

2014 UNDERGRADUATE

RESEARCH SYMPOSIUM

WEDNESDAY

MAY 7, 2014

KEN OLSEN SCIENCE CENTER

PROGRAM CONTENT AND SCHEDULE

**Poster Display**

Posters will be displayed in the Ken Olsen Science Center Loggia & Chairman’s Room. Students *may* put up their poster anytime after Tuesday (May 6) 12:00pm and before Wednesday (May 7) 2:30pm.

Students will staff their entries for a minimum of one hour on Wednesday (May 7) between 2:30pm and 4:30pm.

A summary of the entries and wrap-up will be offered in the Ken Olsen Science Center Loggia at 4:15pm.

Posters must be taken down immediately after the event.

**Table of Contents**

Posters in Natural Sciences, Mathematics, 3

& Computer Science

 Listed in Alphabetical Order by First Author’s Last Name

 Princemere Journal 23

 Posters in Social & Behavioral Sciences 24

and in Education

 Listed in Alphabetical Order by First Author’s Last Name

Poster Entries: Natural Sciences, Mathematics,

& Computer Science

Listed in Alphabetical Order by First Author’s Last Name

Poster Format Codes: B = bulletin board, T = trifold

NSMCS – 20 (B1)

**Games, Genomes, and Graphs: A Mathematical Investigation of DNA Decryption in Ciliates**

Katharine Adamyk

Ciliates, a single celled organism, upgrade their genome by reordering the encrypted DNA of their micro nuclei into readable strands. The decryption process uses restricted operations which can be modeled on strings of numbers. Using a graphical representation of the encrypted order we have characterized which strings can be decrypted using one or both of these restricted operations. Strands that cannot be decrypted by these operations can be analyzed using finite, determined games between two players. Utilizing the graphical representation, we have found criteria for deciding which of the two players has the winning strategy for certain types of encrypted strings. Collaborators: Erik Holmes (Boise State University); Georgia Mayfield (Willamette University); Dennis J. Moritz (Montana Tech); Marion Scheepers (Boise State University)

NSMCS – 76 (T1)

**Determination of Octanol-Water Partition Coefficients for Acetaminophen, Acetanilide and Benzil by UV-VIS Spectroscopy**

Justin Andrews, Logan Walsh, Ivy Ngo, Mirielle Nauman, Luke O'Donnell, Daniel Perez

The biological interactions of medicinal compounds are often determined by the three-dimensional arrangement of their functional groups. Structure is also tuned to meet certain size, stability and solubility requirements that will affect, among other things, where the medicinal compounds end up within the human body. One important property in evaluating these properties is lipophilicity, or the tendency of a compound to dissolve into ‘fatty’, nonpolar environments over aqueous, polar ones. The octanol-water partition coefficient (Pow) is an important metric in the determination of lipophilicity. The purpose of this study was to develop a facile, waste-minimizing methodology for the determination of Pow and to evaluate its potential for incorporation into the undergraduate lab curriculum at Gordon College. Pow values for acetaminophen, acetanilide and benzil were determined by UV-VIS spectroscopy and compared to known literature values to evaluate the efficacy of the method at the undergraduate level. Initial Pow results are very accurate. The project will culminate in the development of an undergraduate lab procedure that will be well-suited for implementation in either the organic or instrumental analysis lab curricula.

NSMCS – 4 (B2)

**A Novel Procedure for the Sequestration of Ru Leachates in ROMP and RCM using PIB-bound Isocyanides**

Justin Andrews

Ru-catalyzed carbon-carbon double bond reactions like Ring Opening Metathesis Polymerization (ROMP) or Ring Closing Metathesis (RCM) produce products useful in applications such as drugs, materials, and cosmetics. However, steps after a reaction are necessary if Ru leachates contaminate the product. Recent work has shown that the Ru products of a ROMP reaction formed by quenching with polar isocyanide ligands facilitate Ru residue separation via chromatography. Our work has shown that nonpolar polymer-bound isocyanides can be synthesized and used to similarly sequester Ru residues in a heptane phase of biphasic liquid/liquid solvent mixtures through thermomorphic or latent biphasic chemistry. The result is a greener process for Ru recovery/separation that avoids a chromatographic separation. This work uses as a support polyisobutylene (PIB) which is phase-selectively soluble in heptane in mixtures of heptane and a denser polar solvent. To achieve this result, two methods of synthesis for PIB-bound isocyanides have been developed. Initial qualitative results show visible biphasic separation occurring with the colored Ru complex cleanly separating into the heptane phase of a thermomorphic heptane/DMF mixture. Future work will explore the generality of this process in various ROMP and RCM reactions and ways to remove the bound isocyanide ligands to recycle the catalyst.

NSMCS – 47 (B3)

**Fatigue of the High Jump**

Jeffrey Brown, Jessica Ventura

This study looked at the relationship between high jump experience and rate of fatigue while high jumping. A 6 camera Vicon Motion Capture system recorded the 3D position of reflective markers attached to the pelvises of experienced and inexperienced high jumpers to accurately digitalize their movement patterns while jumping. A high-definition 2D video camera was aimed at the take-off position to record the jumpers taking-off for each of their jumps. The jumpers started at a self-determined height and it was increased with each successful jump. The jumpers continued jumping until they failed 5 consecutive jumps, at which point the test ended. After each jump they rated their fatigue level using the Borg scale of Perceived Exertion. The vertical position of jumper’s center of mass (COM) was calculated from when the jumper’s plant foot struck the ground through their maximum COM. There was no significant difference in COM trajectories as the athlete’s fatigue. Neither was there a correlation between high jumping experience and how quickly the athlete fatigued while jumping. A possible explanation of this result is that high jump athletes tend to have long breaks in-between jumps in a typical track meet.

NSMCS – 45 (B4)

**Nitrogen-Vacancy Center Qubits**

Nathan Calandra, David Lee

Quantum computing is an active area of research in both computer science and physics. Beyond the exciting work in new qubit-based algorithms and computation is the fact that a real quantum computer requires a physical system. Several different approaches to qubit manipulation and storage are being actively pursued by the research community; one approach which seems to have several practical advantages over the others is the generation of qubits through introduction of nitrogen-vacancy centers in a diamond lattice. Qubits produced in this manner have, at room temperature, the requisite long coherence times, loosely coupled spin-spin interactions and an optical method for readout/flipping of spin states. Using density functional theory and a grid-based projector-augmented wave method, we have modeled the band structure for NV centers in a diamond lattice in order to study these properties and assess the merits of this system to serve as the basis for a quantum computer.

NSMCS – 75 (T2)

**Microwave Assisted Benzoin Condensation**

John Cashin, Jacob Stephens

We are creating a green chemistry lab procedure that demonstrates benzoin condensation. We are determining the most productive amounts of catalyst as well as ideal times and temperatures for the condensation reaction. This reaction uses both thiamine HCL and microwave reactor as a catalyst for the reaction. One of our goals is to determine whether PEG 400 or PG-H20 is a better solvent for the reaction. We have modified the original methods into our own procedure. We made the original methods safer by replacing DCM with ethyl acetate. We began our procedure with two groups of five reactions (using two different solvents); the differences between these individuals were time and temperature. In one of our tests, we accidentally added double the amount of thiamine catalyst, and this was the only test that gave results of benzoin. We reproduced the procedure that originally synthesized benzoin and recreated benzoin. We then tested it with a different solvent (PEG 400) and found a higher percentage yield of benzoin.

NSMCS – 26 (T3)

**Eggplant Oil Extraction for the United States Department of Agriculture**

Kristen Cease, Benjamin Rivers, Julia Bilancieri, Sarah Huisenga

The USDA has developed a new type Nuclear magnetic resonance (NMR) to extract oil from seeds of many different kinds of plants to test the quality. The Purpose of this research is to extract oil from eggplant seeds and produce a yield that the USDA can compare to the yield from their MMR. The team here is using a Soxhlet Extractor and a shaking method to extract the oil from the seeds. We are comparing the Soxhlet verses the shaking method and grinned verses not grinned seeds to see what method has the highest yield. The research team is only at the beginning stages of the research and there will be more information to come in the near future.

NSMCS – 46 (B5)

**The effects of the invasive, non-native, Lionfish (Pterois antennata) on three target species and overall species abundance in South Water Caye Marine Reserve**

Victoria Cottle, Gayle Watson, Charles Shaw, Ean Mullins, Dalton Kinnard, Margot Lee

Lionfish (Pterois antennata) have been introduced into the coral reefs of Belize. This invasive, non-native species has been suspected to be a detriment to the reef community. This study explored the relationship of the Lionfish on species abundance and on three target species; Spotlight Parrot Fish (Sparisoma viride), Yellow Goatfish (Mulloidichthys martinicus), and Four-eye Butterflyfish (Chaetodon capistratus). Four locations were surveyed in South Water Caye Marine Reserve. Upon the sighting of the Lionfish we recorded extent of coral bleaching, species abundance, and prevalence of target species, and we made the same measurements at a control site. The control sites had similar levels of coral bleaching and coral structure but lacked Lionfish. There was a significant negative correlation between Lionfish presence and species abundance. Fish were more than two times abundant at sites lacking Lionfish. Though neither Spotlight Parrot Fish nor Four-eyed Butterfly fish showed statistical significance, Yellow Goatfish showed a strong negative trend with Lionfish presence. The results of this study show that the presence of Lion Fish has a negative impact on coral reef communities. We suggest that logistical planning must be pursued to eradicate Lionfish in the coral reef systems of Belize. Further study on the effects of Lionfish on the coral reef environment must be conducted to better understand the situation and to make informed decisions about their removal.

NSMCS – 78 (T4)

**A Statistical Analysis of Economic Indicators of Poverty across the 50 U.S. States, 2012**

Austin Drukker, Hannah Scaer

Our motivation for conducting this research is to test the statistical significance of variables that we suspect explain poverty rates. Our research analyzes data collected across the 50 US States for the year 2012. Our dependent variable measures the percentage of State residents living below ½ the State poverty threshold. Independent variables considered include measures of income, measures of employment, measures of federal assistance, allocation of State general funds, State tax structures, measures of family structure, political affiliation of State government, and other variables. In this research, we used multiple regression analysis to determine the best fitting line to the data, which in turn revealed to us the most statistically significant explanatory variables. We found that variables that measure State minimum wage laws, percent of State general fund spend on public assistance, Medicaid and elementary and secondary education, difference in tax rate paid by the poor and the top 1% of earners, marriage and divorce rates, political affiliation of government, and freeness of each State were statistically insignificant variables. We found that variables that measure the percent of households with at least one full-time worker, percent of State general fund spent on higher education, tax rate for the poor, and teen pregnancy rate were statistically significant variables. We hope that some implications of our research would be to bring to light the high explanatory value of teen pregnancy rate on poverty, as well as reveal that some variables one might expect to have high explanatory power in fact do not.

