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With special thanks and appreciation to the faculty mentors and volunteer reviewers.
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Letter from the Editor

We are pleased to present volume VIII of *Explorations, the Journal of Undergraduate Research and Creative Activities for the State of North Carolina*. We are so glad to feature creative works again this year, and hope that trend continues. I especially appreciate the assistance of Ned Irvine as Visual Arts Editor.

This year we include 11 papers and three creative pieces, selected from 18 submissions. The topics range from literary critique to computer science modeling to archaeological research utilizing Google Earth. Nine different public and private schools are represented.

It is useful each year to provide a bit of background about *Explorations*. In 2005, the State of North Carolina Undergraduate Research and Creativity Symposium, affectionately known as SNCURCS (pronounced “Snickers”) was first held, and educators from all colleges, universities, community colleges, and high schools were invited to participate. Now in its 9th year, SNCURCS offers a venue for undergraduates to present their research and creative efforts. *Explorations* was the brainchild of the 2005 meeting, and we are thankful that Michael Bassman and East Carolina University organized and published the first three volumes. In 2008, the late George Barthalamus, former Director of Undergraduate Research at NCSU and the visionary behind our state-wide undergraduate research efforts, talked me into moving *Explorations* to UNCW in time to produce the 2009 volume, and we have now published five volumes at UNCW. At UNCW we are fortunate to have a very successful Publishing Laboratory that developed the current look of Explorations, plus I have a great team of students who have done the layout for the recent issues. This year, I am indebted to Mr. Joe Worthen, our chief layout editor, and Ms. Jamie Watson and the UNCW Honors College Media Board team who produced the layout for Explorations. Thank you so much for your time!

I am also very appreciative of the effort that the 37 ad hoc reviewers spent providing timely and thoughtful reviews of the submissions this summer.

So in the spirit of the excitement that fresh approaches to research and discovery bring, we offer you volume VIII of *Explorations*.

Katherine Bruce, PhD
Creative Work: The Three Horsemen of The Rockopalypse

Arist: Lauren Ellerbe
Faculty Mentor: Brandon Sanderson
Affiliation: University of North Carolina at Pembroke
Framed Dimensions: 16 x 20”
Medium: Pen and Ink

Artist Statement: The compositional basis of The Three Horsemen of The Rockopalypse is derived from Albrecht Durer’s Four Horsemen of the Apocalypse. While the composition remains essentially the same, I have removed one of the horsemen and applied contemporary concepts and content to the figures and background. The changes depict three genres of alternative music: rock, metal, and punk. These three categories are shown in the horsemen, who thereby bring expression and individuality through their instruments. Some consider them to be emblematic of the degradation and destruction of music. That is, the three genres are the harbingers of the musical apocalypse. However, I believe that they are modernizing and improving the discipline.
The Three Horsemen of the Rockopocalypse, Lauren Ellerbe 2013
Art and Humanities
An Analysis of Naturally Derived Marine Clay as a Ceramic Medium

Julienne E. Beblo
University of North CarolinaWilmington
Faculty Mentor: Aaron Wilcox
University of North CarolinaWilmington

Abstract
This project was conducted to evaluate the use of marine clay as a ceramic medium. Samples of the clay were collected from Kure Beach and analyzed using workability tests, mineralogical analysis, and a chemical analysis. The clay shrank 15.63% after air drying and 17.75% after being fired. Porosity was 26.0% and plasticity was identified by handling the material. It contained 27.43% sand, 55.08% silt, 1.06% clay and also had high concentrations of aluminum and iron. Organic content was 15.79%. The marine clay did exhibit plasticity, was able to be thrown on a wheel and withstood firing. However, the small amount of actual clay present made the material more difficult to control and even after firing, it maintained a certain degree of fragility. The plasticity is likely a result of the high organic content. The clay is not ideal for functional studio work but it can perform as a ceramic medium.

Ceramic clay has been widely used and studied for thousands of years. As a result, there is a comprehensive understanding of the material and standards for evaluating its potential as a functional ceramic medium. But even as these standards are currently used, the field continues to change as new processes are utilized and the materials are pushed to new extremes. In addition, much of the ceramic making process is still determined by the preferences of the potter. The purpose of this project was to examine the use of naturally derived marine clay as a ceramic medium. It predominantly encompassed the production of creative pieces, but with an emphasis on understanding the characteristics of the collected clay, how those are defined, and what properties of the collected material influenced its usability in the ceramic studio. The composition of the collected material was analyzed and its functionality was evaluated using existing standards in ceramic studio practice.

Definitions of Clay

Clay is a naturally formed material derived from igneous rock. Interestingly, clay can refer both to a particle size and to specific compositions of natural materials. Any sedimentary particle that is <2μm is considered clay. In addition, clay minerals are defined by their similar crystal structures and range of chemical compositions. Because of the
small particle sizes and chemical composition of clay minerals, the material exhibits certain properties that have made it useful in ceramics. Clay particles have a strong affinity for water and when the two substances combine, the material swells. This helps the particles remain adhered to one another and gives them the ability to retain a stable form when wet. Kaolinite, for example, is a common clay mineral. It has a two-layered, hexagonal shape with a diameter ranging from 0.3 μm-0.01 mm and a general thickness of 0.05 μm. This particular structure has a high surface area that is able to interact with water molecules. The interaction between water and clay particles actually gives the material the characteristics that make it usable as a ceramic medium.

A clay’s origin and whether it has been transported from the spot in which it formed affect its properties. Clays that are found at their origin are considered “residual” while those that have been moved by natural forces—water, wind, erosion, etc.—to another depositional area are considered “sedimentary.” Transportation of sedimentary clays increases the potential amount of impurities present. This difference in composition may change the plasticity and color of the material. A high level of organic matter also tends to increase plasticity and occasionally the stickiness of a clay.

Marine clays are likely the most common source of sedimentary clay. Generally, they form when fine clay particles found in freshwater systems are deposited in brackish water. The clay particles absorb various impurities as they are transported from their place of origin by water movement. Marine clays, like most sedimentary clays, exhibit a higher level of homogeneity and tend to have a high percentage of organic content. They can be grouped into three different categories based upon their location in various marine habitats. Pelagic clay is found in deep water and tends to have very fine particles. Littoral clay is found between the high and low watermarks of a shore and contains coarse particles with a high percentage of organic matter. Estuarine clay similarly exhibits coarse particles and organic-rich content.

Marine and aquatic clays are also known to create clay balls. These sedimentary formations occur when the fine particles of clay suspended in the liquid are rolled back and forth due to wave and current action. The particles naturally adhere to one another when water is present so the formation can become significant, forming lumps or balls of material. These formations will occasionally roll up on shore and often exhibit relatively homogenous contents.

Generally, any kind of raw clay used in the studio can be categorized into five different groups: china clay, ball clay, fire clay, stoneware clay, and surface clay. China clay is formed at the base of mountains and has minimal impurities. It is rare, exhibits minimal plasticity, and is also the most refractory, or resistant to heat. Ball clay exhibits the highest plasticity and has always been moved by water from its primary spot of formation. This sedimentary clay has a finer particle size that results in a high amount of shrinkage. Fire clay is found in mountain or desert areas and has varying, coarse particle sizes. It is a strong clay that has good standing strength and is usually colored beige, red, gold, or red-brown when fired. Stoneware exhibits properties similar to both ball and fire clay. These characteristics make it a very workable material that also fires to a high density. Surface clay is the most prevalent. Because it has experienced years of movement, the level of impurities is high which increases the workability of the material. It tends to fire a rust-red color, but this can change depending upon the presence of various metallic oxides. Surface clay is also the material most commonly used by indigenous cultures to create ceramic ware.

Raw clay exhibits characteristics that are indicative of its origin and its qualities when wet. The creative process, however, usually involves additional steps such as firing and glazing. Firing clay becomes ceramic ware and it exhibits specific properties that influence its utility and its aesthetic. Ceramic
ware is generally categorized into three separate groups. Earthenware is very porous and lightweight. It fires at a low temperature range and has commonly been used among tribal societies. It will absorb 10-15% of its unglazed weight in water. Stoneware is a very hard and durable clay that holds liquids and is not easily broken. It will absorb 2-5% of its unglazed weight in water. Porcelain is a dense and vitreous clay. It is known for its generally white color and translucency. It will absorb 0-1% of its unglazed weight in water. Since the collected material was assessed as a ceramic medium, understanding the categorization of clay and ceramic ware was necessary for describing the collected clay and for comparing it to other clays commonly used in the studio.

Workability Definitions

The quality of clay used in the studio is a somewhat ambiguous characteristic that cannot always be easily identified. Most often it is based upon a potter’s specific preference or upon the qualities needed to produce a particular piece of work. Even so, certain properties have been identified that generally indicate the workability of clay when used in a studio setting. Fortunately, most of those have been given a quantifiable method of measurement. Shrinkage, porosity, and plasticity are three of the most common characteristics used to determine the workability of a clay body.

Shrinkage is a natural process that occurs as the clay dries, or as it is bisque-fired and glaze-fired. It is also an easy characteristic to measure. Clay at the desired plasticity is rolled out into a slab, a measurable block is cut from the slab and then its length is recorded. The length of the block is then remeasured after drying and again after being fired. Using these measurements, the percent of shrinkage can be calculated. Although this characteristic does not necessarily define the quality of a clay, it is an important property of which to be aware. Understanding how much the material shrinks allows a potter to estimate the size at which the piece needs to be created when wet so as to be the desired size after being fired and glazed.

Porosity refers to the percentage of empty space, called pores, found in the material. This characteristic is important because the number and size of pore spaces influence the hardness of the clay and its ability to vitrify. Porosity can also be indicative of the type of clay body being used. Porcelain clay has 0-3% porosity while stoneware has 1-6% and earthenware has 4-10%. Measuring porosity is difficult because some of the pore spaces are sealed within the clay. To overcome this obstacle, testing the percentage of water absorption is one of the most common methods for testing porosity. This measures the amount of water absorbed by a bisque-fired piece of clay. There are multiple procedures, including some that require the bisque-fired clay to be boiled for various time periods and others that soak the clay overnight.

Plasticity is an interesting characteristic of clay because there is no quantifiable measurement for it. Although potters will generally agree that plasticity is an important characteristic, it is predominantly determined by a potter’s preference. Even so, there are multiple methods to determine if it is present. Simply working with the clay to assess if it can withstand pressure, stretching, and a combination of the two while still maintaining its shape and without tearing are observed characteristics that are indicative of plasticity. A very simple method for identifying the presence of plasticity is known as the coil test, a process in which a pencil-sized coil of clay is looped. If the clay remains smooth, it has good plasticity. However, if excessive cracks appear in the bent coil, there is likely very little plasticity. In addition, if the clay is unable to maintain a tall form, and it begins to fold into itself and sag, the material has low plasticity. Sometimes the percent of water present when the sample is at the desired plasticity is used as a quantifiable method of judging plasticity. Again this measurement, although quantifiable, is still based upon a potter’s definition of the appropriate plasticity.
**Firing and Glazing**

Another desirable characteristic of clay is its ability to be fired. Air drying clay does not make it durable which eliminates its functionality. Firing clay to the appropriate temperature hardens the material and makes the clay body a permanent substance. Once fired, clay is transformed into a more resistant substance. Although it can fragment, the fired material will remain in an unchanged state for thousands of years.

Firing can allow ceramic ware to reach a state of vitrification. This is the point at which the clay material becomes very hard and dense. As the temperature increases, components within the clay begin to melt and fill in exterior pores on the clay. This process creates a durable and permanent substance. Further heating beyond the point of vitrification, however, can lead to complete melting and therefore the destruction of the utility of the clay.

The use of kilns to achieve this state of vitrification and to add glazes was first used by the Chinese. Kilns allow firing to occur in a semi-closed system in which temperature and duration of firing can be controlled and monitored. The high temperatures remove water from the clay body, including those molecules chemically combined with alumina and silica. Kilns must have a heat source that is able to transfer its energy to the clay pieces. The heat needs to be contained in some way so that it is focused on the pottery. This system allows for the clay to be in an enclosed and somewhat controlled environment that reaches the necessary temperatures for vitrification.

Temperatures can be measured in a kiln by observing the reaction of pyrometric cones. These pyramidal indicators serve as a physical representation of the temperatures within the kiln. Their compositions of glaze-like materials are designed to melt at specific temperatures. They have been standardized to range from cone 020-15, or temperatures between 635ºC-1430ºC. Usually, multiple cones-including one below the desired temperature, one at the desired temperature, and one above the desired temperature—are placed upright together, in ascending order of melting temperature, on a coil of clay. This is known as a cone pack and it is then placed inside the kiln in an area that is visible to the potter during firing. The cones are monitored throughout the firing process and indicate when the temperature is approaching, has reached, or has passed the desired value.

**CREATIVE PROCESS AND PURPOSE**

The natural material used for this project was found and collected along the ocean water’s edge, predominantly deposited in small clumps or balls that were embedded in or resting on the sand. This specific material was collected because it shared a similar tactile quality to that of the stoneware clay commonly used in ceramic studios. When handled, the particles remained adhered to one another, they did not crumble, and the appearance was smooth. The material had a dark brownish-grey color and was very sticky. Its texture was rougher than the studio clay, but it and resembled the consistency of raku clay.

Initially, the clay was found on a barrier island, but a majority of the material used for the project was gathered from the shore at the end of Kure Beach, North Carolina. It was collected over several trips throughout the summer months. Samples were collected in plastic bags and then stored in a 5-gallon bucket to retain their moisture and to ensure that no other materials would be introduced. In addition, a bottle of salt water was collected from the same area to be used during the working and throwing process in the studio. Because clay particles will easily absorb impurities from their surroundings, using salt water from the location of collection helped to replicate an environment similar to where the clay was found. In addition, it maintained the salinity of the material which affected the clay throughout the working and firing process.

Although the use of clay is often influenced
by the preference of the potter, there are still standards used to define the workability of the material in a studio based upon some general properties. Using these basic characteristics of porosity, plasticity, shrinkage, and the ability to be fired, the collected clay was evaluated to assess if it could perform as functional ceramic ware.

**METHODOLOGY**

The collected clay was first filtered using a settling method in order to remove any debris. All of the clay was placed in a 10-gallon aquarium, which was then filled with salt water collected from the same area as the clay. The salt water and the collected clay were thoroughly mixed in the aquarium, creating a slurry of material. It was covered and allowed to settle for four weeks. The clear walls of the fish tank allowed the separation between clay and water to be easily viewed.

Once a clear layer of water had formed at the top, it was siphoned off using a turkey baster which minimized the amount of clay particles being collected along with the water. This siphoning was repeated until water no longer appeared on top of the clay. The clay was then allowed to dry to a workable consistency. Only the top layers of clay, those that did not contain the larger debris, were removed and placed in a 5-gallon bucket so as to maintain their moisture content.

The intent of the filtration method was to allow the clay to settle and stratify into layers based upon the weight of the particles and to remove any excess debris which would have settled on the bottom. Even after four weeks of settling, however, there was no evident stratification in the clay. Large pieces of shell and other natural debris did settle out to the bottom but smaller shells and debris still remained in the upper levels of the material. In addition, there was a rust-colored residue evident on the inside of the tank. It potentially indicated the presence of iron in the collected clay.

Use of the aquarium was an innovative addition to the filtration process. Although there was no stratification evident, it was an effective method of monitoring the settling of clay particles. In addition, it permitted observation of coloration and residues that formed in conjunction with the settling of the material. Despite the filtration, there were still small shells and pieces of debris present in the clay, although not nearly as many as had been present before filtration.

**Workability Tests**

Shrinkage was measured using the equation:

\[
\% \text{ shrinkage} = \frac{\text{length}_{\text{wet}} - \text{length}_{\text{dry}}}{\text{length}_{\text{wet}}} \times 100
\]

Ten blocks were cut out of a slab of the collected clay when it was at the desired wetness. Each block measured 8 inches in length and 1 inch in width. They were each marked to show inches and half-inches. Once the blocks had fully dried, one of them was measured and its length was used to determine the amount of shrinkage. It was bisque fired and then measured again to determine the shrinkage after firing.

\[
\% \text{LDS (after air drying)} = \frac{8.0 \text{ in} - 6.7496 \text{ in}}{8.0 \text{ in}} \times 100 = 15.63\%
\]

\[
\% \text{LDS (after bisque firing)} = \frac{8.0 \text{ in} - 6.58 \text{ in}}{8.0 \text{ in}} \times 100 = 17.75\%
\]

The linear drying shrinkage (%LDS) after air drying resulted in a 15.63% reduction in length while the %LDS after bisque-firing resulted in a 17.75% reduction in length.

Porosity was measured using the equation:

\[
P = \frac{\text{weight}_{\text{soaked}} - \text{weight}_{\text{fired}}}{\text{weight}_{\text{fired}}} \times 100
\]

To measure porosity, a fragment of the bisque-fired collected clay was weighed. It was also weighed inside a plastic container with a lid that was later used for transport. The piece was boiled for five hours and then

Julienne E. Beblo
allowed to cool in the water. It was removed and then the surface water was gently removed. It was placed back in the plastic container and covered to retain all of the moisture during transport. Then it was reweighed.

\[ P = \frac{(12.40g - 9.84g)}{(9.84g)} \times 100 = 26.0\% \]

The porosity (P) of the collected clay, which basically equals the amount of water absorbed, was calculated to be 26.0\%.

