Honors Research Symposium Poster Presentation Abstracts

COLLEGE HALL

Honors College
Office of the Dean
Honors Advising
Carolyn A. Barros Reading Room
Honors Academy

Department of Military Science
Recruiting
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Hall of Honor - Sponsored by the Corps of Cadets Alumni Chapter

November 19, 2021
University of Texas at Arlington

MORNING SESSION
11:00AM – 1:00PM

JARED ACKLEY, MATHEMATICS
Title: *Application of Log-Concavity Property of Non-Ruin Probability in Allocation of Insurance Pools*
Faculty Mentor: Dr. Andrzej Korzeniowski

Consider a sequence of independent and identically distributed random variables Z_i, $i = 1,2, ...$ and an integer-valued random variable M with a log-concave pmf that is independent of Z_i, $i = 1,2, ...$ It is known that $S_M = \sum_{i=1}^{M} Z_i$ is log-concave. This can be applied to the classical Lundberg risk model by choosing Z_i to be record lows and M to be a geometric random variable representing the total number of record lows. Choosing L to be the sum of the random number of record lows, it was found that $1 - \psi(u) = P(L \le u)$ is a log-concave function of the initial capital u. Given N risk processes with initial capitals u_i, $i = 1,2, ..., N$ satisfying $U = \sum_{i=1}^{N} u_i$, Lagrange multipliers were used to determine optimal capitals that maximize the probability of no risk process running out of money. Numerical calculations in the case of $N = 2$ and $N = 3$ were carried out and analyzed.

AAYUSH BHATTARAI, MATHEMATICS
Title: *Study of Vortex and Vorticity in a Laminar Flow*
Faculty Mentor: Dr. Chaoqun Liu

Vortices are ubiquitous in nature. From kitchen sinks to galaxies, they can be found everywhere. Usually, the swirling motion of fluids comes to mind when one thinks of vortices. Being significantly important in various fields such as engineering, physics, chemistry, and aerospace, it has been extensively studied for centuries. Still, we do not have the unambiguous and universally accepted definition of a vortex. Often vorticity is used to describe the vortex, which is accurate for rigid body rotation; however, this explanation is simply not true for the fluid flow. In order to show the difference between vortex and vorticity, we recreated Shapiro's experiment, which uses a vorticity meter to represent vortex. Additionally, we used dyed ink to observe if this result still holds true for fluid rotation.

KYLIE BURNHAM, ENGLISH
Title: Flawed Female Protagonists as Figureheads of Social Change in Tomi Adeyemi's *Legacy of Orïsha* series and
    Suzanne Collins's *The Hunger Games* trilogy
Faculty Mentor: Dr. James Warren

Recent years have witnessed female characters at the forefront of fantasy and dystopian works. Through Katniss Everdeen, Zélie Adebola, and Amari Olúborí, this work aims to illustrate how flawed female protagonists leading social change highlight modern issues and encourage readers to critically consider their relationships with the world. It also aims to show how the interplay between readership and text lays the groundwork for social change by encouraging readers to confront and navigate societal flaws. Utilizing close readings of Tomi Adeyemi and Suzanne Collins's books, the study analyzes protagonist portrayal, how protagonists reflect society, and how settings reflect the reality. It also employs comparative readings of these details. Panem and Orïsha reflect struggles of real-world Western and African societies, respectively. These conflicts are reflected in the characterization of the books' protagonists. As these protagonists navigate and overcome adversity, they encourage readers to consider their influence over change.

IDARAROSA EKONG, BIOLOGY
Title: *Generating A Sparse Fluorescent Reporter for A Phagocytic Cell in C. elegans to Characterize Compartmentalized Cell Elimination*
Faculty Mentor: Dr. Piya Ghose

Programmed cell death is very important for animal development. Our lab discovered a new form of cell death called Compartmentalized Cell Elimination (CCE) in the nematode C. elegans. Here three segments of a complex epithelial cell called the tail-spike cell (TSC), that shapes the animal's tail, die differently. After a cell dies, it's remains are taken up by a phagocyte (cell-eating cells) through a process called phagocytosis. We wish to image phagocytosis of the TSC as it dies, we have a fluorescent reporter for the phagocyte. However, in the current version of this marker expression is very broad, other cells are obscuring our view to see what we are interested in. The experimental strategy includes gene promoter dissection, PCR fusion of promoter fragments to GFP, microinjections, and microcopy/imaging techniques. We will use new phagocytic reporter to look at phagocytosis in wild-type embryos through time-lapse imaging.