NSMCS – 13 (T5)

**Robust in Combustion: Determination of Ethanol in Gasoline by Gas Chromatography**

Dieter Ekstrom

Ethanol (EtOH) is presently a very important gasoline additive and is used as an oxygenate additive to facilitate a more complete combustion. Complete combustion is desirable to reduce the amount of pollutants leaving a tailpipe. Although it provides less energy than pure gasoline, EtOH is thought to be more renewable than the previous gasoline additive of MTBE (methyl tertiary butyl ether). There continues to be research into making it much more sustainable. In the U.S., most gasoline is 10% EtOH by volume. The amount of EtOH in commercial-grade gasoline was measured by gas chromatography using flame ionization detection. Internal standardization was utilized to overcome matrix effects that are present in gasoline analysis. The results will be compared to the expected nominal value of 10%. These values are expected to agree to within less than five percent. Statistical analysis will be employed in the data treatment to determine the variability and reliability of this measurement.

NSMCS – 3 (B6)

**Effect of high tunnel use on lycopene content in 'Brandywine' and 'Jet Star' tomatoes (Lycopersicon esculentum Mill)**

Mollie Enright, Jennifer Noseworthy

Lycopene is an important dietary carotenoid found in tomato (Lycopersicon esculentum Mill.) known to play an important role in human health. It has previously been established that variability in lycopene content is influence by several factors including genetic variability and environmental conditions. In colder climates, season extension methods such as high tunnel use have increased for extending tomato production season. Little data exist comparing lycopene content of tomato varieties grown under both field and high tunnel conditions. In this study, we are seeking to determine the lycopene content of ‘Brandywine’ and ‘Jet Star’ tomato varieties grown in both field and high tunnel using high-performance liquid chromatography (HPLC) and spectrophotometry. We have also worked to develop an analytical method to determine lycopene content using ‘greener’ solvents during extraction in respect to traditional methods.

NSMCS – 9 (T6)

**There’s Always Pesticides in the Banana Stand:**

**Analyzing Carbendazim Fungicide Residues on Bananas**

Dimitris Fanis

Carbendazim is a fungicide with widespread use, commonly applied to fruits including citrus, bananas, strawberries and pineapples. Carbendazim has been shown in high doses to cause infertility and destroy the testicles of laboratory animals. According to the Food and Agriculture Organization of the United Nations, and the World Health Organization (FAO/WHO), the maximum pesticide residue limit (MRL) for carbendazim in bananas is 0.2 mg/kg. Using this limit as a comparison, banana samples from various markets were extracted and analyzed liquid chromatography for total carbendazim. The amount in the banana is not expected to that exceed the FAO/WHO limits.

NSMCS – 56 (T7)

**Microwave assisted catalytic oxidation of hydrobenzoin to benzyl**

Elizabeth Fjellstad, Joanna Lee, Grace Aghan, Thor Rasmussen, Brittany Marshall

The goal of this project was to oxidize hydrobenzoin into benzil using a microwave reactor and greener oxidation agents. This is a continuation of a research project where benzoin was oxidized into benzil. Since there are similarities between benzoin and hydrobenzoin we were hopeful that this transformation would be possible. This process is an improved method compared to the traditional oxidation method that uses hazardous reactants like chromium salts. We will record yield and spectra for products at varied temperatures and time of the microwave reactor.

NSMCS – 77 (T8)

**Establishing New Protocols for Data Collection in Tracking Nuclear Divisions and Viability in Wheat (Triticum aestivum L.) Microspores Embryogenesis**

Jenna Gustavson, Daniel Kim, Roland Griggs, John Yoon

Microspore embryogenesis occurs when immature pollen (microspore) of a plant is induced to go through sporophytic development instead of gametophytic development (Zheng 2003). These pseudo-embryos, called embryoids, become diploid through a process called spontaneous chromosome doubling. However, the mechanism through which the chromosomes double has not been studied extensively. In order to study chromosome doubling, various methods of isolating microspores have been developed, such as microspore and another culture (Liu et al. 2002). Our study was done to refine protocols for data collection using microspore culture in order to track nuclear divisions within wheat (Triticum aestivum L.) microspores. The general protocol used in this study consists of isolating microspores and staining them with 4’,6-diamidino-2-phenylindole (DAPI) and fluorescein diacetate (FDA) over a 48-hour period. DAPI was then added to tag the nucleus in the microspores, and FDA was used to assess the viability of microspores. We hypothesized a correlation between cells with divided nuclei and viable cells. From data collected so far, we have consistently observed a decrease in cell viability over the course of 48 hours. However, inconsistency was recorded in our DAPI results where there was an increase in percentage of nucleated cells in some samples and a decrease in others. From these results, we have concluded that tracking nuclear divisions and cell viability will need to be extended for longer periods of time. In addition, a more refined protocol needs to be developed in order to precisely track nuclear divisions in wheat microspore embryogenesis.

NSMCS – 16 (B7)

**Elemental Composition of Metallic Samples through Characterization and Simulation of Plasma Emission Lines from Laser Induced Breakdown Spectroscopy**

Patrick Harrington, David Lee, Danielle Duggins1

1Glassimetal Technologies

Laser induced breakdown spectroscopy (LIBS) is a versatile technique for elemental composition analysis. In LIBS a high irradiance laser pulse (108 – 1011 W/cm2) ablates a sample, ionizing surface atoms to generate a plasma. Atomic line emission from the plasma may then be analyzed spectroscopically to determine elemental composition. In this work we present a comparison of our experimental LIBS data with simulated spectra generated by convolving reference emission lines from the Kurucz Atomic Line Database with effects due to Doppler, Stark, instrumental broadening, and Saha-Boltzmann relations. Plasma temperature is determined by the Boltzmann plot method. Elemental composition is determined by optimization of the fit between simulated and experimental spectra with respect to plasma temperature, electron number density and atomic species. We report on the quality of correlation between experimental data and simulated spectra as well as discuss potential improvements to both our experimental LIBS setup and our MATLAB-based spectrum analysis code.

NSMCS – 8 (T9)

**The Whey of Life**

Zachary Hatch

Whey protein is a mixture of globular proteins, mostly β-lactoglobulin and α-lactalbumin, isolated from whey, a by-product of cheese. It is used primarily as a post workout substance for weight lifters and helps with muscle recovery. With the increased popularity and demand by consumers, it is crucial to examine the true amount of protein within a sample of Optimum Whey Standard® and compare that value with the manufacturing label. Two samples of Optimum Whey Standard® protein powder were tested, but with varying LOT numbers, which allowed for the consistency between two batches to be determined. Also, varying sample preparation techniques were used to find the ideal testing parameters, specifically by using solvents with different pH values. The diverse pH values created varying amounts of protein solubility. It was found that samples dissolved best in solvents with lower pH vales around 2-3. The samples were also mixed with a compound that deformed the protein, which allowed for greater absorbance of light. After determining the sample preparation parameters, the samples were then placed in an Ultraviolet-Visible Spectroscopy, which measures the absorbance of light within a sample. The absorption values were then used in Beer-Lambert’s equation to find protein concentration. A pure protein, Bovine Serum Albumin, was used as a standard. Having a standard created a comparison tool that was used when observing the results of the samples. Therefore, the true compositions of the samples were found.

NSMCS – 7 (B8)

**Effects of Purple Loosestrife (Lythrum salicaria) Removal**

**on Abundance of Native Plants in Wetland Plots**

Krista Heilmann

Purple Loosestrife (Lythrum salicaria) is a non-native species in North America, known to be especially invasive in wetland habitats. Because it chokes out many native plant species, it leads to the loss of important wetland biodiversity. We hypothesized that removing Purple Loosestrife from invaded plots would allow native plant species diversity and abundance to increase. We had 6 study sites around Coy Pond (at Gordon College, Wenham, MA), each with a paired control and experimental plot. All plots initially had over 80% Purple loosestrife cover. In June, we removed Purple loosestrife from the experimental plots, and planted two Blue vervain (Verbena hastata) plants in each. In October, we surveyed the plant diversity in all plots. The Blue vervain plants failed to thrive as we had expected. We failed to reject the null hypothesis and to find a significant increase in species richness with Purple loosestrife removal, which we had expected. However, using a Wilcoxon signed rank sum test, we found a significantly higher percentage of the dominant species in the control plots than in the experimental plots, and the experimental plots were less dominated by one species. Overall, our findings are consistent with the idea that invasive species removal dampens the dominance of individual species.

NSMCS – 43 (B9)

**Effects of pH and Dissolved Oxygen on Spotted Salamander (Ambystoma maculatum) Egg Mass Abundance in New England Vernal Pools**

Krista Heilmann, Roland Griggs, Jose Hernandez, Mary Park, Michael Mann

Spotted salamanders (Ambystoma maculatum) lay their eggs in New England vernal pools. Research shows that these vernal pools vary in their pH and dissolved oxygen (DO) concentrations, and this variability likely affects the egg mass abundance of spotted salamanders. We will test the effects of pH and DO concentration on spotted salamander egg mass abundance by counting egg masses then measuring pH and DO concentration in vernal pools in Essex County, Massachusetts. We will then analyze our data by running regression tests. We hypothesize that pools with low pH or low DO will contain fewer egg masses than pools with neutral pH or high DO. Because acid rain influences the pH of water bodies, and because high temperatures caused by heat waves may indirectly lower DO, these environmental factors likely decrease spotted salamander egg masses in vernal pools. Consequently, they may also reduce spotted salamander populations.

NSMCS – 10 (T10)

**Bower, the Power of Vitamin B: Quantitative Analysis on Vitamin B in Nutritional Drinks**

Seon Kyo Hong

Vitamin B forms a group of eight distinctive chemical compounds. Among the B vitamins, vitamin B2, B6 and B12 were chosen for this analysis because the nutritional drinks often contain these vitamins. Vitamin B2 produces red blood cells, develops skin and vision, and breaks down calories. Vitamin B6 functions to form red blood cells, helps protein digestion, maintains normal nerve function, and develops immune system by synthesizing antibodies. Vitamin B12 functions to manufacture red blood cells and myelin, support the normal function of nerve cells, and support the replication of DNA. Most of B vitamins coexist in many foods, but since these are water-soluble and can be degraded, particularly by alcohol and cooking. Therefore, certain nutritional drinks that are rich in B vitamins would be helpful for those who do not get enough through food. The purpose of this project is to analyze the amount of the three types of B vitamins in nutritional drinks using High Performance Liquid Chromatography (HPLC). These results will be compared to the nutritional label. The chemical names of the interested vitamins are riboflavin (B2), pyridoxine (B6) and cyanocobalamin (B12). Each of the pure B vitamins were diluted to different concentration and were analyzed by HPLC. Likewise, the nutritional drinks were diluted and analyzed by HPLC.

