

25-26 Impact Award Recipients

Student Awardee: Reagan Britt

Faculty Mentor: Dr. Katherine Sterner

Faculty Department: Sociology, Anthropology & Criminal Justice

Project Abstract: The Native American Graves Protection and Repatriation Act (NAGPRA) is a federal law passed in 1990 that intended to return human remains and culturally significant items to Native peoples. NAGPRA requires all federally funded entities to compile an inventory of ancestral human remains and culturally significant items and submit it to the National NAGPRA Office where the list would be accessible to federally recognized tribes who could then request consultation on and repatriation of the inventoried items. NAGPRA has had a significant impact on the relationship between archaeologists and Native peoples. In Maryland, one of the issues complicating this relationship is the difficulty of understanding when remains and cultural items have been repatriated. This is especially difficult for Native community members to navigate due to a lack of resources and complicated inventory systems. This project seeks to create a resource that compiles information on ancestral human remains that have been disinterred from the ground in Maryland and their repatriation status, as well as teach our Indigenous communities how to search through the NAGPRA database themselves. The search guide will be presented at the Annual Summit of Maryland Indigenous Peoples and Archaeologists in the form of a workshop and worksheet handout in the fall of 2026.

Student Awardee: Anna Christou

Faculty Mentor: Dr. Erin Harberts

Faculty Department: Biological Sciences

Project Abstract: When we receive a vaccine, our immune system is trained to recognize and defend against a particular pathogen. The process begins when the introduced antigen—a harmless version or part of the pathogen—provokes an immediate, non-specific response from the innate immune system. This first line of defense sends out warning signals that alert other immune cells to the presence of something foreign. These signals activate the adaptive immune system, whose specialized cells learn to recognize the antigen and remember it. It is because of this immune memory, the body can respond swiftly and effectively if the same pathogen is encountered again. A key element of immune memory is the production of antibodies—proteins that target and neutralize invading pathogens. Our research investigates the role of specific immune-regulating proteins in antibody production following vaccination. We hypothesize that a speckled protein, sp140, plays a critical role in the production of antigen-specific antibodies, and that its expression is contingent upon activation of the innate immune receptor Toll-like receptor 4 (TLR4). Since TLR4 initiates immune signaling that recruits an adaptive immune response, elucidating its relationship with sp140 may provide valuable insight into the mechanisms by which vaccines establish long-term protection against disease.

Student Awardee: Equinox Ezenwajiaku

Faculty Mentor: Dr. Renae Mitchell

Faculty Department: Psychology

Project Abstract: Transgender individuals are routinely stigmatized based on their looks, beliefs, and lifestyles. However, the individuals who have the strongest opinions about them are usually not transgender. This could also be said for nonbinary/gender non-conforming people whose gender expression is not typical of the gender binary society follows. Despite this, what is interesting is that even though transgender binary and gender non-conforming people have different experiences from one another, they are still grouped together in LGBTQ+ research. This act of combining the two groups undermines the unique individual differences both groups have. Luckily, the current research we are conducting highlights the unique differences of nonbinary/gender non-conforming people by actively trying to understand how other LGBTQ+ members view and form opinions about gender diversity. The significance of this study lies in its focus on the views of other LGBTQ+ individuals, rather than the views of individuals who are not part of the community. This research fully centers nonbinary/gender non-conforming people and views them as an entirely different group from binary transgender individuals.

Student Awardee: John Gonsalves

Faculty Mentor: Dr. Yifan Guo

Faculty Department: Computer & Information Sciences

Project Abstract: Indoor human activity monitoring is critical for healthcare, security, and smart environments, yet traditional methods often rely on cameras or wearable devices that raise privacy concerns. This project aims to develop a Wi-Fi sensing framework that leverages existing wireless signals to recognize human activities in real time with privacy-persevering guarantees. By capturing Channel State Information (CSI) from Wi-Fi packets transmitted between a router and receiver, the system can detect movement patterns and classify activities such as typing, waving, and using a phone. Preliminary proof-of-concept data collected during the summer confirmed the feasibility of the setup and informed the full-scale study. Using SenseFi, an open-source deep learning benchmark, experimental data are combined with public datasets to train models optimized for edge deployment. These models will be deployed on low-power devices, such as NVIDIA Jetson Nano, for real-time activity recognition while preserving privacy and minimizing latency. The system will be evaluated for robustness against environmental variability, interference, and mobility patterns. By integrating wireless sensing with edge AI, this project advances non-invasive, scalable solutions for real-time indoor activity recognition and highlights the potential of on-device machine learning in practical environments.

