UROC-PREP/ Student Affairs Research (STAR) Program

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Sponsors: The University of Arizona, The University of Arizona Graduate College, Western Alliance to Expand Student Opportunities (WASEO), Division of Student Affairs.

ASHLEY BATCHELOR
Teach Belief Systems: Beyond Equity
The University of Arizona, Bilingual Elementary Education and Spanish Linguistics
Mentor: Jessica Summers, Teaching, Learning, and Sociocultural Studies

Abstract

This study examines the effectiveness of specific strategies, utilized in teacher certification programs, to challenge harmful language biases. Secondary STEM certification programs were the only programs reviewed due to the dramatic disparity between the presence of standard English speakers and speakers of diverse language populations. The PI used an existing study as a background for the current study, specifically the findings which ndicated the most impactful belief challenging techniques, according to pre-service teacher (PST) experiences. Each individual technique was provided a number value ranging from .5 -2 depending on whether PSTs considered the techniques effective in challenging their biases. Three Southern Arizona teacher certification program s provided the PI with their course syllabi for their specific teacher credentialing program. By creating and utilizing a flowchart to examine individual assignments in the syllabi, the PI was able to code for the presence of each instance of effective belief challenging technique. The PI then scored each assignment,

course, and program based on which belief challenging techniques were identified. Each program examined received vastly different scores indicating that further study is necessary. Given the recent sociopolitical environment, which has been staunchly anti-immigrant and highly nationalist, examining teacher harmful belief is bias is imperative. A huge disparity between standard English speakers and nonstandard English speakers in higher level education is already present. Failure to address existing teacher bias could strengthen this disparity. As such, teacher preparation programs must challenge existing harmful beliefs in future educators, to maintain the current push for more diversity in STEM subjects.

ANH DAO

CATS: A Mobile Application for Cardiac Surgery Patients Using the Cardiopulmonary Ambulatory Tolerance Score
The University of Arizona, Computer Science and Mathematics
Mentor: Chris Gnijdy, Computer Science

Abstract

Hospital readmission is commonly utilized as a clinical outcome measure by hospitals and insurance companies and is becoming an increasing concern. Doctors need clear tools that will allow them to decide which patients are safe to be discharged without risk for readmission. As a result, scoring systems that predict patients with high risk for readmission are essential for reducing hospital readmission. While there are several scoring systems developed for medical patients, few are developed and verified for patients following cardiac surgery. This study examines the Cardiopulmonary Ambulatory Tolerance Score (CATS) scoring system for cardiac surgery patients and implements the system as an android application. The application has the capabilities to measure movement distance, heart rate and oxygen saturation using a smartwatch and a pulse oximeter as additional peripherals. The study took advantage of an existing distance calculation algorithm to calculate distance. Accuracy tests of the algorithm were performed by two participants walking a distance of 25 meters. In addition, the application incorporates several health surveys necessary to calculate a score from the CATS system. A NoSQL database was used for storing data generated from the application. Preliminary results showed that the algorithm was able to measure movement distance with an accuracy of 95%. Two components were also identified from observing patterns of walking and were deemed to be important for gait analysis as they can be used to identify abnormal walking patterns. They are the brief stationary position of the feet during walking and the movement of the ankle.

ANDREA GARCIA BROWN
Casual Sex, Dating Apps, and Sexually Transmitted Infections: Meta-analysis of Current Data

The University of Arizona, Africana Studies
Mentor: Jennifer Donahue, Africana Studies

Abstract

Background: Dating apps are becoming popular on college campuses and have been associated with the transmission of STIs. In Pima County, the University of Arizona brings thousands of students from all over the country to live in close proximity to each other. This meta-analysis utilizes state data and the university's annual Health and Wellness survey to provide background for further research on these topics.

Methods: Data was collected from the Arizona Department of Health Services, which included graphs of document ed cases of Chlamydia and Gonorrhea in Pima county from 2008-2015. The data is separated into three categories (growth over time, age, and gender). The most recent annual survey from University of Arizona Campus Health had 3,113 participants.

Results: Data from the Arizona Department of Health Services displayed significant increases in STIs; the data reflects the timeframe that most dating apps were introduced. The annual survey gave an insight into the campus's undergraduate population, with 71.9% of the participants engaging in sexual activity and 63.8% of sexually active students being tested for an STI within the last year.

Discussion: There has been a significant growth in the transmission rate of Chlamydia and Gonorrhea in Pima County. Though it can be inferred, further research will need to be conducted to investigate if dating apps are the cause of this increase at college campuses across the state.