NSMCS – 5 (T11)

**Iron's Irony: An Investigation in Wine**

Elaine Hong

Wine is known to boost cardiovascular health and provide nutrients that promote longevity. It boasts an impressive list of health benefits, including reduced risk of heart attack and delayed brain impairment. However, do these benefits outweigh the potentially negative effects that also come with wine consumption? There is a high heavy metal content often associated with wine, attained through natural soil content, fertilizers, pesticides, precipitants in solution, and containers. While some of these metals are benign or even beneficial, there is also the risk of exceeding acceptable intake and achieving toxicity in the body due to free radicals, resulting in health complications. In this study, the overall iron content in wines originating from different geographic locations (California, Italy, Australia, and Argentina) will be determined through atomic absorption spectroscopy (AAS). The content measured will be compared against the typical wine serving size and the reference daily intake level of iron according to the FDA. Final results will determine what types of wine are acceptable for daily intake and which are potentially toxic.

NSMCS – 40 (B10)

**Studying Center of Mass in Flight Phases of the High Jump**

Aaron Horton

The flight phase of the high jump is most efficient using the “Fosbury high jump” technique, in which a person lowers their center of mass (COM) below the arc of their back in order to lift their body above the bar. The goal of this study was to test if the bar would be closer to the COM of an experienced versus an inexperienced high jumper at the top of their flight. The experiment was designed to measure the COM by averaging the left and right ASI markers, and finding their maximum clearance height during the flight phase of the jump. We found that the experienced jumper had a COM closer to the bar, relative to the subject height, possibly indicating a more effective body positioning technique in regards to curvature of the back. We also found a negative correlation between bar height and the distance between the COM and the bar. That is, as the bar was raised, the COM of the jumper became closer to the bar at the maximum height of the jump. While the forces exerted by the jumper during the take-off phase are key to obtaining the maximum COM height, the technique used by the jumper in the air is critical to their ability in clearing the bar. Jumpers who are most effective in their “Fosbury Flop” technique will have the lowest COM height at each bar height.

NSMCS – 69 (T12)

**Microwave Assisted Biginelli Reaction Under Solventless Conditions Using Bentonitic Clay as Catalysts**

Kaleigh Jones, Kersty MacLean, Eliara Aquino, Barry Soucy

Dihydropyrimidones were synthesized using benzaldehyde, urea, and methyl or ethyl-acetoacetate (Biginelli Reaction). A greener approach was taken by performing the synthesis over a variety of bentonitic clay catalysts under solventless conditions using a microwave reactor as the source of energy.

NSMCS – 73 (B11)

**A Novel Approach for Cloning and Expressing Genes from Broadly Neutralizing anti-HIV Antibodies**

Dalton Kinnard\*, Yeonggwang "Paul" Park, Damilola Junaid, Brittany Thomas,

J. Christopher Love1, Craig Story

1Massachusetts Institute of Technology, Department of Chemical Engineering

Less than one percent of individuals infected with the Human Immunodeficiency Virus (HIV) are able to produce highly potent molecules known as broadly neutralizing antibodies (bNAbs). These antibodies are capable of binding to, and effectively neutralizing up to seventy percent of known HIV variants. BNAbs have potential both as therapeutic agents for HIV infected individuals, as well as a tool for studying HIV immunity. Because antibodies are composed of two separate polypeptide chains, the heavy chain (HC) and the light chain (LC), it is a challenge to isolate the genes encoding them, because two genes from a single antibody-secreting cell must be isolated together. These genes are known as the variable light gene (VL), and the variable heavy gene (VH). The current state of single-cell PCR is such that amplification of both VL and VH genes is possible; however, expression of antibodies from the cloned DNA that results typically involves the creation of two separate expression vectors, one for each of the protein chains of an antibody. We have developed a novel antibody expression system, wherein both HC and LC are joined together in a single full-length chain by a polypeptide linker, to form a structure which we call a “monobody”. Portions of both the HC and LC are PCR amplified, and then enzymatically assembled in a single-tube isothermal reaction. The resulting bacterial plasmids are then purified and subsequently expressed in mammalian tissue culture. We have successfully created a monobody based on a known HIV gp120-binding antibody. The resulting construct, when transfected into a HEK293T cell line, produced antibodies with similar characteristics to the original native antibody species. These results indicate that the monobody folds in a manner that is indistinguishable from a standard IgG antibody, and binds to the HIV gp120 protein as effectively as its normal counterpart.

NSMCS – 42 (B12)

**The Effects of Conductivity in Vernal Pools on Egg Mass Abundance of the Yellow-Spotted Salamander (Ambystoma maculatum) in Essex County, Massachusetts**

Samantha Kruguer, Marissa Jimenez, Damilola Junaid, Kemberlyne Cordero, Shanell Percy,

Dorothy Boorse

The yellow-spotted salamander (Ambystoma maculatum) requires vernal pools for laying its eggs. Vernal pools in close proximity to roads put the yellow-spotted salamander and its offspring at risk of coming into contact with chemical pollutants from road runoff. Deicing salts are used heavily on roads throughout the winter months in New England. Studies have found negative impacts of deicing salts on wetlands and wildlife. Due to increasing global declines in the number of amphibians, researchers are paying specific attention to the impacts that road salt has on amphibian life in vernal pools affected by chemical pollution. In this study, we have begun surveying 23 vernal pools in Essex County and are measuring conductivity as well as the egg mass abundance of yellow-spotted salamanders at each pool. We will analyze these measurements in order to check for a correlation between high conductivity and decreased egg mass abundance in the species. With this information we hope to be able to better understand the impact of road salts on amphibians living in wetland habitats.

[Poster T13 was retracted.]

NSMCS – 36 (T14)

**Preparation of Quinoxalines Using a Zn[(L)proline] Catalyst**

Abigail Lutz, Jonna Clark, Christian Garzon

Quinoxalines are a type of organic molecule used in many different industries, most often as pharmaceuticals and antibiotics. This project allows us to explore the use of a potentially reusable, cheap catalyst to promote the synthesis of quinoxalines at room temperature. The Zn[(L)proline] catalyst has been shown to promote a very high percent yield for the production of quinoxalines. In our research we hope to test the reusability of this catalyst. We expect that the catalyst will continue to promote high percent yields after several uses. We also hope to convert the study done by Dr. Heravi into a 3 hour lab for future organic chemistry students. More research is currently being done to test these possibilities.

NSMCS – 67 (T15)

**Optimization of Microengraving Tools for Isolation of B Cell Hybridomas**

**Producing Anti-HRP2 Antibodies**

Michael Mann\*, Damilola Junaid

The protein HRP2 appears in the malaria life cycle and is indicative of infection in human malaria patients. We sought to produce a source of antibodies against this protein that can be used to diagnose patients with malaria. We immunized mice with the HRP2 protein, collected its spleen cells, and fused them with myeloma cancer cells in an attempt to produce a functional B cell with an infinite capacity to divide. The procedure for screening involves the use of microengraving, where the hybridoma candidates are put into small wells, and a cover slide is treated to capture antibodies produced by cells in these wells. Early attempts at microengraving resulted in significant cell loss when the capture slide was removed. We prepared a solution of highly viscous methylcellulose in an attempt to increase cell retention. We will compare results of the methylcellulose microengraving with results from regular media to determine if cell loss is significantly reduced in methylcellulose trials. We hypothesize that the high viscosity of the methylcellulose will discourage the cells from floating out of the wells when the antibody capture slide is removed. It is our hope that by improving the microengraving procedure, we will be able to successfully isolate a hybridoma B cell that can produce antibodies against the HRP2 malaria protein.

NSMCS -2 (B13)

**Greener synthetic methods for the undergraduate laboratory curriculum: Microwave-assisted catalytic oxidation of alcohols**

Brittany Marshall\*, Irvin Levy

Oxidation chemistry in the undergraduate curriculum typically depends upon the use of hazardous reactants, such as chromium reagents. Much of green chemistry literature suggests that safer oxidation conditions are necessary in the synthetic tool box available to chemists. In this project, we modified a previously published method for the catalytic oxidation of α-hydroxyketones with a modern microwave-assisted approach. We have studied the effect of time, temperature, catalyst, and substrate beginning with the oxidation of benzoin to benzil. The reaction considers metrics such as percentage yield and e-factor in comparison to the traditional reflux method. Our method is superior on the basis of several of the “12 Principles of Green Chemistry”: prevention of waste, design for energy efficiency, and the use of catalysis. This method of oxidizing benzoin improves the lab procedure sometimes found in undergraduate organic laboratories by providing a fast, efficient reaction.

NSMCS – 17 (T16)

**Do your Molecules Have the Jitters? Caffeine Content in Coffee using FTIR Analysis**

Brittany Marshall

Caffeine is a naturally occurring alkaloid which is commonly found in beverages such as coffee, tea, and is often added to soft drinks. It’s widespread use in a variety of drinks and over the counter drugs make it the most commonly used stimulant drug. The biological impact of caffeine is widely debated and it has been suggested that it has a negative impact on human health. For this reason, it is an analyte of interest for qualitative analysis. In this analysis, the weight percent of caffeine in various coffee samples was measured using Fourier Transform Infrared Spectroscopy (FTIR) with an Attenuated Total Reflectance (ATR). Two methods of caffeine extraction were used. In one method, caffeine extraction was performed by solvent extraction using chloroform. Chloroform is not identified as a GRAS (generally recognized as safe) and would not be considered a green chemistry solvent. A second greener caffeine extraction method was performed using solid-phase extraction (SPE). Both methods were compared according to ease of extraction, accuracy of extraction, hazards of extraction, and cost of extraction. The experiments conducted in this project provide a good example of introducing FTIR instrumentation and green chemistry in an analytical, biochemical, or instrumental curriculum.

NSMCS – 64 (B14)

**Second Graders Model the Effects of Pollution on a Small Plant System**

Sarah McCarron\*, Sarah Goss

Chemistry and environmental education can begin in the early grades of school. A second grade class was chosen to participate in an educational outreach program led by undergraduate students. Pollution, the scientific method, and the conservation of matter were topics that were addressed in this study. Students were given an initial assessment, followed by a hands-on lesson about the conservation of matter. They were asked to apply what they learned to the idea that pollution can come from seemingly innocuous sources. Students prepared rock salt solutions and dosed lettuce seeds to model the effect of unnaturally enriched surface runoff water on the growth of plants. Students monitored the growth of the seeds over the course of six weeks and kept a journal filled with observations and measurements during this time. Follow-up assessments were given and results were compared to the students' initial hypothesis.

