigation into the origins of teeth.

Madeline Wong and Dr. Amro Soliman

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

CONTRIBUTIONS OF METABOLIC REPROGRAMMING TO FEVER-INDUCED ENHANCEMENT OF IMMUNE RESPONSES

Background: Fever is an integrative immune response to infection, characterized by a rise in core body temperature, metabolic, and behavioural changes. Fever is highly evolutionarily conserved among both endotherms and ectotherms, but mechanisms of inducing fever may vary. In several animal models, fever has been shown to promote innate and adaptive immune cell functions such as modulating inflammation and killing or limiting growth of infectious pathogens, thereby enhancing immune responses. Immune responses are regulated by cellular metabolic programs that are capable of shifting in order to meet increased energy and biosynthetic demands. However, cellular functions allowing febrile responses to regulate defense mechanisms remain insufficiently understood.

Purpose: In this study, we aim to investigate how the thermal element of fever interacts with the known cellular shift between metabolic pathways oxidative phosphorylation and glycolysis in murine macrophages to better understand how these changes enhance the immune response.

Methods: RAW 264.7 murine macrophages were cultured in 6-well plates and either left unchallenged or challenged using bacterial lipopolysaccharide (LPS), a bacterial endotoxin well known to produce an immune response in macrophages, and subsequently incubated at both 37°C and 39°C (febrile temperature). This experimental model yields 4 experimental groups; normothermic unchallenged (1), normothermic immune-challenged (2), febrile unchallenged (3), and febrile immune-challenged (4). Cells were then collected at different time points; 6 hours, 24 hours, and 48 hours in order to observe changes in gene expression throughout the propagation of an immune response. Expression levels of genes involved in glycolysis and oxidative phosphorylation were observed through quantitative (q)PCR (quantitative polymerase chain reaction) analysis. Pro-inflammatory cytokine Tnf (tumor necrosis factor) and reference gene β-actin (Beta-actin) were used as a control to ensure the model is functioning. Genes of interest in the glycolytic pathway include Hif1a (Hypoxia Inducible Factor 1a), LDH (Lactate Dehydrogenase), and HK1 (Hexokinase 1). Genes of interest in the oxidative phosphorylation pathway include Ndufa and Cox. 2-NDBG assay was used to assess potential glycolytic shifts in cells under fever conditions using the same experimental model.

Results: Preliminary analysis revealed increased expression of Tnf in the cells stimulated with LPS, and that expression was sustained across time points in the 39°C group, but not in the 37°C group. We also observed changes in expression of genes related to oxidative phosphorylation like Ndufa and Cox, which demonstrated initial downregulation and increase later in the immune response, and an initial upregulation regardless of temperature condition, respectively. We also observed changes in glycolytic gene expression which await further data analysis, along with 2-NDBG uptake analysis.

Conclusion: This work demonstrates that the thermal element of fever has an impact on the regulation of cellular metabolic programs. Ongoing research aims to identify the link between cellular metabolic shifts and the enhancement of the immune response.

Brandon Zurawell and Dr. John Walsh

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

THE DEVELOPMENT AND OPTIMIZATION OF SURFACE HYBRIDIZATION ASSAYS WITH CELLULOSE ACETATE BEADS

The usage of environmental nucleic acid biomonitoring has greatly increased in recent years. For aquatic invasive species, the use of quantitative polymerase chain reactions allow for the determination of water body presence or absence in a sensitive, specific manner. However, it is lacking ease of data interpretation due to potential fluorescence inhibition and procedural contamination. Extra purification methods allow for increased concentration in nucleic acid samples, ultimately reducing background noise and improving the prevention of false negative results. Products like magnetic beads are commonly used to physically separate targeted nucleic acids from composite samples. These beads are costly and not environmentally friendly. Further improvement can be made on surface hybridization assays of alternative technologies, such as the cellulose acetate platform. This project aims to develop and optimize a surface hybridization assay using cellulose acetate beads, a material that offers lower cost and reduced environmental impact compared to common alternatives. With this development, future usage for environmental nucleic acid purification could be possible. Using the principles of complementary hybridization, synthetic oligonucleotide targets labelled with a fluorescein tag and designed to simulate relevant environmental nucleic acid sequences were hybridized to their complementary probes attached to the cellulose acetate beads. After washing, the double-stranded product was denatured to release the captured target oligos from the beads. Test solutions were read for fluorescent intensity across the procedural steps to determine capture efficiency throughout the procedure. Fluorescence intensity was then compared across control and sample groups. Sequence-scrambled control oligonucleotides were used to ensure the specificity of the target sequence capture in the hybridization step. Initial results are expected to show that target sequences can be successfully captured on probes affixed to the beads in a sequence-specific manner. This will be displayed by fluorescence found across the procedure, but with lower intensity in hybridization and washing steps. The highest fluorescent intensity is expected to be found in the final solution of the denaturation step. Further optimizations will be made to minimize fluorescent intensity in earlier steps to maximize the fluorescent output in the final denatured solution. We expect to conclude that the hybridization assay procedure is rigorous enough to concentrate environmental nucleic acids, without significant product loss throughout the procedure.

