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2015

Celebrate

A CELEBRATION OF
STUDENT RESEARCH AND
CREATIVE ACTIVITY

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Art



JOHN DEWEY'S PRAGMATISM AND THE ASHCAN SCHOOL OF ART: A SYNTHESIS OF PHILOSOPHY, POLITICS AND ART IN PROGRESSIVE ERA AMERICA

Shannon Price (Suzanne Chouteau and Dr. Fairfield)

Department of Art

Although the disciplines of art and philosophy are often studied in the context of political history, rarely are the two combined as a lense through which to view political events. In the case of the progressive era, cultural and political events are so integrally tied that the work of artists, politicians, and philosophers can be aligned to provide a deeper understanding of the American public in a time of national transformation. Separately, John Dewey's pragmatism and the Ashcan School of art are both significant cultural developments of the progressive age. Examined together, the two go beyond the progressive reform impulse to question the very foundations of their respective disciplines, not only driving cultural changes but providing a radical reevaluation of American democracy. The goal of this project is to explore links between Dewey's pragmatism and the Ashcan artists in terms of politics, aesthetic philosophy, and cultural impact, and ultimately to establish that art history is an essential and often underutilized method for understanding political and philosophical developments.

Athletic Training



FEMALE SWIMMER WITH SHOULDER INSTABILITY

Melissa Gehlert (Dr. Lisa Jutte)

Department of Athletic Training

Background: An 18-year-old female (5'8", 156lbs) reported for Division-I swimming pre-season physicals. The patient reported: anterior and inferior right shoulder pain; right shoulder hypermobility; and the ability to voluntarily sublux her glenohumeral joint when brought into full flexion. The pain and subluxations had occurred since age 13, with the more severe subluxations occurring during freestyle swimming, when the glenohumeral joint was abducted greater than 135°. The patient's orthopedic surgeon ordered an MRI arthrogram and ruled out rotator cuff and labral tears. The patient was prescribed strengthening exercises for the rotator cuff, trapezius muscles, levator scapulae, rhomboids, and serratus anterior. During the pre-participation examination, the patient exhibited: abduction, internal rotation, and external rotation weakness; a 2+ positive sulcus sign with mild crepitus and clicking; and general ligament laxity throughout her body. She was referred to the team orthopedic surgeon.

Differential Diagnosis: Rotator Cuff Tear, Glenoid Labral Tear, Ehlers-Danlos Syndrome: Type 3, Multidirectional Glenohumeral Instability, Biceps Tendinitis

Treatment: The team orthopedic surgeon's evaluation revealed chronic anterior and inferior instability of the right shoulder and overall genetic laxity in the left shoulder; MMT revealed: right shoulder flexion (3+/5), abduction (3+/5), external rotation (4-/5), internal rotation (4-/5), biceps (4-/5), and triceps (4-/5); and the O'Brian's Test and Clunk Test were negative. The team orthopedic surgeon reviewed the past MRI and disagreed with the previous surgeon's diagnosis, as he believed there were signs of a posterior labral tear. The MRI also revealed that the anterior-inferior glenohumeral ligament was absent, either from a congenital defect or rupture. Additionally, fluid in the biceps tendon indicated chronic biceps tendinitis. The patient was placed on a strengthening program for shoulder external rotation, internal rotation, flexion, extension, abduction, scapular protraction and retraction, and elbow flexion and extension. She was also given a scapular posture shirt to help reinforce proper glenohumeral joint positioning. She used Flector patches (180mg of diclofenac epolamine) to reduce pain. The patient continued to swim using kinesiotape to retract and elevate her shoulder position and to inhibit the biceps brachii. Ehlers-Danlos Syndrome-hypermobile type (EDS-HT), a genetic connective tissue disorder, was suspected. Therefore, the patient was referred to a connective tissue clinic for a blood test. However, the patient declined the test, so the condition cannot be ruled out. The success of surgical stabilization would be compromised if the syndrome was present. Therefore, surgical intervention has been delayed and the patient receives annual shoulder MRIs to monitor any further glenohumeral complex derangement. The patient continues to participate in swimming as her symptoms allow. The patient has decided to have capsular plication surgery at the end of the competitive swim season, despite the uncertainty of the surgical success.

Uniqueness: Ehlers-Danlos Syndrome has 10 recognized types. This patient is suspected of having type 3, also known as EDS-HT. It is a genetic connective tissue disorder, characterized by significant joint hypermobility. It affects 1 in 10,000-15,000 people. EDS-HT presents with frequent joint dislocations and subluxations, general joint instability, and chronic musculoskeletal pain. Surgery intervention for joint instability is unsuccessful in individuals with the syndrome.

Conclusions: The presence of the anterior-inferior glenohumeral ligament will determine the surgical procedure used. The possible presence of EDS-HT, and congenital defect of the anterior-inferior glenohumeral ligament are factors that will determine surgical success in this patient.

Clinical Application: When athletic trainers identify patients with general hypermobility, they need to consider the possible presence of EDS-HT and the implications that it can have on surgical success.



FEMALE SOCCER PLAYER WITH PAIN AT THE FIRST MTP JOINT PAIN

Kari Lockwood (Dr. Lisa Jutte)

Department of Athletic Training

Background: The patient is a 20-year-old, Division-I, female, soccer player who hyperextended her left foot while dribbling the soccer ball during a pick up soccer game over the summer away from the university. She immediately stopped play and reported feeling sharp pain (9/10) on the plantar side of the foot around the first MTP joint. She also complained of swelling, ecchymosis, and difficult walking. The patient went to an urgent care facility the following day and the physician ordered an X-Ray which suggested a fracture of the sesamoid bones of the great toe. The patient contacted the university's athletic trainer at this time regarding the injury. The patient had a medical history of a TMT stress fracture a year prior. She also wears orthotics bilaterally for pes cavus. **Differential Diagnosis:** Hyperextension of first MTP joint, sesamoid bone fracture, flexor hallucis longus strain, flexor hallucis longer strain, phalanx fracture, avulsion fracture, bipartite sesamoid. **Treatment:** The signs and symptoms persisted for the next two weeks. The patient was still at home for the summer, so the university athletic trainer instructed the patient to see her local podiatrist who has treated her previous TMT injury. She was diagnosed with hyperextension of the first MTP joint and was instructed to use a walking boot for two weeks. The patient followed-up with the podiatrist two weeks later and previous CT scans from her initial TMT stress fracture were reviewed. The podiatrist determined the patient had bilateral, congenital, bipartite sesamoids. The podiatrist instructed the patient to decrease the use of the walking boot as well as to continue activity pain allowed. Two weeks later the patient returned for a follow-up where an X-Ray was ordered showing that the sesamoid bones had separated 2mm. The patient also received a cortisone injection into the first MTP joint to help reduce inflammation. The patient denied pain relief after the injection. The physician instructed the patient to continue activity as tolerated for three weeks and if no improvement occurred a sesamoidectomy will be recommended. Treatment in the athletic training facility began when the patient returned for the fall, collegiate, soccer season. The patient received treatment of 3.3MHz, 20% duty cycle, ultrasound for 6 minutes at an intensity of 0.6 W/cm³ to help reduce inflammation. The patient also performed exercises to help strengthen the musculature that supports the joint. Some exercises included AROM marble pickup, AROM towel crunch, and RROM four way ankle. The patient was instructed to wear a dancer pad placed under first MTP joint to relieve pressure while playing soccer. The patient played soccer at her pain tolerance and has been limited to 40-minutes or under of soccer activity per day. **Uniqueness:** Approximately 20% of people have bipartite sesamoid bones that are asymptomatic and 85% of these cases are bilateral. Trauma to the sesamoid region, such as hyperextension to the first MTP joint, causes bipartite sesamoids to become symptomatic and limit physical activity. **Conclusions:** X-rays are an important diagnostic tool in determining fractures but can be misread and lead to misdiagnosis if not taken properly at appropriate angles. Small fractures can be difficult or impossible to see on routine x-rays and in some cases additional x-rays must be taken at special angles to reveal the fracture. In this case, the patient had a misread x-ray at the urgent care facility which led to an early misdiagnosis. It is important for athletic trainers to be aware of persisting signs and symptoms and understand additional imaging may be required to reveal a fracture or another condition.



SHOULDER PAIN IN A MALE COLLEGIATE BASEBALL PLAYER

Emily Martz (Dr. Lisa Jutte)

Department of Athletic Training

Background: During pre-season practice, a 21-year-old, collegiate, male, second baseman reported pain and clicking in his right shoulder during the cocking and follow-through phases of throwing. He had a history of a right SLAP tear three years prior. Upon inspection, the athletic trainer noted his posture included bilateral anteriorly rotated glenohumeral heads. Palpation revealed point tenderness over the right anterior glenohumeral capsule. Pain was elicited with flexion, horizontal adduction, and external rotation (ER) active range of motions (AROM). Despite his pain, manual muscle testing revealed full strength for external rotation, scaption, flexion, and horizontal abduction shoulder motions. Apprehension, O'Brien's, Neer's, Hawkins-Kennedy, and Clunk tests were positive in the right shoulder, while the full can and sulcus tests were negative.

Differential Diagnosis: Anterior glenohumeral instability, Bankart Lesion, Bennett Lesion, glenohumeral capsular tear, SLAP tear, and shoulder impingement

Treatment: Patient was referred to the team orthopedic surgeon and presented with pain during external rotation at 90 degrees of abduction, crepitus with shoulder abduction and external rotation, and a positive O'Brien's test. Based on his physical examination and history, the surgeon ordered an MRI arthrogram to rule out a glenohumeral labral tear. MRI revealed a partial tear of the infraspinatus muscle and Bennett lesion along the posterior glenoid rim. The orthopedic surgeon presented the patient with two treatment options: arthroscopic surgery or a cortisone injection. After a failed cortisone injection, the patient elected the arthroscopic surgery, which included rotator cuff repair and debridement of the Bennett lesion. The arthroscopic surgery confirmed a 70-80% infraspinatus tear, Bennett lesion, and small posteroinferior labral tear from the 7:30 to 8:00 o'clock positions. Therefore, glenohumeral labral debridement was included in the surgical procedures. The patient began a conservative post-operative rehabilitation protocol for two reasons. First, there was inadequate time to return to the current baseball season, and secondly his history of prior shoulder injury. During the first four weeks of his rehabilitation an emphasis was placed on passive (P) and active assisted (AA) ROM of the elbow, shoulder, and neck. Strengthening began in week three with manual resistance of scapular motion. Rhythmic stabilization shoulder exercises and isotonic elbow flexion and extension exercises were incorporated in week four. Advanced shoulder flexion and abduction AAROM, UBE, and ER strengthening exercises were introduced at week seven. At week eight, most PROM exercises were replaced with strengthening and stabilization exercises, while AAROM exercises were continued. Plyometric exercises were introduced during week 18. Functional sport activity began with batting practice at seven months and throwing at eight and a half months post-operation.

Uniqueness: Bennett lesions occur in approximately 50% of overhead throwers, however half are asymptomatic. Symptoms associated with Bennett Lesions include tenderness along the posterior inferior glenohumeral joint and pain during the throwing follow-through phase. The pain this patient experienced during the follow-through phase of throw could be attributed to a symptomatic Bennett Lesion, as well as his infraspinatus tear.

Conclusions: Due to the combination his shoulder injury history and the timing of the sport season, a conservative rehabilitation was implemented after his shoulder surgery. Therefore, functional activity was introduced at seven months post-op compared to the typical four and one-half months.

Clinical Application: When assessing an overhead thrower who reports pain during the follow-through phase, clinicians should consider a Bennett lesion. Bennett lesions can be detected by x-ray, tenderness along the posterior inferior glenohumeral joint, and a decrease in throwing pain with Xylocaine injection. In addition, rehabilitation protocol should be modified as necessary to address a patient's history, injury complexity, timing of sport season, and additional personal factors.

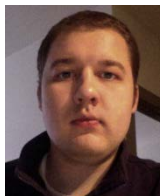


CERVICAL SPINE INJURY IN HIGH SCHOOL FOOTBALL PLAYER

Maura Shea (Dr. Tina Davlin-Pater)

Department of Athletic Training

Background: A seventeen-year-old football receiver reported pain in his cervical spine after two weeks of preseason, two-a-day practice. He had no history of cervical spine injury or complaints and denied any known mechanism of injury. During the initial evaluation, the athletic trainer found no physical deformity upon cervical palpation. However, palpation elicited pain in the C5/C6 and C6/C7 joint spaces, localized on the spinous and transverse processes of C6 and the surrounding left trapezius musculature. The patient expressed intense pain (9/10) with all cervical spine active range of motion (ROM), and discomfort (3/10) with all cervical passive ROM. Due to pain, resistive ROM was not tested. The patient was referred to a sports medicine physician to rule out fracture. **Differential Diagnosis:** C6 spinous or transverse process fracture, C6 subluxation, C6 dislocation, ventral wedge compression fracture, Clay - Shoveler's fracture, C6 spinous process avulsion fracture, acute torticollis, cervical paraspinal strain, posterior longitudinal ligament sprain, osteophyte fracture **Treatment:** The sports medicine physician ordered x-rays, which were normal, followed by a CT Scan, which found a well-corticated ossification posterior to the C6 spinous process with a small linear lucency traversing it. The radiologist, in conjunction with the sports medicine physician, diagnosed the patient with a fractured osteophyte on the spinous process of the C6 vertebrae. Due to the fracture's stability, the sports medicine physician ordered the injury be treated as a trapezius strain and the patient's symptoms addressed with therapeutic modalities and manual therapy, fully avoiding use of muscle strengthening exercise in the upper body. The physician also cleared him to continue to participate as long as he maintained treatment and his symptoms were tolerable. Daily treatment included 15 minutes of high-volt electrical stimulation with thermotherapy on the left upper and middle trapezius, manual trigger point release throughout the upper and middle trapezius and erector muscles, massage throughout the previously mentioned areas with the addition of the lower trapezius and latissimus dorsi as needed, manual cervical traction, active and passive cervical stretching (flexion, bilateral lateral flexion & rotation), and 20 minutes cryotherapy post practice. Occasional tension headaches were addressed with craniosacral release therapy and 600mg over-the-counter ibuprofen tablets provided by the patient's parents at home. To avoid compromising fracture stability, strengthening was contraindicated until the fracture healing was complete. The patient maintained strength through football activity, but could not participate in upper body team resistance training due to fracture avulsion risk. For lower body exercise, the patient could not hold any weight with his upper body and terminated activity if symptoms increased. The sports medicine physician's main concerns of patient comfort and attenuating muscle tension to prevent avulsion were achieved. The patient participated without limitations for the entire season. **Uniqueness:** The literature is void of any cases of cervical spine osteophyte growth or deformity in adolescent patients. Cervical spine osteophyte growth is most commonly reported in 60-year-old male patients with degenerative joint changes. **Conclusion:** Spinal fractures are commonly season- or career-ending injuries. However, this patient was able to continue to participate due to the stability of the fracture and the management of his symptoms with a focus on diminishing muscle tension. If any unexpected strength deficiencies are detected after fracture healing is complete, they will be addressed with resistance exercise at that time. **Clinical Application:** In special cases, cervical spine fracture may not always constitute termination of athletic contact activity. Maintaining fracture stability by combatting surrounding muscle spasm can enable a patient to continue to participate. It is important to note as long as the fracture margins remain stable, healing will occur regardless of participation in physical activity.



BILATERAL SHIN PAIN IN A COLLEGIATE VOLLEYBALL PLAYER

Cameron Stockdale (Dr. Tina Davlin-Pater)

Department of Athletic Training

Background: A nineteen-year-old, female, volleyball player came into the athletic training facility complaining of anterior shin pain in her left leg. After a few weeks of treatment, the pain worsened in her left shin and the patient began to complain of pain in the right shin. The mechanism of injury was determined to be chronic stress, and a nutrient imbalance. **Differential Diagnosis:** Medial Tibial Stress Syndrome, Stress Fractures, Stress Reactions, Muscle Strain, Tibial Fracture. **Treatment:** The patient was initially given NSAIDs and pain cream to control pain. The patient was initially prescribed 500 mg Naprosyn, but when Naprosyn was ineffective the patient was prescribed 1000mg ibuprofen. The initial x-rays came back negative and MRIs did not show stress fractures, so the team orthopedic surgeon diagnosed the patient with bilateral tibial stress reactions. After 1 month without improvement, the patient showed fracture lines on an additional set of x-rays and was restricted from volleyball activity until these fracture lines closed. After a blood test was done revealing low vitamin D levels, she was prescribed a 30 mg Vitamin D supplements. She also used a bone stimulator to help with her nutrient imbalance as well as Aircast immobilizers and orthotics to provide physical support. Also a strength deficit was addressed with rehab exercises focused on strengthening hip and core muscles as well as improving balance. Once the fracture lines closed, she was allowed to participate in practice to tolerance and her jumps were limited. She was restricted with a jump count for all offseason practices as well. In addition she wore compression sleeves on her legs to help reduce pain and inflammation during activity. **Uniqueness:** This case is unique in that the athlete presented with stress fractures in both legs, which only occurs in 16.6% of cases. Also, tibial stress fractures are typically found in runners and are fairly uncommon in volleyball players. **Conclusions:** This case demonstrated how many different treatments can be used together to treat a condition as involved many different interventions from prescription medications to dietary supplements, as well as immobilization, and the use of a bone stimulator. This case also demonstrates the need for clinicians to treat the root cause of an injury and not just the symptom. Ultimately the cause of this injury was a nutritional imbalance along with decreased strength. If a blood test would not have been done to find the nutrient imbalance, it could have put her at an increased risk to reinjure herself or the original injury might have taken longer to heal. This case demonstrates how important it is to try to find all contributing factors to an injury in order to best treat the current injury and prevent future injuries.