NSMCS – 24 (T17)

**Esterification: Synthesis of Fragrant Esters with a Greener Catalyst**

Harrison Miller\*, Rachel Burke, Zachary Clark, Nana Boakye

Esters are formed from the reaction of an alcohol and an acid, and they are used as fragrances and flavors in products such as candy and perfume. Typically, esterification reactions are catalyzed with concentrated sulfuric acid. This research shows that Montmorillonite KSF clay can be used to catalyze the esterification instead. This is a much greener method because clay is non-corrosive, reusable, easily obtainable, and naturally available—and therefore much more sustainable than using sulfuric acid. This research is useful for high school chemistry classes, because it eliminates the need for students to be exposed to sulfuric acid. This project compares the synthesis of isopentyl propionate and ethyl butyrate using clay catalyst to the traditional method of sulfuric acid as a catalyst. The traditional method was performed in a hot water bath, and the clay catalyst method was performed on a hot plate with a stir bar. The preliminary data shows that Montmorillonite KSF does work as a catalyst, but in different proportions for each esters. Based on the principles of green chemistry, we hope to find the balance of a minimum amount of catalyst with a reasonable reaction time. Further quantitative research should determine these ratios for various esters to produce equivalent yields to reactions using the traditional method.

NSMCS – 70 (B15)

**A Biomechanical Analysis of a Technique of the High Jump**

Kelly Ortendahl\*, Jessica Ventura

Research has shown that the maximum height of the high jump is correlated to the technique of the athlete during the take-off phase. It has been observed that the center of mass position is often above the horizontal ankle position before takeoff. The purpose of this experiment was to determine if the center of mass position in relation to the ankle at take-off is correlated to the maximum height of an athlete during the high jump. Data was collected using reflective markers and Vicon motion capture system of two athletes during multiple trials of a high jump. The center of mass position was found by averaging the ASI markers and its horizontal distance to the ankle joint was calculated. This horizontal was then compared to the maximum jump height. It was found that a smaller vertical distance between the two positions resulted in a greater jump height. This relation can be used to improve an athlete’s jump, as it was found that a maximum jump height during the high jump is achieved when the center-of-mass position is directly over the ankle at take-off.

NSMCS – 49 (B16)

**The Effect of Running on Ankle Joint Forces**

Kelly Ortendahl\*, Jessica Ventura, Karen Troy1

1 Worcester Polytechnic Institute

Research has shown that bones get stronger in response to mechanical loading. However, it is not clear how mechanical loading during running affects the structural behavior of the bone and its density. The purpose of this pilot study was to compare a young adult’s running mechanics and bone structure between the start and end of an eighteen week Couch-to-5k training session. The kinematic and kinetic running data of the participant was recorded using a Vicon Motion Capture System and an in-house force plate. The force plate was built specifically for this study using four vertical and four horizontal Wheatstone bridges composed of four strain gauges and an amplifier each. A dynamic simulation was conducted in OpenSim 3.0 to estimate the muscle forces required for a scaled 16 degree-of-freedom musculoskeletal model to reproduce the experimental kinematics and kinetics. These estimated muscle forces were combined with inertial effects and ground reaction forces to calculate the total forces acting on the distal end of the tibia. The maximum vertical force acting on the tibia was 8.3 body weights, with 28% contributed from the ground reaction force and 72% contributed from the muscles and inertial forces. This maximum loading occurred at 40% stance, just as the runner was entering the propulsive phase. A 1.1% decrease in volumetric bone density, with slight improvements in trabecular architecture, indicated that bone remodeling may have begun due to the training program. The knowledge gained from this study will be used to conduct a similar study on marathon runners.

NSMCS – 61 (B17)

**Teaching a New Dog Old Tricks**

Mason Ostrowski

The purpose of this study is to examine the inter-breed differences in dog training, in an attempt to draw telling conclusions on the characteristics of both dog breeds and training techniques specific to each breed. Dog breeds have developed varying behavioral and physiological characteristics through artificial selection practiced by humans, and it would follow that there would exist variance in the learning curve, both in time elapsed and learning facility. Since Clicker Training” has been established as a very effective tool for training, both dogs were trained with this technique. The desired behavior is conditioned without use of punishment. Ten training sessions consisted of fifteen repetitions and was repeated for ten sessions. A Mastiff and a Labrador Retriever were compared in their ability to learn the command “Come;” Shaping was used to encourage the dog to move toward the trainer and sit as his feet. During the sessions, the Mastiff stubbornly resisted training, responding to 0% of the stimuli, even in the presence of reward. The Labrador Retriever, in contrast, was eager to please and learned quickly. Ethogram analysis indicated significant differences in breed’s aptitude for learning commands. The Labrador Retriever learned at a quicker rate than the Mastiff and retained commands better as well, coinciding with their respective histories – Mastiff’s being bred for strength, size, and as stubborn watch dog traits, and Labrador Retrievers being bred as hunting companions.

NSMCS – 22 (T18)

**Musician's Focal Dystonia: An Analysis of the Comorbidity of Anxiety and Perfectionism**

Emily Outland

The objective of this study was to determine if there is a relationship between anxiety (state and trait) and perfectionism (self-oriented, other-oriented, and socially prescribed) and musician’s focal dystonia (MFD) in order to better understand, treat, and prevent MFD. The State-Trait Anxiety Inventory for Adults and the Multidimensional Perfectionism Scale were used to measure anxiety and perfectionism in patients with MFD and in a control group of healthy musicians. The following paper describes the results of the analysis of the data obtained from both assessments.

NSMCS – 50 (B18)

**The Effects of Landscape and Vegetation on Abundance**

**of Four Non-Migratory Wintering Songbirds**

Madeline Penson\*, Greg Keller

Non-migratory songbirds are frequently found throughout Massachusetts between the months of November and February, when most other songbirds have flown south. However, little is known about the impacts winter habitat has the behavior and abundance of these birds. The hypothesis for this project is that abundance and behavior of wintering songbirds are affected by landscape and vegetation composition and type of forest edge: natural edges, human-induced edges, and interior forest. To determine the influence landscape and vegetation has on wintering songbirds, 36 sites comprising three different habitats were selected in the North Shore area using GIS software. Each site was surveyed twice, and the presence and behavior of black-capped chickadees, tufted titmice, white-breasted nuthatches, and downy woodpeckers was collected. We found that these birds are affected by multiple scales, including tree type, forest density, and edge location. From this research, these species each selectively use specific habitats differing in both landscape and vegetation.

NSMCS – 31 (B19)

**The Iffects of Intra-pool Depth Distribution of Wood frog (Lithobates sylvaticus)**

**and Spotted salamander (Ambystoma maculatum) Egg Masses and their Breeding Effort**

**on the North Shore of Massachusetts**

Eleanor Ragon\*, Joy Parillo, Catherine Schweitzer, Kelly Linehan, Gabriel Roberts

Spotted salamander (Ambystoma maculatum) and Wood frog (Lithobates sylvaticus) are habitat specialists and breed only in vernal pools. A vernal pool is a seasonal, depressional wetland, which varies in size, depth, and shape. Their breeding efforts are specific to certain locations found within a vernal pool; therefore vernal pool preservation is extremely crucial to ensure a thriving population of both wood frogs and spotted salamanders. We are looking at the effects of the relative depth of eggs masses found in vernal pools around the North Shore of Massachusetts. We have taken samples from over ten vernal pools and located egg masses for both species and measuring depth of mass and distance to shore or tree island. We found that the Spotted salamander egg masses were found at shallower depths in comparison to the egg masses of Wood frogs. Both species were likely to be found closer to shore in deeper pools with an ideal depth ranging from 15 to 45 cm deep where most masses were attached to plant material. This research is beneficial to others who will be surveying vernal pools and looking at egg masses. This data will help them to narrow their area of study and optimize their time.

NSMCS – 57 (B20)

**A Biomechanical Analysis of the Take-off Phase of the High Jump**

Lisa Richardson\*, Jessica Ventura

The take-off phase of the high jump is key in maximizing the center of mass height. This study examined whether an experienced high jump athlete conserved more mechanical energy during take-off than an inexperienced jumper. Two high jump athletes, one who competed in Division I meets (experienced) and one who recently began training in Division III (inexperienced) were fitted with reflective markers and successfully completed three jumps in a biomechanics lab that was outfitted with a Vicon motion capture system. The change in mechanical energy from foot strike to toe-off of the take-off phase was calculated. The mechanical energy was defined to be the sum of the potential gravitational, the horizontal kinetic and the vertical kinetic energies. The results showed that kinetic energy changed more than potential gravitational energy during the take-off phase for both subjects. The experienced jumper’s total energy values at toe-off were closer to the total energy values at foot-strike than the inexperienced jumper’s, thus the experienced jumper conserved more mechanical energy during the take-off phase. The experienced jumper also had less variation from trial to trial than the inexperienced jumper. The vertical kinetic energy of the inexperienced jumper became greater than the horizontal kinetic energy at the end of the take-off phase, which is to be expected considering the jumper is trying to move his/her body up over the bar. Further studies can provide insight into how high jump athletes can maximize their jump height by optimally transforming horizontal kinetic energy to vertical.

NSMCS – 15 (T19)

**I Say Tomáto, You Say Tomoto**

Katelin Ristenpart\*, Jennifer Noseworthy

Lycopene is a plant pigment responsible for the red color of several fruits and vegetables including tomato, watermelon, papaya and grapefruit and is an important antioxidant compound in human health. Lycopene is an intermediate in biosynthesis pathways in which other carotenoids come as a result. High tunnels are used as a method for season extension in colder climates where the growing season is limited. Very little data exist comparing lycopene accumulation in tunnel and field grown tomatoes. The main objective of this study was to determine lycopene content grown in high tunnel and field grown ‘Brandywine’ tomatoes produced at the University of New Hampshire during the 2013 growing season. Multiple harvests were also gathered during the growing season to evaluate variability in lycopene content throughout the season. The analysis of lycopene was performed by UV-Vis spectroscopy using two different spectrometers: Ocean Optics Spectrometer and the SpectraVis spectrometer. The experiment was done using a greener sample preparation method than previously reported. Lycopene was extracted from fresh tomato tissue using 1:1 2-Methyltetrahydrofuran: methanol, rather than using the traditional solvent, tetrahydrofuran (THF). Results indicated that field grown and high tunnel tomatoes harvested later in the season tended to have slightly higher values of lycopene but the differences do not seem significant. Future work will include a detailed analysis by High-Pressure Liquid Chromatography (HPLC).

NSMCS – 58 (B21)

**Vigilance in Geese**

Erika Sanderson\*, Morgan Towle

It is no surprise for those who frequent the quad that geese are vigilant. Yet sometimes they seem not to care about passers-by. In an effort to better understand their vigilance, and build on work done by Tillberg, breed, and Hinners (2007), we have created our study. The purpose of the study is to test the conditions under which geese are vigilant in an open field near people. Consistent with other research, we predicted that there would be less vigilance in geese when the flock is larger. If so, we hope to differentiate between two common explanations: predator confusion and shared vigilance. Second, we predicted that, when more people walk by the flock there would be more vigilance compared to when there are fewer or no people around. Data were collected on 10 separate occasions for each condition (more than one goose vs. one, and 2 or more passersby vs. one). We recorded vigilance behavior using an ethogram. Results from the data show that geese are less vigilant when the flock is larger. There was no significant difference in vigilance when comparing the number of people walking by.

