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Presents

Scholars Day
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Abstracts

April 22nd & 24th, 2008

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College of Arts and Sciences
Department of Anthropology, Forensic Science and Archaeology

Jay Creighton and Anali Gatlin

Faculty Mentor: Dr. Sara Alexander

Putting People First: The Challenges of Local Participation in Community Development
(Anthropology, Forensic Science and Archaeology)

Since developing countries are facing economic problems at multiple levels, it is critical that development projects utilize available local resources to their fullest extent. Research addressing issues around the development process indicate a strong correlation between the necessity of community participation in planning and implementing development projects if they are to be sustainable.

Cernea notes that without local participation, projects are often unsuitable, unwanted, and may be opposed by the communities they are expected to benefit (1991). Researchers caution development planners not to underestimate the power locals have to derail development plans if they feel inclined to do so. Local people may not have much power to influence the design of a project, but they wield a great deal of power when they oppose a project. As Schwartz and Deruyttere note, "...their power is usually more negative than positive; it is the power not to do rather than to do" that is most influential (1996). Consulting with the community is a way of harnessing that power and energy to make certain that locals will support the project rather than actively or passively ensuring its failure (ibid.).

Belize has oftentimes fallen short of their sustainable development through community participation goals. The government recognizes the need to 'do development differently' but does not have the knowledge about development strategies to guide communities through the process effectively. This poster will explore key factors that have acted to facilitate or constrain local participation in community development projects in western Belize.

Scott Kuykendall

Faculty Mentor: Dr. Garrett Cook

The Design of Offerings at Maya Shrines
(Anthropology, Forensic Science and Archaeology)

The Costumbristas (traditionalists) of Santiago Momostenango, Guatemala follow a religion that mixes Catholic practices and beliefs with ancestral indigenous Mayan religion. They conduct ceremonies which are without a doubt different from one ceremony to the next, yet at the same time they follow similar patterns in design and routine. There is a distinct cultural pattern involved in the ceremonies exemplified in the combinations of offerings and the symbols laid out upon the altar. The ceremonies and symbols used are in correlation with particular days in the Mayan Calendar. The Costumbrista culture of Momostenango uses incense, spices, herbs, candies, candles, flowers and fruits, each with a particular purpose. The research conducted in this project observed and analyzed numerous ceremonies and documented as well as photographed the techniques used in preparing altars, the process of making offerings through the altar, and the reasoning behind each ingredient used by the Costumbrista. By the aid of audio recorded ceremonies I was able to discover and explain the cultural patterning of offerings and of the design features of the altars and ceremonies.

Robert Moore

Faculty Mentor: Dr. Garrett Cook

Mayan Sacred Music and the Spirits
(Anthropology, Forensic Science and Archaeology)

The religious ceremonies and festival celebrations in Momostenango, Guatemala include live music performances as important parts of the proceedings. This project is based on recordings and interviews of Momostecan musicians involved in these performances. Live music holds an integral place in the annual fiesta for the Patron Saint Santiago of Momostenango every July, and in this project I investigate the specific conventions, forms, and purposes of religious dance-drama music at the fiesta. I look specifically at the formal structure and narrative value of the marimba songs that make up the Deer-Monkeys dance-drama (a performance included in the fiesta), its meaning in the context of the fiesta, and the duties required of the dance-drama musicians. One purpose of this music is to connect the living people with supernatural beings, and because of this it is evaluated differently from popular market music; its success is measured in terms of its religious adequacy. In my project I discuss this different paradigm of musical evaluation and how it affects the contemporary practice of this music tradition. I conclude with ideas about music's potential to unite living people with perceived supernatural beings and the consequences of this connection.

Megan McNerney**Faculty Mentor: Dr. Garrett Cook**

Effects of Formal Education on Indigenous Women in Momostenango
(Anthropology, Forensic Science and Archaeology)

Within the K'iche' Maya community of Momostenango, Guatemala, there exists a quiet cultural tension regarding the role of formal education. Many of the older generation express reservations regarding its impact upon the indigenous culture, as it replaces the social networks and customs which have defined their community with those deemed more appropriate by outside entities. This cultural replacement does not occur equitably as it does not affect rural women to the degree that it affects the women in town. Education for rural women comes at a high opportunity cost, as females have particular roles in providing for children and tending agricultural and market interests. Therefore these women attend schools with a decreased frequency and reduced cultural replacement. Cultural replacement has led to generational differences. Women of younger generations have diversified interests, as they seek not only to provide for their families, but for themselves as well. Evidenced by the popularity of women's empowerment groups, the importance of one's individual financial stability has become an additional concern for many young women. Education may allow women to become financially stable and ascend the social hierarchy, but the traditional view of women as housekeepers has not diminished, creating tension.

Jesi Mann and Kassie Kemp**Faculty Mentor: Professor Carol Macaulay**

A Toyah Campsite on the Leon River: Excavations at the Upper Sprague Site (41HM54), Hamilton County
(Anthropology, Forensic Science and Archaeology)

This presentation will provide an overview of the excavation activities conducted by the Baylor University archaeological field school at the Upper Sprague site (41HM54) in Hamilton County last summer. We focused on a 15 square meter block located along the northern bank of the Leon River. An intact living surface with five discrete features were uncovered -- a basin-shaped hearth, a large mussel feature, an arc-shaped daub concentration, a small *Rabdodus* cluster and a lithic reduction station. The lithic assemblage and the presence of bison bone date the activities at this site to the Toyah Interval of the Late Prehistoric Period.

Larry Kocian**Faculty Mentor: Professor Carol Macaulay**

Descriptive, Nutritional and Contextual Analysis of Freshwater Mussels from Area D, Upper Sprague Site (41HM54), Hamilton County
(Anthropology, Forensic Science and Archaeology)

Twelve hundred valves from freshwater mussels were recovered in Area D of the Upper Sprague site (41HM54) in Hamilton County during the 2007 Baylor Archaeological Field School. We propose that the mussels were an important seasonal staple, rather than a dietary supplement in the subsistence strategies of the inhabitants of the site. Evidence supporting this interpretation comes from 1) the quantity of mussels and the ease of procurement at this locale and 2) information gleaned from calculations of meat-weight estimates and nutritional values of the assemblage.

Luis Aran and Lindsey Estep**Faculty Mentor: Professor Carol Macaulay**

How to Manage, Visualize and Analyze Intra-Site Archaeological Data Using GIS
(Anthropology, Forensic Science and Archaeology)

GIS (Geographic Information Systems) has most frequently been employed in archaeology for regional analysis and predictive modeling of settlement patterns and land use. Seldom has it been used for organization and analysis of spatial data within a single site. This summer, the Baylor Archaeological Field School implemented ArcGIS9™ ArcMap during its excavation activities at Area D of the Upper Sprague site (41HM54). GIS not only provided the infrastructure for data collection, but also for querying data when questions arose in the field. This presentation will demonstrate how GIS was used to catalog and quantify artifacts by unit and level, to visualize spatial patterns and artifact densities, and finally, how various analytical applications of GIS may be implemented using archaeological data within a site.

Patricia Cowling**Faculty Mentor: Professor Max Courtney***Effects of Time, Heat, Light and Surface on the Deterioration and Enhancement of Bloody Fingerprints*
(Anthropology, Forensic Science and Archaeology)

Fingerprints made in blood at a crime scene can potentially offer a great deal of information since useful data may be obtained from the blood aspect as well as the fingerprint aspect of the evidence. DNA analysis can be performed to yield even more individualizing information. Numerous methods for both fingerprint and blood enhancement have been developed and their effects on subsequent analyses have been investigated. It is important to ensure that a blood enhancement reagent will not dilute or obscure any pattern detail of a bloody fingerprint, or that a fingerprint enhancement reagent will not adversely affect serological or DNA analysis. In this blind experiment, bloody fingerprints were deposited from randomly selected fingers onto nonporous surfaces including: aluminum, mirrored glass, glossed ceramic tile, and painted wood. These surfaces were exposed to different light and temperature conditions in 4-month or 8-month intervals. The bloody prints were then stained with the protein stain Amido Black and examined. Bloody fingerprints aged outdoors with exposure to sunlight for longer periods of time showed much fainter Amido Black staining intensity than bloody fingerprints aged indoors with no sunlight exposure for shorter time intervals. Comparison between the aged bloody fingerprints with known inked prints was performed and identification of the fingerprints was attempted to determine possible correlations between different environmental combinations and the rate of positive fingerprint identification. This study found that Amido Black enhancement was successful for bloody fingerprints aged up to 8 months, and positive identifications were made for prints aged in all environmental and time conditions.

Department of Art**Chuck Jobe****Faculty Mentor: Professor Robbie Barber/Professor John McClanahan**Medium: *Sculpture*Title: *Senior BFA Exhibition*

(Art)

My work is an exploration of the intricacies of organic curved surfaces. With these curves and surfaces in mind, I design pieces that range from realistic to abstract, influenced by classic figurative sculpture and organic shapes. I try to strip the sculpture down to its essence, to discover what its defining qualities are.