Because there is no quantifiable test for plasticity, the clay was handled and observations were made about its reaction. The coil test was performed to check for cracking. The clay was also compressed and stretched to analyze its reaction. In addition, it was thrown on the wheel to see how well the material retained its shape and if it exhibited signs of sagging. As a final, although less indicative test, the percentage water of plasticity (%WP) was measured using the equation:

\[ \%WP = \frac{(weight_{wet} - weight_{dry})}{(weight_{dry})} \times 100 \]

The clay did exhibit plasticity. For the coil test, the material looped easily and minimal cracking was evident. Simply handling the clay revealed that it could withstand a certain amount of stretching and compression. While throwing on the wheel, the pieces rarely exhibited any signs of sagging and the clay maintained its form and height.

\[ \%WP = \frac{(13.30g - 8.84g)}{(8.84g)} \times 100 = 50.45\% \]

The percentage water of plasticity (%WP) for clay that had reached the desired level of plasticity was 50.45\%.

In addition to the workability tests, the collected clay was used in the studio to assess its throwing capabilities and tactile qualities. The material was able to be thrown on the wheel and multiple vessels were created. Although the clay’s consistency was rough and contained more grit, it still maintained its shape and exhibited plasticity. A sponge was used to help eliminate continuous contact with the rough clay. It also helped to keep the outer consistency of the clay smooth.

There were a few particular characteristics that differed from the studio clay. One piece was thrown too thin on the bottom curve. Rather than sag, as would have been expected with the stoneware studio clay, as the weight of the top of the piece pushed down it created a vertical split in the bottom wall of the pot while the rest of the piece maintained its form. This reaction could be attributed to the combination of the stickiness of the clay and its larger particles. The stickiness from the high organic content of the material helped to keep it together. As excess weight pushed down on the clay, however, the organic material could no longer hold the larger particles easily and a tear would form. The collected clay forms also adhered more strongly to the wheel than the studio clay. Again, this could be a result of the increased stickiness due to a high organic content.

Strangely, once the pieces had been thrown and were ready to be moved off of the wheel, they maintained their intended form despite having to be removed more forcibly. This is unexpected because the studio clay deforms easily if too much pressure is applied when being removed from the wheel. The collected clay, however, compressed as it was being removed and then returned to its original form without showing any major signs of malformation. This elastic-like reaction is probably a result of the high concentration of salt and organic matter.

**Mineralogical Analysis**

X-ray diffraction (XRD) is used to determine the mineralogical composition in sediments. It is used for clay mineral identification because the particle size is very small, generally falling between 1 and 10μm. In order for the collected material to be analyzed by XRD, a wet bulk sample was dried at 110°C for 24 hours to remove the moisture.
and was then crushed into a fine powder with mortar and pestle. The dried powder was treated for contained organic matter (OM) by applying a 6% Sodium Hypochlorite solution, buffered to pH 9.5 with 10% HCl. The treated sample was then heated in a water bath for 15 minutes to increase the reactivity of the oxidizer, centrifuged and the supernatant decanted. The treatment was repeated until the OM was entirely removed.

For carbonate removal, the sample was washed in an anhydrous Acetic Acid – Sodium Acetate solution. It was then heated in an 80°C water bath to increase reactivity and the supernatant discharged after centrifugation.

After this chemical alteration, the sample was wet sieved with a 125 screen (64μm) to remove the sand particle size fraction. The remaining wet sample was dispersed in a sodium hexametaphosphate solution and further mixed in an ultrasonic bath. This stimulated sample was then settled out, applying Stokes Law for settling particles. After the allotted time interval, it was decanted to separate the silt particle size fraction from the clay particle size fraction. Both fractions were centrifuged, washed with distilled water and after all the dispersant was removed, dried in an oven at 70°C. The finalized samples were mounted on aluminum discs and analyzed using the Rigaku MiniFlex II X-ray Diffractometer.

This entire procedure was repeated with a sample of the clay used in the studio. Having both clays sampled the same way allowed for a precise comparison of composition between the two.

The collected material had a particle size distribution of 27.43% sand, 55.08% silt and 1.06% clay with a loss of 0.64% due to analysis. The major components within the material were quartz, kaolinite, nacrite, and halloysite (Figure 2). All of those were present in the clay particle fraction. The sample contained 3.08% organic matter and carbonate material.

### Chemical Analysis

Samples of the collected clay were dried and crushed. A mass of 0.2 g of the dry material was measured out into three separate Teflon digestion vessels and a fourth was left empty as a blank. Volumes of 1.2 mL of concentrated HCl and 3.8 mL of concentrated HNO₃ (both trace metal grade) were added to the 4 digestion vessels. All four vessels were sealed and placed in pressure-safe frames and microwave digested for 50 min under increasing pressure and temperature (up to 150 psi and 210°C) using a CEM MARS microwave digestion instrument. After cooling, the samples were filtered and brought to 50.0 mL with high purity water. Samples were analyzed for metals using inductively coupled plasma optical emission spectrometry on a Perkin-Elmer Optima 2100 DV instrument that was calibrated using matrix-matched mixed metal standard solutions.

As the samples were being filtered, the liquid in each vessel displayed a different hue of yellow. The sediment within each sample also appeared to be three different colors. This is unexpected because each of the samples was taken from the same bulk sample. There were no intentional differences between samples when they were collected.

The concentrations of the metals in each solution were measured by the microwave digestion instrument. Those concentrations were then multiplied by the volume of the solution and divided by the sample weight to calculate the concentration (μg/g) of each metal in the dry samples of collected clay. Iron and aluminum had the highest concentrations in the samples and levels of cobalt and cadmium were BD, or below detection (Table 1).
KILN CONSTRUCTION AND FIRING PROCEDURE

Initially, the blocks of collected clay used for shrinkage testing were also bisque fired along with the studio ware in one of the studio kilns. Because the bisque firing only reaches temperatures up to cone 06 (1830°F), this gave a general indication if the material could withstand lower firing. A single, bisque-fired block was then placed-unglazed-in the studio kiln along with studio ware that was being glaze-fired. The glaze kiln fire up to cone 10 (2381°F), so this gave a general indication of the material’s ability to withstand higher temperatures.

After the initial bisque firing in the studio kiln, the sample blocks of collected material became a brick-red color. They were very light weight, but also they crumbled and broke apart easily. The block that had been placed in the glaze firing along with the studio ware melted, bubbled, and then adhered to the piece of kiln shelf on which it had been placed. Although the block maintained its general shape, it became hard and lumpy. It also had a metallic grey and rust color when it was removed.

A small kiln was then constructed to allow for the collected material to be fired separately from the studio clay (Figure 3). Cone packs-made of cones 09, 08, 06, 04, 6, 8, 9, and 10-were placed on the kiln shelf along with the ceramic pieces to serve as an indication of the temperature in the kiln. In addition, drawrings of the collected material were made in order to monitor the effects of firing on the clay. Drawrings are small loops of the clay that can stand vertically in the kiln so that they can easily and quickly be removed in order to monitor the material as it is being fired. The creation of the smaller kiln permitted more control over the temperature of the kiln and the ability to remove the drawrings during the firing process.

The kiln was constructed out of firebricks on a base of cinder blocks. An opening below the interior shelf allowed access for the gas-fueled flame which heated the kiln. An additional opening was created level with the interior shelf. It served as a spy hole to check the progress of the cones and as a channel for removing the drawrings while the kiln was being fired. An insulation brick was used to block the opening when it was not in use.

The gas burner was placed parallel to the specified opening. It was attached to the main gas line through a series of pipes. Each joint between pipes was wrapped with tape to form a tighter seal and then securely fastened. To ensure proper sealing, dish soap was dripped onto each joint as the gas was running. Any bubble formation would have indicated a gas leak.

The ceramic pieces made of the collected material, the cone packs, and the drawrings were placed on the interior shelf of the kiln. The drawrings were positioned in a row directly in front of the spy hole so that they could easily be retrieved using a piece of rebar. The cone packs were positioned so that they could be easily seen through the spy hole. The pottery was then spaced throughout the rest of the kiln.

Two flat kiln shelves were placed on top of the kiln to contain the heat. A gap of about 1.5 inches was left between the pieces to serve as a damper. Once the interior shelf had been organized and the top of the kiln positioned, the gas was turned on. It was adjusted periodically, usually every hour, to increase the heat and the area of fan exposed was adjusted accordingly to allow for the amount of air flow needed to keep the flame burning. Temperature was monitored occasionally with a pyrometer but the cone packs served as the main indicator of temperature.

One drawring was taken out periodically to check the condition of the clay. It was removed through the spy hole with a piece of rebar and then submerged in a bucket of water for rapid cooling. This allowed it to be examined almost immediately and was repeated three times during the first firing. When the drawring that had reached maturation had been removed and cooled, the gas was turned off and the kiln was allowed to cool. The first firing in the small kiln, from ignition to turning off the gas lasted 3.5 hours.

The three pieces fired initially in the kiln
built specifically for this project also melted (Figure 4). The taller piece sagged and collapsed into itself while the shorter pieces just melted down on themselves. The same shiny black, speckled glaze that formed on the latter draw rings was evident on the pieces. Interestingly, although the glaze did form on the outside of the pieces, the brick red color was still maintained on the interior and underside of the pieces, albeit a darker shade. In addition, there was a strange smell emitted from the kiln, however, it went away as firing continued.

The process was repeated a second time with some minor adjustments made based upon the initial outcome. In an effort to reach vitrification without causing melting, the kiln was only allowed to run until cone 04 have fallen but cone 6 was still standing. At this time, the pieces exhibited a shiny surface but also were still maintaining their form. Five drawrings were used in the second firing to allow for additional chances to monitor progress. The firing, from ignition to turning off the gas, lasted about 4.5 hours. The additional hour needed for firing likely occurred because of the manual control of the gas burner. The gas was probably increased more slowly than the first firing, thereby the temperature increased more slowly.

During the second firing in the small kiln, a similar smell was emitted, but that time is was more pronounced and lasted a bit longer. It is likely that this smell was caused by the burning off of organic material. Once the material had been removed, the smell dissipated. In addition, the pilot burner was releasing a lot of flame, more than what was usually seen, but there was no way to adjust it. The second set of pieces did vitrify and did not melt. They had a glassy surface and were much more durable. They also were able to hold water without leakage. However, the texture was rougher and the coloring exhibited more reds and even some yellow while the first coloring was predominantly a dark grey (Figure 5). In addition, when the pieces were removed from the kiln, they had an odor similar to that of the wet material.

It is important to take note of some overall observations through the drying and firing process. After air drying, all pieces of the collected clay remained a dark grey color but had also formed a white residue (Figure 6). This residue is likely salt that formed as the water evaporated, causing the salt crystals to precipitate on the surface of the piece. Once bisque-fired, the collected material exhibited a significant amount of shrinkage and its color changed from a dark grey to a brick red. It remained lightweight but was not particularly durable. The single block that was also glaze-fired with the studio ware melted.

For the first firing in the small kiln, the pieces melted, although the progression of drawrings did indicate vitrification had been achieved. Even so, the shiny smooth surface that formed with vitrification revealed a natural film of glaze. The pieces in the second firing of the small kiln did not melt, but their appearance was different from those in the first firing. These, too, exhibited a thin film of natural glaze although the texture was much rougher and the coloring was different. The natural glaze was likely a result of the salt precipitating on the surface of the pottery.

**DISCUSSION**

The collected clay is sedimentary because it has been moved from its spot of origin and has picked up a number of impurities. Because it was found on the ocean shore between the high and low tide marks and contained a high level of organic matter, the material would be considered littoral clay when categorizing it based on marine clays. In addition, due to its low firing temperatures and the brick-red color it becomes after bisque-firing, the material is likely surface clay. This is further supported in that surface clay has a high level of impurities and is the most common kind of clay found.

The high level of quartz found in the marine clay also had a large impact on the quality of the material as a ceramic medium. Quartz is a free state of silica, which is a common component found in clay. The presence of quartz
can reduce plasticity, lower refractory ability, and limit the crushing and tensile strength of the clay. Sedimentary clay, in particular, tends to have a high concentration of quartz. The low firing capabilities and fragility of the pieces, even after firing, are all possible effects of the high quartz concentration.

Kaolinite and montmorillonite were both found in the marine collected clay. In general, these tend to increase the plasticity of a clay body. Although the collected material did exhibit plasticity, kaolinite and montmorillonite were found at such low levels that it is unlikely they significantly influenced the overall plasticity. It is most probable that the plasticity was a result of the high organic content.
content, which is known to have a significant effect on this characteristic.

Chemical analysis revealed that there were high concentrations of aluminum and iron in the marine clay samples. Aluminum, in the form of alumina (Al(OH)3), may reduce the plasticity and increase the refractory abilities of a clay. Iron, not surprisingly, can affect the color of the material, often producing red or brick-colored clay. In addition, it may form a scum on the fired ceramic ware and reduce the refractory abilities of the clay. The red color of the bisque-fired clay and its low firing temperature were likely affected by the high concentration of iron. The aluminum may have decreased plasticity; it does not, however, appear to have had any additional effects on the material.

CONCLUSIONS

Ultimately, the collected marine clay did not perform ideally in the studio. It did exhibit several properties characteristic of clay, including critical plasticity. These properties did allow the clay to be thrown on the wheel, creating the shape of functional vessels. It was able to withstand lower firing and it vitrified and hardened to a more durable state. Even so, the excessive amount of sand and the minimal percentage of actual clay made the material more difficult to control. More than likely, the significant plasticity was a result of the high amount of organic matter in the material. Once fired, and when not melted, the pieces were roughly textured and did not show a consistent coloring. They were also porous and still maintained a certain degree of fragility. Both of these characteristics make the material unsuitable for storing food or liquids. Even so, the collected ocean clay did function as a ceramic medium and the vessels created possessed a unique and aesthetically pleasing quality.

ACKNOWLEDGMENTS

I would like to thank my advisor, Professor Aaron Wilcox for his guidance and support of this project. I would also like to thank my Honors Committee members, Dr. Nicholas Hudson, Dr. Michael Smith, Dr. Sridhar Varadarajan, and Dr. Diana Pasulka, for their advice and guidance. A special thanks, as well, to Thorger Gabriel Enge for his work on the mineralogical analysis, Dr. Skrabal for his work on the chemical analysis, and the Art and Art History Department. This project would not have been possible without the help of these people and I am so appreciative of their time and support.

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BD = below detection

Table 1: Summary of chemical analysis results
Figure 3: Image of melted pieces after first firing

Figure 4: Image of small kiln built for firing the collected clay
Figure 5: Image of vitrified pieces after second firing

Figure 6: Image of dry, collected clay showing evidence of salt precipitation on the surface
References


Earth Forms: The Boundless Art of Lonnie Vigil and Ansel Adams

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Abstract
This paper examines Lonnie Vigil and Ansel Adams’ “earth-formed artworks” within the shared context of The Mint Museum’s permanent collection of American artworks. While Vigil’s ceramic vessels are literally made of micaceous earth, Adams’ landscape photographs and abstract earth patterns are formed in gelatin silver. Both artists use fundamentally different media to embody the earth’s materiality; however, their processes similarly represent their reverent partnerships with the earth and rely on the earth’s forms and textures to comprise their art’s content. This research juxtaposes Vigil and Adams’ spiritual relationships with the earth with the visual metaphors extant within their art, identifies the initial, critical moments of both artists’ acceptance into the international art arena, and provides three formal comparisons between “earth-formed artworks” produced by both twentieth century, American artists.

Imagine yourself in a gallery surrounded by ceramic and photographic art that radiates the earth’s sublimity. A shimmering, micaceous clay sphere robed in an undulating mass of cloud forms sits on a pedestal adjacent to a photograph filled with folding sand dunes and reflective planes of sky and desert. For contemporary artist, Lonnie Vigil, from Nambe Pueblo, New Mexico, sculpting traditional, micaceous clay ceramics infused with innovative, elemental abstractions embodies his spiritual partnership with Mother Earth. For modern artist, Ansel Adams, from San Francisco, California, transforming the traditional, transcendental landscape vista into a “straight photograph” of abstract, earth patterns formed his reverent relationship with the earth. The shared context of Vigil’s micaceous ceramics and Adams’ straight photography in The Mint Museum’s permanent collection of American artworks provides the foundation from which I have researched the artists’ initial, critical moments of professional acceptance and performed three cross-media, formal comparisons. In addition, the artists share the following two qualities: their spiritual partnerships with the earth and the literal embodiment of the earth’s materiality within their art. Vigil’s elemental ceramics, made of micaceous earth, and Adams’ earth-patterned photographs, formed in gelatin silver, metaphorically represent the earth’s
transformative nature through abstract, formal properties. Moreover, despite the artists’ use of fundamentally different media, they similarly utilize abstract textures from the earth’s landscape to form their art’s content and inherently honor their reverent partnerships with the earth through their creative processes.