ALLISON FENSKE, CONSTRUCTION MANAGEMENT
Title: *Recycled Aggregate and Recycled Plastic in Concrete*
Faculty Mentor: Dr. Nur Yazdani

Disposal of waste plastic and waste concrete aggregates is a widespread issue. If not responsibly disposed of, the waste winds up in sensitive ecosystems where it leeches toxins into its surroundings. This study determines the effects of recycled plastic and recycled concrete on specific concrete properties. Tests performed in this study include slump, compressive strength, modulus of elasticity, and water permeability. This study had an issue with inconsistent results with the compression test, but conclusions were drawn from the three other tests. The slump test showed the recycled concrete reduced the workability while the recycled plastic had little effect on the workability. The batches tested with recycled plastic content performed better for elasticity and the recycled concrete was deduced to have no advantages in terms of improved strength based on the modulus of elasticity test results.

ANDREW HANDS, MATHEMATICS
Title: *On graphical representations of Grimm's Conjecture and minimal interval lengths*
Faculty Mentor: Dr. Esteban Diaz

Grimm's Conjecture asserts that given any sequence of consecutive natural numbers, say $n + 1, n + 2 \ldots, n + k$ for integers n and k, there exists primes k distinct primes, $p_1, p_2, p_3 \ldots p_k$, such that $n + i$ is divisible by p_i, for all $i = 1, 2 \ldots, k$. A construction for graphical representations was demonstrated by setting each composite and each prime as a node and then drawing a ray between composite and prime nodes to indicate divisibility. Valuations and related works were used to prove properties of those subgraphs. Algorithms were then explored to help with finding experimental results regarding minimal interval lengths for counterexamples. It was then shown given a known valuation for a particular node, valuations for many nearby if not all nodes could in tern be evaluated for the same prime. It was then shown Grimm's Conjecture holds for all $k < 31$ and a new method for deriving a relationship between n and k was found.

ALEEMA HAQ, BIOLOGY
Title: *The effect of the mutagen Acridine Orange on the DNA of the minute plankton crustaceans, Daphnia*
Faculty Mentor: Dr. Sen Xu

Acridine Orange is a fluorescent dye, which can smoothly permeate a cell membrane. Acridines are considered to produce frameshift mutations, where the insertion or deletion of a base pair occurs. *Daphnia*, plankton crustaceans, were used as the organism to interact with the mutagen as they have a prompt life cycle and can be cultivated in large populations. After isolating the *Daphnia*, they were subjected to different treatments of Acridine Orange to indicate which one the *Daphnia* can survive in, but not thrive. The determined mutagen concentration used for the *Daphnia* is 1.5 μL. These organisms were allowed to reproduce and create ephippia, which are resting eggs. The sequenced Daphnia have indicated presence of mutations, but further research is being done to specify the type of mutation and the mutations of the babies. In future research, it can be determined that for the babies, it will likely be a frameshift mutation.

ACHYUTH MANOJ, MATHEMATICS
Title: *Parameter Estimation and Sensitivity Analysis Through Mathematical Modeling of Colon Cancer*
Faculty Mentor: Dr. Souvik Roy

We formulate a new and efficient method to propose a personalized treatment platform for colorectal cancer. We use a mathematical model of colon cancer comprised of a system of differential equations, modeling various cell dynamics. The dynamics are dependent on patient-specific parameters that are unknown and which we want to estimate given patient data in the form of cell measurements. We approach this estimation as an inverse problem, based on an optimization framework and develop computational optimization techniques based on non-linear conjugate gradient methods to solve for the optimal set of parameters for a specific patient. These optimal parameters are then ranked by conducting a sensitivity analysis, using the Latin Hypercube Sampling-Partial Rank Correlation Coefficient method, to determine the most sensitive ones with respect to the tumor cell count. Based on this information, we then deduce the types of feasible treatment strategies that can be used for curing the patient.