POSTERIOR THIGH INJURY IN A FEMALE COLLEGIATE SOCCER ATHLETE

Nathalie Towchik (Dr. Lisa Jutte)

Department of Athletic Training

Background: A nineteen year old female soccer player came to preseason with a left hamstring injury. Her pain had originally developed over time starting in June of summer before attending college. No specific mechanism of injury was known. Athlete reported tightness as well as intermittent sharp pain in left hamstring when pivoting and pushing off. Athlete also reported stiffness and aching upon waking up in the morning. She had no previous history of hamstring injuries. Her pain was tolerable at first, but conditioning on her own for collegiate play aggravated the left hamstrings. The athlete was referred to a physical therapist by her physician in her hometown for treatment when the pain became intolerable. The therapist's initial evaluation found some postural issues including trunk shift to the left, bilateral anterior tilt of the pelvis. Palpation included soft tissue restrictions medial to distal hamstrings on the left side. Physical therapist diagnosed patient with a Grade 1 hamstring strain. No laboratory tests were ordered. Patient was treated for a hamstring strain using massage and hamstring strengthening exercises over the course of 4 weeks. Treatment plan included lumbar and lower extremity stabilization exercises, general flexibility and stretching, soft tissue techniques, strengthening and conditioning, posture training, body mechanics instructions, gait training, and agility training. Physical therapy eased pain, but did not eliminate hamstring pain. **Differential Diagnosis:** Hamstring strain, hamstring muscle spasms, nerve impingement, slipped disc, hamstring muscle cramps, hamstring tendonitis, compartment syndrome, and neuritis of sciatic nerve **Treatment:** Upon arrival to college preseason, the athletic trainer palpated the athlete upon arrival for preseason and found no evidence of a strain. Athlete continued exercises while also receiving ice and high volt electric stimulation on campus to treat continued pain and tightness. Because there was no significant improvement from restricted exercise and rehabilitation exercises, the trainer had the athlete begin neural gliding techniques to rule out suspected sciatic nerve involvement. There was tightness in the hamstring and decreased strength in the affected side when manual muscle testing hip extension and knee flexion still present after several weeks of therapy. Therefore, the trainer suspected the real issue may be neural and considered hamstring syndrome as a possibility. The neural gliding technique applied included passive hip flexion and active ankle inversion, eversion, dorsiflexion, plantar flexion, and rotation three times before and after exercise. This reduced athlete's pain significantly. Exercises included resisted knee flexion, hamstring curls, wall sits, seated scoots, and single leg cone pickups. Neural gliding added to the strengthening exercises helped eliminate pain and athlete returned to partial participation in one week and full participation in three weeks. **Uniqueness:** Hamstring syndrome is rarely suspected when a soccer player presents with hamstring tightness and pain. Through assessing an aspect of the neural evaluation that was not previously tested, the athletic trainer was able to accurately diagnose and treat the injury. Therefore, the athlete was able to return to play quickly and pain-free. **Conclusions:** A nineteen-year-old female soccer player developed hamstring pain over an extended period of time. Tightness and pain persisted through physical therapy when treated for a general hamstring injury. The patient began neural gliding for suspected sciatic nerve issues once arriving to college. Pain significantly decreased after one week of neural gliding and athlete returned fully to play in three weeks' time. Clinicians should ensure they address all possible injuries in their evaluation process so that the diagnosis and treatment help the patients return to play quickly and comfortably.

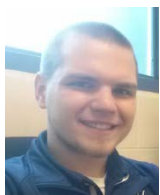


ELBOW INJURY IN A COLLEGIATE BASEBALL PLAYER

Sarah Wechter (Dr. Lisa Jutte)

Department of Athletic Training

Abstract Background: A twenty-one-year-old, right-hand dominant, male, baseball player sustained an injury to his left elbow while playing first base. His medical history included a left humeral growth plate fracture requiring internal fixation. Upon evaluation by the University's athletic trainer, the patient reported a base runner collided into his left elbow while it was extended, causing a valgus stress. The patient was unable to continue playing that day. During the evaluation he reported sharp pain (6/10) on the medial aspect of his elbow and was point tender on the medial joint line with mild edema and erythema noted. No gross deformity or discoloration was observed. The patient experienced pain with active and resistive wrist flexion and supination, and exhibited a positive valgus stress test. The athletic trainers' recommendation was rest, ice twice a day for 20 minutes, and 400mg ibuprofen three times per day. The patient's pain persisted for three days prompting patient referral to team physician. **Differential Diagnosis:** Flexor carpi ulnaris strain, flexor digitorum superficialis strain, contusion, ulnar collateral ligament (UCL) sprain, medial epicondyle fracture, flexor tendon avulsion fracture **Treatment:** The physician's examination revealed the patient had increased pain with batting; point tenderness over the left proximal flexor pronator muscle bundle; discomfort with passive left elbow flexion, extension and forearm pronation; and a positive milking sign and valgus stress test. An X-ray one week post-injury ruled out fracture. Consequently, MRI with contrast was ordered 11 days post-injury. The results were consistent with a distal UCL tear of the anterior bundle, a UCL sprain, and edema within the posterolateral humeral head. Two weeks post-injury, the patient elected to undergo UCL reconstruction surgery using an ipsilateral palmaris longus graft. The patient wore an elbow brace for five weeks post-operation to limit flexion. The range of motion (ROM) was increased incrementally and resistance exercises were incorporated following a standard UCL rehabilitation protocol. Week one of rehabilitation consisted of passive and active ROM exercises for the shoulder, elbow and wrist. The patient progressed to isometric exercises for the flexor digitorum superficialis, extensor carpi ulnaris, biceps and deltoids. Isotonic exercises for the deltoids, rhomboids, infraspinatus and trapezius, and proprioceptive neuromuscular facilitation with resistance were added during week three. During week four, isotonic exercises were continued with added weight. The following months of rehabilitation focused on strengthening, while incorporating functional exercises for activity. After four months, the standard UCL rehabilitation was discontinued and the patient was cleared to begin baseball specific activity including catching and throwing, in addition to a batting progression program. Typically UCL repair patients reach this functional level 12-15 months post-operation. **Uniqueness:** Traumatic UCL injuries are absent from the literature. UCL injuries are common overuse injuries in overhead-throwing athletes. Between 2010-2014, 245 major league baseball pitchers underwent UCL reconstruction, all caused by overuse. Patients with UCL reconstruction in their throwing arm typically return to play in 15-18 months. **Conclusion:** Since this patient's UCL reconstruction was in his non-throwing arm, he experienced less muscle mass lost and did not need to complete a throwing progression. Therefore he returned to functional activity in four months. **Clinical application:** The UCL functions to resist valgus stress at the elbow; therefore 90% of UCL injuries are due to microtraumas caused by repetitive stress. In addition, traumatic UCL injuries are seldom surgically repaired, however this option provides long-term functional stability after an accelerated rehabilitation. Rehabilitation for UCL reconstruction in the non-throwing/serving arm in patients that participate in upper extremity dominant sports such as softball, tennis, football, and volleyball is accelerated to 4-6 months compared to the typical 12-15 months for the throwing/serving arm.



LOWER BACK PAIN IN MALE FOOTBALL PLAYER

Nathaniel Wolfe (Dr. Tina Davlin-Pater)

Department of Athletic Training

Background: Patient is an 18 year old male football player has been dealing with lower back pain. It should be noted that this patient has an endomorph frame and a poor postural stance that may be contributing to some of the discomfort. Patient presented with significant pain in the lumbar spine that was beginning to radiate down his left leg. This pain has been present since the start of the season and football practice has re-aggravated the injury to a 8/10 on the VAS scale. The initial Athletic Trainer's evaluation found significant pain in the lumbar spine upon palpation, along with weaknesses in his quadriceps, hips, and abdominal muscles. MMT's caused pain in the lumbar spine due to the transfer of energy. Once the patient was unable to finish practice due to pain, it was decided that it may be best to refer this case to an orthopedic specialist for further diagnosis. Differential Diagnosis: Herniated Discs, Bulging Discs, Lumbar Compression Fracture, Lumbar Degenerative Disc Disease, Lumbar Facet Arthropathy, Lumbar Spondylolysis and Spondylolisthesis, or Osteoporosis. Treatment: Because the orthopedic specialist was able to isolate the problem to a spinal issue, it was decided that an X-ray and an MRI would be ordered to confirm and rule out possible injuries. The X-ray came back relatively negative and the MRI showed the discs bulging anteriorly in L5/S1. Once pinpointing the exact problem and ruling out any other possible complications, the patient began to undergo conservative treatment in an attempt to rehabilitate the weakened muscles from this injury. The patient began treatment by isolating the quadricep muscle through manually resisted exercises including leg extension and hip flexion. Then, the patient would perform isolated hip adduction and abduction exercises in order to force him to activate his core. Traditional abdominal exercises were not be used because it could possibly aggravate the spine even more due to their mechanical nature. The patient was also given a supportive back brace to help him remain supported in an upright position. After 6 weeks of treatment, the patient returned to the physician for a follow up visit and it was determined that he could resume practice because of the effectiveness of the treatment and the decrease in pain levels. Uniqueness: This case is unique because it shows the true importance of quadricep, hip, and core strength. During the physical examination, the athlete was very weak when his quadricep, hip, and core muscles were put to the test. This is what was believed to be the main cause of his spinal discomfort. The bulging discs were developed because the patient would tend to use his back, when the true power should be coming from his core. Since the patient had weak muscles, his body decided to create extra power from his back and this caused his overused back to become injured. Conclusions: This patient avoided a major injury by strengthening his quadricep, hip, and core muscles. This case is important to the athletic training profession because it shows the true importance of muscle strength and stability; and what can happen if those things are neglected or used incorrectly for long periods of time. There is a lot that can go wrong with the spine, but good posture and a strong core can avoid injuries to arguably the most important structure in the human body.

Biology



METEOROLOGICAL FACTORS AFFECTING TIMING OF ROOST ENTRANCE OF CHIMNEY SWIFTS DURING FALL MIGRATION

John Albers, Lucas Beven, Robert Link, Michael Patton, Jessica Wolfe, Teigen Young (Dr. George Farnsworth)

Department of Biology

Chimney Swifts (*Chaetura pelagica*) are diurnal birds that breed in North America in the summer and migrate to South America during the winter. During fall migration, Chimney Swifts congregate in communal roosts each evening. Often large flocks use industrial chimneys of old buildings in urban settings. The purpose of this study was to determine what specific environmental factors affect the timing of roosting behavior at one of these sites in Cincinnati, OH. We used video recordings every evening to monitor swifts roosting in a large old chimney on the campus of Xavier University from the end of August through the first half of October during 2011, 2013, and 2014. Observation began approximately ten minutes prior to sunset. We recorded the number of swifts entering the roost during 30 seconds at 5-minute intervals until all swifts were inside. We collected data for meteorological factors such as: temperature, humidity, and rain. Multivariate linear regression indicated that Chimney Swifts roosted earlier in the evening as the season progressed. Additionally, birds roosted earlier on days that were cooler with high humidity, especially on evenings with rain. Chimney Swift populations are declining throughout eastern North America and in Ohio in particular. These large industrial chimneys built in the early part of the 20th Century probably represent an important resource for these birds that may be disappearing as older buildings are replaced. More information about this species use of chimneys may be useful to strengthen conservation efforts in the future.





ENVIRONMENTAL CORTISOL: EFFECTS ON WEIGHT AND MORTALITY OF FATHEAD MINNOWS

Kurt Backer, Alexa Bolin, Sara Fieger, Matthew Orlando (Dr. Jennifer Robbins)

Department of Biology

Hormones, such as cortisol, have been found in sources of water. Inevitably, this cortisol builds up in the environment as it is excreted in human waste and in fish waste. Fish are exposed to these circulating contaminants in fish farms often where they experience stress inducing situations prompting the release of cortisol. Fish in fish farms are often grown to be sold for food, so because these fish are meant for human consumption it is important to evaluate the effects of environmental cortisol on such factors as body weight and mortality of fish. In order to do this, fathead minnows were divided into three groups, a control group (n=45), "low" cortisol group (n=48), and "high cortisol group (n=41). The low cortisol and the high cortisol tanks were made by adding a cortisol solution made with 100,000 times and 1,000,000 times the average amount of plasma cortisol in a fish, respectively. Daily mortality counts and weekly average body weights were determined. In the high cortisol tank, the body weight of the fish decreased while the mortality rate of the fish increased. Both the control tank and the low cortisol tank experienced similar results for both body weight and mortality. This helps in concluding that at high levels of environmental cortisol, fish do experience significant changes to their tertiary stress responses.



SODIUM ASCORBATE AND QUORUM SENSING INHIBITION IN PSEUDOMONAS FLUORESCENS

Madisynn Beckett, John Duchak, Adam Lamb (Dr. Jennifer Robbins)

Department of Biology

This study determined the impact of the combination of a quorum sensing inhibitor, sodium ascorbate, and an antibiotic, streptomycin, on *Pseudomonas fluorescens* biofilm formation. Sodium ascorbate has been shown to act as a quorum sensing inhibitor that impedes the cell-cell communication that enables biofilm formation. However, the impact of the combination of a quorum sensing inhibitor and an antibiotic has not been determined. It was expected that the combination of the quorum sensing inhibitor and antibiotic would decrease biofilm formation. In this study, the bacterial growth of the biofilms was measured using spectrophotometry. The absorbance was reflective of the number of bacteria present in the biofilms. The results suggested that the combination of the quorum sensing inhibitor and the antibiotic may decrease biofilm formation, however, the results were inconclusive.





ASSESSMENT OF WEST NILE VIRUS IN LARVAL MOSQUITO POPULATIONS OVER TIME

Ian Borczon, Kacie Hoyt (Dr. Mollie McIntosh)

Department of Biology

Adult mosquitoes are known for the ability to vector numerous diseases, including West Nile Virus (WNV). Research efforts have focused on horizontal transmission of WNV via adult mosquitoes, birds and humans, less is known regarding possible vertical transmission of WNV from to adult to larval mosquito. The objectives of this study were to (1) assess the presence of WNV in larval mosquito populations from wetlands in Ohio; and (2) determine if relationships exist among WNV presence, mosquito density, and ambient temperature. Mosquito larvae and water quality parameters were collected biweekly from four wetland sites in southwestern Ohio, from May to October 2014. Mosquito habitat was sampled using a standardized mosquito dipper (350ml) and all organisms within were subsequently processed and identified to the lowest possible taxonomic level in the laboratory. On each date, additional immature mosquitoes were collected and assessed using RT-PCR to test for the presence of WNV in the larval specimens. West Nile Virus was detected in larval mosquitoes at all sites during May and June. Mosquito populations exhibited variable population dynamics between sites during the sample period, with peaks occurring at different times. No correlation was found between mosquito density and ambient temperature. An increased understanding of larval mosquito population dynamics and WNV presence can be beneficial in assessing disease risk in humans and in the development of effective control programs.



MRSA PREVALENCE AT XAVIER UNIVERSITY: NURSING STUDENTS ARE 2X MORE LIKELY TO COLONIZE MRSA

Kaitlyn Brown, Florence Fournier, Rachel Plaughter (Dr. Jeniffer Robbins)

Department of Biology

There is currently minimal research concerning the prevalence of MRSA colonization among student nurses. Many studies report a high prevalence of MRSA colonization among healthcare workers, both in hospitals and nursing homes. As many as 76% of hospital workers may colonize MRSA, according to a study done by Iyer et al. in 2014⁴; workers with the highest percentage of colonization have shown to be nurses.³ This is of great concern to healthcare facilities because nurses are the healthcare workers that spend the majority of their time interacting with patients, posing a large risk for transmission of MRSA. We tested 86 students at Xavier University, of which 37 were nursing students, in order to examine the colonization rate of MRSA among the student population. Students were tested for MRSA colonization both in the nose and on the hand. 19% of students tested positive for MRSA colonization on the hand, 2% in the nose, and 5% both on the hand and in the nose. We found that 35% of the nursing student population colonized MRSA, compared to a 19% colonization rate among non-nursing students. In fact, by an odds ratio, we determined that nursing students were two times more likely to colonize MRSA than non-nursing students. During our study, each participant also answered a series of questions. Some of these questions included: if you attend clinical, what kind of healthcare setting do you attend; do you use hand sanitizer, if so how often; and do you have allergies? We found that of the 37 nursing students, 18 (49%) attended clinical rotation in nursing homes and 21 (51%) in hospitals. At both clinical sites, nursing students colonized MRSA at relatively similar rates, 39% in the hospital and 38% in the nursing home. A correlation was observed between use of hand sanitizer and the rate of bacterial colonization. In fact, the colonization rates for MRSA and *S. aureus* were 18% and 24% greater in those that used hand sanitizer, respectively. Additionally, of the total student population, an odds ratio determined that students, who reported daily hand sanitizer use, were 2.77 times more likely to have allergies than students that did not report using hand sanitizer. From the data we collected, we are able to indicate that nursing students colonize MRSA two times more often than non-nursing students. Our results are specific to Xavier University and they allow us to reiterate the need for nursing students to be knowledgeable about MRSA transmission, not only in the hospital among patients, but also on campus among students and faculty.