I prefer to work in oil-based clay due to the immediacy of the material's response as well as the interaction with the piece that is enhanced through tactile feedback. This interaction allows me to become more "in tune" with the piece. As the sculpture begins to take shape, it helps inspire the direction that it will go.

I have cast many of my pieces in bronze, aluminum, or iron. The casting process allows me the freedom to create things with textured surfaces and complex curves I could never create using ordinary materials and methods. The casting also provides a permanency to the piece, and allows a permanent record of the human touch that was visible in the clay original.

I attempt to be true to the form created during casting, with its rough surface and random deformities. I feel these should be embraced as part of the aesthetic and not concealed or removed. The imperfections are what help make the piece unique, and give it a personal touch. The human touch is important in differentiating a work of art from a man-made object.

Joey Drew**Faculty Mentor: Professor Susan Dunkerley/Professor John McClanahan**Medium: – *Ink Jet Print (Digital Photography)*Title: *Joseph Drew Senior BFA Exhibition*

(Art)

Photography is traditionally thought of as a medium bound to the rules of the real world. My project is to present images that represent more than their subject matter. I intend to achieve this by using simplified compositions of details that border on abstractions. I am inspired by the work of Aaron Siskind. In the process of finding these compositions I found myself drawn to the basic shapes and line work in my subject matter.

Shawn Denny

Faculty Mentor: Professor Virginia Green

Medium: *Graphic Design*

Title: *Senior Portfolio*

(Art)

I enjoy problem solving through means of creative expression. The process of being given a problem and then having to creatively come up with a solution that reaches an audience is challenging and invigorating at the same time. I start my own process by brainstorming and researching several ways to get the message or problem across. That is followed by thumbnails and mock-ups, which are a very important part of the creative process. Once you go through all the steps, it makes it worthwhile and rewarding to see the finished product. I don't see it as work because it is something I truly enjoy. It excites me knowing that each day there is a new challenge. As a designer you have the opportunity to see your work get produced and out in public. There's nothing like reading a magazine or walking down the street and seeing something that grabs your attention and makes you go "Man! I wish I would of thought of that!" I am motivated and determined to be the person that somebody says that about. As I have progressed in my major, it has made me appreciate art and design more than ever. I have also learned the importance of internships as an undergraduate and how valuable they are to a student. I have been interning at Baylor's Creative Service Department for two and a half years and it has helped me tremendously in my design skills. I also had three internships with Tracy Locke, a major national advertising agency, which turned into a full time job. Creative Directors at the agency stressed the importance of internships while you are in college, and the skills learned while at the agency are priceless to future designers in their careers.

Katherine Rice

Faculty Mentors: Dr. Bill Jensen/Dr. John Thorburn

Portrayals of Individuality among Women in Hellenistic Art

(Art)

The influence of Alexander the Great's campaign throughout the Mediterranean world was not limited solely to historical, political, or social dimensions, but released significant developments in the Greek artistic tradition which raised an interest in the individual that progressed through Hellenistic and into Roman art. This thesis will analyze the relationship this development had on depictions of women and how they are characterized according to this trend.

The thesis will introduce specific notions of the ideal which were promoted throughout much of the Archaic, Classical, and early Hellenistic world, borrowing traditional ideals of physicality from both Egyptian and Polykleitan canons, and expressing these systems of proportion internally through an idealized portrayal of mental balance and stability. It will then focus on the Hellenistic advancement of artistic personification and allegory, as these figures, virtually all female, come to represent an intermediary state not only between divinity and mortal, but also between ideal and individual. Finally, it will conclude with a discussion of genre scenes and the idea that specific aspects of womanhood present both the ideal and the individual woman as an artist's candidate for expressing contemporary social and philosophical concerns.

Department of Biology

Amanda Hartman

Faculty Mentor: Dr. Tamarah Adair

Nasal Carriage Rate of Staphylococcus aureus in Undergraduate and Veterinarian Populations

(Biology)

Reports of nosocomial Methicillin-resistant Staphylococcus aureus (MRSA) infections began in the 1960's, shortly after the introduction of methicillin. More recently, however, strains have emerged in communities, causing outbreaks whose source cannot be traced to a health care facility. The CDC estimates that 1-3% of Americans carry MRSA in their nasal passages. These individuals are capable of passing MRSA on to others. Recently, it has been reported that MRSA transmission can also occur between animals and humans. It is known that MRSA transmission occurs through direct contact, and that situations in which close contact occurs heighten one's risk on MRSA colonization. College students may be at a higher risk of MRSA colonization due to close living quarters and additional group interaction. Veterinarians have a much higher incidence of close contact with many different animals. This project tests the hypothesis that veterinarians may have a higher carriage rate of MRSA. In addition, it seeks to use antibiogram profiles to determine similarity of MRSA strains in college students and veterinarians.

Nasal swabs were taken from participants and cultured on MSA plates. Fermenting colonies were picked from each plate, and tested for catalase, coagulase, and gram staining. Isolates were then subjected to Kirby-Bauer antibiotic profiling.

Of 288 college students, 66 (22.9%) harbored *Staphylococcus aureus* isolates that progressed to antibiotic profiling. Of these, 6 (2.1%) were resistant to oxacillin, and thus classified as MRSA. Two of the MRSA cultures were also resistant to one other antibiotic, and one was multiresistant. Of 95 veterinarians, 18 (18.9%) harbored *Staphylococcus aureus* isolates that progressed to antibiotic profiling. Of these, 3 (3.2%) were resistant to oxacillin, and classified as MRSA. All of these MRSA cultures were multiresistant.

The carriage rate of MRSA in both populations tested was comparable. However, the veterinarian population had antibiograms vastly different from those of the student population. This suggests a difference in the organisms common to each population.

Amanda Hartman, Trevin Rube, Breck Sandvall, Brooklyn Sandvall and Youssef Ybarra

Faculty Mentor: Dr. Tamarah Adair/Dr. Diane Hartman

Prevalence of Methicillin resistant Staphylococcus aureus Nasal Carriage in a College Population
(Biology)

Staphylococcus aureus causes disease through the production of toxins or through direct tissue destruction. *Staphylococci* have the ability to acquire resistance to many antibiotics, making treatment challenging. Methicillin-resistant *Staphylococcus aureus* (MRSA) emerged originally as an infection in healthcare settings (HA-MRSA). More recently, community outbreaks of MRSA have emerged (CA-MRSA) which are genetically distinct from HA-MRSA and often are sensitive to a different set of antibiotics and carry a toxin gene associated with necrotizing pneumonia.

S. aureus is also a common commensal reportedly in the nasal passage of 20-30 % of the population. Carriers show no signs of infection and may unknowingly transmit the organism through direct or indirect contact. CDC estimates indicate that CA-MRSA resides in the nasal passages of 1-3% of the population, but reports have varied from 1.9-96% and several risk factors have been identified.

The purpose of this study is to survey college students in order to determine the prevalence of *Staphylococcus aureus* carriers in a college population. In order to identify risk factors associated with carrier status, participants completed a questionnaire and consent form. Each volunteer provided a nasal swab sample for culture. Three colonies were analyzed for each individual that tested positive for *S. aureus*. Isolates were subjected to an antibiotic sensitivity screen, resulting in an antibiogram for 12-13 antibiotics. Preliminary results of 672 participants, indicate 11.8% harbor isolates positive for *Staphylococcus aureus* and 0.6% were categorized as MRSA. The antibiograms of the isolates reveal several resistance patterns and risk factor analysis is ongoing.

Department of Chemistry and Biochemistry

Kimberly Doffing

Faculty Mentor: Dr. Sung-Kun Kim

Interactions of 5'-Adenylylphosphosulfate Reductase from Pseudomonas Aeruginosa with Substrate
(Chemistry/Biochemistry)

5'-Adenylylphosphosulfate (APS) reductase from a bacterium *Pseudomonas aeruginosa* (PaAPR) has been shown to contain a [4Fe-4S] cluster. Thioredoxin is used as an electron donor for PaAPR has been shown to form a disulfide-linked adduct with mono-cysteine variants of *Escherichia coli* thioredoxin and *Chlamydomonas reinhardtii* thioredoxin-dependent enzyme. The redox midpoint potential of the disulfide bond in the PaAPR and the mono-cysteine adduct is -280mV. Site-directed mutagenesis and mass spectrometry have identified Cys256 as the PaAPR that forms a disulfide bond with Cys36 of *C. reinhardtii* thioredoxin and Cys32 of *E. coli* thioredoxin in these adducts. Perturbation of the resonance Raman and visible-region absorbance spectra of the APS reductase [4Fe-4S] center by either APS or the competitive inhibitor 5'-AMP indicates that both the substrate and product bind in close proximity to the cluster. These results have been interpreted in terms of a scheme in which one of the redox-active cysteine residues serves as the initial reductant for APS bound at or in close proximity to the [4Fe-4S] cluster. We also found that randomly generated single-stranded deoxyribonucleic acid (ssDNA) seems to bind PaAPR in the presence of [4Fe-4S] cluster using an electrophoretic mobility shift assay technique, suggesting that the phosphate moiety of the random pool of ssDNA can be a binding site of APS reductase.