EVANNS G. MORALES-CUADRADO, ELECTRICAL ENGINEERING
Title: *Minimum Time-Energy Path Planning through Integral Reinforcement Learning for a Multivehicle Nonlinear System Subject to Unknown Disturbances and Collision Avoidance*
Faculty Mentor: Dr. Yan Wan

The path planning problem is crucial in the field of autonomous navigation. By applying integral reinforcement learning, it is possible to not just create a system that iteratively improves upon itself in its pursuit of a target destination for a vehicle, but also achieves optimality with respect to desired parameters such as minimal time and energy expenditures. The challenge of solving the reinforcement learning problem with a nonlinear system is addressed with two neural networks - one for the actor portion of the reinforcement learning problem and one for the critic portion. Although preliminary results with discrete-time reinforcement learning found adequate solutions to the path-planning problem, the continuous-time integral reinforcement learning comes with additional challenges due to error accumulation at each integration step. However, because as discrete time steps become smaller, they approximate continuous-time results, a future avenue of research could explore the appropriate time steps for continuous-time approximation.

PARTHVI PATEL, BIOLOGY
Title: *How does Wag31 protein affect the growth of the mycobacterial cell wall?*
Faculty Mentor: Dr. Cara Boutte

Tuberculosis has been killing millions of people worldwide which is caused by the bacterium Mycobacterium tuberculosis. To understand how mycobacterial cells grow, we are studying growth in the model organism Mycobacterium smegmatis. The mycobacterial cell wall has asymmetrical polar growth. The insertion of new peptidoglycan accounts for the growth of the cell wall. The Wag31 genes in Mycobacterium smegmatis cells were mutated and used to evaluate the function of Wag31. The strains were stained with HADA, staining the peptidoglycan and Syto-24, staining the DNA of the bacteria. The bacteria were then observed under the microscope. Using MicrobeJ and Fiji software, the mycobacterial cells were analyzed to figure out the intensity and profiles of Wag31 in the cells, and the cell lengths. In some mutants, Wag31 promoted old pole growth, while in others it inhibited septation. It was concluded that Wag31 has multiple distinct roles in the mycobacterial cell cycle.

PARVAT SAPKOTA, PHYSICS
Title: *Study of the AI-Feynman Package*
Faculty Mentor: Dr. Amir Shahmoradi

At a particular point during the scientific process, we need to understand the relationships between different variables. In science, generally, the relationships are derived using the first principle. Developing another way to determine the relationship among variables of a physical system will help to boost not only overall scientific research but may also aid greatly in the scientific discovery process. Symbolic regression, which is a process of discovering a symbolic expression to describe the given data, can be used to determine relationships between variables. However, the problem with symbolic regression is that we have to go through many combinations before the relationship is discovered. In this project, we aim to discuss the overall progress, with more focus on the current use of Artificial Intelligence (AI) in this field, one of which is the AI-Feynman package. Here, we will also discuss in-depth about the methods implemented within this package.

ASHNI WALIA, INFORMATION SYSTEMS
Title: *A study of algorithmic bias with a focus on mitigation practices and an analysis of discrimination conscious data mining procedures*
Faculty Mentor: Dr. Jennifer Zhang

Algorithmic bias is a moral error within computer systems that is often left undetected due to a lack of set procedures. The aim of this study was to find the source of this bias leading to possible procedural solutions that can be applied widely. A meta-analysis, case study, and sample interview statistics are used to understand the multiplication of such bias into generated outputs. The study concluded that lack of diverse data leads to bias in output, in addition to a lack of awareness about the existence of such bias. This ignorance is amplified by the mystic surrounding deep learning algorithms. The study recommends government intervention to set standards for artificial intelligence (AI) development and further peer-reviewed research in the context of larger societal impact in the future.

AFTERNOON SESSION
2:00PM – 4:00PM

ALEXIS ERICKSON, PSYCHOLOGY
Title: *Personality Assessment in Cloned Equines*
Faculty Mentor: Dr. Scott Coleman

The nature versus nurture debate of personality has been widely researched, yet it has seldom used cloned animals. Since cloned animals are genetically identical to their donors, this avenue of research provides a unique opportunity to understand the genetic and environmental factors of personality. Horses are cloned to retain the donor's excellent physical and behavioral qualities, which makes this species an ideal candidate for personality research. To explore the genetic and environmental influences of personality, a donor polo pony and her cloned offspring were analyzed. The trainers of the ponies rated each horse based on its personality traits and physical characteristics. A positive correlation was found between the personality traits of the donor horse and her offspring. Notably, the traits of intelligence, cooperation, competitiveness and tameness had the strongest correlations. Further research is needed to investigate the underlying cause of these correlations and determine how generally applicable these findings are.