Khushi Panara, Md Morshedul Islam and Christain Jovero

FACULTY: SCIENCE
DEPARTMENT: MATHEMATICS AND INFORMATION TECHNOLOGY

AN LLM AGENT FOR EXPLAINABLE INTRUSION DETECTION IN IOT NETWORK

Background: The Internet of Things (IoT) refers to a large network of interconnected smart devices that automatically collect, exchange, and process data through the internet without requiring direct human involvement. This paradigm has significantly benefited many sectors, including healthcare, energy, transportation, smart cities, and finance. However, the rapid expansion of IoT network has also increased the attack surface, making networks more vulnerable to cyber threats. To address these risks, Intrusion Detection Systems (IDS) are widely used to monitor and detect malicious activities in IoT environments. Many existing IDS solutions rely on machine learning (ML) techniques to analyze network traffic patterns. Despite their effectiveness, ML-based IDS models often lack interpretability and are limited to predicting predefined attack categories.

Purpose: The main objective of this research is to develop an IDS agent powered by a large language model (LLM) to improve the interpretability and reasoning capability of intrusion detection systems. LLMs are advanced artificial intelligence models trained on large-scale textual data that can understand context, perform reasoning, and generate human-like explanations.

Method: The proposed framework integrates LLM with a retrieval-augmented generation (RAG) mechanism to enable explainable intrusion detection for IoT network traffic. The system operates on structured IoT traffic datasets containing network flow features representing both benign activities and various cyberattacks. To make the data interpretable for LLM, each network traffic record is transformed into a human-readable textual description using predefined feature templates that explain attributes. These textual representations are then converted into semantic embeddings using a pre-trained sentence transformer model and stored in a vector database to enable efficient similarity-based retrieval. When a user submits a query or provides a network traffic instance for analysis, the system retrieves the most relevant traffic records from the vector database using embedding similarity search. The retrieved examples serve as contextual information for the LLM, allowing it to reason about the current traffic behavior by comparing it with previously observed patterns. The LLM then performs threat analysis and produces structured outputs that include traffic classification (benign or malicious) and a natural-language explanation describing the reasoning behind the decision.

Results: We implemented a prototype IDS-Agent using a Streamlit-based web interface to analyze IoT network traffic within the proposed LLM-driven framework. The interactive interface enables users to submit traffic records and receive both the detection results and explanations based on the input of the user, demonstrating the feasibility of applying LLM-based agents to enhance transparency and interpretability in IoT intrusion detection.

Conclusion: This study proposed an LLM-based IDS agent that integrates RAG to detect and explain IoT network threats. The prototype demonstrated that combining contextual retrieval with LLM reasoning can provide interpretable intrusion detection results. However, reliance on a single dataset and limited evaluation may affect generalizability. Future work will explore multi-dataset validation, real-time deployment, and improved detection of emerging attacks.

Jaad Ezzeddin, Dr. Matthew Churchward and Dr. Makan Golizeh

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

IRON-DRIVEN STRUCTURAL CHANGES IN HUMAN SERUM PROTEINS

Background: Structural modifications in proteins can occur when sugars attach to certain amino acids, especially lysine and arginine. Over time, these changes lead to the formation of stable sugar-derived products that accumulate in the body. The buildup of these modified proteins has been linked to aging and aging-related diseases, such as diabetes and neurodegenerative disorders. However, these modified proteins are challenging to study because they occur in small amounts and can exist in various forms. This makes it challenging to detect and measure them using standard laboratory methods. As a result, more robust experimental models are needed to better produce and analyze these structural changes under controlled laboratory conditions.