Alex Cole and Connie Tang

Faculty Mentor: Dr. Sung-Kun Kim

A Potential Site for Antibiotic attack: Inhibiting DD-Carboxypeptidase
(Chemistry/Biochemistry)

With the prevalence of antibiotic resistant drugs a continuing threat to public health, finding and exploiting novel sites for antibiotic attack is critical. Carboxypeptidase is an enzyme involved in the catalysis of peptidoglycan subunits to create the peptidoglycan wall, a structure that generally increases the virulence of a pathogen. By inhibiting carboxypeptidase action, the peptidoglycan wall will be subject to serious malformations and, ultimately, be more susceptible to the body's own defenses and other medicines. An effective carboxypeptidase inhibitor, then, may be able to act as a "primer" of sorts, "preparing" the pathogen for further attack. It is with this goal that we are looking to find efficient inhibitors to act as potential pharmacological agents.

Department of Classics

Erin Stewart

Faculty Mentor: Dr. Antonios Augoustakis

Never Go In Against a Sicilian When Death is on the Line
(Classics)

This project summarizes my experience studying abroad in Syracuse, Sicily Fall of 2006. It includes both ancient and modern perspectives of Italy and specifically of Sicily, noting its historical and continuing importance.

Department of Communication Sciences and Disorders

Claire Burch

Faculty Mentor: Dr. Kathy Whipple

The Usage of Visual Scene Pages to Enhance Communication of the Severely Impaired
(Communication Sciences and Disorders)

Visual scene pages were first introduced in the 1980's but the true use of scene pages was not seen until the early 90's. A visual scene uses a drawn picture or a photograph of a typical scene. In recent years, visual scene pages have been introduced into dynamic Augmentative systems to enhance communication. The purpose of this investigation was to discover how visual scene pages are being used in speech-language therapy using the Dynavox V and to determine if they are enhancing communication.

The Dynavox V offers options of many scene page types. One type is a personal picture on half of the screen while the other half has preprogrammed buttons with phrases that apply to the picture showing. A second type is a preprogrammed scene page that link to button pages about each item in a room. A third type of visual scene page is the adult setting. These are photo pictures of the patient's home with hot spots. The last type of visual scene page is for the low functioning teenager. These pages are preprogrammed picture pages. The user will touch an object in the room and a personalized preprogrammed phrase will speak.

Visual scene pages have reportedly increased communication due to the listener having a context on which to impose the communication. Secondly, the pages are more familiar to the user than abstract buttons. The pages speak so the listener doesn't have to be looking. Lastly, the pages get to the importance of the communication faster.

Department of Environmental Studies

Sarah Garza

Faculty Mentor: Dr. Susan Bratton

Impact of Ligustrum lucidum on leaf morphology, chlorophyll, and flower morphology of White Trout Lily (Erythoium albidium) in Cameron Park, Waco, Texas
(Environmental Studies)

Invasion of non-native species is reducing biodiversity worldwide. In Cameron Park, Waco, TX shining privet (*Ligustrum lucidum*), a species native to Asia, is diminishing native understory flora. Previous data from Cameron Park indicates that privet is suppressing the vernal ephemeral, white trout lily (*Erythoium albidium*) in ravines above the Brazos River. In February 2008, we sampled trout lily populations to test the hypothesis that greater privet cover

increases petiole length of the ramets while decreasing the percentage of flowering shoots and leaf chlorophyll content. We categorized two large sample sites along the Hale Bopp and Rio Perdido trails as areas of high privet cover, moderate privet cover, or low privet. Average petiole lengths under no privet at Rio Perdido and Hale Bopp were 1.81 cm and 1.63 cm respectively. Under high privet cover average petiole lengths increased to 4.04 cm and 4.2 cm. At $p = .05$, T-tests and ANOVA demonstrated petiole lengths significantly increased 2.23 cm under privet at Rio Perdido, and 2.52 cm at Hale Bopp. Rio Perdido had no flowering individuals under dense privet and only 12% of Hale Bopp ramets under privet were flowering. Utilizing a CCM-200 Apogee chlorophyll meter we collected chlorophyll concentration index (CCI) values. At Rio Perdido, CCI revealed averaged 33.7 under no privet and 19.7 under dense privet. At Hale Bopp, under no privet CCI averaged 34.8 and 17.5 under dense privet. The research suggests that the trout lily is responding to the excessive shading of the privet through etiolation.

Department of Geology

Gabriela Keeton

Faculty Mentor: Dr. Stephen Dworkin

Grain Size Distribution and Organic Matter Content from Paleosols that Span the Cretaceous-Tertiary Boundary, Big Bend, Texas

(Geology)

This research project investigates climate change across the Cretaceous-Tertiary (K-T) boundary, a time period that encompasses one of the major extinction events in Earth history. By characterizing the grain size distribution in a succession of paleosols (ancient soils), it is possible to infer temporal trends in the intensity of soil-mineral weathering which can lend insight into ancient climatic conditions. Additionally, paleosol organic matter content was quantified to see if this attribute could be used as an indicator of ancient plant cover, which is probably controlled by climate.

The study area is located adjacent to Dawson's Creek within the Tornillo Basin of Big Bend National Park. This study examined forty three paleosols spanning the late Cretaceous (Maastrichtian) and early Tertiary (Danian) with the specific goal of studying grain size distribution and organic matter content in paleosols associated with two previously identified periods of elevated temperature and atmospheric carbon dioxide content (Green House events).

The most common grain size within the paleosols is fine silt (2 to 15.6 μm) which makes up about 68% of the sediment particles. On average, about 8% of the paleosol sediments falls within the clay size range (<2 μm), 22 % are coarse silt, and less than 2% of the particles are within the very fine and fine sand fraction (62.5 - 250 μm).

The abundance of the finest grain-size fractions (0 to 7.8 μm), increase during the Green House events. This is most likely due to increased mineral weathering, a process that produces fine-grained weathering products. Therefore, grain size distribution in paleosols appears to be a good tool for constraining ancient climatic conditions.

Davis Walker

Faculty Mentor: Dr. Steven Driese

The Anatomy of Petroleum Exploration in the Gulf Coast

(Geology)

This study examined the processes involved in petroleum exploration in the Gulf Coast. The area of interest is the southwestern region of Louisiana. Here an energy company conducted 3D seismic studies on a large area in search for prospective oil and gas wells. The company did not find the large scale areas they were looking for and handed the data off to smaller companies. Upon closer inspection, a well-formed trap was located and wells were drilled. Two of these wells are currently producing oil. By examining past oil wells and fields that were drilled one can find similarities between them and determine why hydrocarbons were deposited here. By viewing the 3D data and correlating those data with surrounding well logs, a channel that deposited a large amount of sand was identified. This channel is located in the Cockfield or Yegua Formation and is of Eocene age. The sand deposited in the channel created a bulge or small anticline, and this feature is prevalent in the overlying sediment. The study region is overall marine-influenced and dips to the southeast. The east and west dips are caused by the channel sand. A north dip is provided by a growth fault cutting through the area; this completed a 4-way trap and created the anticline where the hydrocarbons were deposited.

Adam Damman

Faculty Mentor: Dr. Steven Driese

Archean Glaciation: Mechanisms and Termination
(Geology)

The Archean Eon dates back to 3.8-2.5 Ga (billions of years) and accounts for 45% of geologic time, yet very little is known about this time interval, which is chiefly characterized by very hot surfaces temperatures up to $70\pm 15^{\circ}\text{C}$ and high concentrations of greenhouse gases such as methane (CH_4), carbon dioxide (CO_2), and ethane (C_2H_6). These high greenhouse gas concentrations allowed the Earth to trap heat and remain warm and ice-free, even though the sun was 20% less luminous than today. Around 3.3 Ga a proposed abrupt climate change led to an episode of global glaciation. The mechanisms which may have driven the onset of this glaciation period are largely dependent on greenhouse gas concentrations. Methane concentrations in the atmosphere might have been high due to the dominance of methane-producing cyanobacteria. If the ratio of methane to carbon dioxide increases, an "organic haze" forms that effectively blocks sunlight, leading to a cold, methane-rich atmosphere. Also during this time, the formation of the continental cratons began. These new rock exposures were vulnerable to chemical weathering, and chemical weathering functioned as a carbon dioxide "sink" that removed carbon dioxide from the atmosphere. The glaciation episode terminated as a result of both the rise of oxygen-producing bacteria, and the decrease of available weathering surfaces. It is also possible that a mantle superplume event occurred in the late-Archean which would have spewed large amounts of greenhouse gases into the atmosphere, thus initiating the global warming that would have ended the Archean ice age.