THE EFFECTS OF KCl AND N ω -NITRO-L-ARGININE METHYL ESTER HYDROCHLORIDE ON VASOMOTION IN BOVINE CORONARY ARTERIES

Kathleen Copp, Nateka Faison, Dushawn Harley, Kaitlyn McBride, Samuel Nelson, Madalyn Robbins, Alexandra Rudinoff, Emily Vogel (Dr. Lisa Close-Jacob)

Department of Biology

The purpose of this experiment was to determine whether bradykinin-induced vasomotion was a result of the nitric oxide pathway or the endothelium-derived hyperpolarizing factor (EDHF) pathway. It was hypothesized that vasomotion is primarily due to the EDHF pathway. Two inhibitors were used: KCl, which blocks the effects of EDHF, and N ω -Nitro-L-arginine methyl ester hydrochloride (L-NAME), which inhibits the nitric oxide pathway. It was predicted that KCl would inhibit vasomotion activity more than L-NAME, indicating that the EDHF pathway was the cause of vasomotion. Two transverse arterial rings cut from left anterior descending coronary artery of bovine hearts were dissected and maintained in Krebs' solution at a temperature of 37 °C. The pH was maintained at 7.4 by bubbling the tissues with a 95%O₂/5% CO₂ gas mixture. The arterial rings were treated with U46619 (5 x 10⁻⁸M), a thromboxane A₂ agonist, to cause a sustained contraction. Then, bradykinin (5 x 10⁻⁷M) was added to relax the arteries and induce vasomotion. Once vasomotion activity began, arteries were treated with either 10 μ M/100 μ M L-NAME or KCl (80 mM). There were 8 out of 9 instances of vasomotion stopping after being treated with KCl. Interestingly, there were 5 out of 9 instances of vasomotion slowing or stopping after being treated with the high dosage of L-NAME. These data suggest that the EDHF is the primary contributor to the bradykinin-induced vasomotion, but the nitric oxide pathway may also play a modulatory role.



ENVIRONMENTAL AND BEHAVIORAL RISKS CONTRIBUTING TO MELANOMA AND PREVENTION

Jill Cowan (Dr. Waltke Paulding)

Department of Biology

Skin cancer is currently the most commonly developed cancer caused by ultraviolet radiation. The three most commonly occurring skin cancers are basal cell carcinoma, squamous cell carcinoma, and melanoma. Particularly, melanoma is the most deadly form of skin cancer associated with high mortality rates. In 2004, there were 7,654 deaths caused by melanoma in the United States from the ages of 0-85 years old, equating to a death rate of 3.3 per 100,000 people (Linos et al., 2009). While the survival rate is low, this form of cancer is preventable by taking precautions and educating oneself about the dangers of radiation exposure. Solar ultraviolet radiation is the main etiological factor for skin cancer via an induction of DNA damage. Additionally, artificial exposure from tanning beds can also occur. People with fair skin and those living in geographical areas with high UV exposure are at greater risk for developing melanoma. Fortunately, our bodies have natural defense mechanisms to prevent extensive damage. Specifically, epidermal keratinocytes containing melanosomes, imported from melanocytes, form a protective cap around nuclear DNA, shielding it from UV rays. Understanding causes such as societal norms, socioeconomic factors, and potential risks for younger generations are essential, as severe sunburns during childhood and adolescence increase the chances of developing melanoma later in life.

THE RELATIONSHIP BETWEEN METAPLASIA AND CANCER

Kyle Ferchen (Dr. Waltke Paulding)

Department of Biology

Metaplasia involves the transformation of a fully differentiated cell type to another differentiated cell type, thus replacing the original cells. While anomalous, metaplasia is not specifically carcinogenic, but sometimes correlates with dysplasia and cancer. The most frequent example of this occurs in the condition known as Barrett's esophagus, but other cases include gastric, intestinal, and pancreatic cancers. This project primarily analyzes case studies of patients with metaplastic diseases, correlating the probability of such disorders leading to cancer with different risk factors. As the diagnosis of metaplastic conditions uses analysis of histological evidences, specific attention is given to cell structures obtained from biopsy and endoscopy results. Also examined are the biochemical pathways involved in the differentiation process, which provide clues to identify genes involved in the process of metaplasia. A thorough overview of metaplastic conditions is presented in an attempt to better understand the development of specific cancers.



THE ROLE OF RFESD IN HEMATOPOIETIC DEVELOPMENT IN ZEBRAFISH

Madielyn Gemmer (Dr. Dorothy Engle)

Department of Biology

Formation of all the cellular components of the blood, hematopoiesis, involves primitive and definitive waves. The genetic controls of hematopoiesis are particularly important as any defect may lead to leukemia, anemia, lymphomas, and myelomas. The objective of this study was to investigate the role of the *rfesd* gene in zebrafish hematopoiesis. Zebrafish were used as the model organism as they are transparent and easily manipulated to observe the waves of hematopoiesis. In situ hybridization was performed and gene expression was observed and analyzed. Expression of *rfesd* was specifically identified. It was found in the posterior blood island (PBI) of 24h embryos as well as in the posterior lateral plate mesoderm (PLPM) in 13s, 17s, and 25s wildtype (WT) embryos. The PLPM site is involved in erythropoiesis, the formation of primitive red blood cells. Some embryos were injected with Gata-1 to further characterize the role of *rfesd* in hematopoietic development. Gata-1 is a transcription factor that is necessary for erythroid development and is expressed in the lateral plate mesoderm during primitive erythropoiesis. *Rfesd* appeared to decrease in the 17s Gata-1 injected embryos. These results indicate that *rfesd* may have a role in hematopoiesis and further investigation may show its exact pathway.



GENETIC MUTATIONS ASSOCIATED WITH ACUTE MYELOID LEUKEMIA (AML)

Austin Glascoe (Dr. Waltke Paulding)

Department of Biology

AML (Acute Myeloid Leukemia) is a cancer of the myeloid line of blood cells. In patients with AML, there is an accelerated and unregulated growth of white blood cells in the bone marrow. This interferes with the production of other normal, healthy blood cells. Due to the obstructed production of normal cells in the bone marrow, normal levels of red blood cells and platelets decrease in patients with AML. There are many genetic mutations that occur that lead to AML. Many of these mutations lead to disruptions in cell processes that can be categorized into three groups. The first group of mutations of the genes FLT3, KIT, ITD, and JAK2 lead to malfunctions in tyrosine kinases functions. The second group of mutations is caused by point mutations in the genes TKD, FLT3, and KRAS. The final category of mutations is caused by unregulated transcription factors in the genes NPM1, CEBPA, RUNX1, and MLL-PTD. The biological and clinical implications of the mutations for each gene from each of the three categories are explored. Currently, more research is being done in order to find a better method for treating patients with AML. The leading avenue of research is exploring better ways to transplant stem cells to reduce complications caused by AML.



THE EFFECTS OF THE INVASIVE AMUR HONEYSUCKLE ON SOUTHWESTERN OHIO'S FOREST ECOSYSTEMS

Madi Habel, Emil Jackson, Aaron McPheters, Emily Myers (Dr. Brent Blair)

Department of Biology

Amur Honeysuckle (*Lonicera maackii*) is a prevalent invasive shrub in forests of southwestern Ohio. The species is particularly common in urban areas due to human disturbance of forest ecosystems. Previous studies suggest that honeysuckle can alter the native soil properties to promote its own growth while creating negative consequences for native species. The goal of our study was to investigate differences in soil moisture, temperature, respiration rates, and tree basal area in forest ecosystems with and without honeysuckle. Furthermore, honeysuckle removal plots were used to assess the possible aftereffects of honeysuckle invasion. Data was collected in Fall 2014 and Spring 2015, and was also compared to data from previous years. Data analysis is currently being conducted.





SKULL ANATOMY AND BITE FORCE IN THE GENUS PANTHERA

Lindsey Howard (Dr. William Anyonge)

Department of Biology

This study focuses on three large wild cat species which belong to the genus *Panthera*, specifically; *Panthera leo* (lion), *Panthera tigris* (tiger), and *Panthera atrox* (extinct American lion). While it has been possible to study the behavior of lions and tigers and it has been discovered that lions are a social species and tigers are a solitary species, there are differing opinions on whether the extinct American lion was a solitary or social species, and evidence has been found to suggest both (Ewer, 1973). It has been shown that analysis of certain skull characteristics can be used to infer the size and function of jaw musculature, allowing different estimations to be made about the strength of different muscles and the magnitude of force they would have exerted (Radinsky, 1981). This study investigates such parameters in the three wild cat species and looks for possible similarities and differences in these parameters among them. When attempting to infer the sociality of the extinct American lion, it could be useful to compare its skull morphology to those of a social (lion) and solitary species (tiger) whose behavior we have been able to observe, since morphology could indirectly reflect behavior to a degree. If *P. atrox* exhibits significant similarities in jaw and skull characteristics to the tiger and not the lion, this could act as another piece of evidence to suggest that *P. atrox* was a solitary rather than a social species. Digital images of the skulls of lions and tigers were obtained from the mammalian collections at the Smithsonian Institution in DC and the Field Museum of Natural History in Chicago and images of skulls of the extinct American lion were obtained from the Page Museum at the La Brea Tar Pits in Los Angeles, CA. Measurements were taken on these skull images using the measurement program ImageJ, while some were calculated from other measurements. All measurements and calculated values were statistically analyzed using SYSTAT Statistical and Graphical Software. All measured characteristics were similar in the three species excluding masseteric fossa length, which was found to be significantly smaller in tigers than in lions and American lions.



COMPARATIVE BITE STRENGTH IN EXTINCT AND EXTANT CANIDS

Adnan Ilyas (Dr. William Anyonge)

Department of Biology

Bite force of animals belonging to the Order *Carnivora* and Family *Canidae* is explored. Specifically, cranial and dental characteristics were analyzed in 5 species of large canids to see how bite force has changed since the Pleistocene era and whether it relates to change in prey preference over time. The species studied were the Dire Wolf, *Canis dirus*, Grey Wolf, *Canis lupus*, Coyote, *Canis latrans*, the African Hunting Dog, *Lycaon pictus*. Fossil specimens used in this study are housed at the La Brea Tar Pits Museum in Los Angeles, California. In mammals, the jaw musculature involved in generation of bite forces during killing and feeding include the temporalis and the masseter muscles. The masseter originates on the zygomatic arch and inserts on the inside and outside of the lower jaws and is responsible for chewing action. The temporalis originates on the temporal fossa of the cranium and inserts on the coronoid process of the mandible. The temporalis muscle generates most of the bite force at the canines, which are used for killing. It was hypothesized that extant canid species that evolved smaller body size would exhibit reduced jaw musculature and reduced bite forces that would suggest preference for smaller prey than that seen in the large extinct canids such as the Dire Wolf.



CORRELATING INTERACTIONS OF COMMON RISK FACTORS BETWEEN DIABETES AND PANCREATIC CANCER AND THEIR CO-MUTUAL INFLUENCE

Kortnie James (Dr. Waltke Paulding)

Department of Biology

Diabetes affects 25.8 million Americans, while another 1.9 million new people are diagnosed each year. Along with that, pancreatic cancer is one of the most malignant cancers, having nearly 100% fatality within the first year. Approximately 50% of patients with pancreatic cancer also have either Type 1 or Type 2 diabetes. Given the constant increase in Americans with diabetes each year, this could predict an increase of pancreatic cancer victims. Both diseases are outlined in detail, while looking at their relationship with each other, and the risk factors of each disease. Factors including obesity, smoking, drinking alcohol, age, race, and heredity all play a role in increasing the likelihood of a person contracting either disease. The relationship between diabetes and pancreatic cancer was researched to determine if there are possible links and whether one is a side effect of the other or if they both operate under a cause and effect mechanism. Finally, possible preventative measures in to attempt to control the diabetes rate in America and the deaths by pancreatic cancer each year were detailed.



DYSREGULATION OF BAX IN TUMORIGENESIS

James Kelly (Dr. Waltke Paulding)

Department of Biology

Cancer is the result of unregulated cell growth and depends on a balance between the rates of mitosis (cell division) and apoptosis (programmed cell death). Checkpoints in the cell cycle monitor the genome for mutations during replication and will activate the apoptosis pathway if damaged DNA cannot be repaired. Dysregulation of the apoptosis pathway is a common cause of uncontrolled cell growth that may lead to cancer. One important protein in the apoptotic pathway is Bax, a pro-apoptotic member of the Bcl-2 protein family. When activated, Bax initiates the intrinsic pathway of apoptosis in which a series of events leads to the activation of several proteases called caspases, which cause the protein machinery of the cell to breakdown, ending in cell death. One well-known activator of the intrinsic pathway of apoptosis is the tumor suppressor p53 transcription factor, which increases transcription of the Bax gene in response to DNA damage. Dysregulation of this pathway leads to multiple types of cancer.



USE OF DISCODERMOLIDE AS AN ANTI-CANCER AGENT

Michael Kulmoski (Dr. Waltke Paulding)

Department of Biology

Discodermolide is a naturally occurring molecule in the marine sponge species *Discodermia dissolute* and was first discovered in 1990. The compound was shown to stabilize microtubules by bonding to the β -tubulin and promote polymerization which in turn inhibits mitosis, making it a potentially effective anti-cancer agent. Several cell lines of cancers have been successfully treated with discodermolide, including ovarian and lung. The drug entered but did not complete phase 1 of clinical trials due to the unfortunate death of 2 patients because of pulmonary toxicity caused by the drug. Because sponges only produce small quantities of the compound, organic synthesis was attempted. However the compound is difficult to synthesize, (13% yield), limiting its production in significant quantities. Current research has attempted to improve synthesis yield, optimizing growing conditions of the sponge, and alter the compound in a way that prevents pulmonary toxicity, but still possesses the microtubule stabilizing properties. A successful analogue of the drug will be used in phase 1 of clinical trials.

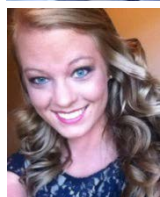


2D:4D DIGIT RATIO: INDICATOR OF SPORTS AND GAMING PARTICIPATION IN MALES

Nick Lehan, Kayla Smith (Dr. Jennifer Robbins)

Department of Biology

The ratio of the second to fourth finger lengths (2D:4D) is suggested to be an indicator for level of androgen exposure during fetal development. It is typically seen that more testosterone exposure leads to a lower 2D:4D ratio. This study was undertaken to see if there is a relation between this testosterone exposure, represented by the 2D:4D digit ratio, and a person's level of competitiveness in various areas. Subjects completed a survey that was comprised of the Revised Competitiveness Index and questions involving competitive activities. Subjects also had their right hands photographed to find their 2D:4D ratios. The difference between male and female ratios was statistically significant. Males that competitively game had significantly lower ratios than males that do not game, and males who play sports had significantly lower ratios than males who do not. Social and natural science majors tended to have lower digit ratios than those majoring in the humanities, but there was no relationship established between 2D:4D and scores on the Revised Competitiveness Index. While the 2D:4D digit ratio was not found to be an indicator of competitiveness as a trait, it does seem to be a marker for participation in some competitive activities for males.