Earth-formed art, a term I propose here, refers to artworks that embody the natural locations from which their compositional structures literally derive, and in effect, exist as progeny of physically extant earth sites. To test the rigor of this concept, I have conducted three, cross-cultural, formal comparisons of artworks by Native American Lonnie Vigil and American Ansel Adams. These works form their materiality from the land itself and encompass Vigil and Adams’ physical relationships with the earth’s landscape. As such, the term, earth-formed art, also serves to index the inspiration for both Vigil and Adams’ creative processes, namely their spiritual bonds with the earth. Vigil’s ceramic vessels, made of micaceous clay, formally and thematically correspond to Adams’ gelatin silver prints of the earth’s landscape. In addition, these earth-formed artworks encapsulate the artists’ syntheses of three principles: their art’s embodiment of the earth’s materiality, their respectful relationships with nature, and their phenomenological relations with the earth. Thus, when collecting clay, Vigil honors the earth as the utmost, elemental entity from whom he asks permission to use “her” material to demonstrate the sacred clay’s multitude of meaningful expressions. Through his art, Vigil gives viewers an opportunity to closely examine and experience the mica-flecked, lustrous clay. Moreover, he prefaced his public explanations of his creative process with a solemn gratitude for the earth’s irreplaceable, transmutable energy as well as his ancestors’ earth-based, artistic traditions. Likewise, Adams nurtured his reverent bond with the earth’s landscape through an inspired relationship with Yosemite National Park; his honorific photographs and conservationist work demonstrated his reverence for the earth and appreciation of the land’s essential vitality. In addition, Adams, a proponent of the nineteenth-century Romantic landscape tradition, publicly encouraged viewers to experience the vastness of the earth’s formal properties through his compassionate lens while simultaneously promoting his message of the earth’s transformative nature.

Vigil’s earth-based medium, micaceous clay, refers to mica-rich soil found in the decomposing minerals of northern New Mexico’s Sangre de Cristo mountains. Native American ceramists from Northern New Mexican Pueblos ask permission from Mother Earth to collect the sacred clay from this section of the Rocky Mountains. Moreover, micaceous clay, a gift to contemporary Pueblo people from their ancestors and Clay Mother, is used to make art vessels as well as domestic, heat-resistant cooking pots and durable storage wares. The Pueblo tradition of hand-building micaceous culinary wares dates back to the fourteenth century.

Vigil, a self-taught artist, intuitively makes hand-built, micaceous vessels which exist as contemporary artworks that unequivocally blend traditional, storage ware forms with the artist’s unique, sleek designs. Echoing the scale of large storage vessels, Vigil’s works possess non-traditional, thin walls and asymmetrical openings that utilize the clay’s plasticity to maintain their spatial positions. Vigil applies earth-inspired, abstract sensibilities to his contemporary sculptures; he relies on line, texture, light, and mass to communicate meaning within his works. To accentuate his vessels’ formal aesthetics, the artist sands and polishes the clay bodies as well as layers shimmering, micaceous slip on the sculptures’ walls. This process intensifies the vessels’ luminosity, hue, and tonality and epitomizes the artist’s signature, formal language. When the artworks are completely built and stylized, Vigil places them into a homemade bonfire. After Vigil gently wipes
the ashes from a fired vessel’s walls, the artwork’s transcendental, spiritual nature is revealed through its pertinent formal properties, namely its sleek design, lustrous surface, and undulating fi re cloud patterns. These properties mimic the formal characteristics of desert, sun, and sky and represent the artist’s spiritual connection to the earth and Nambe Pueblo, New Mexico.

In 1982, Vigil made his fi rst steps towards his current career when he resigned from the Bureau of Indian Affairs in Washington D.C. and returned home to Nambe Pueblo, New Mexico. Shortly after his return home, Vigil began studying clay. From his mother and sister, he learned about micaceous clay’s plastic properties and its nearby location in the Sangre de Cristo mountains. He also relied on his ancestors and the sacred earth spirit, Clay Mother, for strength and guidance during this unpredictable journey. Vigil told me, “The process unraveled over about ten years.” Since 1992, Vigil has been credited as the pioneering artist who established mi- caceous ceramics as legitimate art within the contemporary, international art arena.

The world-renowned Santa Fe Indian Market facilitates relationships for competing Native American ceramists like Vigil, serves as a professional springboard for all participating Native American artists, and holds an “art world authority” post in the eyes of the market’s extensive community of curators and collectors. In the mid-1960s, the market experienced substantial growth in the facets of support and attendance and began facilitating direct communications and professional relationships between the market’s participating artists, curators, and collectors. However, until 1992, competing micaceous ceramists were shunned from winning the market’s awards; their artworks did not match the judges’ traditional criteria and were deemed strictly utilitarian because of the medium’s extant use for domestic, culinary wares. The judges also staved off the acceptance of micaceous ceramics as “art,” because the vessels’ surfaces lacked hand-painted slip motifs and, in some cases, featured decorative fi re cloud markings. The market’s denigrated status of micaceous ceramics prevented these artworks from winning the required awards needed for candidacy for the market’s top honor, best of show. In effect, it signifi cantly hindered the market community’s reception of micaceous ceramics as art.

At the 1992 Santa Fe Indian Market, the judges overturned the market’s earlier perspectives of micaceous ceramics and awarded Lonnie Vigil’s Rainbow Jar with the three necessary honors needed to qualify for best of show. In effect, the elevated status bestowed upon Vigil at the 1992 market positioned the artist’s micaceous, sculptural vessel as a legitimate artwork in the eyes of the market’s curators and collectors. Although Vigil did not win best of show, being a candidate for the award propelled the artist into a global arena of museums, galleries, and academia and provided the artist with international publicity. While the market’s judges honored Vigil for many awards throughout the following years, it was not until 2001 that Vigil received the market’s top honor, best of show. During a telephone interview with Vigil, he said, “I help my family and other people while sharing our [ancestors’] gift with the world. [Winning] the award had to be at the right time.”

Although Vigil’s professional accolades serve as testaments to his talent, technical proficiencies, and international acceptance in the art world, the Nambe Pueblo artist remains humble and continues to be inspired by his family, the clay, and the earth. Reflecting on the physical power of the earth, Vigil shared with me, “[The earth] begins all things, from the fuel to create to [all] natural and manufactured things.” Moreover, the artist reaffirms his spiritual connection to nature by participating in seasonal, phenomenological rituals with the sacred land. For example, during each year’s milder months, Vigil collects modest amounts of Mother Clay’s gifts of cottonwood trees and micaceous soil. He
explained, “We gather only dead cottonwood trees near the river [for the bonfire] and ask Mother Earth for only as much clay as we need.” While the trees, clay, and artistic process are all gifts from the earth, Vigil’s ceramics also metaphorically represent his ancestors from the Pueblo of Nambe, whose village name translates to the words “earth’s roundness.”

Akin to Lonnie Vigil’s spiritual partnership with the earth, Ansel Adams’ reverence for the earth also embodied the content of his art and the inspiration for his photography. Adams saw the unity of all things in nature and believed that nature’s expressions could be manifested in art. As such, the essential materiality of Adams’ photographs resulted from the artist’s optical selections of physical sites, which translated into light marks within the negative and abstract earth patterns within the gelatin silver print. In essence, Adams fused three artistic principles into his mature photographic visualizations: the spiritual, Romanticist landscape or view tradition, modernist abstraction, and the straight photography tradition.

As a “Western School,” American photographer, Adams applied straight photography principles to his Romantic, yet modern portrayals of the lyrical planes and patterns of abstracted landscapes. By producing straight, un-manipulated photographs of transcendental landscape scenes from 1930 onwards, Adams’ practice most closely paralleled that of nineteenth century British photographer, Peter Henry Emerson. During the years 1882 to 1889, Emerson’s practice of straight photography was based on creating “truthful,” naturalistic photographs of rural landscapes, which rendered the intense formal details and spiritual qualities of the earth to viewers. Emerson’s work opened a space for twentieth century artists, like Adams, to re-present the mechanical medium as art in its own formal terms. After meeting American modernist photographer Paul Strand in 1930, Adams committed to producing “honest” straight photography which intuitively described both his sublime connection to the earth as well as the extracted, textural details of the landscape. From 1932 to 1935 Adams took the straight photography tradition to new heights as a founder of the modernist photographers’ collective, “Group f/64.” The group’s pro-technology members used the camera’s smallest aperture to create un-manipulated, sharp-focused compositions of abstract patterns of the physical world. They also preferred the tactile practice of making contact prints from large-format negatives.

American art photographer Alfred Stieglitz, Adams’ most revered influence, began experimenting with straight photography as early as 1901. By 1907, Stieglitz hailed straight photography to be the most honest way of depicting life through an abstract art form. Interestingly, by concurrently championing straight photography and pushing for critical acceptance of the painterly photographs by his own “Photo-Secession” group, Stieglitz solidified his canonical authority and internationally elevated vernacular American photography to legitimate art status. Stieglitz’s solidification of photography’s “art” status also manifested in his magazine, Camera Work, where he showed Strand’s straight photography in 1916 and 1917. In essence, Stieglitz, Strand, and Adams shared the perspective that the purity of straight photography’s aesthetics revealed intense truth, meaning, and beauty through the formal properties of line, texture, and tonality.

Originally, Adams trained to be a concert pianist, and through his musical practice, he learned the abstract qualities of “architectural” depth and fineness. Adams’ acute understanding of musical aesthetics gave way to his lifelong career of creating transcendental landscape photographs which proponed the tradition of portraying the sanctity of the earth, albeit with a modernist approach to detail. In 1927 prior to Adams’ straight photography practice, the artist’s first successful visualization, Monolith, The Face of the Half Dome, revealed the granite’s intricate texture and range of tonalities as a result of the artist’s use of sharp-focus and a red filter. This print was featured in Adams’ debut photo-book,
Parmelian Prints of the High Sierras, which was sponsored by the artist’s first patron, Albert Bender. Proving to be a lifelong supporter of Adams and in an effort to expand the artist’s career, Bender promoted Adams’ creative photography to his wealthy friends and notably introduced the artist to Stieglitz’s wife, American modernist painter Georgia O’Keeffe, during a visit to Taos and Santa Fe, New Mexico.

Following meeting O’Keeffe in the late 1920s, Adams persistently courted Stieglitz, whose legendary modern art gallery, “291,” had exhibited vernacular photography alongside avant-garde painting and sculpture during the years 1908 to 1917. In 1933, Adams visited Stieglitz’s An American Place gallery in New York City and presented his straight photography to the iconic owner, who granted him a solo exhibition three years later. Adams’ exhibition at Stieglitz’s gallery in 1936 marked the artist’s official acceptance into the modern art arena and expanded his position to an international level. Beginning in 1937, Adams merged his “Group f/64” style with his mature mode of evocative, intimate landscape extractions. In 1938, Stieglitz dubbed Adams’ photography as “perfect.”

From 1930 until the end of his life, Adams created transcendental expressions of the landscape’s formal properties through the truth-telling lens of straight photography. Throughout his artistic journey, Adams continued to nourish his spiritual relationship with the earth through phenomenological rituals, namely his hiking pilgrimages into the mountains. Through these repeated, celebratory acts, he habitually experienced new views of the sacred landscape. Adams’ physical engagements with the earth reinforced his practice of experiencing discovery and natural awe and infusing these feelings into his photographs. To encourage viewers to experience an intimate view of the earth, Adams compositionally eliminated the distance between the landscape and the viewer and offered a personalized, close-up view of the earth’s materiality. Moreover, in an effort to formally describe the earth’s spiritual power in his artworks, Adams adopted Stieglitz’s philosophy of “equivalents,” where physical entities, like the earth, embodied such subjective qualities as emotions. This ideal was vital to Adams’ mature style, and it manifested in 1940 in the artist’s technical development of the “zone system.” This system allowed Adams to predict the tonal values within each photograph while working on-site. Adams used this innovation, a significant technical contribution to the art of photography, to visually communicate the complexity of the landscape as well as his deep spirituality towards the earth.

Reflecting his deep love for the Yosemite Mountains and affinity for the American landscape, Adams’ reverent connection to the earth visibly manifested in the content and materiality of his photographs. Likewise, Vigil grounds himself in a sacred, sublime relationship with the land by creating micaceous clay artworks that literally and spiritually embody the earth’s materiality. Vigil told me, “It’s more than a literal thought or action [to make art]; I go to a different place when I work.” In essence, Vigil’s abstract micaceous ceramics and Adams’ photographic landscape extractions metaphorically evoke their transcendental relationships with the land and spiritualistic approach to making earth-formed art.

In a formal comparison of Lonnie Vigil’s Neckless Jar with Fire Clouds (Fig. 1), made in the late 1980s, and Ansel Adams’ Sand Dunes, Sunrise, Death Valley National Monument, California (Fig. 2), printed in 1948 and 1980, the properties of line, light, and mass visually correspond between the artists’ compositions. In Neckless Jar, the sloping contours of the clay correspond to the contouring folds of Adams’ sand dunes. Additionally, the curvilinear bands at Neckless Jar’s base correspond to the ribbons of linear indentations in the foreground of Sand Dunes. In both works, linear contours and colonies guide the viewer and define the materiality, or formal structures, of the compositions. In terms of light, Vigil and
Adams employ a vast spectrum of tonalities to add depth and dimension to their works. The all-over radiance of Vigil’s Jar offers senses of stability and vitality while the vessel’s extending gray fire clouds evoke a sense of expansiveness. In a reverse mode, Adams’ reflective planes of sky and sand dunes evoke vitality and stand in contrast to the dunes’ dark planes and peaks which connote stability. Both artists’ works offer viewers intimate experiences of nature’s formal expressions in terms of elemental properties.

In a formal comparison between Vigil’s Jar (Fig. 3), made in 1995, and Adams’ Old Faithful Geyser, Yellowstone National Park, Wyoming (Fig. 4), printed in 1981, the slanting fire clouds in Vigil’s Jar echo the diagonal geyser stream of Adams’ composition. These directional guides promote exploration through both works’ earth-based forms. In Vigil’s Jar, the contrast between the dark fire clouds and the bronze, micaceous clay connote the complexity of nature’s moods. Likewise, in Adams’ reverse use of light, the white condensation of the geyser juxtaposed with the dark earth and sky emulate the emotive moods of nature. Vigil’s Jar embodies a vertical form made up of horizontal coils and a globular base. Similarly, Adams juxtaposes the horizontality and curvature of the landscape with the geyser’s vertical stream. This embodiment of cardinal directionality reflects both artists’ awareness and acceptance of the earth as their art’s driving force. In terms of light, the imprinted triangles and all-over luminous clay of Vigil’s Jar communicate infinite movement and vitality. Similarly, the angled peaks of glowing condensation in Adams’ Old Faithful Geyser evoke senses of infinite motion and energy. These indicators of movement refer to the earth as the source of energy and existence.

Lastly, the isolated fire cloud at the waist of Vigil’s Jar corresponds to the isolated cloud in the bottom left edge of Adams’ Old Faithful Geyser. While these clouds evoke independence, they remain bound to the earth.

In a final comparison between another of Vigil’s works entitled Jar (Fig. 5), made in the 1990s, and Adams’ El Capitan Fall, Yosemite National Park, California (Fig. 6), printed in 1981, cloud masses are the predominant, visual characteristic in both works. In Jar, fire clouds accentuate the curvature of the vessel’s neck and correspond to the clouds that rest atop the mountain peaks of El Capitan Fall. In both cases, the artists simultaneously reference the sky as a source of elemental energy and emphasize the angular earth forms that define the upper portions of their compositions. In addition, in Vigil’s work the sporadic fire cloud markings parallel the mountains’ erratic, linear fissures in Adams’ work. These areas connote sensibilities of change and growth and allude to the eternal variance of earth’s elementals. The overall roundness of Vigil’s work also reflects the mountains’ concave interior in Adams’ work. These visual elements suggest the notions of circularity and reciprocity and reflect the artists’ practices of earth-formed art. In addition, the presence of light in both works allows viewers to closely examine the physical materiality of Jar and El Capitan Fall. The luminescence in Vigil’s work intrinsically exists within the mica-rich clay, while in Adams’ work, the illumination of the mountains comes from sunlight. Through their compositional designs, both artists honor the earth as the ultimate source of energy and present viewers with visual embodiments of humanity’s respectful co-existence and interconnectedness with the earth.