MARIANA GASTELUM
The Framing of Crime and Immigration in Print Media: A Qualitative Analysis

The University of Arizona, Political Science and Spanish Literature
Mentor: Jennifer Carlson, Sociology

Abstract

Despite an abundance of literature stating crime and immigration hold a negative relationship, the public associate immigrant as threats to social and economic interests such as safety and job security. Previous research suggests that negative media framing can result in a negative public perception that can produce detrimental consequences for society as a whole. This study aims to understand whether framing of immigration and crime by the media perpetuate the disconnect between public perception and empir ical research. A database on immigration and crime was created using articles from the Los Angeles Times between 1997 to 2007 succeeding the significant influx of immigrants in the 90's and post 9/11. A longitudinal qualitative analysis will be completed using Atlas.ti. Results are pending. Limitations of the current study and recommendations for future research are discussed.

ALEXANDRIA HERRERA

Arizona K-12 Principals' Perceptions Surrounding Safe School Climate and Arming School Personnel for the Prevention of Violent School Attacks

The University of Arizona, History and Spanish Literature

Mentor: Michael Sulkowski, Disability and Psychoeducational Studies

Abstract

In recent years, mass shootings have become of increasing concern to parents, school administrators, and state and federal policy makers. Researchers have attempted to discover the best means to prevent another violent school attack from occurring and to understand the roles school staff, such as principals, teachers, and other school faculty, should play in such preventions. One proposed solution is arming teachers, but this proposal has been met with contradictory research outcomes. Overwhelmingly, principals support the use of armed school resource officers (SROs) within schools, claiming that SROs make schools safer. However, there is limited merit in this perception, as there is limited proof that SRO's make any significant chance in improving school safety. Further, some school administrators do not support non-law enforcement personnel's, such as teachers', being armed in schools, even as they acknowledge the benefits of armed personnel's being in schools such as reduced response times. In the following study aims to investigate these contradictory findings and the effect of school climate on principals' perceptions of arming K-12 teachers and support staff with firearms in schools by surveying 400 State of Arizona public K-12 principals. With a future completion date of December 2017 and while exploratory in nature, this research aims to help federal and Arizona State policy makers and school administrators better understand the perceptions of Arizona principals in order to aid in the implementation of policies for safer school environments.

ADRIANA IVICH

Quantifying Olfactory Glomeruli In Social Castes of the Ant Novomessor

The University of Arizona, Neuroscience

Mentor: Wulfila Gronenberg, Neuroscience

Abstract

Social insects, such as ants, are heavily dependent on communication among the colony members. This communication is largely dependent on olfactory signals, which are received by receptors in the antennae, and are then sent to the antennal lobes in the brain through the antennal nerve. The antennal lobe comprises spherical structures called glomeruli, each of which receives input from different kinds of odor molecules. The number of glomeruli in each ant's antennal lobe therefore indicates the variety of odors that the individual ant is able to perceive. Glomeruli number has been previously studied for a few ant species, showing differences between social castes of a colony. Based on brain sections, the present study examines the differences in glomeruli number between social castes (queens, males, and workers) of the ant species Novomessor cockerelli.

FRANCY LUNA DIAZ

Minorities in Government and Their Effect on the Political Engagement of Latina Women Constituents
The University of Arizona, Political Science and Government and Public Policy
Mentor: Sammar Klar, Government and Public Policy

Abstract:

As the Latina and Latino population increases in size, more research is needed about how this group of people can be engaged in the United States politics. Currently, Few existing studies focus on the role model effect of minority representatives on Latina constituents, rendering the effects of descriptive representatives on Latina women relatively unknown. The current research examines whether descriptive representatives change the levels of political engagement among the constituents of several districts and states across the United States to assess how minority representatives affect the political participation of Latina women. Using questions and responses about political engagement selected from the ANES 2016 Time Series and the demographic information of current Congresspersons and governors, the current study finds that minority representatives increase the political engagement of Latina women in at least two aspects: trust in politics and attention to politics. These findings confirm previous research about role model effects and contribute to the advancement of knowledge about Latina constituents'engagement in U.S. politics.