Purpose: This project aimed to develop a laboratory workflow that models iron-driven protein modification using well-characterized human proteins. Specifically, this study sought to (I) induce protein structural changes under controlled conditions similar to those that occur in patients with aging-related diseases, and (II) evaluate how these conditions affect the extent of protein modification.

Methods: Two human serum proteins were selected as model proteins due to their high abundance in human serum and their susceptibility to sugar-related structural changes. Protein samples were exposed to an iron-rich chemical treatment in the presence of excess sugar to mimic the conditions similar to those found in patients with aging-related diseases. Samples were analyzed using a powerful bioanalytical technique to examine the structural changes of the target proteins.

Results: Iron-driven protein modifications were detected in specific regions of both proteins. Treated samples also showed a higher degree of protein breakdown, suggesting that these structural modifications promoted protein breakdown and facilitated their detection using bioanalytical methods.

Conclusion: These findings show that iron can accelerate structural alterations in proteins and result in measurable changes in protein breakdown patterns. The workflow developed in this study provides a reliable laboratory approach for structural modification of proteins under controlled conditions. This work offers a useful platform for future studies exploring how iron-driven structural changes affect human serum proteins.

Blessing Bassey-Archibong

FACULTY: SCIENCE
DEPARTMENT: BIOLOGICAL SCIENCES

TARGETING MICROENVIRONMENT-DRIVEN HLA-G FUNCTION IN BRAIN METASTASES

Background: Breast cancer is the most common malignancy and a leading cause of cancer-related deaths among women worldwide. Advances in screening and systemic therapies have improved early detection and survival; however, breast cancer remains a major global health burden due to biological heterogeneity and variability in risk factors and screening practices. Certain molecular subtypes have a high propensity to metastasize to distant organs, including the bone, lungs, and brain. Brain metastases represent a particularly severe stage of disease, associated with significant neurological morbidity, poor prognosis (median survival <14 months), and limited treatment options. The molecular mechanisms driving brain colonization by breast cancer cells remain incompletely understood, underscoring the need for further research to identify new diagnostic and therapeutic targets.

Purpose: We recently discovered that early-stage brain metastatic cells highly express various molecular factors, including the immune-evasion molecule HLA-G. HLA-G (human leukocyte antigen-G) is a non-classical major histocompatibility complex class 1 molecule that is known for its potent immunosuppressive and immune-tolerogenic actions. HLA-G expression is limited in normal cells, but in cancer cells, HLA-G is abnormally expressed at high levels. In our earlier study, we suppressed HLA-G expression in brain metastatic cells, which reduced the ability of these cells to establish brain metastases in animal models, indicating a plausible role for HLA-G in promoting brain metastases. However, the mechanism by which HLA-G acts to promote brain metastases is not well known. The purpose of my research program is to determine the mechanism by which HLA-G is involved in brain metastases.

Method(s): Since HLA-G is known to carry out its functions in normal cells by interacting with the inhibitory receptors ILT2 and ILT4, we analyzed our RNA sequencing data from our animal models of brain metastases to determine if these receptors are expressed in brain metastatic cells and cooperate with HLA-G to drive metastases. We also determined the signalling pathways that are activated by HLA-G in brain metastatic cells using western blot analysis and assessed whether blockage of this pathway using inhibitory drugs against the respective downstream effector of the specific pathway identified will impede HLA-G's effect on brain metastases establishment.

Result(s): We found no expression of ILT2 and ILT4 in the brain metastatic cells studied. Using the Bio-ID assay, we identified a new protein partner (SPAG9) for HLA-G in brain metastatic cells. We also discovered that HLA-G activates the STAT3 signalling pathway, and this activation is mediated by SPAG9. Importantly, inhibiting the STAT3 pathway in brain metastatic cells resulted in a significant decrease in brain metastases despite the presence of HLA-G in these cells, highlighting the relevance of STAT3 to HLA-G functions in brain metastases.