ALLISON FENSKE, INTERDISCIPLINARY STUDIES
Title: *Life Cycle Analysis of Recycled Aggregate and Recycled Plastic in Concrete*
Faculty Mentor: Dr. Melanie Sattler

Life cycle analysis [LCA] can compare the environmental impact of products and processes. If not responsibly disposed of, waste winds up in sensitive ecosystems where it leeches toxins into its surroundings. To utilize the waste plastic and waste concrete, a study was conducted prior to this one that mixed both recycled wastes in the same mix design. This current study will explore the environmental impacts of the alternatives of the previous study. The analysis is being conducted to determine if the alternative is truly a more sustainable alternative, or if the life of the alternative is more or just as harmful as standard concrete. SimaPro is the LCA software that will be used and the outputted information will provide the quantified environmental impacts and a comparison across all alternatives. A preliminary analysis has shown decreased impacts of mixes including recycled product for carcinogenic, ecotoxicity, and ozone depletion categories.

TIFFANY FRIAS, COMPUTER SCIENCE
Title: *Wireless Network Data Visualization in Augmented Reality*
Faculty Mentor: Dr. Chris Conly

The visualization of wireless networks has been a research topic so computer scientists can understand what cannot be seen with the naked eye and advance in specialized fields such as data visualization, cyber security, and computer networking. Flying a drone with a microcontroller around a building, signal strength and location data points of wireless networks can be collected and uploaded into a cloud database such as Azure Cosmos DB. On the Unity game engine, developers can create a program that pulls the data from the cloud in real-time and displays the wireless networks as bubbles. The bubbles will display important metadata collected such as network name, strength, and SSID. The program data is then visualized through mixed reality smartglasses like the Hololens 2. End-to-end data transfer goals like these are modified to adapt to software and environmental constraints and has required agile software development methodology.

ALLIE GARDINER, COMPUTER SCIENCE
Title: *Texas Poker VR*
Faculty Mentor: Dr. Chris Conly

Texas Poker VR is a virtual reality (VR) poker game that provides players with the ability to play privately among friends. The Texas Game Developers team is working to develop a VR poker game that has a focus on the private room and socialization aspects of the game. The application is for the Oculus Quest 2, using the Unity game engine. We will be using a subscription server that will allow players to create a private room with other players they invite, visualize the poker screen, socialize with each other, and keep track of the fake money, all on a real-time basis. Because existing VR poker games have shortcomings in which players cannot create a private room to play poker with real friends, our primary focus as a team is to solve this problem and have more private socialization abilities, in addition to creating a VR poker game.

YOGESH GAUTAM, MECHANICAL ENGINEERING
Title: *CFD Study: Influence of Angle of Attack and Ground Effect on Racecar Wings*
Faculty Mentor: Dr Robert Woods

Aerodynamics is an important factor while designing a racecar. Slight changes in the profile of the body could be the difference between winning and losing a race. For an electric car, reduction of drag will result in longer range. In this study, the wing designed for an electric racecar is simulated to analyze its aerodynamic properties. The simulation is done on a single element wing with varying angles of attack and height from the ground. The Solid model is prepared in solid works and the computational fluid dynamics simulations are performed through ANSYS Fluent. The main goal of this project is to find the best angle of attack and ground level for the single-element racecar wing. The CFD analysis presented the highest downforce at 15° angle of attack and lowest tested ground clearance. The drag force increased as the angle of attack increased and remained constant as ground clearance decreased.

CARSON GONZALEZ, NURSING
Title*: Evidence Based Practices that Engage Patients in Primary Care*
Faculty Mentor: Dr. Yan Xiao

Patient involvement is required to improve patient outcomes. This paper will discover the best practices to engage patients in primary care by using a formulated literature review and an environmental scan. An environmental scan is an observation of an environment and discoveries of opportunities for improvement. In the literature review conducted, there was a study that reported 81% of families felt they had benefited from being involved in the care. Some of these practices include being open to questions, focusing on the patient holistically and giving the patient autonomy. Engaging patients in care allows them to have control over the situation and to have a say when it comes to their health. The cooperation of the patient leads to better adherence to the treatment plan. This research serves to improve patient health and advances the knowledge of the patient involved in their care.