Stephen Secrest

Faculty Mentor: Dr. Vincent Cronin, Dr. Shane Prochnow and Dr. Steven Driese

Newly Recognized Faults near Belton, Texas: A Display of Preliminary Results and Measurements
(Geology)

A set of normal faults with meter-scale displacements was identified south of Belton, Texas in the Austin Chalk (Cretaceous) on the Price Ranch in creek-bottom outcrop exposures. Orientations and locations of these faults were measured using a laser-based total station device. The faults were recognized based on offset of marker beds in the chalk, as well as by the presence of calcite-lined slickensides and veins. Detailed maps of the documented faults were created, and preliminary results suggest that all faults are normal, and nearly all strike NE-SW and dip to the SE, similar to other faults associated with the Balcones fault system. Future research will document other faults in the area and their relationship to these and other known fault systems.

Alexander Dixon and Debra Jennings

Faculty Mentor: Dr. Steven Driese

Provenance and the Early Diagenetic Alteration of Volcaniclastic Material Incorporated in Fluvial Channel Sandstone Deposits, Morrison Fm. Near Capitol Reef National Park, Utah
(Geology)

The Morrison Formation has been studied for over a hundred years, primarily because of its rich dinosaur fauna. The study includes an interval within the Brushy Basin Member, which consists of pebble conglomerate towards the base and fine-to medium-grained sandstone towards the top. The conglomerate beds are crudely cross-stratified and rest on an erosive, scoured surface incised into underlying claystone and siltstone paleosols; clast compositions include chert, metaquartzite, vein quartz, and rare fossiliferous and oolitic carbonate lithologies. Sandstone lenses intertongue with conglomerate and grade upward into trough cross-stratified and bioturbated sandstone beds. The sandstone body is interpreted as an element of an anastomosing stream system that flowed from the Elko and Mongollon Highlands, perhaps distal from alluvial fan systems. Brushy Basin Member ash deposits were apparently reworked and deposited within fluvial channels, which were then diagenetically altered to release soluble silica that accumulated at the boundary of the sandstone/conglomerate interval and the underlying paleosols. The purpose of this study is to test the hypothesis that the silicification is due to the early diagenetic alteration of ash and volcaniclastic material that had fallen into the alluvial fan from highlands in the west. Petrographic analysis of the underlying paleosols will identify if the ash fall had been introduced into the system at the source or in the alluvial fan. This study demonstrates the importance of detailed studies of volcaniclastic materials in deducing Morrison Fm. provenance and in helping to better define the paleoenvironment and paleoclimate during this part of Jurassic time.

Christopher D'Aiuto**Faculty Mentor: Dr. Steven Driese and Dr. Rena Bonem***The Edwards Aquifer: Understanding and Solving Water Issues*
(Geology)

The Edwards Aquifer is an artesian aquifer that extends laterally in the subsurface more than 200 miles from Temple, TX to Brackettville, TX. The aquifer underlies and/or supplies some of the fastest-growing counties in Texas including Bexar, Comal, Hays, and Travis counties. Because demand for the aquifer's water resources is rising from both urban growth and agricultural needs, the risks of continued unrestricted use of water from the Edwards Aquifer include: (1) damaging the environmentally sensitive natural springs, (2) contamination, (3) water deficit or over-pumping, (4) harm to downstream communities, and (5) too little protection. Current solutions to these potential problems include building dams in the recharge zone, selective pumping, and changing public practices and attitudes.

Ryan Lindsay**Faculty Mentor: Dr. Vincent Cronin and Dr. Steven Driese***Applying SLAM to the Wells, Nevada Earthquake February 21, 2008*
(Geology)

On February 21, 2008 the town of Wells, Nevada was heavily damaged by a magnitude 6.0 earthquake. This event is known as one of the most-recorded earthquakes in history thanks to the multi-million dollar project called EarthScope. EarthScope has made the effort to place hundreds of seismometers across the United States. As of today the project is halfway completed, making the western United States, including Nevada, some of the most seismologically monitored places in the world. However, the fault that caused the Wells, Nevada earthquake has not yet been pinpointed to any particular fault in the area. The goal of this research is to: (1) briefly examine the geological history of Nevada, (2) use the Seismological-Lineament-Analysis-Method (SLAM) to locate the fault that caused the magnitude 6.0 earthquake in Wells, and (3) apply SLAM to recent aftershocks to find if they correlate with the same fault that caused the main shock.

Michelle Diehl**Faculty Mentor: Dr. Steven Driese***The North American Outlook for Petroleum*
(Geology)

Only a few years ago, the conventional wisdom was that the expansion of oil and gas drilling in North America, led by the high prices of crude oil, would be limited, either by a lack of trained personnel, lack of drilling rigs or rig-related components, lack of new exploration prospects, or lack of some critical well-construction component, such as drill pipe. But these predictions have not been borne out by current practices and activities in North America. Instead, industry has resolved to find ways around these obstacles and by all measures has prevailed. However, there are clear signs that the rate of well drilling is slowing; North American oil and gas drilling is still growing, but at a slowing rate. This increase has been a modest 5.6% the first seven months of 2007, which is about a third of the rig-count increase in 2006. Reasons are proposed to explain these observations.

Department of History

Joshua Hyles**Faculty Mentor: Dr. Keith Francis***"King John, Paul, St. George, and Ringo: How Beatlemania Saved the British Empire"*
(History)

Though the British Empire "collapsed completely" after World War Two, with most of its dependencies in Africa, Asia, and the Caribbean opting for independence by 1968, former British colonies retain a connection both culturally and politically with the United Kingdom through the Commonwealth. The umbilical cord to the mother country is not seen in other former colonial powers, such as the former dependencies of France or particularly Spain where, although there is a linguistic tradition, Latin America connects little with mainland Spain. Additionally, former Spanish and French colonies often severed themselves from the homeland after violent wars of separation. Most British protectorates opted for a more peaceful exit, then immediately chose to continue their "Britishness" through the Commonwealth.

The hypothesis of this paper is that, in the crucial early 1960's, "Beatlemania," particularly the Beatles worldwide appeal in former British colonies, smoothed the way to independence in the post-colonial age and built a cultural bridge to Britain that neither politics nor military intervention would have been capable of achieving.

Larry Sandigo

Faculty Mentor: Dr. Keith Francis

Nineteenth-Century Secularization in Europe: Causes and Effects
(History)

The theory of European secularization has been heavily debated by historians and sociologists. While different experts use different criteria, I have chosen to use church attendance, literature and sentiment of the time, as the primary indicators of the religiosity of a people group. The nineteenth century was a particularly pivotal point in the progression of European secularization. The dawn of the century saw the rise and fall of Napoleon, the continued publication of literature that attacked religion, continued scientific discoveries that didn't align with biblical standards, and the fostering of an intellectual atmosphere that welcomed biblical criticism. Up until the nineteenth century, secularization had been limited to the elite, upper classes, and had largely been confined to the intellectual sphere. However, the 19th century also saw the effects of industrialization and urbanization, the increase in literacy, and the beginning of social secularization, in which religion has less influence on the lifestyle and activity of society, among the lower classes. Because of the increase in literacy and the implementation of mass education, the literature, and therefore the thoughts and ideas, which had been restricted to the upper class now became available to the lower classes. By the end of the nineteenth century, the same intellectual movements that had propagated secularization in the previous centuries were still in effect, and had been joined the new developments that led to the beginning of social secularization.

Lindsey Cox

Faculty Mentor: Dr. Keith Francis

"Pope Gregory VII, Was He Interested in Ideas of Papal Primacy or Papal Monarchy?"
(History)

This paper briefly discusses the foundation of the idea of papal primacy, as well as, the reform minded popes of the mid-eleventh century. I then go on to illustrate how Pope Gregory VII built upon the set traditions and moved from a policy of papal primacy to try and create one of papal monarchy, culminating in a discussion of his conflict with Emperor Henry IV in the Investiture Controversy.

Department of Journalism

Megan Malouf, Catherine Baker and Victoria Bongat

Faculty Mentor: Dr. Mia Moody-Hall

Not Ready to Play Nice: An Analysis of Negativity in the News Releases of 2007-08 Primaries Presidential Candidates
(Journalism)

Mudslinging and negativity have become more prevalent with the advent of the Web and the subsequent increase in media sources such as blogs and online news releases. Aside from providing a historical overview of how politicians utilize the Web to disseminate information, this study analyzed the dominant themes present in online campaign news releases posted leading up to the 2008 primary election. It assessed the extent to which candidates use the Web to attack or discuss their opponents' personal characteristics and the types of issues, topics and frames that appear most frequently online. Findings indicated that the underdog candidate was more likely than the frontrunner to include negative, attack-based news releases that contrast their positions with those of other candidates. Conversely, frontrunners were more likely to present more acclaims or positive information and to promote accomplishments and policy positions in their news releases.