Through informed examinations of the artists’ initial moments of professional acceptance, contemporary contexts, spiritual connections to the earth, and formal aesthetics, it is clear that Lonnie Vigil and Ansel Adams’ artworks yield definitive positions under the boundless label of earth-formed art. Vigil’s elemental ceramics, made of micaceous clay, and Adams’ earth-patterned photographs, formed in gelatin patterned photographs, formed in gelatin silver, communicate multifarious visual metaphors referencing the earth’s sacred landscape and honor their lifelong, reverent partnerships with the earth. Moreover, through gestural abstract designs and emotive formal properties, the
artists emphasize the strength and variability of the earth’s elementals and offer homage and gratitude to the land for its eternal, life-giving energy. As earth-based artists, Vigil and Adams offer an expansive portal for the global arts community at large to intimately experience the earth’s materiality through the artists’ transmuted abstractions. In turn, these works characteristically ask viewers to form a bond with the earth’s vital energy and transformative nature. Conclusively, the abstract earth patterns and spiritual metaphors found in Vigil’s micaceous ceramics and Adams’ straight photography communicate both artists’ transcendental approach to making art. Thus, these commonalities between the artists inspire a collective unity between their earth-formed artworks and invite a boundless, collegial dialogue of earth-formed art across culture, media, location, decade, and century.

Michelle Janine Lanteri
Fig. 1 - Lonnie Vigil, Neckless Jar with Fire Clouds, micaceous earthenware, 13” x 15.5625” x 15.5625,” ca. late 1980s. Collection of The Mint Museum, Charlotte, North Carolina.

Fig. 2 - Ansel Adams, Sand Dunes, Sunrise, Death Valley National Monument California, gelatin silver print, 18” x 14.25,” 1948, 1980. Collection of The Mint Museum, Charlotte, North Carolina.
Fig. 3 - Lonnie Vigil, Jar, micaceous earthenware, 10.625" x 10.1875" x 9.625," 1995. Collection of The Mint Museum, Charlotte, North Carolina.

Fig. 4 - Ansel Adams, Old Faithful Geyser, Yellowstone National Park, Wyoming, gelatin silver print, 20.75" x 13.5," 1981. Collection of The Mint Museum, Charlotte, North Carolina.
Fig. 5 – Lonnie Vigil, Jar, micaceous earthenware, 8.25” x 10” x 33.8,” ca. 1990s. Collection of The Mint Museum, Charlotte, North Carolina.

Fig. 6 - Ansel Adams, El Capitan Fall, Yosemite National Park, California, gelatin silver print, 10.75” x 13.75,” 1981. Collection of The Mint Museum, Charlotte, North Carolina.
References


Cruz, Veronica M. “Forged in Fire; Nambe Pueblo Potter Lonnie Vigil Revived an Art Form.” *Santa Fe New Mexican*, May 19, 2010.


Mithlo, Nancy M. “‘We Have All Been Colonized’: Subordination and Resistance on a Global Arts Stage.” Visual Anthropology 17 (2004): 229-245.


Smith, Craig. “Simply The Best.” Santa Fe New Mexican, August 18, 2012.

West-Barker, Patricia. “Judgment Day: Best of Show is ‘Never Obvious.’” Santa Fe New Mexican, August 18, 2012.

Double Identity in Jamaica Kincaid’s *Lucy*

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Abstract
This paper focuses on the eponymous protagonist in the novel *Lucy*, written by Caribbean author Jamaica Kincaid who now lives and works in the United States. The protagonist is a female immigrant from a Caribbean postcolonial society and this paper will analyze her quest/struggle as not only a foreigner and immigrant but also as a woman of color in the multicultural context of the United States. As immigrants undergo a physical change in environment, they also experience a significant change in their identities. Their identities as immigrants are reconstructed as they assimilate to the political, social, and cultural norms of a group of people they identify with. These changes are usually influenced by race, class and gender. This paper will highlight how in the United States, the immigrant experience is intertwined with the Black experience through Lucy’s character. More specifically, it will analyze Lucy’s role as a woman, her sexuality and her position as a domestic laborer that forces her to take on the identity of a Black woman along with her Caribbean identity.

The novel *Lucy* by Jamaica Kincaid focuses on the eponymous protagonist and how she is a product of double identity. Lucy is analyzed as a foreigner/immigrant from the Caribbean as well as a woman of color within the United States. Although migrants and immigrants are generally understood to be those who settle in another country, immigrants are distinct from migrants because they undergo more than just physical displacement; their identities change as well. They leave their native country and try to integrate themselves into their new country by exchanging one identity for another. This identity formation is usually influenced through components such as race, class, and gender. This paper will explore the dynamics of gender, sexuality, the lingering effects of colonialism in postcolonial societies, the traditional roles of domestic labor and the confounded perceptions concerning women of color in both American and Caribbean societies. Drawing on criticism by Sharon Harley who addresses the relationship between Black women and domestic work, Ketu Katrak who discusses the resistance and oppression of a woman’s body in a postcolonial society, Gary Holcomb who explains the concept of sexual migration, as well as other critics, this essay will analyze how Kincaid intertwines the immigrant experience and the Black experience that forces Lucy into a realm of global Blackness in which Lucy is identified by her Black racial identity instead of her ethnicity. Therefore, Lucy is not only seen as Caribbean woman but also a Black
woman in America, which forces her to take on two separate identities.

Similar to Lucy, as a native of a Caribbean island, the struggle in identifying who I was once I began to live in the United States was a great one. From my understanding, I was a Caribbean woman who lived in America and my Black racial identity had absolutely no significance in defining who I was. However, living in America for fifteen years has had a great impact on those I identify with and how other people identify me. While I can identify with other Caribbean people, Americans associate me with African-Americans because of my Black racial identity. Paul Silverstein, who explores the process in which immigrants are categorized through racialization, argues that, “race remains salient in the everyday lives of immigrants” because it is “an inescapable social fact” (Silverstein 364). Silverstein also points out that, “immigrants are categorized along the “color line”” (Silverstein 365), which simply means that people in the United States will associate immigrants with a particular group of people based on the similarities in their biological makeup. For this reason, the protagonist Lucy struggles with taking on the identity of a Black woman once she has arrived in America.

Born in St. Johns, Antigua, Jamaica Kincaid creates a semi-autobiography, through Lucy, reflecting the experiences she endured as an immigrant within the United States. Lucy, who is considered an antihero because of her unconventional persona, happens to flee from the West Indies to America. Prior to her arrival, Lucy is known as the girl from (what is assumed to be) Antigua, who has spent her entire life in mental and physical bondage because of the cultural norms that her society imposed on her gender. She is a product of a postcolonial society which affects how she perceives herself being controlled and defined by other people. In an interview, Kincaid herself states, “I do come from this tradition of possessing and claiming yourself, because if you don’t possess and claim yourself, someone else will” (Ferguson 184). Stacey Floyd-Thomas and Laura Gillman both explore the Black radical subjectivity in the writings of Black women. Thomas and Gillman argue that, “the struggle of Black women [allows them to] wrest their identity from the strong holds of hegemonic normativity” (Thomas and Gillman, 534). They also believe that, “the problem of identity is the problem of seeing oneself through the eyes of others” and to fix that Black women should “move beyond this legacy of ontological Blackness, the Blackness that Whiteness created” (Thomas and Gillman, 535). Understanding this, Kincaid illustrates that desire to define oneself through Lucy’s character. This gives us a clear understanding of Lucy’s desire to create an identity outside of her cultures traditions. Lucy is neither timid nor shy; she is highly opinionated and very outspoken. Though she is all of these things, she is also an inexperienced nineteen year old girl who enters the context of a new world in hope of becoming the woman she has always wanted to be. In the process of doing so, her identity as a foreigner/immigrant becomes articulated, both by her own choice and by the cultural forces around her, with the image of being a Black woman within the United States. Lucy physically becomes a part of the American cultural space because of her physical re-location while she emotionally holds on to parts of her Antiguan identity. This ultimately doubles her identity as she is perceived to be not only a foreigner but also a Black woman because of her physical attributes which associates her with every woman of color in America.

Lucy finds herself working as an au pair for a White upper-middle-class family, Mariah, Lewis and their four daughters. Throughout the novel, although Lucy never admits to being a part of the Black race, as she values her Caribbean identity more, she often gives a few hints that allow the reader to imagine that she is a woman of color. For instance, on the journey to Mariah’s childhood home, Lucy observes a few physical differences between herself and the passengers on the train. “The other people sitting down to eat dinner all looked like Mariah’s relatives; the people waiting on them all looked like mine…On
closer observation, they were not at all like my relatives; they only looked like them… Mariah did not seem to notice what she had in common with the other diners, or what I had in common with the waiters” (31). At this point, Lucy is analyzing not just the difference in race, but also social class whereas the Black people who seem to look like her are serving the White people who seem to look like Mariah. However, though their physical appearances might look the same, she certainly understands that there are only similarities in the physical aspects of their lives, and that their experiences happen to be very different. As Lucy has the ability to separate her Black racial identity from being Black in America, the people in her environment do not.

Understanding the role of an au pair, “a foreign girl employed to look after children and help with housework” (OED), domestic labor consumes Lucy in both the Caribbean and American world, and this is the first area where Lucy’s identity as a woman of color is doubled. Lucy is introduced in the novel as a figure who takes on the conventional role of “the helper.” While she comes to America to study to be a nurse, she is also assigned to take care of Mariah and Lewis’ four children: “I was the young girl who watches over the children and goes to school at night” (7). Lucy acknowledges her dissatisfaction with the physical space she inhabits when she describes the room she is given to stay in: “The room in which I lay was a small room just off the kitchen—the maid’s room…a box in which cargo traveling a long way should be shipped. But I was not cargo, I was only an unhappy woman living in a maid’s room, and I was not even the maid” (7). This description taints Lucy’s image in numerous ways as she is seen as not just a domestic help, but as Kincaid’s language suggests through the reference to “cargo,” also a slave. The paradox of sleeping in the maid’s room without being considered a maid also influences Lucy’s tense relationship with the actual maid. For instance, upon arriving, the maid makes it very clear to Lucy that “everything about me was so pious it made her sick to her stomach and sick with pity just to look at me” (11).

Seeing Lucy as also a woman of color explains the belligerence the maid has towards her, whereas Lucy’s pompous attitude influences the negative response from the maid. In this case, Lucy’s ability to disassociate herself from the world of labor, as if she is better than that, gives off an arrogant impression that the maid does not like because they are both perceived as Black women in America despite their ethnic identities.

As Lucy struggles to define who she is, her Black racial identity becomes problematic because the expectations of Black women in America are purposely imposed on her. The White American women fail to differentiate the difference between Lucy’s Antiguan identity and her appearing physically as a Black woman. As a result, Lucy adopts a nanny-like image, exemplifying a maternal role towards Mariah and Lewis’ children. Without the title of being mother she ultimately demonstrates motherly tendencies towards the children, especially towards Miriam. She expresses great love for Miriam:

I loved Miriam from the moment I met her. She was the first person I had loved in a very long while, and I did not know why. I loved the way she smelled, and I used to sit her on my lap with my head bent over her and breathe her in. She must have reminded me of myself when I was that age, for I treated her the way I remembered my mother treating me then. When I heard her cry out at night, I didn’t mind at all getting up to comfort her, and if she didn’t want to be alone I would bring her into bed with me; this always seemed to make her feel better, and she would clasp her little arms around my neck as she went back to sleep. Whenever I was away from them, she was the person I missed and thought of all the time. I couldn’t explain it. I loved this little girl. (53)

This is considered a false imitation of a mother-daughter relationship/bond in which Lucy is playing the role of mother to a child that is not hers. More specifically, it suggests that the work responsibilities of Black women
in America are usually dedicated to taking care of White women’s children. Although Lucy grows attached to Miriam, she still remains as the unhappy Black woman taking care of her White employer’s child.

Lucy’s image is being tainted in a way that is beyond her control; Americans perceive her to be something that she is not. Their perception of Lucy comes from the ideas they know about Black women in America, which are usually African-American women. Because they, Mariah and Dinah, focus solely on her physical appearance as she is Black, they disregard the fact that she is a Black Caribbean woman and not a Black American and/or African-American woman. Failing to understand this, allows Lucy’s image in America to be misconstrued. For example, Dinah, Mariah’s best friend, also appears as an upper-middle-class White woman who imposes the role of a domestic laborer upon Lucy. During the first moment in meeting Dinah, Lucy recognizes their difference in language and conversational idiom, which is based on social hierarchy as well as race. Dinah’s first question to Lucy, “So are you from the islands?” (56) is full of self-righteousness. This sense of superiority makes Lucy feel belittled and embarrassed: “I did not like the kind of women Dinah reminded me of… Dinah now showered the children with affection—ruffling hair, pinching cheeks, picking Miriam up out of my lap, and ignoring me. To a person like Dinah, someone in my position is ‘the girl’ as in ‘the girl who takes care of the children’” (57-58). Dinah’s reference to Lucy as a ‘girl’ instead of a ‘woman’ illustrates how people from different racial backgrounds identify themselves in contrast to others. Lucy understanding herself as a young woman, despite her race, and Dinah referring to her as a girl because of her Black racial identity, demonstrates a lack of respectability between the two characters that comes from the confounded perceptions they have for one another. Because of Dinah’s social status and White racial identity she perceives herself to be a woman opposed to Lucy who is simply just a girl. The notion of being seen as the help is also in correlation to women of color as lower class subjects producing domestic labor as an ultimatum for income instead of their own personal choice. Lucy is now identified as a domestic laborer because of both her race and social class, someone who is inferior both socially and culturally.

Sharon Harley demonstrates this concept of Black women in America being constrained to domestic labor in her book Sister Circle: Black Women and Work. Reflecting on the post-slavery practices of Black women in America, Harley argues that “although Black women were now legally free, their postbellum work differed little from that of their enslaved and free ancestors” (Harley 4). During slavery, household slaves (usually female) were confined to taking care of their masters children. The nanny role is still apparent today as it was during slavery and after slavery. More specifically, the idea of mothering another woman’s children has always been a racial/economic issue, whereas it is a necessity for Black women to take care of White women’s children in order to feed their own children and that domestic labor is the only form of labor Black women could produce: “Black women from Emancipation experienced discrimination based on both race and gender… despite the freedom, Black women continued to do work similar to that performed during slavery” (Harley 7). In Lucy’s case, although she is an immigrant from the Caribbean with possibly little to no history or knowledge on slavery, the images, history and traditions of Black women in America are being imposed on her in regards to employment because of her Black racial identity. She is placed in a space (the maid’s room) where she can only be identified as a domestic laborer and she is regarded by White women like Dinah as a young, subservient girl rather than a fully grown and independent woman despite the love and affection she showers on Mariah’s daughter Miriam. Lucy recognizes the similarities she shares with the actual maid of Mariah’s household, as both of them are Black, working-class women. Consequently, although she has only just arrived from the Caribbean, Lucy’s social and cultural position becomes articulated with the historical background of Black women in America,
who because of racial discrimination, lack work opportunities outside of domestic, care giving careers.

Harley also discusses how Black women in America work as a necessity for the survival of their families (Harley 5). Correspondingly, Lucy connects their history with the expectations the Caribbean society has of her and her male siblings:

Each time a new child was born [her brothers], my mother and father announced to each other with great seriousness that the new child would go to university in England and study to become a doctor or lawyer or someone who would occupy an important and influential position in society. I did not mind my father saying these things about his sons, his own kind, and leaving me out...But my mother knew me well, as she knew herself: I, at the time, even thought of us as identical; and whenever I saw her eyes fill up with tears at the thought of how proud she would be at some deed her sons had accomplished, I felt a sword go through my heart, for there was no accompanying scenario in which she saw me, her only identical offspring, in a remotely similar situation. (130)

The low expectations Lucy’s family, especially her mother, has for her comes from Lucy being a woman. Women within Caribbean societies are compelled to take on domesticated careers such as nursing. This influences Lucy’s decision to stop attending school to become a nurse. She states, “Whatever my future held, nursing would not be a part of it...I was not good at taking orders from anyone, not good at waiting on other people” (92). Therefore, when Lucy comes to America and takes on another identity as a nanny, she states “I could hardly imagine spending the rest of it [her life] overseeing their children in one situation or another” (110). As a result, Lucy recognizes the image of a domestic laborer consistently being imposed on her, and deviates from those practices. That is to say Lucy’s understanding of her femininity through her mother as they are identical influences a desire to break away from her mother’s uncompromising standards of life. Her Antiguan identity replicates her mother’s expectations: to pursue a nursing career suitable for a woman. Representing the standards of womanhood in a patriarchal society, Lucy’s mother supports the traditional norm that imposes gender as an influential factor on one’s career. However, her mother’s domesticated view on their gender motivates Lucy to distinguish her own identity as more than a domestic laborer.