SUSHANT GUPTA, COMPUTER SCIENCE
Title: *Designing, Developing, and Deploying Fast and Secure System Architecture with Autonomous Data Importation Feature for State Farm*
Faculty Mentor: Dr. Chris Conly

State Farm is interested in creating a digital system that studies individuals' health habits and predicts their future health conditions. The system uses Machine-Learning on the recorded user's health data through a Fitbit watch, to determine how healthy the individual is. Based on the outcome, State Farm would provide a better health insurance rate to its customer. Concerning the sponsor requirements, a system consisting of a mobile and web application is designed, developed, and deployed, along with the service of autonomous data importation from Fitbit server to AWS S3 bucket using AWS Lambada function that runs Python script periodically. A strong, efficient, and secure system architecture is implemented that improves the performance and reliability of the overall system by a significant amount. A new framework, ReactJS with Python Flask, for web app was proposed and implemented that improved the user experience quality and increased data loading speed in the app.

GAJENDRA GURUNG, PHYSICS

Title: *Search for Light Mass Dark Matter Using Leptophilic Gauge Boson Model in Neutrino Experiments, MiniBooNE, and DUNE*

Mentor: Dr. Jaehoon Yu

In search of Dark Matter, we go beyond the Standard Model by introducing models with particles interacting weakly with gravity. We study different models and search for particle signatures in the proton dump mode of Neutrino Experiments, the Mini-Booster Neutrino Experiment [MiniBooNE], and Deep Underground Neutrino Experiment [DUNE]. One anomaly-free model is the leptophilic U(1) boson Z', which gauges the differences in the lepton number. We study the production of Z' through meson decay, electron bremsstrahlung, and resonant production by e+e-collision. From the existing proton beam dump data from MiniBooNE and GEANT-based simulation of MiniBooNE and DUNE, we achieve competitive constraints on the gauge coupling parameter gZ'. We note a considerable increase in the expected number of Z' passing through the MiniBooNE and DUNE detectors. The larger Z' production suggests that DUNE could potentially probe new areas of parameter space, which is a qualitative improvement from previously published works.

EESHA KHAN, BIOLOGY

Title: *Altering the DNA of the Microcrustacean, Daphnia, with Exposure to the Mutagen Proflavine*

Faculty Mentor: Dr. Sen Xu

DNA can be altered by introducing mutagens that can induce mutations and alter the genomes of organisms. The microcrustacean, *Daphnia*, was exposed to Proflavine, a mutagenic disinfectant, and the effects were seen by breeding the organisms and sequencing their genomes. Isolates of *Daphnia* were collected and then solutions with the mutagen were prepared to determine which concentration the organisms reproduce in. After successive reproductions, the babies were monitored and sent to sequencing to examine mutations present in the DNA. After many trials, the adequate concentration for Proflavine was determined to be 45 ug, showing the ability of *Daphnia* to reproduce in subsequent generations in the presence of a mutagen. Sequenced genomes illustrated that mutations were present in the babies, and that the microcrustaceans were still able to reproduce successfully and sustain the mutation. Research will continue being conducted to see the types of mutations and its effect in growing generations.

KARISA KINARD, THEATRE ARTS, DESIGN AND TECHNOLOGY

Title: *Everyone*

Faculty Mentor: Dr. Anne Healy

Avant-garde is described as an experimental technique of art, whether it be fashion, painting, or theater. These methods have been effective in helping the audience connect to the script. This script, entitled *Everyone*, echoes the high emotional value placed on common human themes; depression, hatred, faith, isolation, self-consciousness, and education are aspects of life we have all experienced and have had adverse and inescapable influences on our health. *Everyone* is a way to describe the cycle of life revolving around us. The theater has always been a conduit for catharsis, evolving from stringent rituals to emerging contemporary works. Over time, boundaries have been traversed in ever-emerging styles to help incite emotions from audiences. The recent societal shift of an inundation of opinions and choices, resulting in a state of emotional limbo, is the cause and foundation of my writing.

IRISSA LE, BIOLOGY
Title: *Impact of Developmental Coordination Disorder*
Faculty Mentor: Dr. Priscilla Tamplain

Development Coordination Disorder (DCD) is a neurological disorder that affects the performance of common, everyday tasks in children due to a delay in the development of motor skills. Oftentimes, parents of these children express concern about the limited number of resources available. To further understand what kind of support children with DCD may need, the parents of children with DCD in the US were documented about their experiences. A survey was prepared through a survey software program called QuestionPro for the parents participating in Impact for DCD – USA. In total, there were 210 surveys completed. It was found that most children with DCD were also diagnosed with co-occurring conditions, including verbal dyspraxia, ADHD, and anxiety. Additionally, the majority of the children were not attending therapy for their movement difficulties. More awareness and funding is needed to advance the development and performance of children with DCD, physically and emotionally.