AN ASSESSMENT OF MACROINVERTEBRATE COMMUNITIES AND HABITAT QUALITY IN THE MILL CREEK WATERSHED, CINCINNATI, OHIO

Trisha Makley, Lauren Stock (Dr. Mollie McIntosh)

Department of Biology

Rapid urbanization during the past 200 years in Cincinnati, Ohio, has led to the deterioration of the city's central waterway, the Mill Creek watershed. Cumulative impacts from industrial effluents, road run-off, combined sewer overflows, and habitat destruction have resulted in the Ohio Environmental Protection Agency designating all streams within this watershed as impaired. Continued efforts are underway to improve the quality of the watershed, however baseline data are still needed to understand the current condition and to assess future improvements. The main objectives of this study were to (1) assess the benthic macroinvertebrate community and habitat quality within the Mill Creek watershed, and (2) relate these data to a concurrent chemical assessment of the watershed. In July 2014, a rapid biological assessment of nine stream segments within the Mill Creek watershed were conducted (including 2 segments in West Fork Creek, 2 in West Fork Mill Creek, 2 in East Fork Mill Creek and 3 in the mainstem Mill Creek). Quantitative macroinvertebrate community samples were collected from 3 random riffles located within the stream segment and a qualitative macroinvertebrate sample (timed 30 minute search) from all macrohabitats were collected using 500 μm D-framed nets. To assess habitat quality a general evaluation of lotic macrohabitat characteristics were surveyed using the Qualitative Habitat Evaluation Index (QHEI). All macroinvertebrate samples were preserved in 70% ethanol, sorted and all taxa were identified to the lowest possible taxonomic level. Preliminary results suggest low variability in riffle macroinvertebrate communities among sites, with numerous Ephemeroptera and Trichoptera taxa present. However, macroinvertebrate diversity was more variable among sites when all macrohabitats were considered. A range in habitat quality was observed throughout the watershed, with QHEI index scores ranging from good (55 -70) to very poor (< 30). Overall, this study will provide needed baseline data necessary for future monitoring, management and restoration efforts within the Mill Creek Watershed.



CELL HARDENING

Charlie Pfister (Dr. Waltke Paulding)

Department of Biology

In the battle against cancer, various types of treatments have been practiced, including chemotherapy, immunotherapy, radiation therapy, targeted therapies, and transplantation. While many of these methods are effective at treating milder forms of cancer, they work poorly for treating pancreatic cancer, which is one of the most lethal. Recently, a new treatment has been developed to specifically address highly aggressive cancers, such as pancreatic cancer, called cell hardening. Cell hardening acts by targeting cancerous cells within the pancreas, (or hopefully any infected organs in the future) and halting their division during telophase I of meiosis. The overall goal is to suspend cancerous cells in their proliferation stage permanently and then remove the cells from the body. An ethical dilemma surrounding the experimental treatment is the associated cost. Specifically, given that pancreatic cancer has almost 100% mortality, is it ethical to spend the large quantity of time and money on treatments if the hope for a cure is bleak? Or is it ethical to save the money and time of researchers and doctors and put it towards cancers or other diseases with a better chance at success? I currently explore both the promising treatment of cell hardening as an effective treatment for pancreatic cancer and the ethics questions surrounding the cost of treatment.



CRANIAL AND DENTAL EVIDENCE OF KILLING BEHAVIOR IN VELOCIRAPTOR MONGOLIENSIS

Adrian Oppong (Dr. William Anyonge)

Department of Biology

The dinosaur family Dromaeosauridae, lived during the Cretaceous period (144-65 million years ago). The Dromaeosaurid comprised of the Genus *Velociraptor*, were between 2 and 3 meters in length. Dromaeosaurids had serrated teeth that were the same on each tooth. Although it did not have a strong bite force like T-rex, *Velociraptor* used its serrated teeth to tear its prey's flesh, inducing death from blood loss. Like *Velociraptor*, *Allosaurus* did not have a strong bite force to cause instant death of its prey. Instead it used its serrated teeth and fairly large neck muscles to tear the flesh off its prey. There were other dinosaurs as well as extant relatives that performed different feeding mechanics such as chomping and chewing. This study seeks to identify and quantify cranial, dental, and muscular characteristics in *Velociraptor* and selected species of carnivorous as well as herbivorous reptiles (*Allosaurus*, Komodo dragon, Crocodile, and Iguana). It is hypothesized that reptiles that kill prey by tearing their flesh would be expected to exhibit small cranial muscles and serrated teeth among other characteristics as evidenced by skull measurements.



PREVALENCE OF ORAL CANCER IN RESPECT TO PROPER KNOWLEDGE AND SOCIOECONOMIC STANDING OF INDIAN POPULATIONS

Anish Patel (Dr. Waltke Paulding)

Department of Biology

This thesis has the main point of understanding the correlation between knowledge levels of smokeless tobacco, and the risk factors that these individuals have towards being diagnosed with oral cancer. This study is prevalent in the Indian populations due to low education levels in many areas of the countries, and could also be linked with socioeconomic issues. The biology behind oral cancer and smokeless tobacco has to do with detection of aneugenicity and clastogenicity in buccal epithelial cells of the various types of smokeless tobacco. The cyclin d1 gene expression holds a mutation in tobacco users, and the presence of dysplasia show tobacco users are susceptible for further changes and development of carcinoma. Studies are shown in students between ages of 12-15, in women populations of low socioeconomic status, and a random sample of 1500 men all from India to decipher how cancer can affect the entire sample size. Conclusions have been made to increase awareness for all three groups in order to help lower the use of smokeless tobacco in any form, and help from preventing cancer due to the natures of the findings on the literature.



AN ASSESSMENT OF AQUATIC MACROINVERTEBRATES IN WATERBODIES ENDEMIC FOR BURULI ULCER IN BENIN, AFRICA

Kevin Perkins (Dr. Mollie McIntosh)

Department of Biology

Buruli Ulcer (BU) is an understudied infectious disease, caused by the bacterium *Mycobacterium ulcerans*, and is endemic to West and Central Africa. The bacterium produces a lipid toxin that destroys skin and subcutaneous tissue, resulting in ulcers. The mode of transmission is unknown, but predacious aquatic insects of the families Belostomatidae and Naucoridae (Order: Hemiptera) have been suggested as potential vectors of the causative bacteria. Few comprehensive analyses of macroinvertebrate communities in endemic regions have been conducted. The main objectives of this study were to assess temporal variation among macroinvertebrate taxa and to compare aquatic communities between waterbodies with high and low endemicity for BU. Four waterbodies, frequently used by local residents, were selected from rural areas of the Lalo commune located in the southwestern region of Benin, Africa. Four standardized macroinvertebrate samples were collected from each waterbody in June 2012. Samples were also collected from one of the endemic sites in June 2012, May 2013, December 2013, and May 2014. All samples were preserved and then identified in the laboratory. Preliminary results suggest the presence of Hemiptera in both high and low endemic waterbodies. However, frequency and abundance of Belostomatidae and Naucoridae varied over time and among sites. These results will be used to better assess biting Hemipteran's role as vectors of *M. ulcerans*, characterize the disease potential of water bodies and aid in disease prevention.



POWDERY MILDEW EFFECTS ON GARLIC MUSTARD ALLELOCHEMICALS

Ian Purvis, Tanya Rana (Dr. Kathryn Morris)

Department of Environmental Sciences/Microbiology

Alliaria petiolate, commonly known as garlic mustard, is a plant species known to be invasive in North America. It invades forested regions of North America and displaces many native species quickly. The allelochemicals, chemical compounds produced by the plant for defense purposes, harm components of other plants' root systems that reduce their ability to appropriately gain nutrients from the soil. Learning more about the allelochemicals of garlic mustard is of importance in understanding how to potentially prevent or help reduce the effects they have on the surrounding ecosystem. A recently discovered fungus, *Erysiphe cruciferarum* or powdery mildew, has been observed reducing the competitiveness of garlic mustard. This experiment aims to determine whether or not powdery mildew affects allelochemical production which could explain how it reduces the plant's competitiveness. A control and experimental group of garlic mustard were grown under the same conditions. The experimental group was then infected with powdery mildew spores. The allelochemicals, specifically glucosinolates and flavonoids, were then isolated from each group, and the levels of each were quantified using HPLC.





THE EFFECT OF STREPTOMYCES BACTERIA ON SOIL AGGREGATION AND PROTEIN PRODUCTION

Ian Purvis, Tanya Rana (Dr. Kathryn Morris)

Department of Environmental Sciences/Microbiology

Soil aggregation is very important in our environment because it helps stabilize soil so plants can grow better and no dust bowls occur. *Streptomyces* bacteria are also very important to our environment because they help to recycle nutrients such as nitrogen and produce that distinct odor that we associate with the smell of soil. *Streptomyces* bacteria are very abundant that in a sample of soil, 30% of the mass could be attributed to *Streptomyces* bacteria. This study was conducted to see how the addition of *Streptomyces* bacteria into a crushed, sterile soil sample affected the rate of soil aggregation and protein production caused by the bacteria. Soil aggregation was quantified by running the sterilized soil through different sized sieves and collecting the water stable aggregates and coarse material in beakers and let dry and the amount of water stable aggregates was determined from this method. Protein production was quantified by using a Bradford assay and then a spectrophotometer was used in order to quantify the protein levels in the control and experimental soil groups.



ALLOGENIC STEM CELL TRANSPLANTS IN ACUTE MYELOID LEUKEMIA

Caroline Shrum (Dr. Waltke Paulding)

Department of Biology

Blood cancer is ranked as the third leading cause of cancer deaths across the United States. There are limited treatment options such as chemotherapy, radiation, and bone marrow transplants. A specific type of bone marrow transplant, allogenic stem cell transplant (alloSCT), has become increasing successful in curing types of blood cancer. Specifically, I researched the success rates in acute myeloid leukemia (AML). AML causes a large number of white blood cells to be produced that leave limited space for healthy red blood cells. An alloSCT is needed to restore normal functioning red blood cells, white blood cells, and platelets. It was found that patients who received alloSCT had a much high cure rate than those who only underwent chemotherapy alone. These patients had higher chances of entering complete remission and longer life expectancies. However, most studies saw the greatest results when alloSCT followed a course of intensive chemotherapy. These results indicate that both treatment should be used in combination with each other in order to have the highest success rates. These results may play a significant role in future patient treatment options.

IMPROVED DETECTION AND SCREENING METHODS FOR COLORECTAL CANCER

Rahn Simon (Dr. Waltke Paulding)

Department of Biology

Colorectal cancer is the second leading cause of cancer-related deaths in the United States for cancers affecting both genders. However, early detection through active screening can reduce the disease burden and improve survival odds. Several new methods are being explored to complement or replace older procedures. Current optical screening methods include standard colonoscopy, often considered the “gold standard,” as well as flexible sigmoidoscopy and capsule endoscopy. Two virtual screening alternatives which are gaining popularity are CT colonography and MR colonography, while a third, barium enema, is losing acceptance. All three may additionally employ “fecal tagging” to improve accuracy and simplify bowel preparation. Home-based tests have also been developed which simplify testing, but which are less reliable. For instance, the fecal occult blood test detects blood in stool, while Cologuard® additionally measures methylation of biomarkers in shed DNA. Blood and serum tests measure complement protein levels or track methylation of specific DNA biomarkers, possibly employing nanoparticles to improve sensitivity. Furthermore, microRNA analysis has grown in recent years, with increased or decreased levels of specific miRNAs showing promise as disease indicators. This article documents the common methods used to detect colorectal cancer and the myriad new screening procedures under development.

(R)-FUSCUMOL ACETATE: A CANDIDATE ATTRACTANT PHEROMONE OF Nicrophorus DEFODIENS

Alexander Vaisvil (Dr. Ann Ray)

Department of Biology

Beetles of the genus *Nicrophorus*, or burying beetles, are vital indicators of forest health, although the biology and mating behavior of many species is poorly understood. Male-produced volatile pheromones mediate mate location in several species of *Nicrophorus*. We hypothesized that males of *Nicrophorus defodiens*, a species endemic to the Pacific Northwest of North America, would also produce volatile pheromones. The results of a preliminary field bioassay demonstrated that female *N. defodiens* were strongly attracted to traps baited with a racemic blend of (*R*)- and (*S*)-fusicumol acetate. We conducted field bioassays in Alaska to test the response of female *N. defodiens* to traps baited with the single enantiomers. We also collected headspace volatiles from male *N. defodiens* to isolate and identify pheromone components. Significantly more female beetles were collected in traps baited with (*R*)-fusicumol acetate than were collected in traps baited with the (*S*)- enantiomer or in blank controls. This result suggests that (*R*)-fusicumol acetate is a likely attractant pheromone for this species.

Business

D'ARTAGNAN CAPITAL FUND

Richard Burke, Ben Cloutier

Department of Business

D'Artagnan Capital Fund is an opportunities fund which values large cap equities within the S&P 500 utilizing a bottom-up approach. Our analysts extensively research company financials, management, and industry competitors in formulating financial valuation models which lead to investment decisions. Our goal as a fund is to continuously outperform our benchmark – the S&P 500 – on a risk-adjusted return basis while remaining compliant in accordance with our prospectus. The D'Artagnan Capital Fund is solely run by Xavier University students. We manage approximately \$2.4 Million of Xavier's Endowment. Per our prospectus, our exposure is limited to large-cap equities, and we currently manage a portfolio of 47 companies.

<http://www.xavier.edu/williams/equity-fund/>

Chemistry



METHOD OF COLLECTION AND DETECTION FOR AIRBORNE ORGANO-ARSENIC COMPOUNDS

Kristin Clark (Dr. Barbara Hopkins)

Department of Chemistry

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METAL SUBSTITUTION IN A COPPER AMINE OXIDASE FROM YEAST

Blake Barlow (Dr. Stephen Mills)

Department of Chemistry

Copper Amine Oxidases (CAOs) are a large class of enzymes whose primary role is to catalyze the oxidation of primary amines to the corresponding aldehyde, as well as the reduction of molecular oxygen to hydrogen peroxide. These enzymes are widely distributed in nature, and are found in both prokaryotic and eukaryotic organisms. CAOs catalyze the oxidation of primary amines to aldehydes through a ping-pong enzymatic mechanism using an organic cofactor (TPQ) and a Cu(II) ion. The reductive part of this mechanism is well documented, and involves the hydrolysis of a Product Schiff Base to release the aldehyde as the cofactor becomes reduced. The oxidative part of the reaction is less understood, and somewhat controversial. Two different mechanisms for this oxidation have been proposed and documented. One mechanism involves the reduction of Cu(II) to Cu(I) by TPQ, which causes the formation of a semiquinone form of TPQ. Cu(I) transfers an electron to oxygen forming a radical which ultimately becomes the hydrogen peroxide product. An alternate mechanism does not involve the reduction of Cu(II), and instead TPQ transfers an electron directly to oxygen. The Cu(II) ion stabilizes the oxygen radical until hydrogen peroxide is formed. The CAO from *Hansenula polymorpha* (HPAO) is currently being studied, with the goal of removing copper from the cofactor active site and substituting in Co(II), which cannot be reduced and thus prevents the first mechanism from occurring. Metal analysis through atomic absorbance spectroscopy is used to verify proper copper removal from HPAO, and enzyme kinetic analysis will be performed to test the reaction rate of the CoHPAO. The results of these tests will give clues to the preferred mechanism of this CAO.



DEVELOPMENT OF MICROSENSORS USING ATOMIC ABSORPTION AND CLOUD POINT EXTRACTIONS

Peter Donnelly (Dr. Adam Bange)

Department of Chemistry

The scientific demand for portable, point-of-care sensors in a clinical or field setting has been growing rapidly. This research aims at developing a microsensor for the determination of concentrations of heavy metals in solutions. The metals analyzed were cadmium, manganese, and mercury. Analytical methods used to determine the metals were atomic absorption and anodic stripping voltammetry. To prepare the solution for analysis, an extraction or a preconcentration step may be necessary. For this, a cloud point extraction procedure was optimized for each metal. A cloud point extraction forms a micellar phase around the metal complex. When heated this becomes a viscous solution that can be isolated from the aqueous layer. After isolation, the ions can be released as charged particles into a smaller volume of solution to accommodate the limit of detection for instruments used. This is ideal for the research of disposable sensors because the extraction does not require harsh solvents or create hazardous waste. The atomic absorption spectroscopy was used to accurately determine the concentration of metals in the solutions. Further research will include the testing of the cloud point products using atomic absorption spectroscopy and anodic stripping voltammetry. Current research involves analyzing samples on the atomic absorbance spectrometer from blood serum to conclude if metal concentration can be determined.



SUMMER 2014 MUNOX STUDY AT THE METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

Michael Jerge (Dr. Barbara Hopkins, Dr. Achal Garg)

Department of Chemistry

Following the record breaking North American winter of 2013-2014, the Metropolitan Sewer District of Greater Cincinnati sought to improve the industrial waste sewage treatment process. This innovative objective, in turn, unfolded from the inhibited nitrification process within the wastewater treatment process, which relies on naturally occurring bacteria to reduce ammonia concentration. As catalysts of aquatic chemical reactions, bacteria mediate most of the significant oxidation-reduction processes that occur in water, and temperature directly affects bacterial enzyme activity, resulting in dormant Nitrosomes. Thus, the intention was to introduce genetically modified extremophiles into the wastewater treatment process. Prior to addition, however, the extremophiles, herein referred to as Munox, had to undergo several experiments and tests, which include, but are not limited to, alkalinity, ammonia and nitrate, and carbon-oxygen demand. It was found that the Munox bacteria symbiotically interact with one another, maintaining a steady and effective nitrification process. However, it remains inconclusive as to whether or not the Munox bacteria properly function at colder temperatures.