Kate Gronewald

Faculty Mentor: Dr. Sara Stone

Reviewing "A Mighty Heart: The Brave Life and Death of my Husband, Danny Pearl"
(Journalism)

Reviewing "A Mighty Heart: The Brave Life and Death of my Husband, Danny Pearl" analyzes Mariane Pearl's account of her husband's murder and the militant Islamic terrorist network responsible. On a more encompassing level, it explores the role of journalists in promoting peace and representing truth amid the deep-seated hatred that increasingly disturbs society, not only throughout the Middle East, but worldwide. The work focuses on the Pearl's tragic encounter with the brutality of terrorism, a more real and rampant truth than can be realized through a television screen or a newspaper headline half a world away from the hotbed of Al Qaeda's corruption. It additionally addresses the documented news coverage of Daniel Pearl's beheading and First Amendment Rights of media. Mariane's account of Daniel's death, while horrific, inspires hope to combat evil, and peace to combat misunderstanding. Conclusively, the work reinforces the noble foundation of journalism: to seek truth and justice, and to hold a mirror to society to root out animosity.

Victoria Bongat

Faculty Mentor: Dr. Sara Stone

Freedom of Expression and Freedom of the Press
(Journalism)

This paper provides an argument for the preservation of freedom of expression and freedom of the press. Sources include recent text books and Web site articles. It examines the commentary of experts and landmark court decisions that support the rights of expression and the press. It points out the dangers of restricting the expression of ideas that may seem objectionable. This information is significant because the laws that were passed to safeguard speech are especially important for maintaining the healthy exchange of ideas, which strengthen the country's foundation. While freedom is a risky thing to allow, it is necessary for expression and the press.

Jaclyn Reddick

Faculty Mentor: Dr. Sara Stone

Jerry Falwell v. Hustler Magazine, Inc.
(Journalism)

Jerry Falwell sued Hustler Magazine, Inc. (for intentional infliction of emotional distress, invasion of privacy and libel) after it published an ad parody lampooning him on the inside cover of its November 1983 issue. The case eventually reached the Supreme Court, which ruled in favor of *Hustler*.

The court ruled that a public figure had to prove two things to recover damages. The first requirement being that the parody could be interpreted as a statement of fact, which in this case it could not be reasonably interpreted as true facts about Falwell. The second requirement being that he/she must prove that it was published with "actual malice" (Wermiel 1). The court defined "actual malice," stating the publication in question has to have contained false statements or been published with a reckless disregard as to whether or not it was true (Hustler 1).

The Supreme Court emphasized the importance of free-flowing speech whether it is positive or negative in nature, and how it is necessary for the promulgation of ideas and truth and an essential part of an individual's liberty (Hustler 2-3). It reinforced the importance of protecting First Amendment rights. It gave greater protection to artists and those in the media. The decision allowed for truly free speech instead of stifling it. Also, it unknowingly, made room for future satire such as Saturday Night Live and for the creation and preservation of the Internet. The ruling affirmed that *all* speech, including satire, is important and deserves protection under the law.

Department of Modern Foreign Languages

Julie Dobson

Faculty Mentor: Dr. Frieda Blackwell

La crítica religiosa en "La conversión de Chiripa"
(Modern Foreign Languages)

Leopoldo Alas, un escritor del siglo XIX, era muy famoso por sus críticas de España y especialmente la religión. Por analizar su cuento corto "La conversión de Chiripa," este ensayo trata de probar que Alas usa tres técnicas principales para hacer una crítica severa de la Iglesia. La primera técnica es usar los elementos de la trama para mostrar que no está de acuerdo con las prácticas ni el papel de la Iglesia porque no son buenos siempre. También usa la presentación del personaje principal para hacer el punto que la Iglesia acepta mendigos como Chiripa porque quiere otro miembro de la Iglesia. No le importa que Chiripa no entienda la Iglesia. Finalmente, todo el cuento tiene lenguaje muy irónico, desde el título hasta la descripción de Chiripa y las palabras que Chiripa usa. Esta crítica ofrece al lector una vista interesante de las opiniones de la Iglesia en España en el tiempo de Alas.

Here's the English translation:

Leopoldo Alas (pen name Clarín), a nineteenth century writer, was quite famous for his criticisms of Spain and especially of religion. By analyzing his short story "The Conversion of Chiripa," this essay attempts to prove that Alas uses three principal techniques for offering a harsh criticism of the Church. The first technique is the use of elements of the plot to show that he is not in agreement with the practices nor the role of the Church, which is not always positive. Also, he uses the presentation of the main character to make the point that the Church accepts beggars like Chiripa because it wants another member of the Church. It is unimportant that Chiripa does not understand the doctrine that he professes. Finally, the whole story uses ironic language, from the title itself to the description of Chiripa and the language he uses. This criticism offers the reader an interesting view of the popular opinion of the Church during Alas's time period.

Kristina Edwards

Faculty Mentor: Dr. Paul Larson

El Rechazo y el Perdón en Los Escarmentados por Emilia Pardo Bazán
(Modern Foreign Languages)

In *Los Escarmentados*, Emilia Pardo Bazán uses a brief, life-changing encounter between two bitterly disillusioned souls to demonstrate that redemption can come from unexpected sources. The protagonist, a young, unmarried woman named Agustina, is pregnant and has been abandoned by her lover. In order to escape the reproaches and condemnation of her family, she attempts to travel to Madrid alone and on foot on a cold, dark night. When she falls and is injured on the road, her unlikely savior is a misogynistic doctor, recently betrayed by a woman he loved and determined never to love again. The compassion that he shows to Agustina—initially reluctant, but stemming from true sympathy—serves as a reminder to her of the beauty that can be found within a human soul. His kindness contrasts sharply with the reproachful, self-righteous response of her parents. Likewise, Agustina's reciprocation of compassion in the form of gratitude makes the doctor realize how wrong he was to blame all of humanity for one person's crime. The walls around the hearts of both characters, built to deflect the pain of rejection, begin to crumble. Thus, Bazán condemns the cruelty of established society, proving that the people often deemed "worthless" by its arrogant members are actually capable of sharing great love, kindness, and compassion with others.

Aylssa Lawler

Faculty Mentor: Dr. Frieda Blackwell

The Evolution of the Symbol of Water Demonstrates the Transitions in the Poetry of Antonio Machado
(Modern Foreign Languages)

The poetry of Antonio Machado, the renowned Spanish poet and member of the Generation of 1898, is suggestive and therefore depends largely on symbolism. One symbol frequent in his poems is running water in the form of a river, a sea, or a fountain. Nevertheless, the images of running water and his symbolism evolve from his early poetry to his later poetry. The four poems studied are <<Fué una clara tarde>>, <<La vida hoy tiene ritmo>> from *Soledades* (1903), <<El Dios ibero>> from *Campos de Castilla* (1912), and <<Canciones de tierras altas (III)>> from *Nuevas Canciones* (1924). Compared to his early poetry, the most pronounced change in this symbol is the shift from functioning as an in-depth mirror of the past to a more literal focus on the destiny of human beings; and finally the symbol serves as a shallow description of the poetic voice's surroundings and a memory of what once was.

Alexandrea Elkins**Faculty Mentor: Dr. Paul Larson**

The Influence of Music: García Márquez's "Ladrón de sábado"
(Modern Foreign Languages)

Music is an essential part of life that helps to express our difficulties, pain, love, emotions, and ultimately, music is a common thread, shared by all human beings. Through music, connections and commonalities with others become more apparent and we become able to relate more easily. Music is a powerful tool that allows people to realize connections, and it has the ability to evoke empathy that may not normally occur. This empathy is influential enough to change attitudes and behaviors because the common experiences shared through music can be life-changing when one begins to realize the connections with others. Everyone is affected by music and without the ability to express and relate to others, the world would be a very solitary place. In "Ladrón de sábado," by Gabriel García Márquez, music changes the nature of the relationship between the main characters. These characters begin as adversaries but when music enters their lives, they realize they have more in common than they realize, especially their individual struggle with solitude and loneliness. The struggle between them disappears, and they turn from adversaries into companions, linked by their common love of music. In the guises of a lonely house-wife and a solitary, weekend thief, Gabriel Garcia Marquez emphasizes the power of music as a defining influence on human relations.

Rachel Pfarr**Faculty Mentor: Dr. Paul Larson**

Self Realization and Room to Grow: Keys to Becoming Something More
(Modern Foreign Languages)

In *El ahogado más hermoso del mundo* by Gabriel García Márquez (1968), a drowned man washes up on shore in a community by the sea and changes the town's perception of itself and life forever. The town is primitive and isolated with "apenas veinte casas de tablas, con patios de piedras sin flores, desperdigadas en el extremo de un cabo desértico." Within the story, the words of García Márquez paint the image of a boring and mediocre life that is in dire need of what we would contemporarily call "a make-over." The author conveys the message that a society cannot improve itself while living in isolation to a larger world, but in order to obtain this sense of being a part of a larger whole, something beyond the ordinary needs to happen in order to bring about the necessary epiphany. This epiphany becomes real as it manifests itself with the arrival of an unusual drowned man. I hope to show that it is precisely the nature of this man's unusualness that will push this village out of its development doldrums and give them new life.