ISAAC MANRIQUE

Analysis of Temporal Operators in a Semantically Compositional Annotation Schema
The University of Arizona, Linguistics
Mentor: Steven Bethard, School of Information

Abstract

Many natural language processing tasks over the last two decades have implemented both sophisticated semantic analysis and machine neural networks to simulate a variety of natural language tasks, such as question-answering. This approach is mirrored in the present project, which trains a machine learning model on human-annotated documents. Human -oriented applications of natural language processing, especially those used within such linguistically specialized professions as medicine, should (1) prove sufficiently robust to normalize expressions that may prove esoteric or idiomatic and (2) account for queries posed as natural language questions for ease of use. The present natural language processing task examines patterns in natural language text to improve the performance of a semantically compositional annotation schema dedicated to temporal expressions. A rich variety of linguistic expression has been found in the training document corpus, providing a basis for future interpretation of similar expressions rendered as questions by a user. The project's end goal is to apply this annotation to clinical text to provide medical professionals with an automated interpreter for patient health record and pathology. This model operates on three primary forms of temporal expression: explicit time intervals (timeline segments); periods (durations); and operators that serve as functions of intervals and periods to create more of the same. The primary focus of this study is to normalize linguistic temporal expressions, specifically examining the semantic alternations of functional

operators-variations in meaning conditioned by context, such as when an operator's meaning changes upon accepting different arguments.

JULIAN ZY MAZZA

Why a Materialist Ought to Deny the Consciousness of the United States: Response to Schwitzgebel and Kammerer

The University of Arizona, Religious Studies

Mentor: Marga Reimer, Philosophy

ABSTRACT

A recent paper by Eric Schwitzgebel argued that if materialism is true, then a sufficiently complex and interconnected group of conscious entities like the United States is probably conscious. Schwitzgebel reasonably dismisses anti nesting principles as arbitrary and easily dismissible in many circumstances. Kamerrer responds by offering up the "Sophisticated Anti-Nesting Principle" (SAP) which, though intuitive and not arbitrary still allows for group -level consciousness. In this paper, a new principle is presented to disallow for group level consciousness in all but a very narrow set of circumstances. The principle, called the "Anti-Reificiation Principle" (ARP), focuses on the nature of identity and how entities are structured as opposed to what those entities are composed of. Ultimately, this paper presents the view that only entities that have no identity outside of the group they comprise can give rise to a phenomenally conscious mind.

HALEY MOORE

Oxytocin Changes Looking Behavior in Rhesus Macaques

The University of Arizona, Neuroscience and Cognitive Science

Mentor: Katalin Gothard, Physiology

Abstract

Eyes serve as both sensory and communicative tools -biological instruments used to gather information and interact with the outside world. During natural vision, the eyes move (saccades) and reallocate visual attention to a restricted location within the visual field (fixation). Individuals with autism spectrum disorder experience difficulty maintaining gaze on faces and eyes, resulting in failure to communicate social interest, intent, and response to social cues. Intranasally administered oxytocin has been shown to alleviate these social deficits by increasing eye contact, and gaze following behaviors. Does inhaled oxytocin alter general visual motor behavior, or more specifically eye movement when we communicate socially? To test this, we administered either inhaled saline or oxytocin to a Rhesus Macaque and presented both social (unfamiliar conspecific) and nonsocial (object) videos. We then calculated the mean number of fixations separately for each treatment. Oxytocin significantly increased the fixation frequency of social stimuli between the first half and second half of trials. All other trials decreased in fixation frequency. These results further support the role of oxytocin in promoting social behavior, and suggest that oxytocin more specifically targets the social brain rather than general control of eye movements.

RAUL NAVA

Testing The Potential of VEGF-Bt to Improve Mitochondrial Function in Dopaminergic Cells In Vitro

The University of Arizona, Physiology

Mentors: Torsten Falk, Nuerology and John Purdy, Immunobiology

Abstract

The importance of Vascular Endothelial Growth Factor B's (VEGF-B) neuroprotective capabilities have been stated previously. For this reason, VEGF-B's has been considered as a potential candidate for therapeutic use in the neurological disease known as Parkinson's Disease(PD). Cell degeneration of dopaminergic neurons observed in PD has been shown to be inhibited by exogenous application of VEGF -B in vitro and in vivoPD models. Accordingly, research has summarized these findings into two possible pathways, one in which inhibitionof apoptosis plays a role, the other, by increase in mitochondrial function of the affected neurons. Inhibition of apoptosis by VEGF-B could be due to the upregulation of Pigment Epithelium Derived Factor (PEDF). It is unclear how VEGF-B interacts with mitochondrial function. The results of this experiment are pending; however, two outcomes are possible. Long Chain Fatty Acids (LCFA) transport into the cells is increased by VEGF-B, and LCFA can either integrate into the mitochondria's plasma membrane of dopaminergic neurons or are metabolized in the mitochondria to produce ATP. Consequently, if LCFA are integrated into the plasma membrane future studies would require radioactive labeling of LCFA. If VEGF-B increases ATP levels, by increasing LCFA transport, further mass spectrometric (LC-MS) measurem ents can be used to determine the specific LCFA that are taken up by the cell.