NSMCS – 12 (T20)

**How Hot is Hot? - An Analysis of Capsaicin Content in Hot Peppers by High Performance Liquid Chromatography**

Charles Shaw

Capsaicin is a naturally occurring toxin produced by plants to repel mammals seeking to consume its seeds. It does this by activating the neurons normally associated with sensing heat. In other words, contact with capsaicin causes the animal to perceive that it is on fire. In a strange twist of fate this same toxin has become a prized component in many human cuisines. It is found in many varieties of peppers, primarily in the genus Capsicum, and is used everywhere from Mexico to Nepal. This project sought to discover the exact quantities of capsaicin found in four different varieties of hot pepper; Jalapeno, Habanero, Chapotle, and the infamous Ghost Pepper. To do this the peppers were dried, ground before being dissolved in methanol. Each sample was then analyzed using High Performance Liquid Chromatography (HPLC) for quantitative analysis of capsaicin content. The capsaicin concentration of each pepper will be determined and then compared to the value defined by the FDA.

NSMCS – 14 (T21)

**Using ONIOM by Gaussian to Characterize Organic Molecules**

Samuel Sherratt

The computer program Gaussian is a powerful tool used in computational chemistry. The ONIOM technique in Gaussian allows for effective characterization of large molecules by partitioning the molecule into “layers.” The layers denote differing levels of importance in how the molecule in question interacts with other molecules. For example, the active site of an enzyme is composed of only a handful of atoms but is the location of the most dynamic chemistry of the enzyme, and is thus labeled a “high” layer. The rest of the molecule does not undergo a similar magnitude of change, and is thus denoted a “low” layer. Segregating the molecule in this way enables Gaussian to perform high accuracy calculations on the high, more important layer while performing less accurate (but quicker) calculations on the rest of the molecule. While this technique has most often been applied to large proteins, a basic application of ONIOM to smaller organic molecules can serve as a good introduction to the powerful technique and open the door to investigation of larger molecules. This project will seek to replicate an ONIOM protocol from UC Waterloo for modeling propanal. The protocol was designed for Gaussian ’09, but will be adapted for use with Gordon College’s Gaussian ’03. Succeeding in replicating the protocol opens the door to more work with ONIOM, such as writing lab protocols to further student understanding of ONIOM and potentially modeling enzyme activity.

NSMCS – 52 (B22)

**Synthesis of 2’-Hydroxy-2-methoxy-chalcone and 2’-Methoxy-aurone Using Greener Alternatives**

Victoria Tennant\*, Margot Lee, Ryan Williamson, Bailey Grinnell, Erin Walker,

Kiersten Bieren, Daniel Kim

Chalcones are molecules comprised of an aromatic ketone and an enone, which are critical in the formation of important biological compounds. Aurones are heterocyclic chemical compounds known as flavonoids. Flavanoids, which are most commonly found in various plants, have been shown to serve in a wide range of biological, chemical, and pharmacological activities. Due to their natural antioxidant properties, the flavonoids derived from the synthesis of chalcones and aurones have the potential to be used in treatment of cancer, cardiovascular disease, and neurodegenerative syndromes. In this experiment, the group synthesizes the chalcones and aurones utilizing the Claisen-Schmidt condensation reaction and the oxidative cyclization reaction. The experimental procedure was modified to be more aligned with the principles of green chemistry through substitution of chemicals which displayed higher yields and were safer for human contact and disposal than the historical methods. We suggest that further experimentation of this procedure use Bismuth Acetate in place of Mercury (II) Acetate and Pyridine in place of Triethylamine. Further experimentation must be conducted to further understand how to most efficiently synthesize chalcones and aurones in the laboratory setting as opposed to extraction and isolation from plants. While the synthesis of the chalcones and aurones is not yet complete, preliminary results are promising.

NSMCS – 34 (B23)

**The Relationship Between Nutritional and Environmental Knowledge**

**on Diet Choices in College Students**

Victoria Tennant\*, Kelly Linehan

When students start attending university, they gain independence from their parents and are responsible for lifestyle decisions regarding their health and overall well being. College students living in a new environment are presented with new food options in the dining halls. This study was conducted to examine if nutritional and environmental knowledge influence the food choices made daily by students at Gordon College. 163 participants took a survey that was created to analyze the diet choices made from the previous three days, to assess the knowledge students had about nutrition and environment, and to analyze the total care of body health and concern for environment health. Our results suggest that males and females differ in their total care for both the environment and nutritional health. The participants who scored higher on environmental questions also presented superior nutritional knowledge and healthier diet choices compared to their peers. These results can be used to promote education and awareness of link between environmental sustainability and healthier life decisions.

NSMCS – 35 (B24)

**The Effects of Coral Bleaching on the Abundance and Richness of Four Common Fish Species in the South Water Caye Reserve, Belize**

Victoria Tennant\*, James Aguiar, Dimitris Fanis, Jose Hernandez, Madeline Penson, Eleanor Ragon

Many tropical fish species require a stable marine habitat for survival, and in an already vulnerable area, changing ocean conditions present a higher risk for species loss. We speculated that with an increase in coral bleaching, we would observe a decline in abundant fish species. We surveyed 3-4 meter sections of coral reef habitat, and measured the degree of coral bleaching at each section. At each site, we measured the abundance of squirrelfish, sergeant major fish, stoplight parrotfish, and four-eyed butterfly fish. Regression analysis was used to evaluate the correlation between the overall health of the coral and the abundance of the individual species. This analysis illustrated a positive correlation between coral health and fish abundance. Based on previous studies and these findings, coral bleaching appears to be having a significant negative impact, not only on local fish populations, but also on the surrounding marine environment.

NSMCS – 48 (B25)

**Effect of Cultural Standard of Beauty on Self-Esteem**

Maria Theo\*, Grace Crosby, Tiffany Jack

This study investigated the effects of cultural standards of beauty on the self and body esteem of women, ages 18-25. One purpose was to see how quickly exposure to images of beautiful people could lead to self-perception of body image and self-esteem. 40 women participated by taking an anonymous and confidential questionnaire online using Survey Monkey. First, participants completed both a body-esteem and self-esteem inventory (pretest). Then they rated images of People’s Most Beautiful Women on several different criteria. The same body and self-esteem inventories were taken as a posttest. A paired-samples t-test was used to evaluate any differences between the pretests and posttests. In keeping with our hypotheses, significant changes were found for both the self-esteem and body-esteem scores. In both instances, the scores dropped indicating poorer self-image after viewing the pictures of beautiful women. According to our results, the cultural standards of beauty that our society has accepted appear to have a negative effect on the women who are exposed to them.

NSMCS – 11 (T22)

**Blue 1 and Red 40 Dye Analysis of Generic Brand Grape Soda vs Established Brand Fanta Grape Soda with UV-Vis Spectroscopy**

Owen William

Dyes are subject to FDA approval before they may be used in food, drugs, or cosmetics. They can be potentially harmful so dye concentration analysis is an important study. This experiment focuses on the two-component analysis of Blue 1 and Red 40 found in grape soda. This experiment sought to answer if the dye concentrations in Stop and Shop brand grape soda (a generic brand) differed from the dye concentrations in Fanta brand grape soda. It was found that the dye concentrations in the established brand Fanta Grape Soda were significantly higher than that of the dye concentrations in the Generic Brand Grape soda. Samples were prepared using Solid Phase Extraction and a two-component UV-Vis spectras analysis was performed using excel.

Princemere: The Gordon College Academic Journal

 (Poster T23)

Elspeth Currie

Princemere: The Gordon College Academic Journal serves as a publication for the scholarly work done by students here at Gordon. By collecting undergraduate research and work, Princemere creates a forum for thoughtful dialogue and celebration of ongoing student scholarship. Princemere publishes student work, nominated by faculty members, which engages the ideas and questions of the College and the wider academic community. As Gordon College's only academic journal, Princemere is in the unique position of giving students the opportunity to see their work published and printed in one of the journal's biannual publications. The Princemere staff is excited to be a part of this year's Undergraduate Research Symposium and hopes that presenting students will consider submitting their papers for publication.

Poster Entries: Social & Behavioral Sciences and Education

Listed in Alphabetical Order by First Author’s Last Name

Poster Format Codes: B = bulletin board, T = trifold

SBS/ED – 30 (B26)

**Does Wanting to Give to Charity Make Us More Vulnerable to Social Influence?**

Katharine Adamyk\*, Kelly Burton, John Ingemi, Zoey Meyer-Jens, Kasey Miller, Ashley Pengelly, Mark Spooner, Marie Ware

It is widely assumed that humans naturally and easily converge to the actions and choices of others and it is this strong tendency to conform that makes culture possible. Against this consensus, Hodges and his colleagues (Hodges, in press; Hodges & Geyer, 2006; Hodges, Meagher, Norton, McBain, & Sroubek, 2014) have argued that divergence is also pervasive, even in situations in which one might expect convergence. Agreeing with the wrong answers of unanimous majorities, the “Asch effect” (Harris, 1985), is not easily generated, but tends to occur ¼ to 1/3 of the time. We created conditions that increased the likelihood of agreement with wrong answers: (1) a short-term memory task, rather than a perceptual task, was used, and (2) participants were told that for every item that they all answered correctly, $2 would be given to a charity of their choice. A preliminary analysis of the data shows the majority of subjects agreed with an incorrect answer at least once. Complete agreement, however, was very rare. The most frequent pattern of responses was one agreement. Further analysis will include categorizing the relationship between survey responses and task agreement patterns, as well as comparing the pattern to individuals who completed the short-term memory task without hearing others’ answers.

SBS/ED – 63 (B27)

**Lack of Cell Phones and Effect on Anxious Behavior**

Caitlyn Alekshun\*, Kayleen Rogers, Paula Gomes

This study examined the relationship between undergraduate college students’ cell phone usages and their relative anxiety levels. Two experimental participant groups were used; both groups had their cell phone taken away from them and placed within their view on the opposite side of the testing room while they were asked to complete a sheet with ten simple math problems on it. At the same time the participants were given this task, the researcher left the room, with the reason unknown to the participant, for a total of fifteen minutes. After this amount of time had elapsed, the researcher entered back into the room and gave the participants of group A their cell phone along with a copy of the State Trait Anxiety Inventory (STAI) survey or, if the participant was randomly assigned to group B, solely a copy of the STAI. At the conclusion of the study, each participant was asked to fill out a cell phone overuse scale survey as a base measurement of their individual cell phone dependency, and those members of group B regained their cell phone. This study showed a marginally significant difference between the two experimental groups, t(38) = -1.74, p < 0.1. This difference was opposite of the predicted alternative hypothesis; the group which regained their cell phones after debrief (M = 1.89, SD = .41) showed slightly less anxiety than the group which regained their cell phones during the anxiety survey (M = 2.13, SD = .49). Contrary to predictions, the presence or absence of a cell phone did not influence anxiety levels in college aged participants.