Victoria Turner**Faculty Mentor: Dr. Paul Larson**

El proceso de santidad dentro de "La santa"
(Modern Foreign Languages)

En la vida el ser humano busca propósito. Es muy común que las personas determinen o propongan metas en su vida, pero también es muy común que no lleguen a ellas. En su cuento de *La santa*, Gabriel García Márquez presenta a un hombre en busca del derecho de la santidad de su hija por toda su vida – esa fue su meta. Todos los personajes secundarios dentro del cuento tienen características de buenos cristianos, y tratan de ayudar a Margarito Duarte en su lucha. Sin embargo, al transcurrir los años todos cambian o mueren, y el único que permanece en el mismo lugar siendo fiel a su meta primordial ha sido Margarito. Con su uso del tiempo en la obra de *La santa*, García Márquez demuestra la perseverancia de Margarito, a pesar de cuánto tiempo pasa desde el principio de su peregrinaje y la consecuencia de tal en poder concluir su meta. A través de las características y relaciones entre los personajes, y la perseverancia y esperanza del protagonista en su lucha, Gabriel García Márquez presenta una crítica del proceso de santidad en la Iglesia Católica dentro de "La santa."

Department of Philosophy

Blake Batson

Faculty Mentor: Dr. Jonathan Kvanvig

Does Pierre Know Londres est Jolie?

(Philosophy)

The purpose of my paper is to discuss Kripke's puzzle of belief and its implications upon knowledge. Kripke maintains that it is metaphysically possible for one to hold logically contradictory beliefs of the form P and \neg P simultaneously. If this is true, then it seems one's ability to know either belief is precluded by the presence of its negation. I argue that Kripke's puzzle does not derive contradictory beliefs of the form P and \neg P and, therefore, knowledge of one of these propositions is possible. In order to accomplish this, I present two kinds of objections to Kripke's argument. The first, or weaker objection, relies upon the Fregean theory of names. The second, or stronger objection, relies on an examination of belief structure. It is the second objection that I believe dissolves the possibility of a logical contradiction. I conclude that knowledge is possible in Kripke's puzzle and others like it.

Ezra Cook and Bethany Perryman

Faculty Mentors: Dr. Anne-Marie Bowery and Dr. J. Lenore Wright

Women's Bodies, Women's Stories: Use of Narrative in Feminist Theory of the Body

(Philosophy)

The autobiographical narrative is often incorporated into contemporary feminist theory. These accounts are used as justifying bases for claims about the legitimacy of certain theoretical standpoints. Focusing specifically on theories of the body, this paper analyzes how women's narratives are utilized to augment feminist theorizing. In theoretical discourse, the narrative provides a phenomenological ground from which value is extrapolated. This paper examines the strategies employed by thinkers to link particular narrative accounts to value claims in their systems of thought. Use of the narrative filters theories of the body through certain socio-cultural and political lenses. Via Foucauldian analysis, this paper characterizes the implicit forces situated within the narrative account, thus revealing certain discourses which influence feminist theories of the body. The aim of this paper is to explore the ways in which autobiographical narrative accounts and theoretical conceptions of the body inform, enhance, and supply one another.

Evan Roane

Faculty Mentor: Dr. Stuart Rosenbaum

Moral Transformation in the Process of Religious Conversion

(Philosophy)

Although many individuals think of psychological healing as a process of therapy, I show that religious conversion is a psychologically complex process that results in moral reorientation of an individual's inner focus toward virtues and values embodied by saintly or divine persons. In describing the psychological process of conversion, I address two ethical questions taken from Iris Murdoch's essay "On 'God' and 'Good'." First, "What is a good man like?" and second, "How can we make ourselves morally better?" In order to go about this task, I draw upon *The Varieties of Religious Experience* by William James to supply answers to the questions Murdoch asks.

Religious conversion takes place when the image of an embodied, operative moral ideal is inscribed upon an individual. A saint is one example of a being that lives or has lived who embodies an operative ideal for moral improvement in individuals and communities. The positive moral values that are carried by the internal image of the saintly figure displace and replace the positioning of the ego as occupying the "hot place" or area of primary focus in the psyche. I argue that the process of conversion occurs in three stages: bifurcation, transmutation, and transformation. When a person has been converted, then she or he is equipped with life-affirming virtues and values which promote the health of the individual and of the society she or he belongs to.

Department of Physics

Matthew Benesh

Faculty Mentor: Dr. Lorin Matthews and Dr. Jeffrey Olafsen

Thermophoretic Effects on Dusty Plasma Crystallization

(Physics)

The Box_Tree program is used to simulate the formation of Coulomb crystals within a complex plasma environment. This simulated environment is similar to a heated GEC rf reference cell, which is used to study the influence of thermophoresis on dust crystallization. The Box_Tree code generates a simulated potential well containing a user-defined number of particles. Each particle is given a random position and velocity and the system is allowed to progress to the lowest energy state, using a particle-drag force to dissipate energy from the system. The particles are subject to Coulombic forces, an external gravitational field, and a thermophoretic force. It is shown that introduction of the thermophoretic force in the Box_Tree code reproduces experimental results.

Pamela Vo

Faculty Mentor: Dr. Anzhong Wang and Dr. Jeffrey Olafsen

Highly Efficient Numerical Simulations and Current Acceleration of the Universe in String Theory

(Physics)

The currently accelerating expansion of the universe was discovered observationally in 1998. In order to explain this acceleration, an exotic component of matter has to be introduced in the framework of Einstein's theory of gravity. This component is usually dubbed "Dark Energy" (DE), and a simple model of DE is the cosmological constant. Combining the public MINUIT program of CERN and numerical programs developed here at Baylor by Dr. Wang's group, I first check two methods of fitting data (the newest supernova Ia data, Baryonic Acoustic Oscillation (BAO) data, and WMAP data) to the standard LCDM model. The use of Xm2 is found to be more efficient, and this method is then applied to cosmological models in string theory, recently developed by Dr. Wang and N.O. Santos [arXiv:0712.3938, 2007], to find values for Ω_m , Ω_k , and Ω_Λ . The generalized Friedmann equations are then evaluated, and all Ω 's except Ω_Λ are found to decrease rapidly. As a result, Ω_Λ soon dominates the evolution of the universe, and an exponentially accelerating universe results.

Kyle Lartigue

Faculty Mentor: Dr. Lorin Matthews and Dr. Jeffrey Olafsen

Tokamak Dust-Wall Impact

(Physics)

In tokamak reactors, dust flakes from the plasma-facing walls during normal operation. While these particles play a benign role in current reactors, they might pose a risk in larger next step designs (ITER) that will produce more dust. Dust-to-wall interactions are simulated here using a light gas gun and the effects of the interaction on the wall surface are studied to determine potential safety concerns for reactors, and how risk can be reduced.

Meagan E. Vaitses

Faculty Mentor: Dr. Dwight Russell and Dr. Jeffrey Olafsen

Analyzing Variable Stars

(Physics)

The primary goal of this senior research project is to learn about the Celestron Nexstar GPS 11 telescope in order to image and study stars and interstellar objects. In order to image binary star systems a ST-237 fast star optics unit is mounted at the prime focus of the telescope. The camera uses a RGB filter system to expose the film to the different wavelengths. The first step in this project is to conduct night sky viewing sessions in order to find the magnitude limit which will determine performance standards for the camera. Consecutive images will be taken during a 15 minute time period. Initially observations of the moons of Jupiter will be made in order to calculate the mass of Jupiter. In addition to determining Jupiter's mass, comparisons of the accepted period of rotation of the moons to the observed periods will be made. The second aspect of this project is to construct light curves of binary star systems. The binary star systems of prime interest are ones that have light curves with an orbital period of a few weeks. From the constructed light curves of the chosen binary star systems stellar temperatures, periodicity, and stellar mass can be calculated.

Eileen Fernandez

Faculty Mentor: Dr. Lorin Matthews

Mars' Circumplanetary Dust: An Application to the Runge-Kutta Method
(Physics)

Mars' system includes dust grain orbits possibly created by impacts of particles with Mars' moons, Phobos and Deimos. The motion of these particles becomes complicated under the different conservative and non-conservative forces in Mars' system. This study tracks water ice grains with a 20 micron radius in the fifth order Runge-Kutta method around Mars through a MATLAB program in which the following forces can be turned on and off to be individually examined: the gravitational forces due to the sun, Mars, Phobos, and Deimos, the Poynting-Robertson drag, and the spherical harmonic contribution to Mars' gravity. Plots of the positions and velocities of the dust grains under the above forces will be compared to previous experiments to later be generalized and applied to dust in Saturn's rings.

Department of Political Science

Courtney Spott

Faculty Mentor: Professor Lauren Redman

Corporate Responsibility in International Relations
(Political Science)

From the time of the formation of the East India Company, corporations have greatly intertwined their economic functions with the political realm. The East India Companies were given the power to make war, capture and claim territory, and employ, or—as was more often the case—enslave local populations. This predictably created a number of legal complications that have only grown and multiplied as the world has become more globalized and corporations have begun to directly pursue their interests as international actors.