CATALYTIC OXIDATION OF PRIMARY ALCOHOLS BY TRANSITION-METAL-TRIPHOSPHATE COMPLEXES

Eric Lamping (Dr. Craig Davis)

Department of Chemistry

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CHARACTERIZATION OF CARBON PASTE ELECTRODES VIA CYCLIC VOLTAMMETRY

Matthew Monterosso (Dr. Supaporn Kradtap)

Department of Chemistry

Carbon Paste Electrodes (CPEs) are useful electroanalytical tools for measuring a vast group of both inorganic and biological compounds. Usually, a CPE is constructed of graphite powder and binding agent such as mineral oil. In this research, various readily available low cost carbon materials were tested for construction of CPEs in place of commercial graphite powder. These materials include wood charcoal, art charcoal, and multiple grades of pencil lead. Baby oil and vegetable oil were also tested as alternative binding agents to the lab grade mineral oil. Using an electroanalytical technique known as Cyclic Voltammetry (CV), CPEs could be tested for key parameters, such as anodic and cathodic currents, and peak potentials, for characterization of electrode performance. These parameters were compared with standard commercial glassy carbon electrode and lab grade graphite CPEs.



DETERMINATION OF MANGANESE CONCENTRATION AND EXTRACTION EFFICIENCY USING ATOMIC ABSORPTION SPECTROSCOPY AND ANODIC STRIPPING VOLTAMMETRY

Allison Pairan (Dr. Adam Bange)

Department of Chemistry

In a clinical setting, manganese concentration in the body can be a significant point of interest. Manganese is naturally used in the body for brain and nerve function, however, high concentrations of manganese may result in neurological disorders and poor cognitive performance known as manganism. Currently, the detection procedures for metals such as manganese, cadmium or mercury in the body are complex, expensive, require a specialized technician and often create hazardous waste. This research focuses on optimizing the extraction process of manganese in the efforts of creating a point-of-care microsensor for the detection of heavy metals in a clinical field. This sensor would be portable, inexpensive and disposable, as well as not require a specialist or create high volumes of hazardous waste. Different serums and extraction procedures were tested using atomic absorption spectroscopy and square wave stripping voltammetry to determine their concentrations. One particular extraction method that was modified was a cloud point extraction. This removes metal ions from a solution using a surfactant to enclose them within a micellar phase. This micellar phase can be reopened, leaving the metal ions exposed from the original matrix and available for analysis.



CATALYTIC OXIDATION OF PRIMARY ALCOHOLS BY TRANSITION METAL-TRIPHOSPHATE COMPLEX

JP Rizik (Dr. Craig Davis)

Department of Chemistry

This project is designed to develop a catalyst which utilizes the abundance of O_2 in the air as the oxidizing agent to oxidize primary alcohols to aldehydes. The goal is creating a metal-organic catalyst capable of replicating the oxidations that occur in nature (bio-mimetic chemistry). Using transition metals such as nickel and copper for catalysis is rare because of the difficulty of accessing the required higher oxidation states; however, the potential for these metals as catalysts is expanding as ligands are developed to stabilize those higher oxidation states. The Baldwin group at the University of Cincinnati formed a tris-oxime nickel-organic catalyst capable of oxidizing methanol, but its turnover number is low.

Our research group has since moved away from $H_3TRISOX$ to the similar yet even larger $H_3TRIPHOS$, replacing the three methyl groups with phenyls. The phoxime groups were created by converting 2-chloroacetophenone to an oxime through the use of hydroxylamine. Three equivalents of phoxime were then added to methanolic ammonia solution, forming a core nitrogen with three phoxime groups surrounding, or $H_3TRIPHOS$. MCl_2 ($M = Ni, Cu$) is then mixed with $H_3TRIPHOS$ in acetonitrile to form $M-H_3TRIPHOS-Cl_2$ (our pre-catalyst).

The $M-H_3TRIPHOS-Cl_2$ complex is dissolved in the appropriate alcohol, which acts as both substrate and solvent. Potassium hydroxide deprotonates the oxime functional group, which in turn displaces the chlorine on a second metal center; the resulting doubly bridged dimer is the active catalyst. The volatile are removed from the catalyst by using a Schlenk Line. The turnover number can be identified through either Gas Chromatography or ^1H-NMR spectroscopy.



ORGANIC SYNTHESIS OF REPURPOSED COMPOUNDS FOR THE ICCL PROJECT

Ankit Srivastava (Dr. Richard Mullins)

Department of Chemistry

The International Clinical Compound Library (ICCL), located in St. Louis, Missouri is a non-profit project headed by the Center for World Health and Medicine at the St. Louis University Medical School. The purpose of the ICCL is to create effective new drug therapies for unmet medical needs, including rare and neglected diseases, by reducing the time and expense of bringing a drug to market. This library would provide a source of potential drugs for study by researchers around the world. Our group is investigating the synthesis of six potential compounds for this library, with the goal of producing one gram of each to be donated to the ICCL. Originally developed using a three-step process, two of these compounds, idazoxan and imiloxan, have shown promise as α -2 adrenergic receptor antagonists and 12 receptor antagonists. The synthesis of these two compounds, formerly used in the treatment of psychological disorders, will be discussed.

DETERMINATION OF HEAVY METALS IN BLOOD

Jacob Stapleton (Dr. Adam Bange)

Department of Chemistry

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QUANTITATIVE ANALYSIS OF HYDROGEN PEROXIDE USING CRUDE PEROXIDASE EXTRACT FROM CUCUMBER PEEL

Lindsey Totten (Dr. Supaporn Kradtap-Hartwell)

Department of Chemistry

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Classics

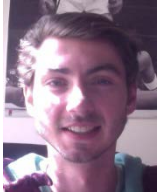


Aristotle & Locke: Ancients and Moderns on Economic Theory and the Best Regime

Andrew Del Bene (Dr. Timothy Quinn)

Department of Classics (HAB)

This project examines and evaluates Aristotle's *Politics* in conjunction with John Locke's *Second Treatise of Civil Government* in terms of how each philosopher attends to both the material *and* non-material goods of a political agglomeration in order to reevaluate concepts in ancient political philosophy that may benefit political thought and organization today. I examine Aristotle and Locke's accounts of the origin, economics, and the end(s) of civil agglomerations in order to understand the original impulse for, practical operations of, and ultimate reason for, civil agglomeration. Given the coherence of his method, his normative evaluation of *both* the material and non-material behaviors of a community, and his emphasis on the comprehensive non-material welfare of the community, I demonstrate in this project that Aristotle better accounts for the truly human aspects of civil agglomeration than John Locke.



BLUEPRINT FOR LEGAL PRACTICE: ESTABLISHING CICERO'S IDEAL STYLE

Henry Farrington (Dr. Thomas Strunk)

Department of Classics (HAB)

Marcus Tullius Cicero represents the greatest historical expression of the ideal, best orator and lawyer. Cicero is praised for his success in the Roman trial court and skills of legal practice in that arena. Due to the disparity between the Roman world and modern America in the late-20th/21st century and the lack of a comprehensive guideline, American lawyers do not directly emulate the style of Cicero, with the goal of achieving the status of the ideal lawyer. Cicero has a certain, specific style of legal practice which can be applied to the modern American trial court setting. Through the analyses of Cicero's works, a stylistic blueprint containing the eleven (11) attributes of the ideal lawyer are established with the purpose of realistic application for modern lawyers seeking to embody Cicero's ideal. The blueprint is applied to four (4) cases from Cicero's own legal experience to support the argument for Cicero's criteria. It is then applied to the modern American courtroom, and provides the means by which a generalized definition of the American lawyer would embody these ideal attributes.



Πρόσωπα AND PROMETHEUS BOUND

William Henry (Dr. Shannon Hogue)

Department of Classics

Earlier this year, Xavier students taking the Greek class on Aeschylus decided to reproduce the play, Prometheus Bound, on stage. The idea behind the project was that attempting to produce the play considering conventions of fifth century Greek stagecraft would yield insight into how the ancient play might have been performed. We played with several elements of the play; the one which I worked on was the presence of full head masks, called πρόσωπα in Greek. The use of these masks is well-attested in fifth century Greek tragedy, insofar as they were an integral part of stagecraft that hid the emotions of the actors from the audience. Thus, in producing Prometheus Bound, I too had to produce these masks. The research I had to do mainly involved the materials and processes used to construct these masks. This is difficult research, because there are not any surviving examples of these masks; the Pronomos vase, and the notion that they must have been practical to the setting of the play (Greek amphitheater) were what drove our choices. I settled on a process using a modern material, called modroc, which is a composition of gypsum plaster and linen.



CLIPEUS AENEAEE: THE SUBSTANCE OF THE MYTH

William Henry (Dr. Thomas Strunk)

Department of Classics

Although most commonly thought of by scholars as simply a divine symbol and literary device showcasing the glory of Rome to come, the purpose of this presentation is to describe the The Shield of Aeneas in a tangible and realistic way to emphasize its role as arma as a way of proving a well established historical and archaeological tradition around Troy. Previous literature concerning the Shield of Aeneas is dedicated to philologically analyzing the narration, symbolism, and theme of the shield's decorum; meanwhile, archaeological approaches to the shield are rare, if not completely absent, in scholastic research, when in truth, archaeological approaches can prove to be valuable to understanding the time period which the author understood as being associated with Aeneas, Troy, and the Late Bronze Age. My argument follows that the descriptions which Vergil gives are consistent with archaeological examples of Late Bronze Age ἀσπίδες, a type of Greek bronze shield often depicted on painted-pottery as quite large and circular. This seems important to understanding what the shield might have looked like, considering the often present anachronisms (i.e. with scutum) by Vergil. The comparisons to the ἀσπίς extend beyond simply its shape and size; the descriptions Vergil gives of the shield lend insight into the composition (via its creation by Vulcan) of the Shield of Aeneas, which also match surviving ἀσπίδες very closely. The notion that Vergil's descriptive vocabulary is similar to Homer's is evidence of a consistent historical tradition concerning Troy. This tradition, even further, seems to support and is further supported by the archaeological evidence being uncovered at Hisarlık in Troy VIIa. In comparing the written record with the physical, I discuss the probable style, size, and composition of the Shield of Aeneas. By doing this, the shield's role as a weapon is emphasized and lends some insight into the consistency of the Aeneid with Homeric details concerning the historicity of the events before, during, and after Troy.



THE ART OF THE STAGE MACHINIST: A DRAMATIC RECONSTRUCTION OF AESCHYLUS' LINEAR TRAGEDY, "PROMETHEUS BOUND"

Alexander Spindler (Dr. Niamh O'Leary, Dr. Rebecca Muich, Dr. Jo Ann Recker)

Department of Classics & Modern Languages

The field of research within this project deals with the development and ever-changing perspectives on stagecraft in antiquity. I have crafted, to the best of my abilities, a fully-realized production of Aeschylus' *Prometheus Bound* as it would have been presented in the early to mid-fifth century in Athens. The cornerstone reason behind researching this topic is that stagecraft is only viewed as a supplementary addition to a production in antiquity. These texts by renowned tragedians are considered autonomous masterpieces of poetry that need no further assistance in telling their stories. I have also looked closely at the work of Aristotle's *Poetics* and this philosopher's perspective on the value of "Stagecraft" in antiquity. Of all the inherent qualities of producing a tragedy, the spectacle and physical aspects of a tragedy are the least important since the text stands the test of time regardless of its physical "limitations." I challenge him on various assertions from a practical standpoint. This piece of researched maintains a linear structure, much like the episodic nature of the tragedy, *Prometheus Bound*. Within it, the chapters are divided into four scenes that parallel the development of plot in the production. After a brief synopsis of what occurs in that particular scene, the chapter addresses such constraints of the theatre in fifth-century Athens, the controversies behind supposed productions of *Prometheus Bound* with which scholars still wrestle and the nature of the music, costumes and masks for each character. Such meticulous attention to detail demonstrates the need for stagecraft despite a need for tangible evidence from this epoch in history. Furthermore, tragedy by definition is poetry that needs to be *performed* and not simply *read* in order for a more wholesome and cathartic experience. Otherwise, these texts simply stand as other works in the canon without any physical representation. For instance, this paper will discuss the debate over Aeschylus' authorship and the affect that this fact has on dating a performance for the play. Various scholars weigh in on the authenticity of *Prometheus Bound* as a work of Aeschylus. Depending on the interpretation, *Prometheus Bound* could have first been produced before or after the influence of Sophocles, another major tragedian of the time. This would allow for more than one actor to enter onto the stage, change the method of presentation and even alter the façade of the *skene* (backdrop) throughout the production. This branch of research is vital in understanding tragedy from not simply a poetic perspective but also from the flesh and blood of its physical characteristics. Additional research which has complemented this endeavor includes such texts by the foremost scholar on ancient stagecraft, Oliver Taplin, his expansive volume *The Stagecraft of Aeschylus* and the works of other prominent theatre experts such as Mark Griffith and Helene Foley. This work has aided me in making intangible and inconceivable concepts (such as masks, emotional composure and performance music) palpable for my readers and myself.

Mathematics and Computer Science

THE LINEAR ALGEBRA BEHIND GOOGLE

M'Kai Folley (Dr. Minerva Catral)

Department of Mathematics and Computer Science

The aim of this project is to first study how Google uses Linear Algebra to calculate importance scores for webpages. The Perron-Frobenius theorem for nonnegative irreducible matrices is used in the study of systems with unique rankings, non-unique rankings, and dangling nodes. A second aim is to apply the Perron-Frobenius theorem to find the most common played genre of music amongst 20 students that I surveyed.

Modern Languages

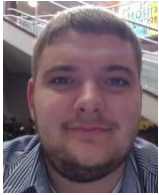
UNDERSTANDING HATRED: CATHOLIC-PROTESTANT RELATIONS IN 19TH CENTURY CINCINNATI

Charles Rosebrough (Dr. Shannon Hogue)

Department of Modern Languages

In my thesis, I argue for a more nuanced understanding of Catholic-Protestant relations in 19th century Cincinnati. The majority of scholarship concerning these two Christian denominations in the United States has contended that Protestants have always dominated American society. As part of this domination, scholars have argued that Protestants, for the entirety of the 19th century, abused and marginalized Catholics. While the premise that Protestants have dominated American culture may be true, the conclusion that this domination lead inevitably to abuse is false. In my paper I break down Cincinnati's history into five eras. Within each era I show the true breadth of sentiments between Catholics and Protestants. At Catholicism's beginning in the "Queen City," Protestants and Catholics were on good terms. Inter-trading freely and even at times worshipping together. But as the century wore on it saw the rise of the Know Nothing Party and an institutionalized hatred. This too passed and Cincinnati moved into an era of intellectual debate. From debate came ecumenism and in the early 1880s, Cincinnati Catholics and Protestants interacted in constructive and cohesive ways. But the bond was not to last. The century closed with the arrival of the American Protective Association, an anti-Catholic society as vehement as the Know Nothings of the 1850s. And so, from even this cursory glance one can see the real mutability of Catholic-Protestant relations in 19th century Cincinnati.

Music



MEANINGLESS MUSIC FOR THE MODERN TIMES

Jonathan Norris (Dr. Kaleel Skeirik)

Department of Music

Erik Satie was known as one of the most unique and innovative composers of the 19th century. Satie wrote music based on modal harmony and simple rhythm instead of the centuries old standard of tonal harmony and complex rhythms making him one of the first innovators of the modern era. One of his most famous pieces is a piano piece by the name of, Gymnopedie. This piece was a cornerstone work within 20th century music literature. Using the Music Composition software, Finale, I have created a modern arrangement of this 19th century piano work that expands its fundamental concept of contrasting timbres. I created this arrangement for string orchestra consisting of: Violin 1, Violin II, Viola, Cello, and String Bass. I decided on this instrumentation because of how I could expand the color (timbre) of the work in a more expansive way that Satie did at the time he wrote it. For example, the string orchestra provides a different texture; the chordal structure can be changed such that the voicing of the chords extend over several octaves, carefully inserted countermelodies can enhance the fundamental melody and more emphasis can be given to key rhythmic and metric features of the work. The string orchestra also allows for instruments to be more rhythmically active without stepping out of the boundaries of Satie's beliefs. Dr. Kaleel Skeirik, composition professor, mentored me in the creation of this project. Manami White, orchestra director, selected this work for performance on the Xavier Spring Concert Series. I will be submitting this work to music publishers for publication in the near future.

Philosophy



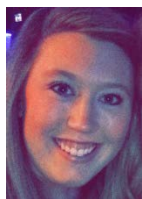
THE NATURAL LAWS OF GLOBAL TRADE: HOBBS AND VATTEL ON INTERNATIONAL COMMERCE

Juan Martir (Dr. Aaron Szymkowiak)

Department of Philosophy and Classics

My research is concerned with the application of the natural law theories of Thomas Hobbes and Emer de Vattel in the realm of international relations, more particularly international commerce. The paper begins with Hobbes' state of nature among individuals and its accompanying epistemological problems. It then progresses to the state of civil society and how individuals relate to one another, in addition to the sovereign. These two constructs (state of nature and civil society) are then used to inform the international condition – or *status inter civitates*, which is distinct both materially and epistemologically from either. The paper then explores Vattel's concept of the polity as a moral person (with its own obligations towards self-perfection) and its role in the Vattelian *cosmopolis* or global community. This paper argues that the Vattelian polity uses international commerce as a means to preserving a kind of balance of power among polities, while the Hobbesian conception is one that is more concerned with internal (i.e. domestic rather than international) stability and order. Additionally, the former is more amenable to ideas of free trade among polities, whereas the latter is more skeptical. Other ideas explored are the Hobbes' possible disposition toward mercantilism and the conception of human nature (sociable or unsociable) in either philosopher. The method employed is an analysis of Hobbes' works (*De Cive* and *Leviathan* in primary text Latin) and Emer de Vattel's *Law of Nations*. This paper hopes to provide a framework by which international contemporary politics may be understood through an examination of enlightenment-era political philosophy and natural law theory.