MICHELLE LE, BIOLOGY
Title: *Sublethal Effects of Ammonia on the Phototactic Behavior of Daphnia*
Faculty Mentor: Dr. Matthew Walsh

Water pollution is a worldwide concern due its devastating effects on the environment and human health. As clean water is vital to our society, it is essential to monitor the effects of pollution. Utilizing *Daphnia* spp. as bioindicators, the effects of various sublethal doses of ammonia, a common waterborne pollutant, on the phototactic behavior of *Daphnia* was investigated. Daphnids were first reared in common garden conditions and exposed to the following conditions: 0 µL, 7 µL, 10.5 µL, 14 µL, and 17.5 µL. After continuous and post-ammonia exposure, daphnids were placed in 500 mL vertical columns under dark conditions for five minutes. The phototactic indices were calculated using the number of daphnids found in either the top, middle or bottom region of the vertical column. Overall, it was found that *Daphnia* exhibited more positive phototactic behavior in higher concentrations of ammonia.

W. ALANA LEWIS, NURSING
Title: *The History of Violence, Personal Control, and The Adolescent Perception of the Birth Experience*
Faculty Mentor: Dr. Cheryl Anderson

The purpose of this secondary analysis was to explore the history of violence and fear of loss of personal control during birth upon the adolescent's perception of the birth experience. Adolescent mothers (13-19 years old; N=303) from two postpartum units at a large county hospital provided data through the Impact of Event Scale, survey questions, and single item rating scales. A negative birth experience was reported by adolescents with either a history of violence, fear of loss of control at birth, or high stress (explored as a confounding variable). A combination of variables made no significant difference. The independent, significant, negative impacts by these variables upon birth perception highlights the importance of early, prenatal assessments, monitoring during birth, and postpartum follow-up of each variable individually and adds to an evidence-based practice model aimed at promoting a positive birth perception for adolescents.

JOANNE MAI, BIOLOGY
Title: *A Proposed Study to Explore the Relationships of Methionine Restriction, the Mitochondrial UPR, and Animal Lifespan Determination*
Faculty Mentor: Dr. Mark Pellegrino

The determination of chronological age is complex and can be influenced by both genetic and environmental factors. Mitochondria, essential organelles that generate the vast amount of cellular energy, are closely associated with the aging process. While many studies have been performed, we still lack a complete understanding of how animal lifespan is determined. In the following research proposal, a strategy is outlined to uncover the mechanism of the mitochondrial unfolded protein response (UPRmt) and extended lifespan resulting from restriction of the amino acid methionine. The model organism *Caenorhabditis elegans* and a forward genetic screening strategy will be used to identify the genetic basis of methionine restriction induced UPRmt. We predict that our findings will help explain the relationship of mitochondrial functional status to the aging process as it relates to the activation of stress responses such as the UPRmt.

GAGE MARTINEZ, PHILOSOPHY
Title: *Finding A Practical Moral Theory:The Failed State of Normative Ethics*
Faculty Mentor: Dr. Kenneth Williford

Normative ethics can be described as the investigation into how one ought to act, morally speaking. The state of contemporary normative ethics is, essentially, a split between consequentialist (the idea that things are morally right or wrong based on their consequence) and non-consequentialist thought. Yet in practice, no one seems to be able to live by these moral theories, and I argue that it would be bizarre to do so as well. I examine reasons to believe that neither theory provides a complete account of real moral life, and how they fail at being prescriptive in practice. I provide a naturalistic account for the place consequentialist and non-consequentialist reasoning has in moral life and analyze the differing meta-ethical groundings for them. This leads to revealing deep concerns about the exact nature of decision making, and ultimately having to decide what role normative ethics occupies in life.