Great debate exists today concerning the appropriate role corporations should play in the formation of international law and, likewise, the level of direct accountability under that law that they should hold for their activities. Human rights concerns surmount this debate, sitting at the forefront of nearly every landmark case on the issue. The United States, along with a number of other governments of industrialized countries have frequently opposed the direct application of human rights law to corporations, maintaining that only states should be subject to these norms. Despite a myriad of complaints brought to the court on this matter, it was not until the Unocal case that the court recognized the possibility that corporations could be held directly responsible for breaches of international law.

This paper will examine the issue of the appropriate role of corporations in matters related to international law by considering key cases, norms, and other developments and their implications on the international scene. The significant political power of multinational corporations, along with various other factors, will lead to the conclusion that these international actors should no longer be allowed to hide behind the veil of state, rather than personal liability, and should be legally recognized in privilege as well as responsibility for the significant power they possess in the international setting.

Dae Kim

Faculty Mentor: Professor Lauren Redman

Political Exceptions: Methods of Foreign Relation in the US and the Power to Control Them
(Political Science)

The United States' foreign policy is complex compared to other countries due to its multiple methods of establishing foreign relations. Not only can it enter through treaties; but it can also establish relations by means of congressional-executive agreements and sole executive agreements. These various methods allow the US to circumvent certain House and Senate requirements that are similar to other countries like China that require government consensus. Each type of relation is distinctive in their own use; one is more convenient for political uses while another is more useful for economic ones. Although politically they are interchangeable, each method still has distinctive purposes and cannot be removed.

What I plan to explain in this paper is why the US needs various venues for different matters while other countries have one central, if not sole, method for handling foreign relations. As stated above, each type of agreement has a more effective use in certain areas, but each method for establishing agreement has a distinct political purpose alongside it. This political drive will be expounded upon in the paper along with why each type of agreement has

certain associations. Also, because of the effect from these various methods reflect on treaties and agreements, I will elaborate on the impact of US domestic law on their foreign relations. The United States have an evasive nature regarding foreign agreements, especially treaties, and use the Constitution to justify their disagreements. When they do enter treaties, they constantly use RUDs to limit their restrictions on power. The imposition of US law on foreign relations is upsetting the very nature of treaties and it must be put under review alongside with the different methods to circumvent their own restrictions.

Taylor Norwood

Faculty Mentor: Dr. Ivy Hamerly

"Global Problem, Global Solution: Transnational Terrorism and the International Criminal Police Organization"
(Political Science)

The September 11, 2001 terror attacks made painfully clear the threat posed by international terrorism. In responding to these attacks, leaders from around the world acknowledged that this threat was not confined to any particular nation, but was a serious danger to all nations of the world. By first examining the nature and history of international terrorism, followed by an exploration of current anti-terror efforts, this paper seeks to evaluate the effectiveness of status quo efforts to combat terrorism. This analysis reveals that anti-terror compacts between states are generally too weak to be effective, and military actions by a single nation or limited group of nations are unable to fight emerging forms of terrorism, such as the threat of terrorism aided by organized crime groups. Attention is then focused on finding a more viable tool for fighting terrorism. This tool emerges in the form of the International Criminal Police Organization, otherwise known as INTERPOL. Based on an analysis of the history, structure, and methods employed by INTERPOL, this essay asserts that INTERPOL is the most effective available weapon to fight terrorism. It is then demonstrated that increased INTERPOL funding from a neutral source would make said organization even more effective. Transnational terrorism is a serious threat that poses significant dangers to individuals across the globe. Only by seeking more effective, non-traditional means of combating this threat can victory be realized. The International Criminal Police Organization offers the best means for attaining such a victory in the fight against international terrorism.

Michelle Miller

Faculty Mentor: Dr. Ivy Hamerly

Re-defining Human Rights
(Political Science)

This paper asserts that the definition of human rights has evolved to the point that it conflicts with other international norms and creates a shift in focus devaluing human rights as a whole. Human rights are defined as "the fundamental entitlements of persons, constituting means to the end of minimal human dignity or social justice." In an effort to explain the meaning of "minimal human dignity or social justice," human rights have come to be defined in broad terms, incorporating everything from citizenship rights to socio-economic rights. Human rights should be the most basic protections given to people and they should transcend ideology. One explanation for the expansion of the definition is that activists attach various initiatives to human rights to give their efforts legitimacy. While these initiatives are necessary for increasing the quality of life for individuals, the association may diminish the value of human rights in general. I argue that the most basic human right is human security, defined as safety for the people from both violent and non-violent threat, which provides human autonomy. If this right is fulfilled, then the other rights have the opportunity to be fulfilled. However, if a state has a government, abusing this protection then that state cannot ensure the standard of living conditions or healthcare standards or voting rights. Narrowing the definition of human rights will give organizations and other states more leverage in punishing states that abuse human rights.

Department of Psychology and Neuroscience

Salif Mahamane

Faculty Mentor: Dr. Wade Rowatt

"The Effect of Photographic Depictions of Nature on Positive/Negative Affect and Humility"
(Psychology and Neuroscience)

As research has shown that connectedness to nature can have many positive psychological and health associations, this study examines the effect of connectedness to nature on psychological affect and humility. Connectedness to nature was manipulated using a photograph/slideshow task. A 2 (connectedness to nature vs. control) X 3 (time 1, time 2, time 3) repeated measures design was used. All participants completed self-report measures of positive and negative affect, humility, self-esteem, and satisfaction with life when they signed-up to participate online. Upon arrival

at the experiment all participants completed the PANAS a second time. There were two conditions (slideshow, n = 42; no slideshow, n = 44) in which participants completed a self-report survey at different points in time. In the slideshow condition, participants were shown slides from Earth to outer space and back; then they completed the PANAS and humility measures again. In the control condition (n = 44) participants simply waited for 3 minutes before completing the PANAS and humility measures again. A repeated measures analysis of variance revealed a condition by time interaction. Participants in the slideshow condition reported less negative affect and increased humility after watching the slideshow than at time 1. However, participants in the control condition showed no change in affect or humility. This study has implications for negative affect reduction therapy or for cultivating humility.

Department of Religion

Keith Gustine

Faculty Mentor: Dr. Dean Martin

The Commoner and The Colonel: Church and International Politics
(Religion)

Did Bryan's religion fail? No. It simply wasn't given a chance to succeed. William Jennings Bryan's arguments for peace during the Lusitania Crisis were built on international law, with minimal Christian rhetoric, while House quickly argued for a moral right that reached beyond law. What Bryan accomplished proves commendable. Edward House certainly didn't sell his attitude towards Germany to Wilson until after Bryan had resigned. House's telegram on May 9th was not revisited nor was the Colonel approached concerning the Lusitania Notes. House had to refocus on mediation so as to not distance himself from the President and retain control. Wilson avoided war even if the Lusitania letters were not as friendly as Bryan had wanted them to be. However, in selection of another Secretary of State Wilson followed the Colonel's advice in selecting Lansing. The reason that House backed Lansing was because Lansing did not have "too many ideas of his own", and this no doubt made it easier for House to influence Wilson and the White House staff.¹ If Bryan had remained Secretary of State, his influence would then have been a tension and possibly a check on House, but he would have had to compromise with House and the rest of the Department; something that his character would not allow him to do.

¹ House Diary, June 14, 1915, PWW, vol. 33, p. 397

Robert Reed

Faculty Mentor: Dr. Sharyn Dowd

Paul and the Value of Creaturely Existence
(Religion)

The foundation of any Christian environmental ethic should include a robust understanding of non-human creations value. If a Christian insists that humans are somehow morally obligated toward non-human creatures, that Christian should explain what sort of value it is that these other creatures possesses. I argue that the sort of value which would obligate humans to non-human creation must be a sort of value which creation possesses apart from its usefulness to humans, a sort of intrinsic value which creation has by virtue of its relationship with the Creator apart from human desires. I find support for this claim in Romans 8.

In Romans chapter 8, Paul presents human and non-human creation together as a single object of salvation. Paul emphasizes the fact that both humans and non-humans suffer from the same fall and both anticipate a single salvation. There is one salvation for one creation. God's decision to save creation and restore it is evidence of creation's value to God. If creation is fundamentally a single entity, the value of which is demonstrated by election for glorification in the coming era, then Christians do not have warrant for subordinating the value of one piece of creation (non-human) to the desires of human creatures. I defend this claim against the objection that non-human creation merely has extrinsic worth by virtue of its usefulness to humans, an objection which makes it virtually impossible for humans to have obligations toward other creatures.

Shea Reyenga

Faculty Mentor: Dr. Doug Weaver

Animal Symbolism in Apocalyptic Literature

(Religion)

My paper examines animal symbolism as it's used in apocalyptic literature. Revelation can be difficult for modern readers to understand because of the provocative imagery contained within this genre of literature. Like I said, I only intend to examine one aspect of apocalyptic literature: animal symbolism. I will look at both Jewish and Christian apocalypses in order to find a way for modern readers to begin to comprehend the meanings of animal symbols in these texts.