Despite the effect of her mother’s expectations on limiting Lucy’s identity, there is another aspect of Lucy’s Caribbean background that gives her agency. Lucy’s experiences of living in a post-colonial Caribbean society complicate the relationship she has with Mariah. Although they build a close bond, while Mariah is persistent in trying to embrace Lucy as both an immigrant and a woman of color, she also attempts to re-identify Lucy through a master-servant relationship. When Mariah vacations at her childhood home, she tries her hardest to introduce and expose Lucy to the things she loves, in hope that Lucy would love them as well. However, with no hesitation, Lucy rejects Mariah’s attempts in trying to include her in a world she does not know or belong to. For instance, prior to Mariah mentioning that spring is important to her because she loves flowers, Lucy reflects on a traumatizing experience from her childhood concerning flowers:

I remembered an old poem I had been made to memorize when I was ten years old and a pupil at Queen Victoria Girls’ School. I had been made to memorize it, verse after verse, and then had recited the whole poem to an auditorium full of parents, teachers and my fellow pupils. After I was done, everybody stood up and applauded with an enthusiasm that surprised me...I was then at the height of my two-facedness: that is, outside I seemed one
way, inside I was another; outside false, inside true. And so I made pleasant little noises that showed both modesty and appreciation, but inside I was making a vow to erase from my mind, line by line, every word of that poem. (18)

Through this anecdote, Lucy conveys strong contempt towards her British-style education. Antigua is a postcolonial society who was once under the British rule, thus their entire culture and society was constructed from British colonial ideologies. Hence, Lucy is forced to learn about things, such as daffodils, that she could not relate to. For this reason, her sense of “two facedness” comes from having two identities in her own country. She is forced to endure all of Britain’s teachings and customs but yet she still feels as an outsider because she cannot embrace British traditions. This explains why she vows to erase the memories of that poem from her mind; her initial goal is to not just rid her mind of the poem but to also to forget the history of her country being colonized by Britain. Mariah of course does not understand the hostility in Lucy’s voice as she is telling the story, and intentionally brings the daffodils into her life after Lucy explains this. Upon seeing the flowers she was forced to learn about for the first time, Lucy quickly responds to Mariah with great contempt stating, “Do you realize that at ten years of age I had to learn by heart a long poem about some flowers I would not see in real life until I was nineteen?” (30) It is not until Lucy’s strong reaction towards seeing the flowers that the notion of the “conquered and the conquests” (Oczkowicz 147) becomes evident. However, whether Mariah understands that concept or not she will always lack the ability to understand that “nothing could change the fact that where she saw beautiful flowers I saw sorrow and bitterness. The same thing could cause us to shed tears, but those tears would not taste the same” (30). Therefore, Lucy being understood as an iconoclast in her own country allows her to be identified with the nonconformists of American societies, which are Black people.

Edyta Oczkowicz discusses this relationship between the colonizer and the colonized, which he illustrates as the transitional moment of cultural and psychological translation in correlation to Lucy being placed at the crossroad of her Antiguan identity and her American identity (Oczkowicz 144). He implies that “Lucy is a mental outcast and moral convict who refuses to accept what she is told to be” (Oczkowicz 146). In this case, Mariah’s attempt in persuading Lucy to see beauty in the daffodils initially fails because Lucy knows from her personal experience that there is no beauty within them. More specifically, Oczkowicz analyzes the poem to dictate “whose beauty she was told to assimilate without ever seeing the flowers themselves… the metaphor for the act of the colonization seen by the colonized” (Oczkowicz 146). At this point, Lucy struggles with her present reality as it is a reflection of her postcolonial experiences. Though no longer living in Antigua, her postcolonial life becomes a reality within America. Oczkowicz conveys this concept that Lucy can never forget her post-colonial experiences as it is a part of who she is. Therefore, in order to liberate herself from her past she must be able to acknowledge her past during her present, in which she will always be seen or identified as the colonized instead of the colonizer. With good intentions, Mariah tries to embrace Lucy from an American perspective opposed to a British one where Lucy describes her to be “a woman who wanted to show me her world and hope that I would like it, too” (36); however, the history of Great Britain and America appear similar as both countries have been in positions of power/ control, which leaves Lucy still feeling as if she is the servant in the world of the master.

In an attempt to understand the formation of Mariah’s mentality, Lucy does not inquire about her authority but investigates specifically how she got to be the way she is (Oczkowicz 149)- someone who can take on an identity that does not belong to her. For example, after catching fish for dinner Mariah jokingly sings, “I will make you fishers of men” (37). Lucy does not perceive
this to be a joke and, following Mariah’s next comment, “This is super. Let’s go feed the minions” responds by thinking, “It’s possible that what she really said was ‘millions,’ not ‘minions.’ Certainly she said it in jest. But as we were cooking the fish, I was thinking about it. ‘Minions.’ A word like that would haunt someone like me; the place where I came from was a dominion of someplace else” (37). This anecdote also demonstrates the relationship between masters and their servants. It is a biblical reference in which Jesus, the master, states to his disciples, the servants, what Mariah says to Lucy: “I will make you fishers of men” (37). Correspondingly, the literal meaning of the term “minion,” (a servile dependent) constructs the idea of Mariah being someone who has great power, enough power to support the “millions/minions.” Furthermore, Mariah then explains to Lucy that she has Indian blood in her which is the reason for her great ability in catching fish and hunting: “She says it as if she were announcing her possession of a trophy. How do you get to be the sort of victor who can claim to be the vanquished also” (40-41). In this case, Mariah unknowingly contradicts her role of being the victor. While Lucy perceives her to be the victor because of her race, class, and history of being the oppressor, Mariah wishes to identify with the vanquished in order to make Lucy feel more comfortable. It can also be said that Mariah’s strongest desire is to demonstrate a sense of similarity in their respective experiences in order for Lucy to see her as an equal. Because Mariah does not understand the history of oppression although she is in some way a part of it, she cannot thoroughly understand Lucy’s being both Caribbean and Black in America. Significantly, Kincaid also states in her interview with Ferguson that, “It really is a form of theft and conquest...what is incredible is how the conquered world would take the identity...when people in the conquering position take things, it doesn’t threaten their identity. But the weaker people feel—that’s why they clutch or hold on so tight and define them narrowly, really leading more to their defeat” (Ferguson 168). By this Kincaid means that the people who have been conquered struggle to create an identity outside of the one their conquerors have already created for them. Although it has a much greater impact on the conquered than the conqueror, identity is only problematic to those who have to accept it because it is not their own. Lucy is an example of this, whereas she understands that her identity as a Caribbean woman has already been created for her. However, she opposes her premade identity and creates her own in which she becomes an extraordinary young woman of color. Kincaid also argues that winners can do anything they please, even if it means taking on someone’s identity that is not even their own. In both instances, Mariah is the conqueror/winner in which she has the capability and the desire to control the people around her, especially Lucy. Therefore, Lucy deviates from what Mariah wants and expects of her in order to form her own identity.

Embracing her sexuality is the most essential component in Lucy’s identity formation within the novel. It is the most unconventional aspect of her image as a Black woman in America whereas her sexuality is the only thing she has the ability to control. Notably, Lucy has no control over her race, class or her gender the way she has full control over her sexuality. Because of her eagerness to increase the number and variety of her sexual experiences (King 370), Lucy adapts the image of the single Black promiscuous woman in American society. Gary Holcomb, whose research focuses on travel literature, believes she is represented as a sexual traveler who willingly accepts the identity of the slut (Holcomb 297). This concept of sexual migration demonstrates “the role of traveler that deeply informs Lucy’s anxieties about being an immigrant” (Holcomb 298). In other words, Lucy’s existence in the New World is defined through her desire for physical pleasure. Lucy’s desire to enable herself through promiscuity is strongly influenced through the relationship that she has with her mother. Her mother, in constant attempt to implement the traditions of the patriarchal society in the Caribbean, is what forces Lucy to leave
Antigua in the first place. She states, “An ocean stood between me and the place I came from, but would it have made a difference if it had been a teacup of water? I could not go back” (10). Lucy’s purpose in coming to America is a way of denouncing her mother and her country. As she no longer wants to be a part of that patriarchal society, more specifically, because her mother is an advocate for patriarchy, Lucy perceives freedom for women to be in the United States. Not going back to Antigua is an important psychological and emotional decision for Lucy, for she could not go back or else she would die from mental bondage. Therefore, her freedom lies in any place that is not her native country and any place without her mother.

Keith Byerman analyzes the motif of anger that Kincaid uses throughout her novels, understanding that the anger is toward the effects of colonialism and more specifically, Antiguan culture. Comparatively, Byerman’s reason for which she could not return home is due to the “problematic role of the mother in shaping the daughters place in culture and society” (Byerman 91). Byerman argues that Lucy’s anger towards Antigua comes from the uncompromising relationship she has with her mother. Because her mother plays such an influential role in her life, “Female identity within Antiguan culture can only be defined in terms of the mother, and since, the mother passes down the culture, she is the source of national identity” (Byerman 97). For this reason Lucy’s entire upbringing as she believes “was devoted to preventing her from becoming a slut” (127). Taken from one of Kincaid’s earlier novels, At The Bottom of the River, “Girl” emphasizes the expectations of women that Antiguan mothers imposed on their daughters:

On Sundays try to walk like a lady and not the slut you are so bent on becoming...you mustn’t speak to wharf-rat boys not even to give directions...This is how to behave in the presence of men who don’t know you very well, and this way they won’t recognize immediately the slut I have warned you against becoming. (“Girl” 3-4)

The conversation between mother and daughter here analyzes the predestinated idea of Lucy being a slut that is based on her gender and not her promiscuous actions. The voice of the mother can illustrate a sense of dictatorship whereas the daughter must live by the teachings of her mother. A sense of hopelessness that mothers have for their daughters is also depicted, in which they believe their female children will eventually become sluts although there teachings convey the total opposite of such behavior. Also, the relationship between men and women is solely identified through sexual desire, as if it is impossible for men and women to have any kind of communication outside of sexual activity. Therefore, in order to deviate from such authoritarian beliefs, Lucy takes pride in embracing the slutty identity that her mother already ordained on her life before she even began her journey to promiscuity.

Lucy’s sexual emancipation begins when she arrives in America. Prior to her migrating, she acknowledges her previous sexual experiences when she reflects on a young boy named Tanner, “the first boy whom I did everything possible you can do with a boy” (82). However, the limitations and restrictions on the female sexuality in her former postcolonial world did not allow her to experience more. Therefore, when she leaves home she takes great advantage of her sexual freedom in her new environment. For example, Hugh is the first man she is physically intimate with in America. This happens when they meet each other for the first time: “He kissed me on my face, and ears and neck and in my mouth. If I enjoyed myself beyond anything I had known so far it must have been because such a longtime had passed since I had been touched in that way by anyone” (66). This occurs again in her act of randomly having sex with a man she had only known for two hours: “And then something
happened that I had not counted on at all. At the store where I bought the camera, the man who sold it to me—he and I went off and spent the rest of the day and half of that night in his bed” (116). While Lucy perceives this to have been accidental, she takes pride in her promiscuous behavior as she “planted a kiss on Paul’s mouth with an uncontrollable ardor that I actually did feel [later that day]—a kiss of treachery, for I could still taste the other man in my mouth” (117). For this reason, she is in love with the idea of not committing herself to one man in a physical or emotional way. Lucy gradually conforms into the stereotypical image of Black women in America being promiscuous. Opposed to her former Caribbean society where she could not embrace her own sexual desires, she gradually invites the notion of being a “slut” as a part of her Black American experience.

Lucy’s lifestyle of engaging in premarital sex is clarified by Ketu Katrak’s critique of cultural tradition controlling the female sexuality in postcolonial societies, which as a result forces women to utilize their bodies as an act of resistance. Katrak argues, “As they negotiate these institutionalized prescriptions of sexual behavior, they face no-win situations: obey the dominant code and survive… or disobey tradition, step outside boundaries, and pay the ultimate price” (Katrak 160). By the ultimate price Katrak is referring to being silenced or forced into exile, which is where Lucy ultimately finds herself. From a historical standpoint, the traditional control of female sexuality was influenced by Victorian’s ideas of sexuality. More specifically, the colonizers perceived themselves to be the “liberators” of the native women, giving them freedom from “barbaric” customs. In this case, “barbaric” is defined as being wild and unsophisticated, therefore, the barbaric customs can be considered as the notion of promiscuity. As cultural traditions have been utilized to control the female sexuality, it also enables women as subjects to the concept of marriage, which allows the male to have dominance. For this reason, Lucy illustrates a sense of being emotionless and heartless (a form of resistance) when dealing with men. Recalling her relationship with Hugh, Lucy makes it clear of her feelings when she states, “But I was not in love with Hugh. I could tell that being in love would complicate my life just now. I was only half a year free of some almost unbreakable bonds and it was not in my heart to make new ones…to latch on to this boy—man, I suppose was not for someone my age and certainly not for me” (71). Lucy displays Katrak’s idea in which “she rejects male domination in a marital frame, and creates and autonomous life as a single woman” (Katrak 186). The marital frame Katrak is referring to can be seen as the act of commitment for Lucy. While for postcolonial societies it is tradition for women to gain legitimacy through marriage by being protected by their husbands and being obedient to the rules of patriarchy, Lucy exemplifies resistance against these cultural expectations with no hesitation. Under these circumstances, she gradually embodies the image of the unmarried Black promiscuous woman in America.

Living in America for approximately one year, Lucy comes to the realization that she is no longer the person she was when she first arrived; her identity had changed: “I had been a girl of whom certain things were expected, none of them too bad: a career as a nurse, for example; a sense of duty to my parents; obedience to the law and worship of convention. But in one year of being away from home, that girl had gone out of existence” (133). While it is evident that Lucy gains a great sense of maturity since her arrival, she has also taken on another identity that is not of her Caribbean heritage. The American society in which she now lives perceives Lucy’s Black racial identity to be in correlation with the experiences of Black women in America opposed to her simply being a Black Caribbean woman in an American society. As she experiences both spaces she adapts numerous sub-identities under the position of being seen as a woman of color. Her body
becomes an object/tool in which she is subjugated to domestic labor and she is perceived as the servant/vanquished in relation to obeying Mariah. Evidently, she also becomes an overly sexual being that appears to disregard all thoughts of obligating themselves to the notion of marriage or a committed relationship. The struggle that Lucy endures as she tries to become an individual ultimately forces her into a space of having two identities. Lucy is now seen as not only an Antiguan but also a Black woman in America.

Works Cited


Abstract
The study of homosociality in literature is relatively new. Investigations into the nature of plato- 
nic male-male relationships have risen within masculinity studies - an offshoot of feminism now linked to the more expansive discipline of gender studies – since the 1980’s. Eve Kosofsky Sedgwick defines homosociality in relation to its semiotic partner; homosexuality. Like homo- 
sexual relationships, homosocial relationships take place between members of the same gender, 
but are, at least superficially, without a sexual element. However, when analyzed closely, the 
lines between homosocial and homosexual relationships easily blur. This becomes clear when 
examining literature published in Victorian England, a period suffused with male-male interac-
tions. Through a study of male homosocial bonds discussed in Edward Carpenter’s essays and 
exhibited in Bram Stoker’s novel Dracula, I begin to unravel striking Victorian anxieties sur-
rounding the influence of males over other males, and particularly the detrimental effects older 
men could have upon the sexual development of young boys.

Queen Victoria’s reign saw the rise of nu-
merous homosocial spheres, and nearly all areas of Victorian life hinged upon relation-
ships between men. As the period pro-
gressed, true men, no matter their class, were more and more those who interacted primar-
ily and almost exclusively with other men. The advent of all-male higher education sys-
tems running from grade school all the way through Oxford and Cambridge ensured that upper-class boys would rarely (if ever) in-
teract with females prior to engaging in, and ultimately anywhere outside of, domestic 
life, certainly, in any case, far less than their predecessors (Tosh 465). For an ascending middle-class, the Industrial Revolution en-
tailed a masculine move from the agricultural life of the farm and home to urban factory work, which promoted a similar dichotomy between the sexes (Sussman 4 – 5). Finally, to the inspired Imperialist, the exciting explo-
ration of foreign countries in Africa and Asia allowed an escape from society, a chance to 
grow with other men without the pressures of courtship and matrimony.

As John Tosh notes, such a separation be-
tween domestic and public, male spheres promoted a clear division between the sexes. 
Self-improvement, economic progression, and production were all associated with male
homosocial arenas of education, industrialization, and colonization, whereas females relegated to the home — “angelic” keepers of a “spiritual… shrine” — were markedly limited in their physical, social, and mental mobility (Tosh 463). In turn, interaction between the genders waned, and by the latter half of the century, virile adventure writers like H. Rider Haggard were rejecting the constant and expected discourse between men and women once epitomized in Netherfield Hall. Thus, male-bonding became a centerpiece in Victorian society and, importantly for our purposes here, within its literature.

Eve Kosofsky Sedgwick’s commentary on erotic, Oedipal triangles provides a helpful, theoretical basis from which to investigate ties between men in this work (21). The Oedipal triangle is a Freudian notion, a tenet of the psychoanalyst’s theory of development famously figured around Sophocles’ great Athenian tragedy. In Freud’s eyes, a “homoerotic identification with [the] father, a position of effeminized subordination to the father” is vital to a boy’s development of proper heterosexuality; through such a close bond, the boy is provided a “model for his own heterosexual role” by watching his father’s interactions with his mother (Klein as qtd. in Sedgwick 23). Due to ubiquitous male-male interactions in Victorian England, a boy often engaged with one or more mentors — “surrogate fathers” — involved in whichever male sphere he entered (Sussman 100). The men might be comrades on the Colonialist lines, older male students, or even male teachers.