KARYSSA NELSON, PSYCHOLOGY
Title: *The Effectiveness of a Web-Based Motor Intervention Program on Motor and Psychosocial Abilities of Children with DCD: A Preliminary Study*
Faculty Mentor: Dr. Priscila Tamplain

Group intervention programs are known to improve motor and psychosocial skills in children with motor difficulties, however, many programs were suspended due to COVID-19. Therefore, we investigated the effectiveness of a web-based asynchronous intervention on the motor and psychosocial abilities of children with DCD. The Strengths and Difficulties Questionnaire, Developmental Coordination Disorder Questionnaire, and Motor Ability Questionnaire were completed before and after 8 sessions. No significant differences were seen on the DCDQ, but effect sizes were found for the MAQ in jumping ($d = .28$), grasping ($d = .27$), lacing ($d = .70$) and overall ability ($d = .30$). For the SDQ, small effect sizes emerged for Peer Problems ($d = .47$) and Internalizing Problems ($d = .35$), and a large effect size on the Impact Scale ($d = 1.76$). This data supports that a web-based intervention may be effective in supporting children's motor and psychosocial skills.

ALISON NGO, BIOLOGY
Title: *The Skull of the Semi-Aquatic Neotropical Lizard Echinosaura horrida (Squamata: Gymnophthalmidae: Cercosaurinae) and New Synapomorphies for the Genus*
Faculty Mentor: Dr. Walter Schargel

Echinosaura is a semi-aquatic group of lizards of the Gymnophthalmidae family which inhabits the streams of the tropical forests of Costa Rica down to Ecuador along the Andes mountains. *Echinosaura* is composed of seven species: *E. brachycephala, E. centralis, E. horrida, E. keyi, E. orcesi, E. palmeri, E. panamensis*. Recent studies have proposed a well-resolved phylogenetic hypothesis for this genus, based on molecular data. However, there is a lack of knowledge on morphological aspects such as their osteology. Here, we perform a bone-by-bone description and illustration of the skull of *E. horrida* using CT-scan data. We found variation in characters that allow differentiating this genus from other gymnophthalmids with available osteological descriptions. Some of these character states are the general skull shape, dorsal sculpturing on the roof bones, teeth count, and posterior process of the jugal. The data generated is important to bring light to the morphological evolution of Gymnophthalmidae.

MY DUNG NGO NGUYEN, BIOLOGY
Title: *The Population of Turtles on Private Property*
Faculty Mentor: Dr. Corey Roelke

Within the past year, dozens of freshwater turtles across Texas have been dying off due to some unknown cause. Texas Parks and Wildlife has documented over 60 deaths since last November. Symptomatic turtles displayed characteristics such as lethargy, swollen or caked closed eyes, and being terminally septic. Even though some believe the cause is viral, there is no sure explanation. In order to help in the investigation and prevention of this event, we collected data in the hopes that it can be used for further research. We captured and marked freshwater turtles from a functionally closed population at French Lake in Fort Worth, Texas. In total, we captured and tagged approximately 100 turtles of four different species, *Trachemys scripta*, *Chelydra serpentina*, *Pseudemys concinna*, and *Apalone spinifera.* There were a couple of turtles captured that were either not tagged or have insufficient data, so they will be excluded.

CRYSTAL TAVAREZ, EXERCISE SCIENCE
Title: *A Scope Review of Motor Skill Assessments for Children*
Faculty Mentor: Dr. Priscilla Tamplain

Motor skill assessments are used to evaluate a child's development and reveal potential deficits of the individual. The purpose of this study was to research and analyze a number of motor assessments for children that have been created over the past 30 years. This information will then be used, in the future, to create a new motor assessment that would be able to be utilized in therapeutic settings. To accumulate the articles to review, the website Rayyan was used. A total number of 14,524 articles were gathered and the screening consisted of assessing abstracts to determine whether an article was included or excluded from the data. Keywords were identified and exclusion reasons were also created to help the decision-making process. For this specific project, 1,555 articles were screened; 183 articles were "maybe," 26 were "included" and 1,344 were "excluded."

WARDA WYNE, BIOLOGY
Title: *The Effects of Maternal Oral Health on Pregnancy and Child Tooth Development*
Faculty Mentor: Dr. Malgosia Wilk-Blaszczak

The impact of oral health on overall health is something that is often overlooked, especially during pregnancy. Tooth development occurs long before the child is even born, within the first 3 months of pregnancy. This is an aspect of development that not many pregnant women are aware of. To further understand the implications poor oral health has on pregnancy and child tooth development, all pregnant women participating in the study were screened for oral issues during the second trimester of pregnancy. Those that were clear, served as a control for the research versus those women who were shown to have indications of poor oral health. Any pregnancy outcomes were noted through obtained medical records and factors such as age, race/ethnicity, socioeconomic status, etc. prior to pregnancy were all taken into account. The study concluded that pregnant moms with periodontal disease showed significant increase in the risk for complications during birth.