SBS/ED – 23 (T24)

**Promoting Social Interaction during Snack**

Abigail Alvera

This study measured student social interaction during snack time in a Pre-K, multi-age inclusion classroom. It examined whether or not prompting from adults positively affects the amount of student conversation during snack time. The data collected was analyzed by gender and if adults were at the table. I found that students engaged in longer and more reciprocal conversations when the prompt was an open ended question and when they sat with students they considered to be their friends. When adults were at the table, the students relied on the adult to initiate and continue the conversation. Students would also address the adults when asking or responding to a question instead of their peers. Groups of friends at a table tended to talk with each other and needed prompting to involve other students especially if they were of another gender. Student interaction during snack increases positively with adult prompting and modelling especially when students sit with peers they are comfortable with.

SBS/ED – 60 (T25)

**The Effect of Domestic and International Service Learning/Missions Trips on Sensitivity towards Human Suffering**

Daruenie Andujar\*, Madison Mears, Pharvyana Marcelin

Many religions share the belief of serving through ministry. In the Christian tradition, faith and works are often tied together. Christians are called to live out their faith in their everyday lives, this includes mission and service works. This study explores how Christian service and missions both domestically and internationally impact the way we view and perceive human suffering. We predict that those who have served in international missions and service will be more sensitive to human suffer than those who served domestically. We also predict that prolonged exposure to missions and service will cause desensitization. This will result in a decreased response towards human suffering. This study recruited two groups of students who attend Gordon College, one group participated in international missions while the other participated in domestic missions. We connected our participants to a Galvanic Skin Response (GSR) machine and showed the participants various images of human suffering while they completed a set of questions for each image followed by a short survey packet at the completion of the slideshow.

SBS/ED – 66 (T26)

**Case Study of a High School Student**

Rebecca Brule

Over the course of my Practicum in a math classroom at Gloucester High School, I observed and gathered data regarding one student’s educational background and experience. Through interviews, various learning surveys, and his cumulative file, data was compiled and then coded. After coding, an action plan was put together in order to address the student’s needs in the classroom and simultaneously play to his strengths. This plan includes actions that need to be taken by both the teacher in the classroom and the student. The teacher in his classroom would need to adjust the instruction and the student would learn techniques to own his learning. A recommendation for his future teachers includes a plan for promoting further success in his subsequent high school years. Due to research done over the past semester, this student will be equipped with strategies to improve his success in any classroom.

SBS/ED – 59 (B28)

**The Outlook on Marriage of College Students with Divorced Parents**

Erin Buckley\*, Aysha DeSilva, Kemberlyne Cordero, Mason Ostrowski

This study focuses on the correlation between religiosity and outlook on marriage for college-aged students who have divorced parents. The purpose of our study is to examine how divorce can impact a child’s outlook on marriage and how religion and age might be associated with these variables. Previous research hasn’t incorporated attitudes towards marriage and their correlation with religiosity in relation to those with divorced parents. In order to investigate this, an anonymous and confidential questionnaire, consisting of 15 questions, was electronically distributed and completed by both strong and nominal Christians as well as non-Christians. A total of 93 students participated in this study. Comparing those who self-identified as strong Christians with those who stated they were not, independent t-tests found no statistically significant differences between the two groups for questions regarding how afraid participants were of committing to a relationship or getting divorced, or their anxiety towards getting married.

SBS/ED – 53 (T27)

**Measuring the Effects of Brain Training on College Students’ Classroom-related Cognitive Abilities in Verbal Comprehension and Recall**

Si-Hua Chang\*, Evan Betti, Kaira Colman

Recent findings in research suggest that it may be possible to increase fluid intelligence using cognitive training on a variety of different tasks. This study examines the effectiveness of Lumosity, a commercial web-based cognitive training program which claims to “improve key abilities such as working memory, visual attention, and executive function”. Specifically, the study tests whether training on Lumosity has real-life application to everyday classroom-related tasks of college students in producing practically significant effects on memory- and attention-related tasks. It measures participants’ potential improvement on verbal comprehension and recall, tasks which are similar to those required of students in an academic setting. Participants signed up for either the experimental (training) group or the control group, and were then given a pre-test consisting of comprehension tests for both a reading passage and a short video of a lecture. Following these initial tests, the training group was required to train on Lumosity for a minimum of 25 days out of 30, while the control group was not assigned any tasks during that period. All participants will be administered comprehension tests similar to the initial tests at the end of the training period, and the difference in test scores of the two groups will be compared. If Lumosity is indeed effective in improving memory and attention, the groups’ scores should be expected to differ significantly. Note: since the training period for the experimental group is not complete, the post-tests have not yet been administered to the participants. The tests are scheduled to be completed by April 30th, and the results will be available for the poster presentation at the symposium.

SBS/ED – 72 (T28)

**Reciprocal Teaching: Promoting Student-Led Discussions**

Shannon Dodds

This action research plan explores the benefits of student-led discussions in promoting comprehension skills within reciprocal teaching groups. The research was conducted using both the on level and advanced reading groups of a third grade classroom. The primary goal of the research was to help students develop the necessary skills to form, articulate, and clarify opinions in open discussion. Based on preliminary observation and analysis of student responses, it was evident that the groups struggled to engage in conversation about textual literary elements without teacher support. Student surveys revealed that participants in the collaborative learning group, approximately sixty-percent, felt dissatisfied with their experience due to varying reasons, such as group dynamic, independent reading preference, and unclear expectations. After providing explicit instruction and modeling followed by teacher-led practice, the students took responsibility for the group. In order to maintain a sense of accountability, I incorporated sentence starter cards for each role, a checklist of the responsibilities, and the use of Ipads to record student responses. Out of the eighteen students that participated in the reading groups, fifteen students claimed to have enjoyed reading the book and felt comfortable in the learning environment. Through careful comparison of the student response sheets for each chapter, I found that the students provided more specific, elaborated details for each role in the process. I witnessed the greatest change in the groups’ ability to summarize the text, with the students displaying evidence of whole-group contribution to create a ten words or less synopsis of the reading. Responding to literature through discussion helps students read for a purpose, whether it is enjoyment, debate, or greater comprehension of the text.

SBS/ED – 38 (B29)

**Social Interaction and Visual Perception**

Seth Downing\*, Stephanie Antonucci, Moriah Gross

We extended research on the reverse correlation paradigm to a rejection setting, and looked at whether rejection affects the perception of the Mona Lisa. Research has shown that rejection alters distance perception (Knowles, Green, & Weidel, 2013). However, the recent reverse correlation paradigms allow us to determine precisely what participants perceive in their visual field. This research has shown, for example, that Republicans perceive Mitt Romney to have a more trustworthy face than he does in reality. In our study, 50 participants recalled a time of inclusion or rejection, and then participated in an fake art detection task. This task involved selecting which of two computer-altered images was more like the real Mona Lisa. These selected faces were then averaged together to create two images: the average Mona Lisa for rejected people, and the average Mona Lisa for included people. We hypothesize that the averaged face of the rejected group will be rated by a second, neutral audience as lower for trustworthy, welcoming, and caring and rated higher on hostile and intimidating. We hope to use this information to better understand how socially rejected people have biased perceptions of ambiguous stimuli and bring to light processes that may cause a feedback loop that unintentionally furthers rejection.

SBS/ED – 33 (B30)

**Adaptation of International Students Attending College**

Kristina Dugas\*, Olivia Heist, Pierre Celestin

As the world is becoming more connected, the number of college students traveling to other countries for their education is increasing rapidly. In Gordon College, international students make up 5% of the population. We interviewed 16 students, representing 12 countries, asking questions related to how they have adapted to US culture to investigate potential similarities and differences across cultures. Overall, we found that although many nations require English or another second language early on in education, the focus is on grammar rather than the components of spoken language. Therefore, these students face a problem when they must quickly adapt to engaging in class lectures and discussions which are entirely in English. Language barrier aside, international students must adjust to participating in class through discussions, presentations, and other graded components: a practice which we discovered is very uncommon in most other parts of the world. While professors at Gordon College are eager to help students adjust to their coursework, many international students come from countries with firmly established hierarchies, distinguishing students from their professors and making personal conversation between the two both difficult and unprofessional. Therefore, international students are largely inexperienced in interacting with their professors, even in a situation in which it is appropriate. With the information gathered in this study, we hope to be able to better help future international college students feel more welcome in the US. By making both students and professors aware of the major cultural differences in effect, they will be better equipped to help each other. With the information gathered here, colleges in the US could offer more opportunities to help international students strengthen the areas they are most likely to struggle with while adapting to school in the US.

SBS/ED – 41 (T29)

**Becoming a Homework All-Star: Motivating the Urban Student**

Jessie Dupre

In the fifth grade at Hood Elementary School, some students have a difficult time prioritizing homework due to the obligations that they have at home. With these circumstances, the principal has told the teachers that there should be no consequence for students who fail to complete their homework. The students are expected to do their homework, but the fifth graders have figured out that there is no consequence if they do not complete theirs. To motivate these students, I put a positive initiative into place to celebrate the students that complete their homework for the entire week. For my action research project, I investigated the outcome of student incentive to complete homework with a positive initiative called "Homework All-Star."

SBS/ED – 28 (B31)

**Smiling as a Form of Nonverbal Communication**

Kelsey French\*, Brittany Owen

Nonverbal communication is well-documented among humans, and is often a more accurate indicator of a person’s feelings than their verbal communication. We set out to test this through studying peoples’ interactions with one another and their smiles: whether they were open-mouthed or close-mouthed. Initially, we hypothesized that people tend to have close-mouthed smiles as a dishonest form of communicating happiness, and open-mouthed smiles as an honest form of communicating happiness. Simply put, smiles are more genuine when the mouth is open. We observed 30 participants, all Gordon College students, in different busy dining locations, such as Gillie’s and Chester’s. We took note of their gender, which type of smile they elicited, the duration of the smile, the context they were in, and any additional factors we saw as important or helpful for our study. We found our results to be statistically significant, with a p value of .0005, in that people display open smiles when they are having positive interactions with others, and closed-mouth smiles when they have negative interactions, with a p value of .0013. This matched our hypothesis.

SBS/ED – 68 (T30)

**Case Study of High School Student ES**

Olivia Gray

During my practicum, I worked closely with a particular student to develop instructional strategies tailored to the student’s unique learning needs. Using Learning Styles and Multiple Intelligences surveys, data from the student’s cumulative file, and interviews with the student, parents, and past teacher, I synthesized information about the student’s social, emotional, and academic experiences. I considered this information in developing an action plan to help the student be as successful as possible.