Using Freud’s Oedipal theory, we can begin to untangle the intimate ties that grew between elders and youth. Such an investigation reveals an intriguing resemblance and resonance of ideas existing between Edward Carpenter’s essays and Bram Stoker’s most famous work, Dracula. This resonance lies in the simultaneous celebration of and cautioning against male-male, and particularly man-boy, relationships. Thus, both pieces evince a tension on the part of the writers, who reveal a considerable Victorian anxiety surrounding the proper facilitation of such relationships.

Edward Carpenter, a pioneering gay writer of the Victorian period, was born in Brighton in 1844. The son of a well-to-do investor, Carpenter was raised in considerable wealth and luxury. Thus, as biographer Sheila Robowtham notes, after attending Cambridge, Carpenter might have settled into the easy life of an indolent priest for a small parish community (Robertson 53). In fact, this was Carpenter’s intended track. However, just weeks before his ordination, Carpenter (much like others after) endured a revelatory experience upon reading Whitman’s Leaves of Grass, and began to view the complaisant, refined setting of Brighton through a different lens (53 – 54). Carpenter became active in the British socialist movement, and throughout his life campaigned for progress in a variety of social areas, including but not limited to “feminism, anticolonialism, [and] environmentalism” (53). Close acquaintance E.M. Forster once aptly described Carpenter as “a poet, prose writer, a prophet, a socialist, a mystic, a manual laborer, an anti-vivisectionist, etc. etc. etc. …” (as qtd. in “Homogenic Love” 535).

Yet Carpenter left his most lasting impressions with his works on sexuality. Writing an abundance of texts on the clandestine topic of “homogenic love,” Carpenter promoted radical leftist notions that remain relevant to modern society. While many of his early essays and their topics required small, furtive publications for a select audience, this changed when Carpenter published a landmark essay in 1899 in the International Journal of Ethics. The piece focuses upon the pervasive relationships between men and boys then taking place in the public schools, a subject that, following the infamous Oscar Wilde trials in 1895, was severely troubling the public conscience.

In his article “Affection in Education,” published 1899, Edward Carpenter argues that male-male relationships in the public school, particularly those between elder and youth, are imperative to boyhood development. Often far away from their homes,
schoolboys looked to older males (“surrogate fathers”) for guidance. Carpenter opens in vigorous celebration of the warm affection that grows between mentor and protégé. Letters from numerous men reveal the passion they had for a beloved elder: “… when I saw him, my heart beat… violently… and I could not speak,” writes one who remembers writing “weekly, veritable love-letters” to an elder boy at his school (483). However, Carpenter is quick to note and to continuously reassure his readers of the absence of sexual attraction between the two parties. He explains that the older does not approach the boy with “secondary motives” or “personal ends,” allowing these “strong affections” to arise “quite spontaneously” (484). In other words, Carpenter is suggesting that the seeds of such attachments grow naturally. The teacher does not prompt the initiation of the relationship and makes no conscious effort towards the affection. Rather, the boy “natively allows his admiration” (484) to develop into a deep attraction.

To reach full bloom, the bonds must be properly cultivated. The first step in developing the affectionate relationship is its acceptance. While the seeds sprout naturally, they develop through nurturance. Thus the elder must decide whether or not he will fulfill or “deny” (Carpenter 484) his role as mentor, and the benefits of the former are boundless. For the rest of the relationship, the boy models and shapes his behavior after the elder’s example, ultimately sharing the essence of his masculinity, the man’s “ideals of life and thought and work” (484). Further, the relationship deeply influences the boy’s sexual development.

Carpenter’s reasoning sounds distinctly Freudian when he makes clear that adolescent boys are not fully sexualized. No actual conception of sex is yet formed: “desire… has not manifested itself strongly”, and the young boys likely experience a general aversion to “any thing like sexual practices” (489). The youth simply shows pubescent interest and it is the place of the same-sex mentor to answer his questions. In the initial development of sexual curiosity, the boys show no real interest in women, their “love to the other sex” having “hardly declared itself” (485); no true heterosexual attraction has formed. Even further, Carpenter claims that a boy’s “unformed mind requires an ideal of itself … towards which it can grow” (485). Thus, like the Oedipal relationship between father and son in which a boy attains a role of “effeminized subordination” to his father, the schoolboy’s introduction to sexuality occurs when he “imitates” and “contracts [the] habits” of his elder male mentor through a relationship with a “certain physical element,” a “real affection and tenderness” (484), before he develops a taste for females. Carpenter connects the development of heterosexuality to the fruition of masculinity: the boy’s relationship with his mentor prepares him for future interactions with the opposite sex, while simultaneously developing his “conduct of life and morals” (492).

Such interactions provide the elder male an opportunity to influence the flourishing of the young child’s masculinity. Acting nobly and with an eye for the boy’s future, he can ensure that the youth grows into a man with substantial “strength of character,” capable of heterosexual relationships rich with love and affection (Carpenter 488). Yet when the elder attends to this bond perversely, his influence can be equally abject and detrimental. For example, if he attempts to form the bond unnaturally, with secondary motives, the consequences for the youth are dire; “the disease of premature sexuality” (486) between mentor and child “cheapens and weakens” the boy’s “affectional capacity” (488). Rather than “blossom[ing] the young mind” (489), these “wretched practices and habits” threaten the boy’s understanding of “true love and friendship” (486). Thus, and importantly, the breaching of such a potentially innocent, warm, and beneficial bond fogs the boy’s psychology; this early sexual experience “arrests” his “mental growth” (488). In an earlier paper titled “Homogenic Love and Its Place in a Free Society,” Carpenter defines sexual “mania” as an excessive form of,
or obsession with, “physical desire” (539). Thus, when discussing premature sexuality between men and boys, Carpenter is implying a potential madness that is born in the latter; they become lecherous fiends, “licentious… odious little wretches” (“Affection in Education” 487) with an insatiable desire for sex.

Although his words may appear harsh or extreme, Carpenter reveals a fairly universal Victorian anxiety surrounding what occurs when males are prematurely and unnaturally introduced to sexual activity. A pioneering gay writer, Carpenter understands the subtleties of male-male relationships, yet there is a perceptible tension in his writing. While clearly celebratory of the bonds he describes, he appears equally concerned with the danger of their improper facilitation; on the one hand, Carpenter emphasizes the importance of man-boy relationships, and on the other, he warns against their potentially dire consequences. As we turn to Bram Stoker’s Dracula, published 1897, just two years prior to “Affection in Education,” we will begin to recognize very similar themes being played out in homosocial spheres beyond the public school. On the novel’s surface, Stoker clearly extols the beauty he sees in masculine bonding and comradeship. And yet, like Carpenter’s essay, Dracula simultaneously portrays the baleful effects that can occur when male-male relationships develop inappropriately. Indeed, as we will see, improper masculine interactions prove destructive for characters of both sexes.

II

The opening section of Dracula is its most eventful. The turmoil within Castle Dracula involves two men only. Jonathan Harker travels to Transylvania as a “solicitor’s clerk” whose purpose is to “explain the purchase of a London estate to a foreigner” (Stoker 21). That foreigner, of course, is Count Dracula, a man with birdlike features; diabolic red eyes, so often surrounded by darkness; and “peculiarly sharp white teeth” hanging over “lips” of “remarkable ruddiness” (23). By the novel’s end, this horrific image of the Count is so fixed that it is often difficult to remember that the purpose of Harker’s trip was quite mundane; at this point in the narrative, Harker’s sole purpose is to inform Dracula of land that he has purchased in London. This point may sound obvious, but is very important when considering the relationship that develops between the two characters. Harker arrives in Transylvania on business, and thus enters the Victorian homosocial sphere of the workplace.

Before we go further, we should note two characteristics of Harker’s journey that distinctly connect his situation to that of Carpenter’s schoolboys. Similarly to the young boys in Carpenter’s public schools, Harker finds himself in an area far away from home and without friends or family. He arrives at Castle Dracula in place of Peter Hawkins, the solicitor he works for who doubles as a father figure (Stoker 23). Hawkins’ role as primary mentor and father figure is secured when the Count reads aloud a letter describing Harker’s “[growth] into manhood in [Hawkins’] service.” Now, finding himself far away from Hawkins’ care, Harker must “take [Dracula’s] instructions in all matters” (23). In this way, Hawkins’ letter signifies an exchange in which a father passes his son off to a “surrogate father” as the boy enters a new, unfamiliar homosocial sphere. Thus, like a boyhood development dependent upon relationships with older men, Harker’s growth in this homosocial sphere will lean heavily upon his interactions with Dracula, a man who, having lived for centuries, is about as “elder” as one can be (212).

Initially, the connection between Harker and Dracula appears natural. The Count even shares a few of Harker’s interests. In the castle’s library, Harker marvels at Dracula’s collection of “English books” that cover a range of subjects and disciplines, but is especially drawn with “gladdened heart” to the Count’s copy of the “Law List” (Stoker 25), a document directly relevant to his own work as a solicitor’s clerk. When the time comes for Harker to discuss the London land purchase
with the Count, he remarks that the elder man posited “myriad questions,” and admits that Dracula is so knowledgeable that he likely “[knows] very much more” (28) than even he. Dracula’s aptitude for all things English, and particularly this familiarity with the practice of Law, sets the elder man up as a surrogate father that Harker might “contract the habits of.” Indeed, the situation seems opportune for the young man. Under the care of such a learned mentor in a new homosocial sphere, Harker may accrue skills, attain a deeper understanding, and further cultivate the masculinity planted during his time with Hawkins. Thus Harker’s relationship with Dracula -- a surrogate father with the potential of being a true workplace mentor -- could potentially bolster the young man’s masculine development.

However, despite the bond being a homosocial one formed through business, the two men’s relationship quickly grows sensual. The affection that the Count shows Harker further establishes his role as both surrogate and Oedipal father. If this affectionate bond were healthy, Harker would be able to reach his full potential within the homosocial sphere, and his masculinity would take a major step if he were to establish the “manhood” he found with Hawkins in an entirely new arena. However, this proves impossible, as Dracula breaks one of Carpenter’s crucial tenets. When the Count “leans over [Harker]” to affectionately stroke him, evoking a “shudder” (Stoker 24) from the young man, he is initiating contact with a secondary motive. Harker has not “naively allow[ed] his admiration” to grow into a deep attraction; rather, the Count is touching the man consciously, evidenced by his “drawing back” upon being “noticed” (24). Unlike the fruitful relationships that spring naturally between boys and mentors, this affection between the two men is purposefully initiated by the elder. This allows Dracula a level of control over their interactions that Harker does not have. The young man is particularly vulnerable: he is separated from society and thus in the hands of Dracula, expected to fulfill all of the man’s wishes on account of business. Harker even admits that to the Count “alone can [he] look for safety” (41). The Count need not wait for Harker to show interest; he must simply take advantage of what is already an optimum situation; the castle is a “veritable prison,” and Dracula its “prisoner” (Stoker 32). In this context, Dracula’s sordid influence can continue unchecked, and with time such influence begins to turn the relationship from homosocial to homoerotic.

There are conspicuous signs that the relationship is growing unhealthy, especially when Dracula threatens to violently penetrate Harker after seeing the man’s blood (Stoker 31; Craft 446). The climactic interaction between the two men -- which criticism of the novel has explicated tirelessly -- occurs in the castle’s west wing. At this point in the novel, Harker has gone directly against Dracula’s advice and fallen asleep in an area away from the safety of his room. He awakens in a dreamlike state, and before long, three female vampires (reminiscent of Macbeth’s weird sisters) appear and threaten, like Dracula previously, to pierce Harker. Yet Dracula cannot have this; he has been prepping the young man for over a month. With his emphatic line “This man belongs to me!” (43), Dracula claims Jonathan Harker and establishes his homosexuality within the novel. Harker then swoons, and our interpretation of their interaction (and potential intercourse) is left to speculation. Yet when Harker wakes the next morning with his clothes folded by his bedside, presumably by the Count, we can assume that their interaction was more than friendly (44). Further, if we are to believe that a sexual act did take place between the two, we must remember that because the affection did not grow naturally, this would constitute a “premature sexual act,” as Dracula has specifically taken advantage of a vulnerable, younger man.

After this crucial moment, Harker’s sexuality begins to change. In her article “A Wilde Desire Took Me,” Talia Schaffer references other critics who characterize the Count’s debased chapel as “the anal orifice… littered…
with Dracula’s fecal/phallic coffins” (Hanlon as qtd. in Schaffer 480). As such, the chapel becomes the setting for the most direct male-male penetration between Dracula and Harker in the novel. Imprisoned in the castle, Harker is forced into Dracula’s temple out of necessity, realizing that his only chance at escape is to procure Dracula’s master key. Thus although Harker seeks control of his own destiny by taking “action!” (49), it is action that is intrinsically linked to his lack of control in the castle. As Harker descends into the Count’s lair, through the “dark, tunnel-like passage, through which came a deathly, sickly odour” (Stoker 50), he is who is penetrating Dracula’s, albeit symbolic, anal orifice. Figuratively, the young man is committing an uncontrollable sexual penetration; given what has occurred between himself and the Count, this penetration cannot be avoided. Further, the behavior becomes habitual. When a “wild desire” brings Harker back through the “dark passage” in another desperate attempt to “obtain (the) key,” Harker is well accustomed to the clandestine activity, stating, “I knew now well enough where to find the monster I sought” (53). Dracula’s sexual influence thus causes Harker to perform a homoerotic act, one reminiscent of the dark and “wretched practices” that Carpenter sees as products of premature sexuality in public schools.

By the close of the novel’s opening section, Jonathan Harker is a fallen man. While the young solicitor’s clerk arrives with a certain degree of manhood in this new homosocial sphere, he falls victim to an Oedipal father figure who traps and perverts his proper masculine development by unnaturally breaching the line between the homosocial and the homoerotic. Stoker presents Harker’s homoeroticism as a perversion, a development caused by Count Dracula’s uncontrollable sexual deviance. Deliberately or not, Stoker is portraying a darkened image of the homosexual man. Dracula is a man who, unable to control his lust for blood and penetration, stains a young man’s masculine development. He causes unnatural homoerotic desires to grow within Harker’s mind, such uncontrollable “physical desires” that lead him into Dracula’s chapel. Thus Stoker appears to be illustrating a considerable anxiety surrounding homosexuality, and the potential corruption it can cause young men during their sexual development.

Luckily for Jonathan Harker, he is saved by a symbolic crux of masculinity within the novel: in the hospital, he is married. While recovering from his “violent brain fever” (Stoker 95) -- a diagnosis implicating the “mental arrest” he experienced in the castle -- Harker is still vulnerable to the Count, whose presence always threatens to subvert his manliness; nurses remind Mina that she must be careful with her husband, for “the traces of such an illness… do not die lightly away” (95). But when the couple observes Dracula for the first time in London, and Harker is “evidently terrified at something” (155), he can lean on his wife, or the symbolic bond of marriage, for support. We are left wondering what might have happened without Mina at his side; the woman herself is convinced that “he would have sunk down” (155). It appears then that the symbolic value of the heterosexual marriage in a way helps to control, or at least veil, Harker’s homoerotic desires. In other areas of the novel, heterosexual relations play a similarly pivotal role in one’s masculine identity. Moving to the other major homosocial sphere in Dracula, we will see that marriage, or the prospect of marriage, is an ideal that is crucial for one’s development of true manliness.

III

Opposite Dracula and Jonathan Harker’s homosocial interaction is The Crew of Light. This group consists of three close friends, Dr. Seward, Quincey Morris, and Arthur Holmwood, who were intimate long before the events of the novel take place. Together, they carried the Imperialist banner to the frontier of “Titicaca” and “Korea” (62), and Morris’ acute recollection of these past experiences reveals how close he keeps the memories to his heart. His laconic letter to Holmwood early in the narrative reveals that the familiarity between friends is not only emotional, but quite physical; by
memorializing “dress(ing) one another’s wounds” (62), Morris fondly remembers an act that would have drawn each man intimately close to the other’s body.

Having returned from the frontier, The Crew of Light finds itself transfixed around the angelic Lucy Westenra. A mutual love for the young girl connects the three friends, and marrying Lucy would prove pivotal in establishing one’s masculinity. As we saw with Jonathan Harker, marriage would help veil any potentially homoerotic experiences that took place on the Imperialist frontier. As the sought after female, Lucy retains the role of moderator; her choice will uphold the masculinity of one man, and jeopardize two others. She finds herself conflicted: “Three proposals in one day! Isn’t it awful! ... I am so happy that I don’t know what to do with myself” (Stoker 57). Her ambivalence is justified, having just accepted her love, Arthur Holmwood, while recognizing the risk she’s caused “two of the poor fellows” (57) in rejecting them. Thus Quincey Morris and Dr. Seward enter the novel on unstable ground. Having been denied the heterosexual security of marrying the woman they love, both characters must re-establish their roles as men.