Philosophy, Politics, & the Public



MEDICAL BRAIN DRAIN: A HUMAN RIGHTS ISSUE

Kayla Boehner (Dr. James Buchanan)

Department of Philosophy, Politics, & the Public

The human rights tradition directs the way that governing bodies address many different issues. Coming out of the Western liberal tradition, human rights are the basic rights that all individuals are entitled to. Health care is universally considered a human right, as established by the Universal Declaration of Human Rights and the Millennium Development Goals. This thesis examines the medical brain drain through the lens of human rights. This perspective on the medical brain drain sheds light on the way that the United States is indirectly exploiting the intellectual resources from developing countries. Looking at developing countries, such as Kenya and Tanzania, provides a glimpse of the medical brain drain and the detrimental affects it has on the health care systems in these countries. If the medical brain drain is a human rights issue, the United States needs to reevaluate the way it contributes directly and indirectly.



A POLARIZED ENVIRONMENTAL CONSCIOUSNESS IN THE AMERICAN PUBLIC

Amanda Burns (Dr. Steven Frankel)

Department of Philosophy

Environmentalism, as a movement, has conflicting points of views which are based on long standing, accepted philosophies. These different philosophies lead to an inability to reach effective solutions for local and global environmental problems. The American public is just beginning to acquaint itself with the movement as the acceptance of global climate change and its impacts are being circulated into the thoughts of the American public. This paper discusses potential philosophical roots of both the conservative and liberal views of environmentalism; by focusing on John Locke's work for conservatism and Jean Jacques Rousseau's ideas as the starting point for the liberal approach. American history shows support for both of these philosophies as well as a constant struggle for popular opinion throughout. Using these philosophies and America's unique history, today's polarization of environmental thought is understandable. However, in order for the country to move forward with one uniform social and political action plan to confront global climate change a push is needed to educate the American public on both of these fundamental philosophies as well as America's long history of struggling with agreeing on one practical solution.



YOUTH AND WAR RHETORIC IN ITALIAN FUTURISM AND FASCISM

Cassandra Burns (Dr. Alexandra Korros)

Department of Philosophy, Politics, & the Public and History

Italian Futurism and other early 20th century Italian intellectual movements contained the seeds of Fascism, demonstrated by Mussolini's use of Futurist rhetoric throughout the entirety of his regime. This thesis briefly summarizes Italian political from unification in 1870 until the height of Mussolini's regime in the 1920s, investigating the histories of Italian Futurism and Fascism to compare their respective glorification of youth and warfare in opposition to Italian liberalism. Research consists of primary sources, including writings by Mussolini, Prezzolini, and other Fascists and Futurists, as well as scholarly secondary sources. This thesis illustrates how the Futurists used youth and war rhetoric in order to advance a radical political agenda. On the other hand, while Mussolini initially used the same rhetoric to gain support among the Italian liberal regime's radical opponents, he then pragmatically departed from the radical Futurist agenda using the same rhetoric to sustain power and inspire loyalty to himself and the nation.

MERIT BASED PAY IN THE US

Kyle Comer (Dr. Mack Mariani)

Department of Philosophy, Politics, & the Public

The debate to fix the learning gap in the United States has toyed with the idea of merit based pay for years but always ends up throwing it back and pushing it down. While many believe it is solely a result of the prejudice accompanying the topic from the Unions and their political supporters, the other glaring issue is the lack of attempts in schools. While there is plenty of research in Europe and even some speculation on how it would be received in the United States, there is a lack of research or interest in the US to properly assess the benefits and the issues. My paper takes a look at what would happen economically and politically if education reform would be brought to the center stage of American politics. The discussion cannot only be based on one topic such as merit based pay, it has to be looked at from several views, my paper specifies in the political discussion-taking place in a real way within the US. This paper shows several different ways to use a merit based pay system, but more importantly it focuses on the possibilities brought to the educational field when the question is brought to light.



INTELLECTUALISM IN SPORTS: PUBLIC FINANCING OF STADIUMS

Connor Cook (Dr. John Fairfield)

Department of Philosophy, Politics, & the Public

This thesis investigates how issues in sports, using the example public financing of stadiums, can be used as a vehicle for serious intellectual conversations. Public financing brings up issues of appropriation of public funds, how local laws are passed in the absence of public support, corporate welfare, gentrification and redevelopment, and how lawmakers in America can use paternalism to achieve goals they see fit, among many other subjects. Public financing is used as the focus of this paper because it is a phenomena that affects parties disinterested in sports and generally incites strong opinions on both sides, though the author makes no effort to declare his opinion, as the specific opinion is not important, but rather the fact that there is an opinion is important. The author brings up this topic as a method of showing that there is potential for intellectual benefit in sports debate.

BELIEFS OF THE FOUNDERS: AN EXAMINATION OF THE NATURE OF MAN AS SEEN FROM THE FEDERALIST

Andrew DeCilles (Dr. Timothy Quinn)

Department of Philosophy, Politics, & the Public

The Federalist, a collection of essays from 1787 and 1788, written by James Madison, Alexander Hamilton, and John Jay, examines the rationale behind the Constitution of the United States. The essays were meant to influence the vote in favor of ratification. This paper examines the views of James Madison and Alexander Hamilton on the nature of man as implied through select essays. The paper argues that while the Founding is often viewed as a radically new approach to democracy as compared to the French Revolution and “ancient” polis formulations of democracy, it actually makes many of the same pessimistic, bleak assumptions about the nature of man found throughout the 16th, 17th, and 18th centuries of political philosophy. The genius of the American Founding lies not in the brand of democracy it offered, but in the way that it accepts and applies those assumptions about the nature of man and still attempts to ennoble its citizens. The paper implies that, nonetheless, the views of our founders about the nature of man should lead us to rethink the ways in which the structure of our government influences us as a society, and to reflect upon whether or not we are satisfied with the lengths to which a regime based upon these assumptions actually ennoble its citizens.



IT'S A MAD WORLD: EXAMINING A NEW MODEL FOR ADDRESSING MENTAL ILLNESS IN THE WORKPLACE

Susan Draus (Dr. Paul Colella)

Department of Philosophy, Politics, & the Public

Mental illness is part of the cultural landscape of the United States of America. Although an estimated one third of the United States' population have a diagnosable mental disorder over a lifetime, the dominant discourse surrounding mental illness has been stigmatized by society as chronic and debilitating. Such intolerance of human variation leads to various types of discrimination that are expressly visible in the workplace. This paper proposes a cultural shift in businesses by gradually transforming the dominant discourse surrounding mental illness from the Medical Model that is currently in use to the Recovery Model. The Recovery Model differs from the Medical Model in that it implements a new philosophical approach that requires client empowerment. This paper proposes using the Recovery Model in businesses to reduce the stigmatization of mental illness, retract the glass ceiling for those diagnosed with a disease, and focus on the positive contributions of individuals. Perhaps one of the greatest strengths of the Recovery Model is that it treats a business as a community in which each individual contributes to the overall success. As such, the Recovery Model could be implemented in any similar setting such as an educational institution or government program.



THE EFFECT OF FEMALE POLITICIANS ON POLICY OUTCOMES

Andrew Dzedzic (Dr. Matt Lang)

Department of Economics

Over the past few decades, voters in the United States have been more accepting of female candidates. However, the debate concerning whether the increase of women in politics affects policy outcomes is unclear. Scholars have attempted to answer whether women serve as a trustee and enact significant changes—a model proposed by Edmund Burke in his speech to the Electors of Bristol. On the other hand, many believe policy outcomes will remain unchanged because politicians regardless of gender serve as delegates and directly reflect the wishes of their constituents. To answer this question, the study compares whether the percentages of women in legislatures—both internationally and in US state legislatures—impact government spending. Early results suggest that the election of female candidates will influence spending priorities.



LAUGHING MATTERS: THE INFLUENCE OF TODAY'S POLITICAL SATIRE

Meredith Francis (Dr. Michelle Brady, Dr. Kristen Renzi)

Department of Philosophy, Politics, & the Public

The golden era of network broadcast news— a time in which anchormen like Walter Cronkite, David Brinkley, and Dan Rather ruled the airways – has long since passed, leaving 24-hour cable networks, digital journalism, and social media to dilute the political discourse in America. But in recent years, political satire shows like *The Daily Show*, *The Colbert Report*, and even *Saturday Night Live*, have responded to the polarized tone of the media. Through a discussion of the evolution of broadcast news, journalism ethics, and the form of political satire, this paper argues that comedy has encouraged political discourse and that satire can actually encourage active participation in the public sphere and influence politics and the media. This paper focuses on three examples of when political satire influenced politics: *The Daily Show's* coverage of the 9/11 First Responders bill, Stephen Colbert's Super PAC, and Tina Fey's portrayal of Sarah Palin on *SNL* in the 2008 presidential election. Ultimately, this paper concludes that satire is a response to the tone of discourse put forth by the media and serves as an effective alternative for public engagement.



THOMAS JEFFERSON'S HORTICULTURAL LEGACY & ITS PLACE IN PUBLIC MEMORY

Karl Koch (Dr. Roger Fortin)

Department of Philosophy, Politics, & the Public

Thomas Jefferson stands out among the American Founders for the breadth of his intellect, though his towering reputation – as author of the Declaration of Independence, the third president of the nation, defender of the agrarian ideal – overshadows other aspects of Jefferson's varied interests. Of particular note in Jefferson's mind were the fields of botany, horticulture, and agriculture. Recent scholarship has brought new attention to Jefferson's horticultural pursuits, from his garden experiments at Monticello to his repeated attempts to import rice to the U.S. However, such scholarship falls short of connecting Jefferson's horticultural interests to his political ideology. Jefferson's passion for studying the natural world forms a constant thread throughout his political career, and indeed his entire life. Horticulture and agriculture were not simply hobbies for Jefferson, but rather, he understood both fields of study as intrinsically linked to society, a polity, and humanity as a whole. Nevertheless, for over a century American scholars have invoked Jefferson's interest in horti/agriculture to support varying and sometimes conflicting arguments. From his supposed radicalism or, conversely, his Lockean orthodoxy to his notorious rivalry with Alexander Hamilton, Jefferson has become a hotly debated character in American history. By reexamining Jefferson's life through a horticultural lens, this project seeks to bridge the gap between differing perspectives of Jefferson and show that someone who viewed himself as a member of the natural aristoi could still be a champion of democracy. With a focus on horticulture and agriculture, Jefferson brought a holistic vision to such public concerns as the economy, food systems, sustainability, and public health – concerns that continue to face the nation. A new understanding of Jefferson's legacy can shed light on how best to perceive these concerns today.



THE NEW INVENTORS OF CITIZENSHIP: THE IMPLICATIONS FOR CITIZEN-GOVERNMENT RELATIONS

Chuma Nnawulezi (Dr. Tyrone Williams)

Department of Philosophy, Politics, & the Public

The conversations and academic fieldwork that are devoted to understanding the different meanings of citizenship history are crucial parts of urban identity. As numerous sources vie to claim influence in the new definitions of citizenship, research regarding the current structure of citizenship is becoming increasingly important in the modern world. This comparative analysis attempts to understand the methods of new "governing bodies" that utilize advertisements to portray conceptions of citizenship. This analysis was completed by an examination of various forms of advertising (billboards, posters, fliers, pamphlets, etc.) and an analysis of academic literature on citizenship. The analysis specifically focuses on two paradigms for looking at urban citizenship: the social contract and "the right to the city". The findings in this analysis indicate impending tension about modern citizenship in the cities of Ahmedabad, India, Dakar, Senegal, and Buenos Aires, Argentina.



DEFENDING THE DIGNITY OF THE HUMAN PERSON: MASS INCARCERATION AND CATHOLIC SOCIAL TEACHING

Colleen Reynolds (Dr. Chris Pramuk)

Department of Theology

Written as a response to the systemic injustice and scandalous reality of mass incarceration in the United States, this thesis defends what resources Catholic Social Teaching offers with respect to affirming the dignity of every human person. In addition to a theological and sociological lens, these issues that surround mass incarceration today can also be understood within the ethical framework of philosophers like Immanuel Kant. This thesis also gestures to the ways that people of all faith backgrounds can potentially find in Catholic Social Teaching helpful resources for responding to the injustices of our criminal justice system.



MERITOCRACY, SOCIAL-MOBILITY, AND THE EDUCATION SYSTEM

Herbert Simanson (Dr. John Fairfield)

Department of Philosophy, Politics, & the Public

What is the relationship between education and the American Dream? Writer, publisher, and editor Katrina Vanden Heuvel wrote in a 2011 article for the Washington Post that,

The modern American dream has always been a simple promise of opportunity: Hard work can earn a good life, a good job with decent pay and security, a secure retirement, and an affordable education for the kids. The promise always exceeded the performance — especially with regard to racial and ethnic minorities, immigrants and women.

There is a belief in America that our country is guided at an individual level by the principle of meritocracy. The idea that everyone is afforded an equal opportunity to achieve whatever they are willing to work for. However, this idea, which has been labeled as essential to the national ethos, has rarely been afforded to the majority of Americans. Throughout America's history the power of wealth and privilege has prevailed over meritocracy in influencing social mobility. This is the case for a variety of reasons, but I am convinced that an essential one of them is that the education system favors some over others. This thesis will address historically why and how this has happened, while also providing possible paths to solutions to problems surrounding social mobility in America.

FEMALE USE OF MORALITY TO ENTER PUBLIC DISCOURSE IN THE UNITED STATES DURING THE 19TH CENTURY

Alice Trent (Dr. Christine Anderson)

Department of Philosophy, Politics, & the Public

Following moral principles established during the Second Great Awakening, Protestant women's reform efforts in the northeastern United States publically confronted immoral behavior. The Female Moral Reform movement challenged the sexual double-standard faced by women during the 1800s by attacking male use of prostitution while offering prostitutes means to reform their behavior. This paper investigates how Female Moral Reformers using morality as a means to enter public discussion acted as predecessors to Woman's Rights activists. Under a liberal feminist interpretation, Female Moral Reform was a feminist movement. Even though Seneca Falls and the associated Woman's Rights Movement made the first demands for female participation in political life, entering public discussion through morality was consistent with previous reform efforts of the early 1800s, specifically Female Moral Reform. This sharing of morality as a justification to enter public life connects these two movements and allows for an interpretation of the Female Moral Reform movement through a feminist lens.

Physics



CAMERA OBSCURA & PINHOLE CAMERA

Briana Davis (Dr. Heidrun Schmitzer)

Department of Physics

The purpose of this experiment was to be able to turn a room into a camera obscura. With this, obtain an image only using a 2.5mm pinhole and no lens. According to the inverse square law, the optimal resolution for the image is 3 feet. After 3 feet, the image will disappear. A protocol for a pinhole camera was established and pictures were obtained using the camera obscura. This experiment was done in three steps: determining the size of the hole, determining the optimal resolution for an image, and comparing those measurements using a smaller test image. The information obtained was then used to project a landscape. Finally, reproducing an image of the landscape inside the camera obscura was the last step to producing a manual for a camera obscura.



THE EFFECT OF APPLIED MAGNETIC FIELD ON MAGNETISM IN Mn₃O₄

Anne Farwick (Dr. Jonathan Morris)

This work was performed at the University of Illinois Urbana-Champaign under Dr. Gregory MacDougall

Department of Physics

The material Mn₃O₄ has been studied for over 60 year, and demonstrates many interesting behaviors, resulting from geometrical frustration and strong spin lattice coupling. One example is the coupled magnetic and structural transition recently observed to occur at T_c=33K, which can be manipulated with applied magnetic field or pressure. Specifically, it has been shown the structural transition at 33K can be encouraged or completely suppressed by applying a magnetic field parallel or perpendicular to what is known as the tetragonal b crystallographic axis. The objective of the current project is to explore the effect of an applied field on the accompanying magnetic order at varying temperatures and in different crystallographic directions, through neutron scattering measurements on large single crystals. In this poster, I will report my work of growing and characterizing Mn₃O₄ single crystals, and performing and analyzing data from neutron scattering experiments performed at Oak Ridge National Laboratory. I will discuss the results, which confirm the samples were magnetic and of high quality, and that we were able to train the ferrimagnetic domains through applied field and a custom-made sample rotator. I will further discuss the effect of applied magnetic fields on the order, when applied nearly parallel to the tetragonal b axis. These results will also be used in future studies to explore the effect of applied field in other crystallographic directions.