SBS/ED – 29 (B32)

**Effect of Physical Verse Electronic Reading on Cognitive Encoding and Recall**

Christina Halsted\*, Kristen Tenglin, Grace Amnott

Book reading is slowly becoming outdated by the more easily accessible digital reading provided through Kindles, laptops, and iPads; college students in particular are using the internet for research resources over printed information. This study sought empirical evidence to discern whether the formats through which a person learns information and the format with which they are tested impact comprehension and recall. To test this, 47 randomly selected undergraduate students from Gordon College read an excerpt from Jennifer Ackerman's "Ah-choo!" and were then assesed with a multiple-choice test. The experiment included two different reading formats and two testing formats, so each participant either read the excerpt via a printed book or on an iPad, and were then tested either with pencil and a printed assessment or via iPad on Survey Monkey. Results showed no significant difference in the mean results based on formatting, though the group with the lowest average mean of correct responses read the excerpt digitally and tested with paper and pencil. Nearly all the participants indicated that their preferred method of reading was a printed book.

SBS/ED – 54 (T31)

**The Effect of Seating Arrangement on Rug Instruction**

Christa Johnson

The way in which students are arranged in the classroom is crucial part of effective teaching. Students who are provided with a space and position that meets their physical, social and academic needs are given the maximum opportunity to learn. Past research shows that there is an increase in on-task behavior when students have less interaction with friends, regardless of what shape the desks were in. This study was conducted in a second grade classroom of 14 students in Salisbury, Massachusetts. The purpose was to discover if there was a relationship between learning disruptions and student choice in seating, particularly on the rug. Originally, students were able to choose their rug seat, and alternate seating (chairs, standing desk) was available. The implemented change was a set, non-negotiable seating chart on the rug chosen by the teacher. In both situations, data and observations were collected, and students were given opportunity to express their own opinion about the change. Data showed that while specific students were still distracted after the new seats, as a whole, the teacher was able to maintain more control of the class when students did not choose their seats on the rug. From this implemented change, an interesting conversation arose in the classroom regarding student choice in matters such as seating. The reaction of this particular group of students spoke to specific issues regarding authority, attitude and a desire for ownership of their classroom experience. The study not only showed the effect of seating arrangement on distraction from learning, but also the connection between students' social and emotional needs and non-negotiable changes in the community.

SBS/ED – 18 (B33)

**What Makes a Party Good?**

Caitlin Keniston\*, Timothy Carr, Aaron Hicks

We want to know what measurable factors make a good party different from a less-than satisfactory. Parties have many different elements whether it be dancing, music, alcohol, low lighting, or all of the above. We surveyed which of these factors contributed to the "greatness" of a party and added in a deindividuation scale taken from Diener's (1979) theory of deindividuation. The survey participants included 160 responses from undergraduate students at Gordon College and members of Mechanical Turk. Our results showed that when factors are considered simultaneously deindividuation and the relational closeness of the attendees are the only significant factors.

SBS/ED – XX1 (T32)

**Effectiveness of Guided Inquiry in a Flipped Physics Classroom**

Jeffrey Lane

Teachers are currently “flipping” classrooms because of the proven effectiveness they provide. For the same reasons, science teachers are taking an uncommon approach by implementing guided inquiry pedagogy. While successful in their own way, could they be successful together, and how effective can they be? Three lessons explicitly using guided inquiry were composed and taught to a high school physics class of 20 students (the “experimental group”) that is currently flipped. A pre-test was administered before the lesson was taught as well as a post-test which was given after the lesson. The pre-test was used as a baseline for the class knowledge and the post-test was a way to see what knowledge was gained as a direct result of the lesson. A control group of 24 students in an identical physics class was used for comparison of final assessment comparison. This group did not receive the
guided inquiry lessons. Final scores for the pre-test, post-test, and final assessments were average among each class and compared to find how successful the guided inquiry lessons were. Significant gains were made in the experimental group from pre-test to post-test as a direct result of the guided
inquiry lessons. Comparison of the final assessments between the control group and the experimental group showed an increase in the experimental group’s average grade.

SBS/ED – 79 (T33)

**Yoga Balls: Distraction or aid in concentration?**

Liz Maurer

When traditional classroom chairs are removed from the classroom in favor of yoga balls (also known as exercise balls), studies suggest that students show an increase in focus and behavior, with the added bonus of strengthening their cores. When used in a 5th grade English Language Arts classroom, with students only having the chance to use the yoga balls for an hour a day, does this hold true? I did find an increase in concentration, but what was more helpful to me was I discovered that I was able to gauge the students’ level of interest with much more ease. When they were disengaged, they would be bouncing or falling off the yoga balls. When they were interested in the lesson, there would be a slight bounce at most. Though there was a slight increase in the concentration level, overall I discovered that the most helpful aspects of using the yoga balls in the classroom was (1) Increased enjoyment for the students, and (2) Increased my awareness as the teacher as to the engagement level of my students.

SBS/ED – 32 (T34)

**The Effect of Sociability on Online and Offline Self-Disclosure**

Alexis McCagh\*, Kola Olateju, Erin Falkenstrom

Around 40 to 60 percent of adults claim to be shy and online communication may help shy people interact with others (Bressert, 2013). This study examined whether shyness influenced self-disclosure in online and offline contexts. Male and female participants from Gordon College were asked to be in one of two conditions, either an online of in-person condition. Both conditions used the Relationship Closeness Induction Task to allow pairs of participants to become acquainted with each other. Following their interaction, they were asked to fill out a 20-item shyness scale and were asked how much they felt they disclosed about themselves to the other person and how much they felt the other participant disclosed about themselves. As expected, we found a positive relationship between shyness and amount of self-disclosure. Shy people revealed less about themselves in the offline condition compared to non-shy individuals.

SBS/ED – 19 (T35)

**Engaging All Pre-K Students during Whole Group Activities**

Elizabeth Moses

This study measured student participation during various whole group activities in a Pre-K multi-age classroom. It examined whether or not there is a difference in the amount of student participation dependent on the specific activity. The data collected was analyzed by gender and age. I found that active activities such as songs and dancing motivate all students to participate. Activities that require students to perform a given task such as produce a rhyming word or to find a specific letter resulted in slightly less participation across all ages, but was significantly lower for the three year olds. Activities where students had to participate in a discussion recalling information about a story read the previous day promoted the least amount of participation by all ages and gender. Three year olds participate less than four and five year olds during all activities except for singing/dancing activities which all aged students actively participate in. Student participation is related to the nature of the activity being implemented and age is a significant factor in assessing student participation. Further research on student participation based on student age in multi-age classrooms should be conducted.

SBS/ED – 25 (T36)

**History and Ramifications of Multilateral Neo-trusteeship**

**in the Democratic Republic of Congo**

Kevin Neil

The Democratic Republic of Congo is one of the most complexly governed countries in the world. Roughly the size of Western Europe, and with an estimated $24 trillion dollars in mineral wealth, the DRC has been subject to the ‘resource curse’. Despite being incredibly mineral rich, the nation has been in the throws of instability since its independence from Belgian colonization. What has resulted from the combined mineral wealth and political instability is a unique system of government where total sovereignty is nowhere on the horizon. Instead, different sectors (education, health care, security) have been run by predominantly foreign or private entities (churches, NGOs, world powers). In this paper, I’ll explain the history that led to this current system of ‘neo-trusteeship’, and explain how this foreign dependence has affected the nation as a whole.

SBS/ED – 39 (B34)

**Does Multilingualism Improve Multitasking Efficiency?**

Alicia O'Brien\*, Jolene Nunez, Kym Van Heemst, Christian Perdomo

Many studies have been done on the “bilingual advantage,” which show that the ability to speak multiple languages has many cognitive advantages, including executive control tasks and delaying memory decline in older adults (Bialystok & Fang, 2009; Bialystok, Craik, Klein & Viswanathan, 2004). This study focused on the multitasking aspect of executive function specifically, hypothesizing that multilingual people would be more efficient at switching from one task to another. Participants of this experiment included 16 monolingual individuals who speak only English and 15 multilingual individuals who speak a wide variety of languages; including English. We tested subjects by using an online multitasking game, the Stroop test, and a texting while walking task. Multitasking abilities did not differ significantly between the two groups in regards to the Stroop task or the multitasking game. There was a significant difference, however, between the errors made during the texting while walking task. This difference showed that multilingual speakers are more prone to error in regards to texting while walking, a result contrary to our hypothesis and the prior studies that have examined the “bilingual advantage.”

SBS/ED – 27 (B35)

**Social Comparison: Assimilation or Contrast?**

Shannon Petersen\*, Emily Hansen, Juliane McManus

We are constantly told to not compare ourselves with others, but it might just depend on how we choose to compare with others! In a now-retracted article, Stapel & Suls (2004) suggested that making a comparison to a person in general might lead us to think we differ from the other person, while comparing with them on a specific dimension might make us think we are similar to them. Given a lack of direct evidence for this assertion, and the fact that it appeared to contradict current social comparison models, our experiment was a replication of Stapel & Suls (2004) design. SIxty Gordon College students were given either an implicit, explicit or control condition. In the explicit condition, we primed the participants with a picture of Beyoncé and the question “Do you think you are better or worse than Beyoncé at singing?” In the implicit condition, we primed the participants with the question “Do you think you are better or worse than Beyoncé in general?” The control condition was showed a picture of a kitchen chair. Participants then gave an objective self-evaluation of their singing ability. Stapel & Suls (2004) findings were not replicated, with no mean difference in self-evaluation between conditions. These findings are not due to low power or design flaws. Overall, the paradigm worked as expected, with people thinking that Beyoncé is a good singer, and knowing that they are a worse singer than Beyoncé. However, this did not influence people’s self-evaluations of how they would fare in American Idol. We suggest that Stapel’s results are unlikely to be replicated given current models of social comparison and our current failure to replicate his results.

SBS/ED – 62 (T37)

**The Church as Transition Agent for Latin American Immigrants**

Rylee Rainwater\*, Allison Vitale

We are seeking to study the role of the church in the process of immigrating to the United States. We hypothesize that it will play a positive role in the experience, providing a supportive community, teaching lessons that help in coping with the difficulties of transition, and helping individuals to understand the process. Ten immigrants from Latin American countries who were at least 16 years old upon arrival and have been here for at least one year will be interviewed. Of the four immigrants who have been interviewed so far, two are currently church going, and two have attended a US church in the past. There seems to be a denominational shift, as three individuals considered themselves Catholic in their home country, while three have or now consider themselves Evangelical since moving to the US. Ages range from 28 to 42, and their time in the US ranges from 7 to 25 years. Two were from Mexico, one from Guatemala, and one from Honduras. All but one is fluent in English. Transitions to the US were difficult, with struggles with the language barrier mentioned by all participants. All were able to find work but one was not able to find work at the level of his college degree. They report that, before leaving, two received community support from the church, and one reported support in coping with the difficulties of transition, but none reported receiving explicit information about the immigration process. After arriving, they continued to receive support. Two left the church, however, one because of work and the other because of a child with disabilities. The remaining two rate the church as extremely important in their lives, and both mentioned that the church is the center of their social life. In interviews scheduled for the future, we expect to continue to see evidence of some form of support from the church provided in the immigration process, even if it is not explicit lessons on the process itself.

