Sample Endeavor! Abstracts, 2014-1015

Analysis of ^{25}Al Gamma-ray Transition Intensities and Doppler Broadening of Gamma-Ray Lines from ^{26}P($\beta^+p\gamma$)^{25}Al Gamma-ray Spectrum

The spectrum of gamma rays emitted following the beta-delayed proton emission of ^{26}P to excited states of ^{25}Al was analyzed to obtain information about this decay channel. New and existing gamma-ray transitions in ^{26}P($\beta^+p\gamma$)^{25}Al were observed and their relative intensities were measured to determine the feeding and branching of excited ^{25}Al states. A new technique which utilizes Doppler-broadening effects due to the recoil of the daughter nucleus was tested using the 1612 keV gamma-ray line. The technique was also utilized to predict the excited state of the parent ^{26}Si parent nucleus for the decay to the 1775 keV ^{25}Al excited state and the energy of the proton emitted.

Great Moments in Amateur Eschatology

While many people disagree on what art is, art is certainly a medium of communication. Artists, through the innumerable media available to them, are able to communicate information, emotion, and ideals to those willing to look long enough to find understanding. As the world moves forward technologically, it is important that artists have access to modern tools to communicate their ideas to a larger audience. Now that the smart phone is a household item, the growing usage of QR codes and the currently developing field of *augmented reality*, which adds digital information and interactivity to physical space, create exciting new possibilities for artists to add a level of interactivity to their work that has never before been possible (Bonsor, 2013). As such, this project explored the use of classical artistic techniques, such as woodblock and screen printing, along with the inclusion of a modern technological interface to add yet another level of depth to the intended message of the work.

The end of the world is a subject that has always sparked debates. Through the history of our species, it seems that every few years the end of the world becomes a topic of discussion once again. Our culture becomes flooded with one theory after the next, creating a vast complex of ideas floating around the world by word of mouth and, in the 21st century, via television and the Internet. As this topic is such conversation starter and because the purpose of this project is to encourage communication, ten apocalyptic visions from the past, the modern era, and the future were created as the catalyst for communication in this experiment.

Gendered Knowledge in the Peruvian Amazon: Gender Roles in the Tamshiyacu-Tahuayo Communal Reserve

The Tamshiyacu-Tahuayo Communal Reserve is a region in the Peruvian Amazon that is uniquely situated. It is a nature reserve and also simultaneously serves as home to hundreds of people. There is evidence of modern influence in the medical practices of the inhabitants of the villages in lowland Amazonia, but large portions of traditional culture remain that permeate various aspects of life not least of which is the very common usage of medicinal plants. Through speaking with local women, men, and midwives about their experiences with birthing and rearing children, I was able to garner an understanding of the process of giving birth in an Amazonian village. Specifically, I compared and contrasted the experiences of women who choose a midwife or traditional home birth to women who chose modern medicine.

Structural Control of Fluvial Geomorphology and Valley Fill Stratigraphy from an Underfit Stream Valley in Vanderburgh County, Southwestern Indiana: Preliminary Results

Previous research identified a small creek near the campus of the University of Southern Indiana as an underfit stream but left the reason behind this classification unexplored (Talley et al. 2013). This research examines the influence of a possible fault identified from the topographic expression of the valley and the stratigraphic architecture of the valley fill. A half-graben structure controlling fluvial deposition is the likely mechanism behind this underfit stream valley creating a wide valley with a small stream. The valley possesses an asymmetrical transverse topographic profile with the eastern wall sloping at a 15.5% gradient compared to a 45% gradient for the western wall. The valley fill stratigraphy identified by previous maps, GPR, and sediment cores shows a series of westward migrating cut and fill sequences beginning with late Wisconsinan glaciolacustrine sediments to the east and terminating with the modern stream and its alluvium pinned against the western valley wall. Oil and gas well locations surrounding the study area indicate a pattern consistent with structural traps. Hundreds of oil and gas wells have been logged in the three sections west of the valley, but only a dozen wells have been logged in the three sections to the east. Thus tracing of key strata across the valley that could indicate offset in the underlying bedrock at depth are not available. GPR data thus far do not show offset within the unconsolidated valley fill suggesting 1) the motion occurs along the edge of the valley fill and does not cut through it or 2) fault motion has not occurred during the past 15 kyr, and the valley fill architecture evolved under static structural conditions. Work is currently progressing to constrain the timing of deposition of alluvium within the valley and to determine if fault motion is evident in the Holocene alluvium.