CLARITA RAMIREZ

Fundamental Frequency: A Potential Tool for Assessing and Predicting Emotional Distress in Separated and Divorced Adults?

The University of Arizona, Psychology

Mentor: Dave Sbarra, Psychology

Abstract

There is a great variability in how people respond emotionally to the end of marriage and there are a variety of approaches studying this process, including study self-report, observer ratings, and natural language. The present study examines whether fundamental frequency (팽표), a physical property of human speech, is a cor relate and predictor of emotional distress in a sample of recently separated adults. I derived F0 from digitized recordings of participants discussing their recent experience of marital separation and hypothesized that this construct would be (a) positivel y associated with self-reported emotional distress immediately at the time of the separation, and (b) associated with less prospective improvement in self-reported emotional wellbeing over the course of the 5-month study. I also hypothesized (H2) that 팽표would be associated with independent (observer) ratings of the degree to which participants expressed negative (vs. positive) affect in the separation recordings, as well as the intensity of the expressed affect. The results revealed

no support for H1; however, under H2, I found that participants evidencing greater F0 in their SOC recordings were also rated as expressing more intense emotions (by independent judges) in those same speech samples. Implications for future research on and use of 팽표are discussed.

MELINA RODRIGUEZ
Descriptive Analysis of Opioid-Related Events Presenting to Emergency Departments in Arizona, 2014
The University of Arizona, Public Health
Mentors: Janet Foote, Public Health and Kristen Pogreba Brown, Public Health

Abstract

In Arizona, increasing rates of morbidity and mortality due to opioids has created a statewide public health emergency. Previous research has examined the burden of opioids in Arizona through a general scope, yet little research is available regarding the characteristics of patients presenting to emergency departments (ED) as the result of an opioid-related event (ORE). To identify the population in Arizona accessing care in EDs, this paper will delineate the characteristics of cases admitted to EDs
due to an ORE. This study evaluated OREs using outpatient data from the 2014 Arizona, State Emergency Department Databases (SEDD), from the
Healthcare Cost and Utilization Project (HCUP), sponsored by the Agency for Healthcare Research and Quality. Specifically, the descriptive study analyzed facility characteristics, patient demographics, clinical characteristics of cases with at least 1 ED visit between January 1, 2014 and December 31, 2014. OREs were defined using external cause of injury codes, in conjunction with Clinical Classification Codes, from the International Classification of Diseases, Ninth Revision, Clinical Modification
(ICD-9-CM). A preliminary analysis has revealed a sample size of n=2,284 cases from the Arizona SEDD database. Future steps throughFall 2017 will include
integration of the HCUP 2014 Arizona, State Inpatient Database (SID) to incorporate cases seen in the ED that were then admitted to the hospital; thereby creating a stronger interpretation of the burden OREs place upon the Arizona healthcare system.

BEATRIZ SMITH
The Tumor Suppressor Merlin Interacts with Oncogenic Proteins in Tumor Cells
The University of Arizona, Molecular and Cellular Biology
Mentor: Melania E. Mercado-Pimentel, Cancer Biology

Abstract

The Tumor Suppressor Merlin Interacts with Oncogenic Proteins in Tumor Cells
Merlin is a tumor suppressor protein encoded by thegene, neurofibromatosis type 2 (NF2). NF2 mutations results in Merlin losing its tumor suppressor function, which causes development of meningiomas and vestibularschwannomas (VS). Vestibular Schwannomas are benign cranial tumors, which develop around the vestibular branch of the VIII cranial nerve. They cause unbalance, tinnitus, deafness, and facial paralysis among other side effects .Present treatment options are observation, surgery and radiotherapy. Therefore, understanding the molecular mechanism by which
Merlin functions as a tumor suppressor is necessary to reveal biomarkers

for drug development. The goal of this study is to determine if wild type Merlin would interact with oncogenic proteins in the tumor cell microenvironment to identify putative proteins that play a role in VS growth. We identified a panel of oncoproteins by transforming human vestibular schwannoma cell lines (HEI-193) with GFP -Merlin and by immune precipitating GFP -Merlin complexes using nanotechnology, the GFP-TRAP_MAbeads. The isolated complexes were separated by electrophoresis and proteins bands were identified by proteomics. Our data show that Merlin interacts with several oncogenic proteins , among them, S100A7, serpin, suprabasin and centromere protein F, among proteins.Merlin/S100A7 interaction was confirmed by immunocytochemistry in GFP-Merlin transformed meningioma and VS cells. Our data indicate that the role of Merlin as a tumor suppressor is to inhibit oncogenic proteins. Further studies will confirm the role of the new identified proteins in tumor growth.