Conclusion(s): Our work reports a new role for HLA-G in brain metastases and identifies a novel partner for HLA-G that may function with HLA-G in the tumour cells or the brain microenvironment to drive brain metastases. Future work is focused on determining the mechanism by which SPAG9 works with HLA-G to drive brain metastases.

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CONTEMPORARY LEADERSHIP AND HUMAN CONNECTION IN THE WORKPLACE

This project is a discussion on how relationships affect leadership and organizational success in today's rapidly evolving work environment. It is a research on how leadership can foster good relationships in a respectful manner in spite of the current changes in the work environment, which include technology changes, generational changes, and working remotely.

In the project, the importance of human relations in the organization is first discussed. Studies indicate that there is a positive correlation between productivity and job satisfaction among employees in an organization when employees feel appreciated, recognized, and supported by the leaders in the organization. The workplace is not just a place where tasks are performed, but it is a human system where employees interact, cooperate, and impact each other. When leaders are able to see the human side of the workplace, employees are motivated and engaged.

Another major theme in the project is the role of trust and respect in the development of positive working relationships in the workplace. The importance of listening as a skill for leaders in the workplace is also emphasized in the project, as poor listening can lead to poor working relationships, low morale, and poor cooperation among workers. Leaders with empathy and emotional intelligence can effectively manage conflicts, address grievances, and facilitate the development of employees in the organization.

The project also deals with the challenges that come with safety in the work environment, harassment, as well as respectful treatment. The leaders have the responsibility of providing a safe working environment where inappropriate behavior is well addressed, and the employees feel safe and respected. Respectful treatment, fairness, and ethical decision-making form the basis of modern leadership.

Another important aspect that the research emphasizes is the changing nature of work in a digital and globally connected world. The research indicates that technology has revolutionized the way people communicate and collaborate in teams. In today's digital world, teams are working remotely or in a hybrid mode, where digital communication is used rather than face-to-face communication. Though technology has provided a lot of convenience and flexibility, it has also created a barrier in communication and personal connections.

This research is a reflection of the needs that are being addressed by the emerging generations in the workforce. Younger employees, in particular, are known to value meaningful work, flexibility, and inclusion, among other things. Leaders who exhibit a collaborative leadership style are better positioned to lead the teams in today's workplaces. Ultimately, it can be seen that this project has highlighted the importance of effective leadership in today's world by emphasizing how it is necessary to balance technological advancements with effective human relationships in any organization or business to motivate employees to become effective contributors to its success.

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UNDERSTANDING HUMAN MOTIVATION AND LEADERSHIP IN MODERN WORKPLACES

Background: Leadership research often looks at why people behave the way they do at work and what motivates them to perform well. One known explanation of motivation is Maslow's hierarchy of needs, which describes how people are driven by different types of needs like safety, belonging, respect, and personal growth. This idea suggests that people usually try to meet their basic needs before focusing on higher level goals. For years this theory has helped leaders understand what motivates employees. However, workplaces today are very different from when these ideas were first introduced. Many organizations now operate in digital or hybrid environments, and employees often expect more open communication, inclusion, and meaningful work from their leaders.

Purpose: The purpose of this project is to explore how traditional ideas about motivation are understood in today's workplace. The project focuses on the leadership concepts discussed in Chapter Twelve of The Art of Leadership and considers how those ideas can be changed to better reflect the expectations of modern employees and changing work environments.

Methods: This project used a chapter analysis approach. The group examined the leadership ideas discussed in Chapter Twelve and focused on how motivation influences employee behavior. After identifying the main concepts from the chapter, the group discussed how these ideas apply to modern workplaces where technology, teamwork, and communication play a larger role. The group also considered how leaders today are expected to support employee well being and engagement.

Results: Our analysis suggests that the ideas about motivation discussed in the chapter are still helpful, but they need to be applied in ways that reflect modern workplace expectations. Employees today are often more motivated when they feel respected, supported, and included in workplace decisions. Leadership that focuses on understanding employees, communicating clearly, and building positive relationships can help create a more motivated and collaborative work environment.

Conclusions: Overall, the project shows that leadership approaches must continue to adapt as workplaces change. Understanding employee motivation is still an important part of effective leadership, but leaders also need to focus on communication, support, and strong relationships with their teams. When leaders pay attention to these factors, they are more likely to create workplaces where employees feel valued and motivated to contribute.

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