Parkour Training for Youth

The goal of this project is to reduce childhood obesity in elementary school students through increased physical fitness. The objective is to improve elementary students' understanding of fitness through Parkour Training, which was assessed by administering health and skill-related fitness tests and a cognitive survey of health. Agility and power measurements were also conducted. Twice a week for 45 minutes, kids participated in Parkour Training. The training activities focused on developing multiple dimensions of fitness and wellness. Thirty-four (n=34) 3rd, 4th, and 5thgraders (experimental) complete obstacles using agility ladders, balance beams, hurdles, plyo boxes, Bosu balls, stability balls medicine balls, and kettle bells. Twelve (n=12) 3rd, 4th, and 5th graders (control) completed a more traditional physical activity and nutritional education program twice a week for 12 weeks. Both experimental and control groups were pre-tested using a battery of tests. Post-test data were collected during the 12th week of the training program. Data were analyzed from the results of the pre- and post- tests from students with both measurements. Due to high dropout rates, statistical comparisons were not appropriate between groups or between testing sessions.

Fabricating Jewelry Designs Utilizing the Hydraulic Press

In this study, I approach working with forming sheet metals in various and comparative ways. Forming sheet metal is a critical application for professional jewelers. First is a look at forming metal over stakes using various stakes and hammers. The hammers provide texture in this application as well as move the metal in the desired way. This technique develops craftsmanship in jewelry making and forging metals.

A second technique is die forming sheet metal with the hydraulic press. This will involve using silhouette/matrix dies in the hydraulic press for forming metal into three-dimensional shapes. It also

involves learning to use eurothane with the dies in different durometers for desired depth and crispness to the piece. Third, pancake dies are used in the hydraulic press for cutting a specific shape in multiples. Pancake dies are necessary when working in a design that requires a repetitive shape.

The use of the hydraulic press, silhouette dies, and pancake dies are needed when making jewelry on a level of production and from a business sense in a career-oriented setting. It facilitates production of multiple pieces at a quicker rate. The hydraulic press has not been studied at USI in the jewelry lab prior to this study.

With this grant I provided some important equipment and knowledge to my classroom that will be used and explored for years to come. I created a unique body of work as a direct result of using the texture hammers, stakes, the hydraulic press, and dies. I will submit my work for a juried student art show, but more importantly, I have learned to produce jewelry more efficiently, and display better craftsmanship as a result of this study.

The Effects of Eating Breakfast on Mood and Class Participation

The effect of eating breakfast on academic performance is a subject that has been often studied, especially among children. I am studying the effects that eating breakfast has on adult college students to see if a positive correlation exists between eating breakfast and performance later in the day as students go on to classes and collegiate activities. Understanding the effects that eating breakfast have on academic performance will help to inform students about what their body needs in order to perform well. I am conducting a split experiment in which I will give half of my participants breakfast and half of them no breakfast. Around 60 college students enrolled in introduction to psychology classes and who have any other morning classes will be recruited to participate in the study. Before their first morning class, the participants will be given a folder containing a food log, a mood survey, and a class participation survey. The surveys will be filled out after each morning class the student has. I expect to find that eating breakfast will positively influence both students' moods and the amount of participation in their morning class.

Tangible Quality of Life Metric

We tested the theory that the ratio of McDonalds to Starbucks would reflect a similar trend of many economic ranks of different MSAs. We completed the data organization part of the project and ran three correlations on our data. We found the correlation is medium to strong; averaging .5 between multiple types of ranking systems. With that conclusion we do believe that McDonalds and Starbucks helps gives people a tangible measure on the health and well being of an area. We do believe this data was skewed due to incomplete data set comparisons and the later nationalization of Starbucks over McDonalds. This placed a heavier influence in the Northwestern United States due to Starbucks originating from that area.