Department of Sociology

Andrew Powell

Faculty Mentor: Dr. Kevin D. Dougherty

Origins of Religious Tension in One Protestant Congregation

(Sociology)

The concept of tension is a central focus in the sociological study of religion. Although researchers have given much attention to the effects of tension, there is little agreement on how tension is created and maintained within religious groups. Using observations of church services, interviews, and a review of church publications and documents, I take a qualitative look at how one Pentecostal congregation creates and maintains tension for its members. The grounded approach reveals a high amount of tension in the congregation; it also shows that the congregation establishes tension by promoting a distinct lifestyle characterized by evangelism, righteousness, interdependence, and self-sacrifice. I conclude with discussing the unique role of Pentecostalism in creating tension.

Hankamer School of Business

Department of Marketing

Caleb O'Flaherty, Brittany Blum, Brittney Darensburg, and Matt Goodwin

Faculty Mentor: Dr. Jeff Tanner

Houston Dynamo Case

(Marketing)

The Houston Dynamo organization has experienced immense on-the-field success in its young existence. With two MLS Cup Championships to its credit, the Houston Dynamo organization is a perennial top-performer with immeasurable potential. Yet, for some reason, attendance figures are lackluster, and a dysfunctional customer processing system has left customers dissatisfied. By analyzing the pricing structure, CRM solutions, and overall customer service processes, hidden areas of improvement may be discovered that will enable the Dynamo to fully satisfy the team's decreasing number of customers. In time, changes in the team's CRM processes will hopefully lead to improved customer retention and increased season-ticket sales.

School of Education Curriculum and Instruction

Angela Boettcher, Sarah Broyles, Claire Chambers, Paige Cox, Jessica Davis, Laura Freeling and Amanda Maloney

Faculty Mentor: Dr. Patricia Sharp, Professor Betty Ruth Baker and Mrs. Melissa Cates

Outside Baylor Mentor: Mrs. Cheri Jennings, Parkdale Elementary School – Waco ISD

Developing Oral Language Skills by Using Wordless Picture Books

(Curriculum and Instruction)

Abstract: At Parkdale Professional Development School, we implemented an action research plan to discover if we could improve students' oral language and vocabulary skills using wordless picture books. According to Katrina Shaw's action research can be defined as "the process of systematically testing new ideas; in the classroom or school, analyzing the results, and deciding to implement the new idea or begin the process again with another idea." Using Shaw's action research plan as a guide, we followed these steps to conduct our research: identify the question, issue or problem; define a solution; apply the intervention and collect data regarding the intervention; analyze the findings, and take action. Our question, as already stated, was "Can we improve students' oral language and vocabulary skills using wordless picture books?" Our solution was to use wordless picture books in a variety of approaches to achieve those skills. The intervention strategies included some of the following: building vocabulary by using descriptive words, identifying synonyms and antonyms, dramatizing the wordless picture books, and developing oral and written storylines. We collected data in student work samples, pictures, video clips, and rubrics. To analyze our findings we compared pre and post assessment data to determine if students improved in sentence length, number of descriptive words, and number of words per sentence. We found that there was some improvement in the students' oral language and vocabulary skills, and we learned, perhaps even more than the students, in the process.

Katherine Geist, Kaitlyn McDonald, Shanna Poyner, Alex Horn, Heather Hays, Susan Cooper-Twamley, Dittika Gupta, Sara Mechell, Kristin Arterbury, and Gabriela Gatlin

Faculty Mentor: Dr. Patricia Sharp, Dr. Sandi Cooper, Dr. Trena Wilkerson, Dr. Rachelle Meyer and Professor Betty Ruth Baker

Developing Fractional Thinking in 3rd Graders: A Collaborative Study with Undergraduate and Graduate Students

(Curriculum and Instruction)

Understanding of fractions is one area of mathematics that learners demonstrate major misconceptions (National Math Panel, 2008; NRC, 2001; Carpenter, Fennema, & Romberg, 1993). Early experiences with fractional concepts are essential to the development of a flexible understanding of rational numbers (Epsom, 2002, Bezuk & Cramer, 1989). One key lies in the instruction elementary students receive in schools. The purpose of this study was to determine the effect on students' conceptual understanding and achievement related to fractions when using discrete and continuous models during instruction. This study took place with 46 students in two third grade classrooms at Parkdale Elementary School in Waco ISD, a professional development school working in partnership with Baylor University's School of Education. Researchers in this study included 5 undergraduate students, one Intern and 4 Teaching Associates, and a team of graduate students who assisted in design, data collection, and analysis. Each student was given an interview pre-assessment to determine prior understanding of fraction, then 6 research-based lessons were taught by the undergraduate students. After instruction each student was given the same interview protocol to determine fractional understanding after the treatment.

A mixed methods analysis approach was applied. Qualitative data sources included video and observation notes along with undergraduate teacher observation notes and reflections. Quantitative evidence was derived from the pre/post assessment instrument administered to the students. Findings will be discussed related to student understanding of fractions. Collaborative experiences by both undergraduate and graduate students will be shared.

Megan Llewellyn, Emily Arrington, Lindsay Wessberg, Mark Montgomery, Sherrie Moore, and Susan Cooper-Twamley

Faculty Mentor: Professor Betty Ruth Baker, Dr. Trena Wilkerson, Dr. Rachelle Meyer, Dr. Patricia Sharp and Dr. Sandi Cooper

Outside Baylor Mentor: Mrs. Cheri Jennings, Parkdale Elementary School – Waco ISD

Developing Fractional Thinking in Kindergarten and 2nd Grade Students: A Collaborative study with Undergraduate and Graduate Students

(Curriculum and Instruction)

Understanding of fractions is one area of mathematics that learners demonstrate major misconceptions (National Math Panel, 2008; NRC, 2001; Carpenter, Fennema, & Romberg, 1993). Early experiences with fractional concepts are essential to the development of a flexible understanding of rational numbers (Epsom, 2002, Bezuk & Cramer, 1989). One key lies in the initial instruction elementary students receive in schools. The purpose of this study was to determine the effect on students' conceptual understanding and achievement related to fractions when using discrete and continuous models during instruction. This study took place in a kindergarten classroom of 21 students and a 2nd grade classroom of 24 at Parkdale Elementary School in Waco ISD, a professional development school working in partnership with Baylor University's School of Education. Researchers in this study included three undergraduate students, one Intern and two Teaching Associates, and a team of graduate students who assisted in design, data collection, and analysis. Each student was given an interview pre-assessment to determine prior understanding of fraction, then 6 research-based lessons were taught by the undergraduate students. After instruction each student was given the same interview protocol to determine fractional understanding after the treatment.

A mixed methods analysis approach was applied. Qualitative data sources included video and observation notes along with undergraduate teacher observation notes and reflections. Quantitative evidence was derived from the pre/post assessment instrument administered to the students. Findings will be discussed related to student understanding of fractions. Collaborative experiences by both undergraduate and graduate students will be shared.

Jordan Sandefur, Caroline Fisher, Melissa Merritt and Sheridan Rainey

Faculty Mentor: Dr. Sandi Cooper

Math in the Museum: An Exploration of Mathematical Thinking in Informal Learning Environments

(Curriculum and Instruction)

Current elementary school structures may not provide young learners with learning opportunities that promote effective mathematical thinking. Since perceptions and conceptual understandings of mathematics are developed at an early age, it becomes important for us to consider possible options for providing young learners with the kind of learning opportunities that more effectively fosters mathematical thinking. Some of these options may include informal learning environments, such as museums, zoos, and historical sites, that have recently become more popular with families.

The goal of this pilot study is to determine the potential for promoting mathematical thinking in informal learning environments, specifically for young learners. The objectives of this pilot study are to determine the potential for mathematical thinking through an examination of existing informal learning opportunities.

At the beginning of the project, the research team was provided with an overview of the research project and received training on the protocol for collecting and recording field data. The team will make an initial visit to three local informal institutions to get an overview of the facility, meet the museum educator(s), and conduct a "walk-through" of the site. During this visit, the research team studied existing exhibits and determined which ones had the most potential for promoting mathematical thinking. These exhibits were designated as "hot spots" and were the focus of study during the subsequent field data collection visits. After all partners collected the field data, the team met again for a focus group session to discuss their experiences and analyze the data.

Department of Educational Psychology

Holly Hodges

Faculty Mentor: Dr. Julie Ivey

Pediatricians and Patients with Autism and Autism Spectrum Disorders: Diagnostic Practices, Confidence Levels, and Beliefs

(Educational Psychology)

Approximately one in one hundred and fifty children today are diagnosed with autism of an autism spectrum disorder (ASD). Early intervention programs are often associated with significant improvement in the autistic patient. The increasing prevalence rate of autism and ASD, along with the need for early diagnosis, clearly has implications for the medical community, especially for pediatricians. A study was conducted among pediatricians in order to gain a better understanding of pediatricians' knowledge and comfort level concerning autism and ASD, along with their diagnostic and treatment practices and their beliefs concerning these disorders. The results of the study of a population of practicing pediatricians were analyzed to determine strengths and potential areas of improvement in pediatricians' confidence level and diagnostic practices concerning autism and ASD.

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