THE EFFECT OF TURBULENCE ON COSMIC RAY PROPAGATION IN PROTOSTAR SYSTEMS

Donovan Herbert (Dr. Marco Fatuzzo)

Department of Physics

The magnetic field associated with young stellar objects are expected to have an hour-glass geometry, i.e. the magnetic field lines are pinched together in the equatorial plane surrounding the forming star but are subsumed smoothly onto a background field at large distances. In such a structure, incoming cosmic rays experience both a funneling effect, which acts to magnify the flux impinging on the circumstellar disk, and a magnetic mirroring effect that acts to reduce that flux. These effects nearly cancel out for simple underlying magnetic field structures with respect to the leading order. However, the environments surrounding young stellar objects are expected to be highly turbulent and, thus, act to complicate these effects. We consider here how the presence of magnetic field fluctuations affects the process of magnetic mirroring, and thereby changes the flux of cosmic rays striking the circumstellar disks. These results may have significant consequences for the ionization fraction of the disk, which in turn dictates the efficiency with which disk material can accrete onto the central object.



OPTICAL NUMBER FACTORIZATION

Samuel Knight (Dr. Heidrun Schmitzer)

Department of Physics

Optical methods provide an interesting alternative to computer based techniques for prime number factoring. While current methods for numerical factorization are primarily computer based, it is possible to find the factorization of select numbers using an optical system as well. We used an optical system comprised of a laser, lenses, and a complex grating to yield factorizations by casting a series of diffraction patterns onto a screen simultaneously. These patterns were aligned in such a way that they revealed the desired factorizations. Computer factorization methods are problematic because they are limited by the operating speed of the computer system that is utilized, which in many cases takes too long to be useful. While our results were limited in their application to small numbers, we were able to prove that it is possible to factor numbers instantaneously using optical techniques.



GROWTH AND CHARACTERIZATION OF SODIUM COBALTATE

David Nafziger (Dr. Jonathan Morris)

Department of Physics

Na_xCoO_2 has been the subject of a multitude of studies over the past 30 years. This is a result of its wide variety of useful attributes including its ability to be used as a cathode for batteries, its thermoelectric power factor and low resistivity, and its ability to be superconductive. In an attempt to create Na_xCoO_2 for further study we created a crystal using the flux method of heating Na_2CO_3 , Co_3O_4 , B_2O_3 and NaCl to over 800°C together in a crucible. The resulting crystal that precipitated out was of similar expected structure as Na_xCoO_2 . We will further verify our crystal as Na_xCoO_2 with an X-ray diffraction and differential scanning calorimetry measurement.



THE BASIN OF ATTRACTION FOR A MAGNETIC PENDULUM

DJ Norman (Dr. Marco Fatuzzo)

Department of Physics

Chaos is exhibited throughout nature and occurs when three important conditions are fulfilled, sensitivity to initial conditions, topological mixing, and dense periodic orbits. These have complex behavior and obtaining solutions that describes this must be done using mathematical modeling. The magnetic pendulum system we explored was modeled using a program called Mathematica and approximated using a runge kutta system. The basin of attraction the magnetic pendulum in combination with a simulation of the pendulum motion can be used to show all three of these conditions and prove the chaotic nature of the pendulum. The basin of attraction also allows us to look for fractal structures in the system.



AERODYNAMICS OF A MODEL CAR

William O'Meara (Dr. Marco Fatuzzo)

Department of Physics

The purpose of this research is to determine if the effects of aerodynamic drag on a relatively small body are sufficient enough to affect top speed. The first phase of this project was to design a two car bodies using Autodesk Inventor: one that is a simple rectangular prism, and one that is modeled after a NACA airfoil to create a streamlined body. These models were injected into an Ansys Fluent computational fluid dynamics simulation at standard atmospheric conditions to determine each body's coefficient of drag. Finally this coefficient was entered into a Scilab/XCos simulation designed specifically for this experiment to determine the top speed of each body. Showing that even small bodies in nonviscous fluids have sizable drag forces can change how aerodynamic design is considered in small toy vehicles and even some very small military and private sector craft.

QUANTITATIVE LOCALIZATION OF DRUG DELIVERY IN ATHEROSCLEROTIC ARTERIES

Daniella Patton (Dr. Justin Link)

Department of Physics

Bevacizumab (BEV), an anti-angiogenic antibody, is a drug with the potential to assay the progression of atherosclerosis in order to prevent cardiovascular disease. Although effective, BEV is limited by its adverse side effects. Ultrasound mediated drug delivery (UMDD) encapsulates BEV in a liposome loaded microbubble which allows for drug targeting decreasing the adverse side effects of the drug traveling throughout the body. In a recent UMDD study, penetration of BEV to normal and atherosclerotic porcine carotid arteries in an ex-vivo system was assayed via a custom immunohistochemical protocol (IHC) [3]. Methods for assessing the delivery of BEV are critical for deciding therapeutic dosage. Differences in drug penetration were qualitatively observed between different vascular compartments (e.g. intima, media, and adventitia). Delineation is visible using hematoxylin and eosin (H&E) staining. A custom MATLAB program to determine the relative amount and spatial distribution of 3,3'-diaminobenzidine (DAB) precipitate, an immunohistochemical indicator of bevacizumab delivered to ex vivo porcine carotid arteries, was created. Using three gold standards to compare the automated MATLAB method revealed under a 4% error. Tissue co-registration of the H&E to the IHC stain in order to compartmentalize corresponding areas in the IHC was qualitatively observed to be effective. Further tests must be completed in the future in order to test the efficacy of the automated MATLAB code.



NOVEL METHOD IN PROTEIN PURIFICATION, ENCAPSULATION AND FLUORESCENT IMAGING TECHNIQUES

Angela Sims (Dr. Justin Link, Dr. Stephen Mills)

Department of Physics

This research designed a novel method for the expression and cloning of several color variations of fluorescent proteins for a study involving encapsulation and imaging on the Xavier University Physics Department's Nikon-TI Eclipse Microscope with Fluorescence X-cite extension. In the past, dyes and staining techniques have been used to image biomolecules for observation. Recently, the use of fluorescent proteins have been used to mark and track different molecules. This experiment presents a protocol in which Green Fluorescent Protein (GFP) and several of its derivatives were cloned, isolated, expressed, and purified for simple imaging via fluorescence microscopy. The technique used, epi-fluorescence, uses materials such as proteins that are excited at a certain wavelength and emit light of a different color, thus fluorescing. For the microscope used, certain restrictions lead to research based understanding of optical lenses, filter cubes, and light paths to help in the determination of selective wavelengths that epi-fluorescence excitation had been observed. After determining the workable range of wavelengths, the experiment then presented a technique to be used for the encapsulation of the protein for concentrated sample observation. Methodology for this research was adapted from various procedures and modified to provide a simple method that can be used over the course of a semester for undergraduate students. Through performing the experiment, students would then have understanding of how to make and purify proteins, and would understand the basics behind fluorescence, wavelengths, energy states, and light paths from understanding the equipment used.

Political Science



THE ETHICAL IMPLICATIONS OF WATER PRIVITIZATION

Ellexis Chapman (Dr. Mack Mariani)

Department of Political Science

Ethical complications arise when the privatization of natural resources are imposed. The privatization of vital basic needs, such as water, is a business multiple actors, including government, non-governmental organizations, and other stakeholders, benefit. Evidence from around the world highlights how the privatization of water endangers the public with high cost and lower quality service. To make more money, companies are hiking prices and cut spending for safe infrastructure. Global citizens whose very life depends on clean and healthy water are met with unequal distribution of water, long delays, lower quality, and high prices that makes the struggle of rights over water a life or death situation. In this zero-sum game, privatization of water can also produce large companies that may try to monopolize the resource and reach across borders for expansion. By excluding this rival good, companies are putting lives on the line to make an extra dollar. Evaluation of water privatization around the globe, specifically in water stressed-regions of the globe, can show the positive and negative effects. As water continues to become scarce, violence and conflict will continue to increase as fear threatens the life and economic well being of people around the world. An analysis of what is being done and what can be done will provide constructive outlets and suggestions for future management of Earth's most precious resource.



GENDER STEREOTYPES AND ELECTORAL SUCCESS IN OHIO HOUSE ELECTIONS

Abigail Schaefer (Dr. Mack Mariani)

Department of Political Science

In recent years, the Democratic party has been considerably more successful at electing women than the Republican party. Some research suggests that the Democratic advantage for women stems from a more inclusive party culture and party support for women-friendly policies. This paper considers whether the gender gap in representation between the parties may also be shaped by intersection of institutions and ideology. Specifically, this study examines how gender stereotypes about ideological differences between the sexes impact the success of female candidates in primary and general elections for the General Assembly in the State of Ohio. The intersection of party, ideology and gender stereotypes shapes the playing field for female candidates differently depending on the party of the candidate and the ideological dispositions of the electorate. Due to ideological stereotypes, women candidates are perceived to be more liberal than they really are. The "liberal female candidate" stereotype creates advantages for female candidates in Democratic primaries and disadvantages for female candidates in Republican primaries. The impact of gendered ideological stereotypes could have a profound impact on opportunity structure for women candidates and partially explains why Democrats have been more successful than Republicans when it comes to recruitment and nomination of female candidates.

Psychology



IS SIMPLY SEEING A CELL PHONE ENOUGH TO AFFECT A STUDENT IN CLASS?

Samantha Bagnis (Dr. Cynthia Dulaney)

Department of Psychology

Cell phones have and continue to become an integral part of people's lives. Research indicates that a person can be negatively affected by the presence of a cell phone (Cheever, Rosen, Carrier, & Chavez, 2014; Misra, Cheng, Genevie, & Yuan, 2014; Przybylski & Weinstein, 2012; Thornton, Faires, Robbins, & Rollins, 2014). Furthermore, depending on the task's level of difficulty, research has shown that the presence of a cell phone can have a negative effect on attention and performance (Thornton et al., 2014). The current study examines if the simple presence of a cell phone is enough to affect memory. Undergraduate students watched a brief educational video and then took a quiz pertaining to the presented information. Participants had their silenced cell phones either placed in plain sight or hidden away. Preliminary data indicate that the presence of a cell phone did not affect memory. Given the inconsistency among findings, future research can be used to clarify the conditions under which a cell phone's presence is enough to negatively affect a person versus have no effect.



CAN DESCRIPTIONS ABOUT EATING BEHAVIORS REDUCE WOMEN'S BODY DISSATISFACTION?

Kelly Clancy (Dr. Christian End)

Department of Psychology

The media's portrayal of beauty is unrealistic for most of the population. Women are depicted as extremely thin, whereas men are depicted as very muscular. The women models are on average 5'11" and 120 pounds, but an average American woman is 5'4" and 140 pounds (Sheldon, 2010). Previous research has indicated that the use of informative labels reporting that a model is underweight can reduce women's body dissatisfaction and counteract the normalization effect (Veldhuis, Konijn, & Seidell, 2012). When women internalize that the thin model's weight is the "normal" weight, the normalization effect occurs. The researchers conducted a study in which girls aged 9 to 16 years old were exposed to pictures of extremely thin, thin, or normal weight women. These pictures contained informative labels stating that the model was 6kg underweight, 3kg underweight, or normal weight. The study demonstrated that informative labels stating that the model was underweight could counteract the media's thin-body ideal. This study found evidence to support that by using correct labels, the normalization effect did not occur (Veldhuis et al., 2012). Research has also investigated the prevalence of eating disorders in models compared to the general population. Preti, Usai, Miotto, Petretto, and Masala (2005) did a study on eating disorders in models. Participants in the sample responded to a set of questionnaires and then attended an interview with the researchers. The results indicated that while models did not have a higher prevalence of eating disorders compared to the general population, models did have a higher prevalence of partial eating disorders than women in the general population (Preti, Usai, Miotto, Petretto, & Masala, 2005). Partial eating disorders occur when a person periodically displays behaviors of an eating disorder. The higher prevalence of partial eating disorders in models is why the current study used descriptions of models' eating behaviors instead of using weight labels. It was hypothesized that when women were informed that the model maintains her weight through unhealthy eating behaviors, then the participants would realize that the models maintained their bodies through "abnormal" eating habits and lead to increased body satisfaction. Through the use of descriptions consistent with Veldhuis, Konijn, and Seidell (2012), the current study investigated whether descriptions about a model's eating habits could counteract the normalization effect. Participants were recruited through the university's participant pool. Participants were assigned to either the healthy eating condition or unhealthy eating condition. The models in the unhealthy condition were described as displaying behaviors related to a partial eating disorder. The participants viewed two images of models with descriptions of their healthy or unhealthy eating habits and then completed the Body Dissatisfaction Subscale from the Eating Disorder Inventory (Klump, McGue, & Lacono, 2000). The expected outcome was that the group that received unhealthy descriptions would report higher body satisfaction than the group that received healthy eating descriptions. In order to test this hypothesis, a *t*-test was used. Participants in the unhealthy eating condition reported the same body dissatisfaction ($M = 26.43, SD = 6.71$) as the participants in the healthy eating condition ($M = 28.16, SD = 8.84$), $t(65) = 0.91, p = 0.37$. The results indicated that descriptions about models' eating habits are not as effective as informative weight labels in reducing body dissatisfaction in women. These results would suggest that the normalization effect occurs to a greater extent when women are comparing their weights to models rather than comparing eating behaviors. Weight must be a more influential factor than eating behaviors on women's body dissatisfaction.



EFFECTS OF SIMILARITY MANIPULATION ON PROSOCIAL BEHAVIOR AND EMPATHY

Ann Marie Diener (Dr. Christian End)

Department of Psychology

Previous research indicates that the differences between individual's socioeconomic statuses can impact the amount of empathy felt towards a person in need, as well as the willingness to help said person (Piff, Kraus, Cote, & Cheng). Specifically, those individuals who come from a higher socioeconomic status are often times less empathetic and less willing to help an individual in need (Stellar, Krauss, Manzo, & Keltner, 2011). Research also indicates that by increasing empathy in upper class individuals, there is a greater likelihood that they would be willing to help those in need (Batson et al., 2003). Similarity manipulations have also been used to influence empathic responses between ingroup and outgroup members (Chen & Kenrick, 2002), implying that similarity may mediate the differences between individuals from upper and non-upper socioeconomic status in terms of empathy and willingness to help someone in need. To address this difference, the current study focuses on influencing the level empathy reported by upper class individuals in order to promote prosocial behavior. It is hypothesized that participants who undergo a similarity manipulation will report higher levels of empathy and a greater desire to engage in prosocial behavior than the participants do not undergo a similarity manipulation. It is expected that upper class participants will be especially affected by the similarity manipulation. University students ($n=108$) were randomly assigned to one of two conditions: similarity or no similarity. Prior to watching a video, participants from the similarity condition received instructions to think of at least three similarities between themselves and the person in the video; participants were informed that they would record these similarities after viewing the video. Participants in the no similarity condition received no instructions about finding similarities between themselves and the person in the video. Individuals in both conditions watched a short video clip displaying an individual experiencing homelessness. Participants from both conditions then completed several questionnaires. The first questionnaire, Measures to assess collapse of compassion, adapted from Cameron and Payne (2011) measured empathy towards the individual in the video. Next, participants completed the Prosocialness scale for adults, adapted from Caprara, Steca, Zelli, and Capanna (2005) which measures intent to engage in prosocial behavior. Participants then completed the Toronto empathy questionnaire, adapted from Spreng, McKinnon, Mar, and Levine (2009). Lastly, participants completed the Perceived similarity measure, adapted from preacher, Treger, and Wondra (2013) that measured perceptions of similarity between the participant and the individual in the video. A series of ANOVAs was conducted in order to determine if there were main effects of similarity and/or socioeconomic status, as well as any interaction effects. While there were not main effects of similarity across dependent variables, a significant interaction was observed regarding prosocial behavior, $F(3, 27) = 7.77, p = .05$. Upper class participants in the similarity condition reported greater prosocial behavior ($M = 29.26, SD = 4.53$) than upper class participants from the no similarity condition ($M = 25.00, SD = 5.31$) implying that the similarity instructions uniquely influence upper class prosocial behavior. Consistent with the hypothesis and previous research, there was a marginally significant difference in empathy towards the individual in the video between upper class participants ($M = 60.38, SD = 10.24$) and non-upper class participants ($M = 63.77, SD = 9.27$), $F(3, 27) = 7.77, p = .05$. Contrary to the hypothesis, the results also indicate that socioeconomic status did impact the overall prosocial scores between participants from the no similarity condition. There was a statistically significant difference in prosocial scores between the upper class participants ($M = 25.00, SD = 5.31$) and non-upper class participants ($M = 27.96, SD = 3.71$), $F(3, 27) = 7.77, p = .05$ from the no similarity condition, implying that there may be less of a difference in prosocial behavior between social classes than previous research has reported.