Student Awardee: Alexander Goodman

Faculty Mentor: Dr. Kelly Coburn

Faculty Department: Speech-Language Pathology & Audiology

Project Abstract: In this study, I will examine collected transcripts of narratives by autistic and non-autistic participants from the Diverse Neurotypes (DiNo) Communication Lab. These transcripts were collected by the DiNo Lab as part of a larger narrative study. Each participant told stories based on four given prompts, which include two stories based on a picture, a story about one's interests, and a story about another person. Using this data, I will analyze each participant's transcript to identify the presence of variables that may be used for linguistic camouflaging, which is social actions and behaviors used by autistic people to be perceived as more neurotypical and to hide their autism. These elements include minimal encouragers (okay, mhm), scripts, formulaic expressions, and validation seeking. I will use existing research literature on linguistic camouflage and social camouflaging in autistic individuals.

Student Awardee: Tyler Hannesson

Faculty Mentor: Dr. Vera Smolyaninova

Faculty Department: Physics, Astronomy & Geosciences

Project Abstract: Superconductivity was discovered in 1911 by Heike Onnes during an experiment where he examined the electrical properties of mercury as it was cooled with liquid helium. It was known that electricity was generated from moving charge (electrons) and resistance is resulting energy loss during electron transport. Electrical resistance comes from the electrons colliding with the atoms in the during electron flow. Every material has resistance, but when the mercury Onnes cooled reached 4.2 Kelvin (-268.95°C), the resistance in the mercury vanished. This phenomenon is called superconductivity, a discovery so significant that Onnes received a Nobel prize in physics two years later. Superconductivity only occurs in specific materials and compounds, and the transition occurs at a temperature specific to the material, called TC. Researchers have spent the past century trying to discover materials with critical temperatures that don't require cooling with liquid helium, a finite resource. The highest (useable) critical temperatures are in (Hg/Tl) BaCaCuO compounds with a TC around 130-140 Kelvin, but the toxicity of mercury and thallium create difficulties during manufacturing. In this project we are looking to create nontoxic analogs of the HgTl family of superconductors by making elemental replacements with Indium and Tin.

Student Awardee: Lucas Hoffman

Faculty Mentor: Dr. John Sivey

Faculty Department: Chemistry

Project Abstract: The use of chlorine to inactivate pathogens has the undesired side effect of forming disinfectant byproducts (DBPs). These DBPs form when organic matter (carbon-based molecules) is chlorinated. These DBPs are a threat to public health, causing cell damage and increasing risk of cancer. My study aims to investigate how sugar—sucrose as a model—affects the formation of DBPs. Phenol is used as a model organic precursor (a compound that can react with chlorine). Sugar enters wastewater through several anthropogenic processes, such as food, beverage, and pulp production. The chlorination rate of organic compounds increases as the concentration of sucrose increases. This effect changes depending on the pH, temperature, organic precursor, or sodium chloride concentration. Therefore, the aim of my project is to examine how sucrose affects the formation of THMs, a regulated class of DBPs. Sucrose may affect the yield and formation of the harmful THMs with phenol and Suwanee natural organic matter as a precursor. The purpose of my research is to examine the influence sucrose has on the chlorination rate of phenolic compounds, forming both regulated and unregulated DBPs. This research is important to further understand the complexity of chlorinated waters to improve public health.

Student Awardee: Kylie Houston

Faculty Mentor: Dr. Alexandra Durfee

Faculty Department: Speech-Language Pathology & Audiology

Project Abstract: Often taken for granted, communication is vital to our daily interactions within our communities at home, school, and work. Central to communication is language, which allows us to share ideas and connect with others. Over 50% of people worldwide speak more than one language (Yale, 2021), and about 22% of people in the United States speak a language other than English at home (U.S. Census Bureau, 2025). People who speak more than one language, or multilingual speakers, hold many unique strengths, including language mixing: the process of switching between languages within a single sentence or phrase. Healthy multilingual speakers may intentionally use language mixing in their everyday speech to emphasize a point or to combat word-finding difficulties, such as when the word is “on the tip of your tongue”. After a brain injury, little is known about the communication recovery of multilingual speakers, or the role of language mixing. Therefore, our scoping review aims to summarize the existing literature on how language mixing affects communication recovery for multilingual speakers with acquired brain injury, to identify current limitations and gaps, and to prompt further research for clinical application. We are currently in the data extraction phase of the project.

Student Awardee: Elise Lam

Faculty Mentor: Dr. Catherine Horta-Hayden

Faculty Department: Dance

Project Abstract: This project follows empathetic theory's place in dance creation, performance, and appreciation. Empathy theory in philosophy studies the psychological reaction one has to a physical object (Lanzoni, 2018). In the context of dance, empathetic theory examines how people engaging with a dance performance react accordingly based on their personal perception. Beyond objective observation, as is more commonly seen in dance criticism, my research investigates the emotional implications of dance as a lived experience, utilizing my findings through the applied research of choreography. The results of this embodied research will be performed at the Senior Seminar Capstone Course Draft and Final Concerts in fall 2025 and spring 2026 respectively. As I apply my findings through the creative process of choreography, I aim to convey my personal artistic intention with the dancers while encouraging their own artistic choices. As I communicate with the dancers throughout the choreographic process, I will incorporate their insights into my choreography so that the dancers can connect with the performance on a personal and emotional level. Following the performance, I will discuss their experience via a model inspired by Ehrenberg's (2015) "conversation" to gauge the dancers' personal connection to the choreography and audience reactions to their performance.