MARIA SMITH
Criminal Justice Contact and Deterred Social Activism
The University of Arizona, Sociology
Mentor: Jennifer Carlson, Sociology

Abstract
Blacks are disproportionately in contact with the criminal justice system. Consequently, encounters with institutions of control are often adversarial in nature and shapes Blacks' perceptions of social standing and political efficacy. Past research has ignored the potential impact that crime control has on Black activism. This study focuses on the criminal justice system as an apparatus of control through which crime is racialized in order to repress social mobilization and group legitimacy. Thus, this research will determine if there is a correlation between Blacks' contact with the criminal justice system and their propensity to engage in ethnic noninstitutionalized collective action (e.g. boycotts, civil disobedience, or protests). The purpose of this study is to further existing literature on the consequences of criminal justice contact by examining crime control and contact rates of Blacks in 81 cities where 175 Black males have been fatally killed by police and where protest may or may not have occured. Through expanding literature on criminal justice contact, this research contributes to the sociological understanding of social control, deviance, and social movements.

SHEILA SOLIS-ARROYO

A Case Study on Improving Spatio-Temporal Benefit Transfers for Pest Control Using Insecticide Cost by the Mexican Free Tailed Bat on Cotton, Corn, and Sorghum Crops in the Southwestern US

The University of Arizona, Hydrology and Water Resources
Mentor: Laura Lopez-Hoffman, Natural Resources and the Environment

Abstract

Given the complexities of evaluating ecosystem services in agroecosystems, improving pest control service estimates provided by insectivorous predators is essential. This study uses a compound spatial temporal model that analyzes spatial and temporal variability of insecticide cost for cotton, corn, and sorghum across the Southwestern US. Previous studies have estimated pest control services of the Mexican Free Tailed Bat (MFTB) on cotton crops in the Southwestern US and Mexico. However, the estimated private cost of avoided insecticide use is derived using a uniform application rate of 0.29 kg/ha from 1990 to 2008 (Ruscena et al. 2017; Gianessi & Reigner 2006). The current study derives insecticide costs and application rate per crop per year from 2008 to 2015. The most prevalent and detailed data found in California was derived at a county level. A benefit transfer approach was then used to extrapolate the data from California to Arizona, Colorado, Kansas, New Mexico, Oklahoma, and Texas. Results are currently underway and will be made available in the following two weeks. This study coupled with a wider scope study of pest control services of the MFTB such as Ruscena et al. (2017) could improve pest control estimates even further. Furthermore, the lack of pesticide application use reporting, specifically application rates, is astounding. Due to the lack of federal regulation of pesticide usage California is the only state in the US that has %100 reporting at the county level mandated by state law. This research and many others concerning pest control ecosystem services would benefit greatly from regulated pesticide use data.

ISABELLA YUBETA

A Preliminary Investigation of Immunofluorescence for Staining Pericytes and Caspase-3 in Retinal Vasculature from Streptozotocin-Induced Diabetic Mice

The University of Arizona, Physiology
Mentor: Erika Eggers, Physiology

Abstract

Diabetic retinopathy is a leading cause of vision loss and blindness among diabetic adults. Globally, an estimated 4.5 million people experience vision loss or blindness as a result of diabetic retinopathy (Leasher et al., 2016). Although pericyte loss is commonly observed as one of the earliest morphological changes in the development of diabetic retinopathy, the timeframe and mechanisms leading to the development and progression of diabetic retinopathy remain unclear. Previous research on mice, six weeks following induced diabetes with the pancreatic beta cell toxin streptozotocin (STZ), has revealed that light-evoked inhibitory input from amacrine cells to rod bipolar cells is diminished (Moore-Dotson et al., 2016). The current study aims to assess if there is pericyte decline and if pericytes are present in an apoptotic state as a result of diabetes. Diabetes will be induced in C57BL/6J male mice by intraperitoneal injections of STZ (75 mg/kg) over three consecutive days and diabetes established by a blood glucose level >200 mg/dL. Six weeks after the first STZ njection,

	immunofluorescence and confocal microscopy will be used to image whole mounted retinas. Preliminary experiments using both direct and indirect immunofluorescence fail to provide the desired staining. Protocols will be optimized and completed over Fall 2017 and Spring 2018.