For Quincey Morris, such a challenge does not prove difficult, for he is a “True Gentleman.” Morris is most distinguishable from others in the Crew of Light due to his use of American slang, a characteristic that threatens his chances with Lucy; he’s so funny, so “jolly and good humored,” that the young girl mistakenly teases the man as he prepares to propose (Stoker 58 – 59). His silliness might have eased Lucy’s rejection; it wasn’t “half so hard” for Lucy to deny his proposal as it was for her to deny Dr. Seward’s (59). However, Morris recognizes his slip-up. Mid-proposal, he turns his tone with an earnest directness, and effuses his emotional attraction to the girl, thus causing Lucy to refer to him as a “great-hearted, true gentleman” (60). To Victorian essayist Samuel Smiles, the “True Gentleman” signified “one whose nature has been fashioned after the highest models,” an individual with prodigious importance “in all stages of society” (467). Such a title upholds Morris as a man of “character,” representing “the moral order embodied in the individual” (450). Thus, the same girl whose rejection threatens Morris’ masculinity reaffirms his manliness.

Lucy’s second suitor, Dr. Seward, re-establishes his masculine identity differently, turning to a common Victorian mode of expressing one’s manliness: he works, and works, and works. After his rejected proposal, Seward intimates a deep depression and disinterest for life; his “empty feelings” cause nothing to be of “sufficient importance to be worth the doing” (Stoker 61). Having been rebuffed by the woman he loves, Seward reasons that “the only cure for this sort of thing was work” (61). Seward’s words suggest a view promoted by Thomas Carlyle. As Herbert Sussman explains, for Carlyle and others, the workplace offered men a locale for masculine development that was without the limiting, oppressive, or threatening existence of women (4 – 5). In the homosocial sphere of the workplace, any erotic or sexual feelings were displaced into productivity.

The mental hospital that Seward oversees is a place noticeably unfit for women, emphasized late in the novel when Mina Murray is unable to “repress a slight shutter” (Stoker 195) upon entering the grounds. Thus, the mental hospital serves as an all-male sphere in which Seward can build his masculinity without the pressures of winning over or fulfilling the needs of women, a place where he sublimates his sexuality into his work; “It seems to me only yesterday that my whole life ended…” he reflects, “Oh Lucy … I must wait on hopeless and work. Work! Work!” (71). Seward consciously focuses his energy upon his career, a move that takes him away from interactions with women; “How can he…” asks Dr. Van Helsing, “… know anything of young ladies” when “he has his madmen to play with …” (108). Ultimately, “playing with madmen” helps Seward assert his manliness through the control he has over fallen, flawed men.

These two men of the Crew of Light, Quincey Morris and Dr. Steward, have their masculinity challenged upon entering the
novel by being denied their choice of wife. Both respond and ultimately regain a semblance of masculine identity, one figuring a “True Gentleman,” the other dedicated to his work of controlling mad men. This reestablishment occurs early in the novel and their masculinity lies on an upward trajectory for the remainder of the narrative. Such movement crosses with their counterpart in the Crew of Light, Arthur Holmwood. Winning over the prized girl gives Holmwood’s masculinity great potential, but this potential disintegrates when Lucy is sucked into (by being physically sucked out of) an unintentional act of infidelity.

IV

Once Lucy rapturously states, “… I love him; I love him; I love him!” (Stoker 57), Arthur Holmwood’s manliness grows in light of his friends’ failures; he is the girl’s chosen lover, and will now have her for a wife. While the novel never touches upon it directly, particular qualities of Holmwood’s seem to influence her decision. Specifically, “the Hon. Arthur Holmwood” (72) is a man of immense fortune, the most wealthy of the Crew of Light. The Holmwoods are aristocrats and Arthur is to assume his father’s Lordship following his death (72). The title of “Lord Godalming” will provide considerable clout (151); for example, during their pursuit of Dracula, Harker uses Arthur’s aristocratic name to collect all possible information surrounding the Count’s real estate purchases (233). Indeed, Arthur is the only character in the novel besides Count Dracula with a formal title. However, he cannot fully appropriate the power of such a title until he proves his worth as a man. Holmwood responds to a premature use of his prestigious title with “… no, not that, for God’s sake! Not yet at any rate…” (153), thus acknowledging that more needs to be accomplished. To do this, Arthur must fully realize the heterosexual manliness he’s gained in winning Lucy by acting in opposition to the homoeroticism exhibited by Castle Dracula. In short, he must deflower his wife.

Throughout the novel, Lucy represents the “sweet maid” (158), an angelic, virginal woman continually associated with “virtue” (121), white flowers, and purity. The most prominent image of virginity affixed to Lucy is perhaps the white garlic flowers that Dr. Van Helsing strews about the sick-room during her transformation into a vampire. This limited space in which Lucy finds herself is reminiscent of John Tosh’s notion of the “spiritual shrine.” In her sick-room, with its “fastened up windows… latched… securely” (121), the angelic Lucy is locked away from the outside world and from forces that could stain her purity. The flowers, of course, defend against the penetrating Count Dracula, who threatens to pierce Lucy unremorsefully with his sharp, dinted teeth. To Lucy, however, the “flowers are only common garlic” (121). Her ignorance enrages Van Helsing. He responds to Lucy jarringly, reproaching her for “trifling with (him),” indignant that any medical procedure of his might be assumed a silly “jest” (121). Once his mood quells, he explains soothingly that “obedience” is key; “obedience is to bring (her) strong and well into loving arms that wait for [her]” (121). Thus, if Lucy agrees to play by his rules, remaining safely within the confines of her immobile shrine, she will be saved for Holmwood, whose “loving arms… wait for [her].”

The problem, of course, is that Dracula jeopardizes Lucy’s purity long before the waiting Arthur can fulfill his role as husband and heterosexual partner. The “two little red points like pinpricks” (Stoker 89) that Mina observes after Lucy’s fretful night walks ensure the girl’s fall into an “aggressive sexuality” (Craft 452). In his essay “Kiss Me with those Red Lips,” Christopher Craft explains that a bite from Dracula entails the transformation from a woman of purity into one overtly sexualized. Stoker appears to be playing with the oft-mentioned Victorian binary between “the dark woman and the fair, the fallen and the idealized” (Roth 411). Despite Lucy being unconscious during her forced coitus with Dracula, she has still faltered;
rape victim or not, her penetration prior to matrimony ensures her mutation into a dark, morally corrupt woman. Further, and most importantly here, her perversion threatens Holmwood’s masculinity. If winning the virginal Lucy’s hand in marriage boosts Holmwood’s manliness, her slip into forced adultery undermines the realization of such manhood.

Thus Holmwood finds himself needing to reassert his heterosexual masculinity. His situation is quite similar to Harker’s when he arrives at Castle Dracula. Both men had previously established a certain degree of “manhood,” but those characteristics are moot in the context of the novel. Harker established his manhood while working under Peter Hawkins, but in Castle Dracula, he enters a homosocial sphere where such manliness must be re-established. Similarly, Holmwood earns a degree of manhood by winning Lucy, and such manhood is likely connected to the wealth of his family and to his aristocratic blood. Yet after his father dies, Holmwood is without the man who has given him that potential; like Jonathan Harker, he is without the father whose guidance has helped him establish his masculinity. Now, like Carpenter’s schoolboys and Jonathan Harker, Holmwood needs guidance from an elder man if he is to fulfill his masculine potential. Luckily for Holmwood, his “surrogate father” is not Count Dracula, but Dr. Van Helsing, the novel’s sanctimonious jack-of-all-trades, a man who is at once physician, philosopher, theologian, and heterosexual promoter. Yet when we analyze the growing homosocial relationship between Holmwood and Van Helsing closely, we will begin recognize distinct similarities between the elder man and Count Dracula.

Despite seeking masculinity in different homosocial spheres, Jonathan Harker and Arthur Holmwood both rely upon surrogate fathers who hold a certain amount of expertise in their fields. As we have discussed, Jonathan Harker’s manliness in Castle Dracula initially depends upon his success in the workforce. For Harker, Transylvania is a place of business, an arena in which, as a solicitor’s clerk, his masculinity can be asserted in the field of law. Under the guidance of Dracula, a surprisingly apt mentor, Harker’s masculinity has a high ceiling. Differently than Harker, Holmwood seeks a masculinity rooted in his heterosexual relationship with Lucy. However, like Harker’s surrogate father, Holmwood’s mentor is an (albeit self-proclaimed) expert. While as readers we never actually witness Dracula mentoring Harker, Van Helsing often quite literally instructs, and even conducts, Holmwood’s interactions with Lucy. When Arthur first comes face to face with Lucy during her transformation, he is overcome with emotion, speaking with a “sort of choke in his voice” (Stoker 114). Van Helsing is thus aware of the man’s vulnerability, and gently exhorts Arthur on the proper mode of his interacting with Lucy; he refers to Arthur as a “Good boy!” yet reminds him that he “shall kiss her once before it is done, but then [he] must go; and [he] must leave at [the professor’s] sign” (114).

Van Helsing seems to be setting very distinct heterosexual guidelines, offering specific instructions that allow the development of Arthur’s masculinity. Later, when Arthur again shows signs of weakness, Van Helsing is more aggressive with his pedagogy. The boy simply will not learn. Arthur is drawn by Lucy’s sensuous pleading -- her “soft, voluptuous voice” – and thus Van Helsing ferociously wrings his neck and drags him away, declaring that “not for (Arthur’s) life” should the young man succumb to his adulterous fiancé (146). The professor recognizes that Arthur’s masculine potential would be scotched if he were to fall victim to Lucy and kiss the mutating girl. Because we can assume at this point in the novel that Lucy is attempting to vamp Holmwood, Van Helsing appears to be protecting Arthur from a premature (and particularly unnatural) sexual interaction, and thus following the directions of Edward Carpenter. Like an elder male student or teacher acting as surrogate father, it is Van Helsing’s responsibility to ensure that
Arthur’s manliness is not threatened by inappropriate sexual activity, and to teach the young man a proper heterosexuality that promotes his masculine growth.

As Lucy’s transformation takes place, Van Helsing appears to provide Arthur the affection that Carpenter calls for and Dracula perverts. Recognizing the man’s plight at witnessing his fiancée’s mutation and his own failing masculinity, Van Helsing offers his hand; “Come, my child… you are sick and weak…” he pleads with Holmwood. “Come to the drawing room where there are two sofas. You shall lie on one, and I on the other, and our sympathy will be comfort” (Stoker 144). Here, in the wake of Holmwood’s father’s death, Van Helsing maintains his role as surrogate, Oedipal father, referring to Arthur as he would his own offspring. He invites Arthur to an intimate setting in which his comfort will help heal the young man. This interaction between the two appears quite healthy, and suggests the type of sentimental affection that Carpenter held would help a boy’s masculinity flourish. Yet, like the relationship between Harker and Dracula, this is a bond that has been formed unnaturally, and thus, the development of Holmwood’s masculinity is destined for a similarly mad and sordid fate as his friend’s in Castle Dracula.

Holmwood first comes face to face with Dr. Van Helsing via a strangely homoerotic introduction prior to the novel’s infamous blood transfusions. Upon seeing the stout young man, Van Helsing is awestruck; “…as he took in his stalwart proportions and recognized the strong young manhood which seemed to emanate from him, his eyes gleamed. Without a pause… he held out his hand” (Stoker 113). When this passage is read in its entirety, we recognize clearly that Arthur is the supreme man for the job; being her fiancé, it is vital that his be the first blood to mix with Lucy’s. Quincey Morris makes this point later when he is so drastically concerned that “Arthur was the first” to give Lucy his blood (138). Yet, it is hard to discount the homoeroticism evident in Seward’s description of this moment. Although Holmwood is the default man for the job given his engagement to Lucy, Van Helsing appears to be choosing the young man at least partially out of personal preference; such “stalwart proportions” quite certainly arouse the doctor’s fancy, and make his eyes gleam. In this way, Van Helsing’s choice figures another instance in which an elder male selects a youth for secondary motives; quite literally, the doctor is selecting Holmwood as the man he will first penetrate during the blood transfusions.

This homoerotic act of a male penetrating a male, like Dracula’s veiled coitus with Jonathan Harker, is a premature one. Arthur has not taken to Dr. Van Helsing; Dr. Van Helsing has taken to Arthur. The relationship hasn’t grown out of a natural attraction of the youth to the elder; rather, like Dracula, Van Helsing has taken advantage of a premier opportunity to penetrate a young man of “stalwart proportions.” Thus in line with Carpenter’s teachings, the proper development of the young man’s sexuality is in jeopardy. Ironically, the elder man who protected the youth from premature sexual intercourse with a bloodthirsty fiancé has broken his own rules. The threat that Van Helsing’s homoerotic behavior poses becomes actualized in Lucy’s tomb. In this scene, filled with “murderous phallicism” (Craft 455), Holmwood’s growth as a heterosexual man comes to a startling climax. In a blatant attempt to punish a young girl who threatened his masculinity with infidelity, Holmwood violently penetrates his fiancée, “driving deeper and deeper (his) mercy-bearing stake” (Stoker 192). The image of Holmwood “(striking) with all his might” illustrates quite clearly the type of sexual mania that Carpenter warns against, the “coarse…, licentious,… (and) hard… physical desire” (“Affection in Education” 487) that pervades a youth’s mind when it is improperly and prematurely introduced to sexual activity.

Thus, much like the improper interactions between Count Dracula and Jonathan Harker, the relationship between Dr. Van Helsing and Arthur Holmwood, drastically influences the young man’s sexual development into
manhood. Both relationships cause a perverse sexuality that Edward Carpenter censures in “Affection in Education.” Writing in Victorian England, where outwardly male-male homosocial relationships were ubiquitous, Carpenter and Stoker suggest a substantial anxiety surrounding the powerful influence of men over young boys. Their writings show that even in the distinctly homosocial spheres of the public school and the workplace, the lines between homosocial and homoerotic are easily blurred, and the consequences are dire. Ultimately, both Stoker and Carpenter reveal that for Victorians, the potential corruption of homosocial spheres and male-male interactions so intrinsic to the development of masculine identity was greatly distressing, and permanently changed societal perceptions of male-male relationships.
Works Cited


“Trembling grass / Quakes from the human foot”: Animal Rights Legislation, John Clare, and the Lines between Nature and Humanity

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Abstract
Today the prevention of cruelty to animals is generally regarded as a desirable ambition. In this paper, I examine parliamentary discussions over animal rights legislation that rose in objection to brutal practices – particularly bull and badger-baiting – that took place in England across the first quarter of the 19th century. The sports involved the atrocious treatment of both domestic and wild animals; however, a close reading reveals that Parliamentary notions were inextricably rooted in concerns for humans, rather than in actual sympathy towards animals. These ideas ranged from a speciesism reactive to the French Revolution, to more devoutly Christian ideas, and finally to a conception of morality as a teachable entity. The critical reading of the period’s legislation allows one to distinguish and elaborate more fully the “radical” beliefs of John Clare, a Romantic writer of the period, whose poetry constructs the natural world as separate from the human. Clare delineates the imposing position of humans in relation to natural creatures, and ultimately illustrates that a quiet approach that places inherent value upon the natural world itself is the only proper mode of our interacting with and within Nature.

From birth, John Clare was considered one of the lower order. Born a twin in 1793 to peasant parents in Helpston, a rural village settled in the English countryside, nearly all of Clare’s youthful acquaintances were in want of luxury. Yet Clare’s family, after the death of his sister being composed only of the young poet, his father and mother, were the “poorest of the poor” according to biographer Frederick Martin, and daily life for the Clares was a struggle to attain and maintain any source of sustenance (5). Amenities were hard to come by and savored when found, and thus indulgences were non-existent. For the young John Clare, however, such inopportune circumstances never wore on an inherent sense of wonder, joy, and curiosity (Martin 6). Days were spent exploring the surrounding world of Helpston, traversing every meadow, field, and coppice that crossed his vision; in these spaces, Clare sought an omnipresent and pervasive beauty. Primarily self-taught following the age of twelve, he learned through his observations, incorporating what he saw into the conversations that took place with his few acquaintances (Thornton). From the singing of birds in spring to the summer buzz of insects and
the flush foliage of autumn, every living creature was subject to Clare’s eye (Martin), and the young boy began to develop a conception of the natural world that would prove vastly influential in his later poetry.

Years spent immersed in the English countryside left Clare believing that to truly understand the infinite workings of Nature, one must situate oneself quietly within its world, and without conscious reflection, remain attentive only to the beautiful “material” before him. Such “materiality” is a notion Louise Economides details in her discussion of Shelley’s “Mont Blanc”. Economides differentiates the materiality of nature from the “anthropocentric sublime” of Wordsworth and Coleridge, in which the human mind connects with Nature and subsequently transcends the tangible material of the natural world itself. Rather, the “sublimity of materiality” reveals the “mystery” that is the natural world, a space apart from anything human (90). This latter piece of Economides’ distinction ties closely to Clare’s incessant verse, which includes an abundance of poems descriptive of animal life and behavior; leafing through Clare’s Northborough Sonnets, readers will find poems titled “The Fox”, “The Vixen”, or even simply, “Marten”. Each is specific to the animal named, and offers a space for readers to peer closely into the creature’s world; we sit alongside as the hedgehog builds his “nest of grass and sedge”, and makes small noises “like a cricket as he goes” (lines 2, 10, Clare 29). Such descriptions are intimate, curiously interested only in the mannerisms of the creature subject. The speaker of Clare’s sonnets rarely acknowledges himself, or takes the time to engage in the type of self-conscious reflection seen in the poetry of Wordsworth and other Romantic poets (Economides).