SBS/ED – 74 (T38)

**Simon Says Move!**

Helen Schoonmaker

This research was done with the purpose of examining the effects of increased movement in the classroom on student focus and classroom management. Studies have shown that exercise improves blood circulation which is key to bringing oxygen to our brains1. The classroom the research was conducted in was a suburban first grade, with a wide range of student abilities and emotional and behavioral needs. There was already a lot of movement in the classroom during the lessons but a variety of short “exercises” were introduced during transition times to get the students moving beforehand. Over a period of five days, I kept track of how many times we had to get the class’ attention and four specific students’ attention back due to disruption. I also kept track of whether the same four students were on task at half hour intervals throughout the day. This procedure was repeated over another period of five days with the “exercises” introduced. The results show that the extra movement did not significantly reduce the number of times we had to get the class’ attention or the attention of the four specific students over the whole period but did towards the end of the five days. Student focus improved through the period of five days, particularly for two students. These results show that exercise does have a positive effect on student focus and classroom management for specific students. These results are general and would be more conclusive had the research been extended for a longer period.

SBS/ED – 37 (T39)

**Self-Ability, Value, and Success: What Motivates Students to do Well in School**

Leah Serao

Teachers at Salisbury Elementary School complained that many students struggled seeing the value of school, which prompted me to research student motivation in four content areas: reading, math, art, and sports. My study aimed to see how students’ beliefs about certain subjects influenced their motivation and confidence, as well as their ability to achieve high levels of measured success in a given subject area. Student surveys and interviews measured three main components: individual motivation toward an academic activity, individual perception of activity importance, and individual prediction of success. Results were collected, analyzed, and then used to create mini-lessons that focused on increasing student motivation in these four content areas. Results showed that students were motivated by different factors in each content area, and that their overall motivation was influenced by their self-belief, expectation, and interest level. Motivation was seen to be content-specific since no evidence showed students who lacked motivation in all measured content areas.

SBS/ED – 51 (T40)

**Seeing The World Through A Lens Of Signs And Symbols: How a New International Symbol of Access can Change the Way We See Individuals with Disabilities**

Leah Serao

The Accessible Icon Project started as a public street campaign that wished to highlight the limitations of the current International Symbol of Access by creating an image that emphasized movement and action. The objective of this study was to do a word study on the type of words people associated with The Accessible Icon and the International Symbol of Access. This study was accomplished by two surveys simultaneously given to two separate participant groups. Survey 1 asked participants to describe each symbol in their own words. Participants first answered questions about the International Symbol of Access and then for the Accessible Icon. When each image appeared on screen, participants were asked two open-ended questions and a series of multiple-choice questions that asked participants to choose from a list of words that best described the International Symbol of Access and the Accessible Icon. The words: Abled, Active, Determined, Disabled, Engaged, Handicapped, Human, Lifeless, Mobile, Motivated, Movement, Moving-Forward, Parking, Passive, Ready-for-action Robotic, Slow, Static, Stiff, and Symbol were than used in a second survey that asked another group of participants to rank these words on a positivity scale, from most positive (1) to most negative (18). Results from the two surveys showed that the top 10 words associated with the International Symbol of Access were categorized as the top 10 words ranked as most negative. On the contrary, words associated with the Accessible Icon were categorized in the top ten most positive word category. Evidence suggests that more positive language is associated with the Accessible Icon in comparison to the International Symbol of Access.

SBS/ED – 44 (B36)

**Temporal Relativity in Visual Perception: The effect of positive and negative stimuli in the perceived duration of events**

Christian Shahzade\*, April Flemming

Several studies have reported the phenomenon of ‘time flying when you’re having fun.’ However, these experiments have focused on either very specific traits of perceived objects (i.e. scent, weight, etc.), or emotional arousal/affectivity of the perceiver (i.e. threatening scenes, angry faces, etc.) Our present study distinguishes itself by offering a new interpretation of the valence-timing effect by demonstrating its emergence as independent from both specific features of objects, and emotionally affective factors. In this study, researchers compiled 48 images, comprised of 24 distinct pairs; each depicting emotionally unaffective, commonplace objects under both positive and negative conditions (e.g. fresh apple/rotten apple). These images were shown to a first group of participants (N=34) and rated according to their overall ‘positivity’ or ‘negativity’. Analysis revealed that within 22 of the 24 image pairs, the images were rated as significantly different (α < .05) from their paired counterpart. These significant 22 pairs were then used as stimuli in a computerized timing-reproduction task. In this task a second group of participants (N=30) were shown the images in random sequential order, and following the display of each image, were instructed to depress and hold the spacebar for the same duration of time that they had perceived each image. The responses were analyzed using a repeated-measures ANOVA, which displayed a valence-timing effect (α<.05; Sig= .043; F= 5.22; ETA2= .322). In light of this we explore the implications of these findings: Positive pictures show richer opportunities for exploration and action, which require more time for interaction. Thus any given brief exposure will seem "cut off" prematurely. These results invite the possibility that time perception is not distorted (as is often claimed), but that time is relative to its affordance potentials, in much the same way that mass "distorts" space (e.g., Einstein's theory of relativity).

SBS/ED – 65 (T41)

**Effects of Movement during Whole Group Kindergarten Instruction**

Nicole Turk

Traditional education has typically focused on reading and mathematical skills, with an enormous amount of focus and resources going into standardized test preparation (Kahan, 2008). This leaves very little room for the methodology of physical activity in the general classroom, resulting in much of a student's day committed to sitting in a desk or on a rug. There is an abundance of research that supports the use of movement in the classroom; so much so that it is interesting that more movement is not a larger part of the education system. Movement either before a lesson or during the lesson “assists with concentration and provides an outlet for a healthy impulse discharge” (Mulrine, Prater, & Jenkins, 2008). This study aims to examine this correlation between physical movement and the students' focus during a lesson. A classroom of Kindergarten students participated in various types of movement breaks ranging from dances to physical exercise, both before and during the lessons. Their focus, energy level, and attitudes throughout the instruction were observed and recorded. After analyzing the preliminary data, there appears to be somewhat of a positive correlation between student focus/energy level and the act of taking movement breaks. Further research is needed for outside factors that might influence students’ focus, such as a student’s sleeping habits and the time of day. A more in depth look at how this perceived improved focus would translate into the student’s work may be a beneficial addition to this research.

SBS/ED – 21 (T42)

**The Effect of Music on Reading Comprehension on Musicians and Non-Musicians**

Krystal Vander Ark\*, Alex Cobourn, Kari Fillian

This research study explored the effects of music on reading comprehension in musicians and non-musicians. We tested undergraduate students at Gordon College, both musicians and non-musicians, in order to discover what impact listening to music whilst reading or studying had on students’ comprehension of the reading material. Each of the participants read three reading passages while listening to one of three musical conditions – a pop-music mash-up, instrumental music, or silence – followed by answering a series of questions on each passage. This was to test comprehension. The results showed that performance on the reading comprehension tests declined most while listening to the pop music condition and were the greatest under the instrumental music. No significant difference was discovered between musicians and non-musicians, indicating that the only major factor that influenced reading comprehension was the type of music listened to. According to the results of this study, instrumental music is the most beneficial for recall and comprehension.

SBS/ED – 79 (T43)

**Student Engagement during Kindergarten Read Alouds**

Brooke Whalen

This action research examines student engagement through the use of “think pair share” during whole group read alouds in a Kindergarten classroom. Before beginning the procedure a Student Engagement Scale, was created to evaluate and monitor student engagement throughout the read aloud. The researcher used the scale over the course of two weeks. During week one, student engagement was evaluated during the story time read aloud and daily results were recorded on the scale. During week two, the researcher initiated peer interaction during the read aloud through the implementation of “think pare share”. Student engagement was again evaluated daily using the same criteria as week one. Results found that students were more engaged during the read aloud when both listening and interacting through “think pair share”, than when only listening as observed during week one.

Addenda: Social & Behavioral Sciences and Education

SBS/ED – XX2 (T44)

 **“Horsenality” Differences**

Cecilia Hemenway

Horses, among many other animals, appear to display personalities through their behaviors. Personalities differ among humans, but do they differ among horses? A longtime horse trainer, Yvonne Barteau, has created her own set of horse personalities. This set includes 8 personalities: fearful, challenging, aloof, and social, all of which have are on a scale of passive to aggressive. For example, an aggressively social horse is one that pursues social interactions and is noisy and fun-loving, whereas a passively social horse is one that is curious, but only peacefully interested in its surrounding environment. Many “horsenalities” can be found in between. In this study I have observed five different horses from Windkist Farm, and compared the frequencies of their social behaviors and the frequencies and time intervals of their social states. I expected to find that these five horses would have differing “horsenalities” from one another. Three of the horses (Horse 3, 4, and 5) that I observed are in the same pasture together whenever they are turned out. The other two horses (Horse 1 and 2) I studied are turned out together, but in a separate pasture than the other three horses. My data have shown that these horses display differing behaviors from each other. My data show that Horse 1 is the most aggressively social horse because it play-fights Horse 2 and bites the most out of the other four horses. My data shows that Horse 3, 4, and 5 are also social, but the degree to which they are social differs. Horse 5 is the most passively social of all of them, whereas Horse 3 and 4 fall in between passively social and aggressively social. Horses 3 and 5 interact the least with their surroundings, and spend most of their time grazing instead of being social with the other horses.

SBS/ED – XX3 (T45)

**Pecking Order in Chicken Flocks: Dominance Hierarchy**

Alexandra Daniel, Keiry Nunez

The term “pecking order” has often been used to describe a hierarchy within a group of individuals. This term originates from the behavior displayed by chickens within the same flock. “Chickens establish a social order based on domination and subordination by pecking” (Guhl, 1964).Frequently, flocks are controlled by a “top” chicken who asserts dominance by displaying aggressive behaviors toward other individuals when there is competition for limited resources. After the “top” chicken is identified, studies suggest that each hen yields to that chicken and knows its rank in the flock (Ehrlich, 1988). In this study, we will use the data we collected via observation and ethograms to describe the dominance hierarchy. We will also discuss other factors which determine the development of social life among chickens (Schjelderup-Ebbe, 1935). The flock that we observed for this study is comprised solely of females. There are seventeen individuals within the flock. The breeds of chickens present in this study are: Araucanas, White Leghorns, Rhode Island Reds, Barred Rocks, Golden Comets, and Silver-Laced Wyandottes. Previously collected data suggests that White Leghorns have a tendency to be more aggressive than other breeds of chickens (Rajecki, 1979). We have established that there is a dominant individual in chicken flocks. In the flock we studied, we believe that this individual is the White Leghorn, “Trumpsy”. We formed this belief after observing Trumpsy’s tendency to peck at other individuals in the flock, to be the first one to eat, and to cause the other chickens to yield to her. Most of the previous studies on this subject suggest that chickens flocks display dominance in a linear hierarchy (Chase, 1982). In the flock we observed, most data showed that Trumpsy was the only dominant chicken in the flock with the others all appearing equally ranked after her.