THE POWER OF SPEECH: NONNATIVE AND NATIVE ACCENT EFFECTS ON EMPLOYABILITY

Claire Kiesel (Dr. Christian End)

Department of Psychology

Previous research indicates that nonnative accents have a negative effect on a job applicant's chances of being hired (Deprez-Sims & Morris, 2013) and individuals are much likely to hire applicants with a native accent as opposed to a nonnative accent (Jussim, Coleman & Lerch 1987). The study examined the effects of having a nonnative accent on hiring decision pertaining to a position that either requires spoken verbal communication skills or online communication skills. It was hypothesized that the applicant with a native accent will be more likely to be hired for both positions and be more favorably perceived than the applicants with nonnative accents even when the job requirements did not include verbal communication skills. Undergraduate students ($N = 113$) were randomly assigned into to one of four conditions. Participants received one of two job descriptions of positions, either customer support specialist or online customer support specialist. Participant's also received a résumé of a qualified applicant; the resume was identical in all conditions. Next, participants listened to one of two interviews, either an interview with an applicant with a native accent or an applicant with a nonnative, Australian accent. Participants then completed four measures regarding their perceptions of the applicant and a quiz on their knowledge about the applicant. The hireability scale (Parton, Siltanen, Hosman & Langenderfers's, 2002), composed of three items, measured the perceived hireability of an applicant. The three items were summed to obtain a total hireability score (Cronbach's alpha = .55). The employability scale (Cleveland, Festa, & Montgomery, 1988), composed of four items, measured the applicant's perceived employability, potential for promotion, proficiency, and their potential success level. The four items were summed to obtain a total employability score (Cronbach's alpha = .92). The Allard and Williams rating form gathered the participant's first impressions of the applicant through nine different items; these items were summed to obtain a total first impression score for the applicant (Cronbach's alpha = .62). As hypothesized, there were significant main effects of accent on both the hireability $F(1, 113) = 8.24, p = .005$ and employability scale $F(1,113) = 7.43, p = .007$, thus the hypothesis was confirmed. Post-hoc analyses were conducted in order to test the hypothesis that applicant with a native accent will be more likely to be hired for both positions. On the hireability scale, participants rated the applicant with the native accent more positively ($M = 10.16, SD = 2.83$) than the applicant with the nonnative accent ($M = 8.69, SD = 2.56$). Participants rated the applicant with the native accent as more employable ($M = 25.41, SD = 6.34$) than the applicant with the nonnative accent ($M = 22.21, SD = 6.43$). However, there was no main effect of job type. No interaction effects were observed. The results indicate that a bias exists in hiring applicants with a nonnative accent. However, this bias is formed regardless of the verbal communication aspects of a job. The results of this study will be used to examine the prevalence of a bias towards individuals that have accents in the job market.



FONT SIZE, LENGTH, AND MEDIUM AND ITS EFFECT ON COMPREHENSION

Kyle Lewis (Dr. Christian End)

Department of Psychology

The present study attempts to determine if font size, length of passage, and reading medium affects reading comprehension. It was hypothesized that when reading from the computer, reading comprehension would be lower than when reading from paper. A convenient sample from the Xavier University Psychology Participant pool was used. Participants read two passages, one shorter (111) words and one longer (851 words). They either read both passages from a computer or both from paper. They either read both passages from size 12 point font or both passages from size 14 point font. After reading the first passage, they answered the comprehension questionnaire. There were two comprehension questions for each passage. All comprehension questions were multiple choice with four options. There were no significant findings, however statistical power was lacking due to the small amount of comprehension questions asked. Results indicated the shorter passage had less reading comprehension than the longer passage in both conditions which was contrary to the hypothesis. However, it was clear that one question was significantly harder for the shorter passage which skewed the data. Future studies should use more passages and comprehension questions and look at different age groups because some are used to reading from a computer.



EFFECT OF MEDIA PORTRAYALS OF SPORTS FAN ALCOHOL USE ON FAN WILLINGNESS TO DRINK

Abigail Maristela, Trevor Morris, Jessica Petri (Dr. Christian End)

Department of Psychology

Inconsistent results regarding the relationship between sports fandom and alcohol consumption have left questions concerning how sports fans and nonfans differ in their alcohol use patterns (Nelson & Weschler, 2003; End, Davis, Kretschmar, Campbell, Mueller, & Worthman, 2009). A possible explanation, derived from Social Learning Theory (Bandura, 1977), is that fans learn socially acceptable norms for alcohol use from observing the behavior of other fans. Researchers hypothesized that participants' willingness to drink would be related to the proportion of sports fan alcohol users presented in the corresponding article that they received. Specifically, participants in the 65% norm condition would report the highest willingness to drink while participants in the 25% norm condition would report being the least willing to consume alcohol. University students ($N = 145$) read one of four randomly assigned "ESPN.com" articles that reported different information regarding the percentage of fans who drink alcohol in sports-related contexts (25%, 42%, 48%, 65%). The percentages were derived from prior analyses of fans portrayed drinking in commercials during televised NFL and NBA broadcasts (42%; Petri, Falco, Morris, Maristela, & End, 2013) and college student sports fans' self-reported alcohol consumption norms (48%, Petri, Falco, Morris, & End, 2013). Using the average of the previously obtain values (45%), artificially high (65%) and low (25%) percentages were extrapolated (the average \pm 20%). After reading the article, participants completed a questionnaire created for this study assessing their willingness to consume alcohol in sports-related scenarios such as attending games and watching televised programs. Unexpectedly, willingness to drink scores did not differ significantly across the four conditions. Nevertheless, 95.5% of non-abstainer fans ($n = 112$) were willing to consume alcohol on at least one sports-related occasion, with the average willingness to drink reported being 13.90(7.90) occasions per month. Regardless of assigned condition, 85.7% and 83.9% of non-abstainer sports fans reported that they would consume alcohol at a sporting event or at home while watching sports on TV, respectively. Even further, 92% of non-abstainer fans reported willingness to drink at least a small amount if with friends who were also fans at a sporting event. The results indicate that the norms presented in the article failed to influence participants' willingness to drink, but that social pressures to drink within sports-related contexts do exist. The findings exposed high willingness to drink across all conditions, suggestive of a ceiling effect which would potentially eliminate significant differences across conditions. In fact, 100% of participants reported that they thought the "average" sports fan would drink on sport-related occasions at least sometimes, a representation that conflicts with previous evidence that a majority, 52%, of sports fans avoid alcohol consumption (Petri et al., 2013). These results could suggest that college-aged sports fans ($M = 20.45$ years, $SD = 2.81$) may be resistant to message about drinking norms that alcohol providers attempt to communicate during what seems to be every commercial break (Petri et al., 2013). However, this study provides evidence that fan perceptions and the sporting event context are related to elevated alcohol use that could lead to dangerous behaviors such as the overuse and abuse of alcohol.



HOW DOES LEARNING HAPPEN BEST? THE ROLE OF PRACTICE AND PRESENTATION STYLE ON RETENTION OF INFORMATION

Lindsey Mooney (Dr. Tammy Sonnentag)

Department of Psychology

The phenomenon known as the “testing effect” suggests that retention of information is heightened when individuals’ knowledge of a topic is tested intermittently rather than not tested before an overall final test (Glover, 1989). Specifically, previous research on the testing effect has demonstrated that open and closed book practice tests are equally effective in yielding long-term retention of information over non-testing (Agarwal, Karpicke, Kang, Roediger, & McDermott, 2008). However, research suggests that when students are made aware of a practice test prior to a final test of knowledge retention, those given closed-book practice tests perform better than those given open-book practice tests (Agarwal & Roediger, 2011). Furthermore, the way in which information is presented (e.g., text vs. video) has been shown to affect knowledge acquisition and retention (Merkt, Weigand, Heier, & Schwan, 2011; Schwan, & Riempp, 2004). Although videos and traditional text are heavily employed in standard learning environments (e.g., classrooms), these two presentation styles are often employed differently in different situations (Mayer, Hegarty, Mayer, & Campbell, 2005). In continuation of previous research, the current study examined whether presentation style (i.e., text or video) and practice tests (i.e., open-book, closed-book, no test) independently and interactively predict retention of information. It was predicted that information presented in video format would lead to better retention than information presented in traditional text format, and practice tests would produce better retention relative to no practice. Additionally, it was predicted that closed book practice tests would produce better overall retention on a final test. In conjunction with these two hypotheses, it was expected that individuals who received video content and participated in a closed book practice tests would perform better than all other participants. Undergraduate students participated in exchange for course credit. Participants were randomly assigned to learn about the topic of Synesthesia presented through either video or text (i.e., transcribed text and screenshot pictures from the video) content format. Participants then completed one of the following types of practice tests: an open-book/video practice test, closed-book/video practice test, or no practice test. Following a distractor task, participants completed a 15-item final test assessing their retention and knowledge of Synesthesia. A 2 (Presentation Style: Video, Text) x 3 (Practice Test: Open, Closed, No) between-subjects ANOVA was conducted on the correct items on a final test of knowledge. The interaction was not significant [$F(2, 143) = .725, p > .05$]; however, a main effect of Presentation Style emerged revealing that individuals in the text conditions outperformed individuals in the video conditions on the final test of knowledge retention [$F(1, 143) = 12.762, p < .001$]. Furthermore, a main effect of Practice Test [$F(2, 143) = 3.814, p < .05$] revealed that participants given an open-book practice test ($M = 12.22, SD = 1.87671$) scored significantly better than individuals who did not receive a practice test ($M = 11.28, SD = 1.71476$). No differences emerged between open-book practice and closed-book practice ($M = 11.6327, SD = 1.8896$) tests or closed-book practice and no practice test ($M = 11.28, SD = 1.71476$). The results of the current study suggest that traditional text and open-book practice tests both promote better learning. These findings have implications for educational settings, as educators can be assured that their assigned readings are beneficial to the knowledge acquisition and retention of students. Furthermore, consistent with previous research, educators should be assured that open-book practice tests promote optimal performance on later tests of knowledge. Future research should investigate the long-term retention of information based on presentation style and practice opportunities. Additionally, knowledge of different content categories, such as mathematics or history, may rely on different types of presentation methods and, therefore, benefit from additional research examining the importance of presentation style and practice testing.



COLLEGE STUDENTS' ATTITUDES TOWARDS INDIVIDUALS WHO HAVE A STUTTERING DISORDER

Marisa Sierra (Dr. Cynthia Dulaney)

Department of Psychology

The present study examined the attitudes of undergraduate students towards individuals who have a stuttering disorder. Previous research has shown that people have more negative attitudes towards individuals with a stutter compared to individuals without a stutter (Betz, Blood & Blood, 2008; Dorsey & Guenther, 2000; Van Borsel, Brepoels & De Coene, 2011). Sixty-eight participants watched one of two videos depicting either a student giving a speech with a stutter or without a stutter. The participants then rated the student on a list of 16 traits (e.g., open, intelligent, self-assured) on a scale of 1 – 7, with a higher rating indicating a more positive attitude (Dorsey & Guenther, 2000). An analysis of an overall rating as well as for each trait was conducted. For the latter analyses, a Bonferroni corrected alpha level of .003 was used. The analysis of the overall rating indicated that there was no significant difference in the measure of attitudes towards the student with a stutter ($M = 68.77$ $SD = 16.87$) compared to the student without a stutter ($M = 70.42$ $SD = 14.98$), $t(66) = .43$, $p = .67$. The analysis of each trait indicated that the student with a stutter was rated significantly less calm, $t(66) = 6.00$, $p < .001$ and less self-assured, $t(66) = 3.07$, $p = .003$, but also less dull, $t(66) = 4.77$, $p < .001$, than the student without a stutter. Although not significant, the student with a stutter was rated as more nervous than the student without a stutter, $t(66) = 2.86$, $p = .006$. The findings indicate that there were no negative attitudes towards the student with a stutter on the overall rating. Furthermore, there were no negative attitudes towards the student with a stutter on 13 of the 16 traits, and in fact, the student with a stutter was rated as less dull than the student without a stutter. Taken together, these findings indicate that individuals who stutter are perceived as positively as individuals who do not stutter.

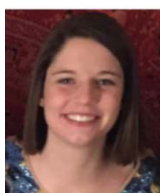


EFFECTS OF ATTITUDES TOWARD AGING AND AGE OF PATIENT ON WILLINGNESS TO PROVIDE OCCUPATIONAL THERAPY SERVICES

Elisabeth Spadaro (Dr. Tammy Sonntag)

Department of Psychology

The population of older adults is gradually increasing and, due to this growth, the demand for medical care is also increasing. Consequently, the present study examined college students' attitudes toward aging and their willingness to provide occupational therapy-related services to individuals of different age groups. One hundred fifty undergraduate students, from a private university in the Midwest, completed a multi-item attitude toward aging questionnaire and were randomly assigned to read one of three hypothetical vignettes describing a car accident in which the driver (i.e., no age specified, mid-20s, mid-60s) experienced pain requiring occupational therapy (OT) services. Subsequently, participants indicated whether they would be willing to provide OT services to the driver. Results revealed that age of the target (i.e., driver) did not significantly affect the decision to provide OT services. However, a main effect of attitudes towards older people revealed that individuals with relatively positive attitudes toward aging were generally more willing to provide OT services than individuals with relatively negative attitudes toward aging. This finding suggests that possessing positive attitudes toward aging (compared to negative attitudes) leads to a greater willingness to provide OT services despite the age of a client. Implications of the current study and directions for future research will be discussed, including examining actual OTs' attitudes toward providing care to clients of different ages in more naturalistic settings.



SERVICE IN THE WORKPLACE: EFFECTS ON JOB PREFERENCES, JOB SATISFACTION, AND LIFE SATISFACTION

Megan Tritschler (Dr. Christian End)

Department of Psychology

The current study identifies whether a job with a service component contributes to job preferences as well as overall job and life satisfaction compared to a job that has the absence of a service component. Previous research indicates that type of work is the most important job factor (Jurgensen, 1978) and the presence of service increases job satisfaction (Pajo & Lee, 2011). In the current study, men ($n = 23$) and women ($n = 37$) were randomly assigned to either a service or non-service condition and read a job description pertaining to a general job. The service condition had primary responsibilities that included volunteering monthly at a non-profit organization and coordinating a work service day. The non-service condition read the normal job description. Both conditions then completed a series of self-report questionnaires that addressed job preferences (Jurgensen, 1978), job satisfaction (Ironson, Brannick, Smith, Gibson, & Paul, 1989), and life satisfaction (Diener, Emmons, Larsen, & Griffin, 1985). A t-test was conducted in order to obtain results and it was concluded that pay was the most important job factor followed by type of work. Also, inconsistent with the hypothesis, a service component failed to increase overall job and life satisfaction.



THE EFFECTS OF TECHNOLOGY AND NOTE TAKING ON ACADEMIC PERFORMANCE

John Witry (Dr. Cynthia Dulaney)

Department of Psychology

As technology continues to advance, more students are gaining access to computers, laptops, tablets, and online learning management systems. Previous research has shown that handwritten note taking leads to better performance than laptop note-taking because laptop use promotes verbatim transcription (Mueller & Oppenheimer, 2014). Previous studies have also shown that reviewing instructor notes may lead to better academic performance than studying personal notes (Kiewra, 1985). In contrast, other studies have found that laptop note taking results in better performance and providing instructor notes decreases performance (Barnett, 2003; Bui, Myerson, & Hale, 2013). The purpose of the present study was to examine the interaction between note-taking method and providing instructor notes. Participants watched a videotaped lecture and either took handwritten or typed notes using a laptop. Half of participants also received a copy of the instructor's PowerPoint slides. All participants were given 5 min to review their notes before taking a factual based exam. The preliminary data indicate a possible interaction between technology and note-taking method used. Regardless of the final data, these findings may have important implications for the use of technology by students in the classroom.

Social Work



SECOND CHANCE HIRING

Katherine Schad (Ms. Shelagh Larkin)

Department of Social Work

Nehemiah Manufacturing is located in the heart of Queensgate, Cincinnati. This unique company licenses with P&G to manufacture products such as Kandoo, Boogie Wipes, Downy, Dreft and Febreze. The Manufacturing Company parallels itself to the story of Nehemiah. A prophet who gave back to the people who were condemned by society in order to fulfill God's mission of supporting them. By providing jobs to individuals with barriers such as homelessness, addictions and majority of criminal records, Nehemiah, though only open since 2009 has created a lot success in this field of second chance hiring. As the first ever Social Work intern at Nehemiah through Xavier Field Work, there has been a lot to learn on the forefront of second chance hiring. In regards to case management, partnering with social service agencies, and community outreach, building Social Work at this company has been inspiring work this year. In most recent efforts, as student studying different records and noticing themes in hiring, I have been able to create a presentation on the successes and failures of second chance hiring. The conclusion of this information has then allowed me to go present at different area prisons so that when their inmates are released they have the tools for being successful. This field has a lot of passion because there is little to no research on its idea in general. As the only representation of Social Work at this agency I feel as though a pioneer in this field and would appreciate being able to share my research with the Xavier Community.