Tracking Changes in Body Fat, Blood Lipid, Glucose, and Insulin Levels in a Cohort Group of USI Students

College lifestyle is typically accompanied by weight gain and may place one at greater risk for the development of insulin resistance (IR) and disease in general. This study tracks 15 students (from an original cohort of 22 students) as they complete four years in college. Following a 12-hour fast, subjects reported to the laboratory for determination of height weight and BMI, and venous blood samples were drawn for the determination of fasting blood glucose and insulin. On the average, body weight increased 3.62±3.9 lbs between freshman and senior years. Weight gain was less than expected and not

statistically significant. Average BMI did not change over the four years in college (23.2±0.55 freshman vs. 23.94±0.85 senior). However over 30% of the subjects (5 of the 15) could be classified as overweight using standards set by the World Health Organization (WHO: Overweight BMI > 25). Both fasting glucose and insulin levels were normal for all subjects and were not significantly changed between freshman and senior years (Glucose: 89.88±0.88 freshman vs. 89.26±1.14 senior) (Insulin: 11.88±1.10 freshman vs. 8.35±0.53 senior). Weight gain during four years of college was approximately one pound per year, and a continued pattern of weight gain would be of concern as being overweight or obese is related to serious health consequences.

Conformational Analysis of Dithianes and Dioxanes Using VT-NMR and Excel Stimulations

Heterocyclic six-membered rings undergo a chair-to-chair ring flip which has been a topic for discussion and research. The present work investigates and estimates the kinetic parameters for this flip of analogues of dioxane and dithiane using VT-NMR and line shape simulations using Microsoft Excel. The values obtained from our experiments and simulations are consistent with values reported for similar heterocyclic six-membered rings.

The Pizza Guide

In the pizza industry, pizza's appearance has become just as important as its taste. Primary research shows that 75 percent of pizza consumers find the appearance highly important. All pizza places, from large corporations to small pizzerias, care about the appearance. Large pizza companies use mystery shopper reports as a way to test pizzerias on the final product. In some cases, long term managers have been fired for not consistently creating a perfect pizza. A manager for 15 years at Papa Johns was fired after receiving a few bad reviews from mystery shoppers for serving imperfect pizzas. Thus, the pizza industry knows that taste and look are now equal in creating the perfect pizza; companies are willing to buy new products to achieve this result.

The Pizza Guide is a new product that solves this problem of consistency in a perfect slice of pizza. The Pizza Guide helps the manager reach pizza goals by providing a fast and easy way to cut a pizza in even slices. First, when the pizza is slid from the oven, it is placed into a box. Then the Pizza Guide fits over the top of the pizza, and the pizza cutter fits into the equally separated grooves to slice the pizza into eight equal slices.

For students, developing the pizza guide has been a learning experience because we are getting hands-on experience about how to start a company, work on financials, develop products, and initiate essential aspects of business.

The Role of YhiM in the Growth of *Escherichia coli* in High Osmolarity

Escherichia coli is a normal part of the gut flora found in humans and many other organisms. This is an important part of digestion and several other aspects of maintaining an organism's health. We are interested in studying how *E. coli* protects itself from the variety of environmental stresses. We previously identified an inner membrane protein, YhiM, which is necessary for survival in acidic conditions (Nguyen and Sparks-Thissen 2012) such as those the bacterium encounters as it travels through on its way to the small intestine. We were interested in determining whether YhiM was also playing a role in protecting *E. coli* from additional environmental stresses. Several additional studies have shown that the expression of YhiM is modulated in other conditions such as low temperatures and high osmolarity. We therefore hypothesized that YhiM was important in protecting *E. coli* from low temperature and osmotic stress. We found that YhiM mutants grew as well as their wild-type

counterparts at room temperature. However when we tested growth in conditions of high osmolarity, we found that YhiM mutants have difficulty surviving in high glucose or high sucrose when grown in both complex and minimal media. This suggests that YhiM plays a role in protecting *E. coli* in high osmolarity conditions.