Student Awardee: Haniel Lopez

Faculty Mentor: Dr. Nicolas Knuth

Faculty Department: Kinesiology

Project Abstract: While studies often show differences in biomechanics and muscle activation between treadmill and overground walking, the effects on local muscle oxygenation are less understood due to limited and inconsistent findings. These discrepancies highlight a need for more precise measurement at the muscle level, as broader whole-body metabolic rates may not capture nuanced physiological changes. Near-infrared spectroscopy (NIRS) addresses this gap by non-invasively measuring skeletal muscle oxygen consumption (mVO_2). Therefore, this study aimed to use NIRS to investigate the specific differences in localized oxygen delivery and consumption responses during treadmill versus overground walking. Measurements for mVO_2 were obtained by placing NIRS on the gastrocnemius muscle (MG) of healthy adult participants. Measurements for $wbVO_2$ were obtained with the COSMED metabolic analyzer. The study involved 15 minutes of baseline data collection at rest, followed by 5 minutes of over-the-ground walking. The final data collection stage consisted of a treadmill protocol across 8 incrementally increasing speeds (1.1 mph to 3.5 mph), spending 4 minutes at each level. The findings from this project will underscore the value of NIRS in capturing nuanced physiological and hemodynamic changes and adaptations in differing walking environments and may help clinicians and researchers interpret treadmill data to better assess patient progress and design effective studies related to overground walking.

Student Awardee: Emmanuela Onyilokwu

Faculty Mentor: Magdeline Biller

Faculty Department: Psychology

Project Abstract: Generative Artificial Intelligence (GAI) tools like ChatGPT have quickly infiltrated higher education classrooms, changing how students learn, challenging traditional pedagogy, and shifting the responsibilities of educators. While institutions are creating policies rapidly, we know very little about how students and faculty actually experience AI in daily academic life to inform these policies—how are students really using it? What do faculty really think about usage of GAI in college? This study takes place in Towson University's Psychology Department, exploring how both students and faculty personally use and perceive generative AI. Using open-ended survey questions, it asks participants to describe their own use of AI, how they believe students use it, and their opinions on students using GAI for academic work. The study then aims to compare student and faculty's responses to see what themes unfold. Unlike most existing research that focuses on technical or ethical debates about the role of GAI in higher education, this project centers their lived experiences. These insights can help Towson (and higher education more broadly) develop human-centered GAI-use policies that support both students and faculty during this technological shift.

Student Awardee: Efosa Owie

Faculty Mentor: Dr. Nathan McNew

Faculty Department: Mathematics

Project Abstract: The goal of this project is to explore an intriguing connection between a tangled string in space (called a knot) and a disordered list of numbers (called a permutation), two completely different areas of mathematics. Several recent papers have developed a way to construct a knot from a permutation, a technique that connects combinatorics, which is the study of counting with knot theory, which is the study of the way you can deform a circle or circles by twisting the edges and sides without cutting. Permutations can be represented visually using a cycle diagram. By utilizing a construction common in topology we can convert the cycle diagrams to a knot. It then becomes interesting to study which type of knot can be constructed from a given list of numbers. The simplest possible knot, the unknot has been studied in several recent papers and the permutations connected to it are now understood, as well as the number of unknots of various sizes there are. Our proposed research is to consider the next two cases, the Hopf link and the Trefoil knot. We hope to characterize the permutations that correspond to each and count the corresponding permutations.

Student Awardee: Asa Seay

Faculty Mentor: Dr. Anne Estes

Faculty Department: Biological Sciences

Project Abstract: Humanity's demand for energy is increasing, and current biofuel technologies are inefficient and environmentally degrading. More efficient enzymes for plant fiber degradation biofuel are needed. The Estes lab examines dung beetle bacteria for these enzymes. In her CURE lab, Wild Microbial Biotechnology Spring 2025 and my research this Fall, we identified xylan degrading dung beetle bacterial isolates. Xylan is prevalent in crop waste normally left on fields post-harvest. Xylose, the base sugar of xylan, is fermentable into ethanol in yeast bioreactors, making xylan degrading enzymes a priority. While other dung beetle bacteria did not degrade xylan, they may have enzymes to degrade xylan degradation byproducts xylobiose and xylotriose to the base sugar xylose. This is like human gut microbiomes where multiple bacteria, each with different enzymes, work together to degrade fiber in our diets. We hypothesize that a synthetic community of multiple dung beetle isolates working together could possess all the enzymes needed to degrade xylan to xylose for biofuel production. My project will use our degradation data and genomics to design and test these synthetic communities' capabilities. After designing the synthetic communities, I will test their effectiveness using the CalScreener microcalorimeter and a colorimetric Bial's test for xylose concentration.