Even in Clare’s poems that include a more active speaker, the materiality of the natural world is still the primary focus of the verse. In “The Nightingales Nest”, the speaker beckons the reader on a hunt for the bird, pulling him down into the brush. Unlike Keats’ transient nightingale, leading the speaker through a dreamlike vision, Clare’s bird and its abode are much more tangible:

--- dead oaken leaves
Are placed without & velvet moss
within
& little scraps of grass ---& scant & spare
Of what seems scarce materials down
& hair… (lines 78 – 81, The Midsummer Cushion)

The speaker’s description of the nest, reflective of Clare’s own relationship with Nature, is one of pure observation, offering an illustration that focuses upon the materiality of the scene; as readers, we can nearly grab at the “little scraps of grass” ourselves. The poem makes no allusions to Philomela, and the speaker seems amazed at the simplicity of the nightingale’s being, that a bird so “famed” (line 20) would live in a nest of “dead oaken leaves” and “little scraps of grass”, or “should have no better dress than russet brown” (line 21). Clare’s nightingale avoids interaction with humans, whose “presence doth retard / Her joys” (lines 65 – 66) and her cheerful song. We should notice that this varies significantly from other poets whose depictions of the nightingale hinge on direct interaction between man and creature, and subsequently place more emphasis upon Nature’s benefits to humanity than upon the bird itself. For example, though Coleridge’s speaker in his conversational poem “The Nightingale” acknowledges how desolate men have ascribed the bird its “melancholy” nature unjustifiably, the speaker himself ironically ascribes instructive qualities to the bird, who reminds him of the light that love creates. For Clare, though, the realness of the nightingale is the focal point, and even if she shies from distinction, his poem celebrates her natural state. Thus, Clare’s verse separates itself from other Romantics by paying close attention the materiality of the natural world and avoiding “self-reflexive” (Economides 89) musings. Further, such poetic notions gain even more distinction and are elaborated more fully when they are viewed alongside the relationship between humans and living
creatures of the natural world as conceived in Parliament during the 19th century.

Occurring in the aftermath of the French Revolution, early British animal rights legislation was heavily influenced by the fervent political strife of the period. In June of 1802, an article appeared in the British Sporting Magazine reporting upon a bill that rose on May the twenty-fourth of that year in the House of Commons attempting to disallow “Bull-Baiting and Bull Running”. Such were two brutal sports in which a bull -- purposefully vexed prior to the games’ initiation, often by having its tongue ripped from its mouth -- was tied to a post and set on with dogs. Onlookers then placed wagers as to the length of the bull’s life (“Bull-Baiting Debate” 180). Yet despite the violence of the events described, discussions in the House of Commons often strayed from the actual behavior and manner of the sports themselves, tending rather to focus upon the social, human issues brought to the surface through the proposed legislation.

Opponents of the bill in the House, predominantly a Mr. Windham, objected on the basis of it carrying frightening political purposes (“Bull-Baiting Debate”). Mr. Windham saw the calls for reform as remaining strands of Jacobinism. The Jacobins were an extremist party that held power for a five-year period in France during the Revolution. The party’s rise ushered in the rise of the Reign of Terror, a morbidly tumultuous period towards the end of the conflict that included mass legal and illegal executions taking approximately 40,000 lives (Tilley). Windham’s words illustrate the remaining tension and anxiety that existed three years after such abject horrors had occurred. The said Member of Parliament’s contention was based upon two major premises. First, he claimed that the primary objective of each reformer who took aim at cruel sport was to “berest” the poor of their “means” to “jollity and amusement”, rendering them more susceptible to political arousal for the dying Jacobinist cause (“Bull-Baiting Debate” 187). A downtrodden lower order, removed of their primary source of recreational entertainment, would likely grow acrimonious towards the British government, causing the threat of major political uprisings to loom large. Further, he believed such a call to be filled with “hypocrisy” and ignorant “cant” (187). Rustic sport involving the injury of wildlife had existed throughout the span of human history and across the economic classes. If they were to abolish bull-baiting, they most certainly would be obligated to equally do away with “hunting, shooting, and all the cruel amusements of the higher order” (188). In this way, Windham’s opposition appears based upon adamant conservatism, stressing the importance of avoiding a variety of horrific violence that had occurred so recently in France, and that the sport, less cruel than others, maintained a loyalty within the lower order that would otherwise be lost.

Through his defense of bull-baiting, Windham’s notions implicate the speciesism that beset animal rights proceedings at the turn of the century. This term is taken from Peter Singer, and first appeared in his book Animal Liberation. “Speciesism” is defined by the Oxford English Dictionary as the “…discrimination against or exploitation of certain animal species by human beings, based on an assumption of mankind’s superiority” (Oxford English Dictionary online). In the context of animal rights legislation, such a notion would insinuate that human ends outweigh those of animals, and that animal suffering is acceptable if it improves or maintains the quality of human life. Windham’s accusations of Jacobinist intents by the bill’s backers disregarded any possibility that the proposals implied actual sympathy for the animals in question. It was not even necessary for Windham to explicitly refute such possibilities, and his speech largely ignores feelings of sympathy. In one shorthanded response to those who refer to the sports as excessively “cruel”, Windham again asserts the hypocrisy of such cries, and questions the reformists’ definition of the term “cruelty”; the hobbies of shooting, hunting, and horse-racing, so essential to the lives of the
higher order and the reformists introducing the bill, were equally, if not more, cruel than the sports debated ("Bull-Baiting Debate" 188). More importantly, though, the initiative could ultimately lead to atrocities seen only within the past decade in France. If they were to enter such a discussion, he would mark that such were the “greatest cruelties” ever “committed” ("Bull-Baiting Debate" 188), greater certainly than the mangling of a bull. Here, Windham’s speciesism is clear. In the aftermath of the French Revolution and the Reign of Terror, events that influenced modern definitions of “terrorism” and crimes against humanity (Tilley 10), he believed that maintaining the wellbeing of the state and its citizens to be of ultimate importance to the House, and worth the trouble of hurting lesser creatures.

Interestingly, others who spoke within the House upon the issue of animal rights reasoned in a manner that similarly placed more concern with human beings than with animals, even those who rose in defense of the Bull-Baiting bill. A Mr. Sheridan expressed strong concern that the cruel sport was detrimental to the morality of those partaking, and to those who witnessed such events as onlookers. Farmers usually brought their families to the games, and after selling their animal for sport, the family watched their bull, a “harmless creature” so useful and essential through the years, tied to a post and set on by dogs ("Bull-Baiting Bill" 190). Others brought forward their “favourite” dog to fight, who, upon her successful performance, was cut open to prove her worth, and thus better sell her pups (190). In its immediate context, we should notice Sheridan’s rather justified questioning of the morals surrounding such practices, especially emphasizing that children often viewed the horrifying scenes.

Yet while his cries were warranted, like Windham’s, Sheridan’s notion places more concern with the well-being of humanity than the suffering bull, thus undermining the plight of the animals involved. In his major premise, Sheridan focuses upon the effects cruel sport has upon the human race, insinuating that the moral judgment of a young child who watches his father act so atrociously is jeopardized, and that to attend the cruel sports at a malleable age would be to compromise one’s moral development. Concerns of a human nature thus overshadow actual sympathetic sentiments towards the bull or dogs; though the animals are treated cruelly, what remains most horrifying is the idea that children might incorporate barbarous values into their moral perspective. Where Windham proclaimed the necessity of maintaining equality among the sport of the Higher and Lower Orders, thus positing the state of humanity above any concern for animals, Sheridan’s invocation is for human morality.

The shocking depictions Sheridan used to convey his argument foreshadow a rhetorical strategy that is abundant in animal rights legislation of the period, especially later in the century, which involved portraying starkly gruesome scenes to impart feelings of disgust in listeners. Sheridan’s descriptions in particular, though, project a conception of cruelty that is rooted in the involvement of beloved, domesticated animals. As we’ve previously mentioned, Sheridan stresses the importance of the bulls to each farmer and family, who had “learned to look on with affection” ("Bull-Baiting Debate" 190) upon the creatures. The animals that were thrust into the sport were not viewed with indifference or disregard. Each game motivated farmers to choose their most vitally stout bull or dog, and thus the animals with the highest likelihood of survival and monetary value. Farmers were charged to bring forward their “favourites” (190), and Sheridan suggests that such a coincidence exacerbated the cruelty of the sport. Yet through his emphasis upon the “cherished” (190) usefulness of the bulls and dogs, we realize that Sheridan’s protests are fixed in concern for human beings, not animals; the cruelty arose only because the creatures were of significant importance to the humans torturing them. Thus, the actual cruelty was faced by the farmers, who jeopardized their livelihood by bringing forth
animals for the blood sport.

As the century progressed, notions presented through legislation became more deeply rooted in Christian virtues, especially of universalism. Lord Erskine rose in April of 1809 to promote a bill whose focus was broader, with a more generalized title: “Cruelty to Animals”. Erskine sought to rework laws that applied solely to humans, apparently realizing the speciesism that existed. His proclamation to the House notes that abusers of animals could only be charged if their intent was “injurious” to the animal’s “proprietor”; the animals themselves, Erskine adamantly declared, “have no rights!” (“Cruelty to Animals Bill” 553). In essence, his proposition sought to reiterate that animals are equal to humans in the sense that God creates both. While Erskine granted that animals exist in a subservient relationship with man, he described such a circumstance as a “trust” (555). He ascribed to animals the same senses, feelings, and emotions as are found in humans, for “God is the... impartial author of all that he has created”. Thus, a distempered dog is as passionate as its crossed owner, and the baited bull feels suffering equal to that of a tortured soldier.

Erskine’s conception of a “trust” between humans and animals hinges upon the idea that human rationality carries the importance of human morality. Humans, though inseparable from animals in certain characteristics intrinsic to living creatures, differ most obviously in their capacity to reason. Consciousness allows us to recognize the impartiality of God’s creation, and the pain and pleasure that our practices may create in “the lower world” (“Cruelty to Animals Bill” 555). Thus, excessively cruel behavior to creatures that we realize can feel as we do, and live in accordance with our well-being, undermines the “trust” that God has placed in humanity. We can reason and differentiate, and thus choose to act cruelly, but similarly choose to act caringly, and as the “lower world” exists to serve our purposes, their well-being is subsequently at our disposal. Such “trust” establishes a “benevolent system” in which animals supplement and serve humanity, and are therefore shown gratitude and gentle kindness (555). Further, by asserting that rationality necessitates morality, Erskine implicates rationality and morality as universal qualities, as all humans are conscious, perceptive beings. Although Erskine’s argument was still implicitly focused upon the betterment of humanity through the just treatment of subservient animals, his words do push for an equality of humans and animals under law. Further, his notion of a “benevolent system”, aimed at gracious reciprocity, and his equality of humans and animals as creatures of God, illustrate a maneuvering in ideology away from the speciesism reflected in previous legislation.

According to David Perkins, the movement that took place during the early stages of the 19th century was partly due to England’s urbanization following the commencement of the industrial age. As life began moving away from the farm and closer to city streets, Perkins holds that Britain became more and more engrossed in romantic ideals, primarily rooted in “nostalgic” yearnings and “sentiments” for former rural life (2). Particularly, households once so close and involved with the pastoral caretaking of animals longed for a companionship they had taken for granted. Thus, the advent of pet-keeping was born.

For Perkins, to adopt an animal into one’s house is to view them as “quasi-human” (5); we treat pets as we would a younger child, sibling, or friend, lavishing them with love, presents, identification, and when needed, discipline (for which we often feel guilt). Viewing animals in human terms is essential for a strong attachment to develop between man and pet, for these are the only terms to which we can subscribe; in Perkins’ words, “we have no ready basis for understanding their inner lives other than our own” (5). Further, just as post-colonial readings of literature have shown us in recent years, the more a creature is viewed as human, “the more they have rights” (5). Thus, if the taking in of animals causes pet-owners to attach human qualities to their smaller companions,
it was no coincidence to Perkins that outcries for animal rights occurred simultaneously with the ascent of pet-keeping during the late 18th century. Such claims fit closely with Erskine’s proposition that animals are equal to humans in various capacities, and most importantly for our purposes here, Perkins suggests that sentiments wrought through the assimilation of animals into the home were eventually applied to wildlife as well (5).

While it is hard to connect Perkins’ observations of pet-holding explicitly with animal rights legislation, it is clear that as the 19th century progressed, the focus of those speaking for the discontinuation of cruelties to animals began focusing more of their attention upon the abuse of wildlife. In 1825, a bill came to debate in Parliament that sought to abolish the intrusive games of bear and badger-baiting, two native mammals of the English landscape. A Mr. Martin described the two sports before the House. Rather than a farmer bringing forth a bull for staking, to initiate the games involving wildlife, hunters must venture into the forest to lure the animals from their dens, and thus pit the creatures against dogs in matches to the death (“Bear-Baiting Prevention” 657). He and many citizens of the participating counties were concerned over the negative effects partaking in or viewing the gruesome games would have. Several magistrates indicated that the sports “led to gambling”, taught the lower orders thievery, and “gradually trained them up for bloodshed and murder” (657).

We should recognize that Martin’s opening notions are actually similar to those promulgated twenty-three years previous. By focusing upon the detriments that could be caused one’s morality, Martin’s initial premises softly echo the opinion of Mr. Sheridan, insinuating that “gambling” and thievery are immoral deeds. And further, if we look closely, we realize that if the cruel sports in fact “train” individuals “up” for murder, then the killing of a human being must clearly sit on a separate level from the killing of an animal. In this way, Martin’s words softly echo Wyndham’s, who asserted that the bloodshed and loss of human life witnessed in the French Revolution constituted “the greatest of cruelties”.

Moreover, the documents of 1825 reveal that class distinctions were unrelentingly influential upon early animal rights legislation. Opponents’ accusations mirrored the concerns of Mr. Wyndham, particularly that the primary intent of the reformists was to rid the lower orders of amusement and continually disregard any objectionable behavior of the higher. Martin thus emphasized the role “several noblemen and gentlemen of the first distinction” played in arranging and funding the cruel features, and became indignant towards contentions that his protests were only aimed at the poor and the lower order (“Bear-Baiting Prevention” 657). Crimes that “opposed the dictates of humanity” could not be delimited, and he believed that every perpetrator, no matter their social standing, should be brought to justice. Further, he believed the “persons of rank and name” who funded such “cruel practices” were the most evil of those involved. Here Martin’s conception of morality and its development differs strongly from Lord Erskine’s. The aforementioned Lord emphasized that rationality necessitates morality, thus implicitly suggesting that rationality and morality transcend class separations; all humans have rationality, or a consciousness about their existence, which God has granted them. Thus, it’s likely that Erskine believed morality an inherent, universal set of values for human existence.

Rather than an intrinsic, God-given sense of right or wrong, Martin conceptualized morality as something that is instilled within humanity through teaching and instruction. He asserted that the higher order should be held more stringently accountable for their actions because of “their education”, which would have given them “feelings averse to cruelty and bloodshed” (“Bear-Baiting Protection” 658). Martin’s words suggest that we are taught our notions of morality through education and the instruction of history, logic, and other various subjects. Further, he conveys that the actions of the “noble” men in
this case are even more deplorable when it’s taken into account that their actions “propagate such feelings among their inferiors” (658). Martin’s words reveal a rift between the classes and certainly imply an assumed superiority of the higher order. Left uneducated, it is assumed that humans will act violently with wanton cruelty; Martin implies a savageness that is inherent to humanity, or at least, to the lower order.

The period of Martin’s legislation was the most active for our featured poet John Clare, and his works run against the grain of Parliament’s assumptions. As we’ve already discussed, Clare’s formal education was minimal, and it’s clear that his personal development in the countryside, in direct contact with the natural world, was supremely influential. The differences between the Parliamentary legislation of the Romantic period and John Clare’s materialist poetry are substantial. Clare’s verse, not only uninterested in self-reflexive musings, rarely dwells upon the plight of humans as a species either, and at times even openly denounces the “free booters” and “poachers” who took part in sport (Wu, “To the Snipe”, “The Badger”). Ultimately, Clare delineates an inherent separation between the natural and the human worlds in both level of consciousness and physical location, and emphasizes the terror that is caused when humans breach such a separation.

In his poem “The Badger” (1235 – 1236), Clare’s “grunting” (line 1) animal is destined to a similar fate as his brethren named in the legislation brought forth by Mr. Martin. The poem’s narrative depicts the events of badger-baiting throughout its entire course. Fittingly, the poem begins as the hunters enter the forest,

...The woodmen when the hunting comes about
Go round at night to stop the foxes out
And hurrying through the bushes ferns and brakes
Nor sees the many holes the badger makes

And often through the bushes to the chin
Breaks the old holes and tumbles headlong in... (lines 9 – 14)

Clare’s opening presents a wooded world unfit for humans, and provides a stark contrast between the naturally-inclined badger and the aggressive hunters. The first few lines of the poem describe the badger in his own environment, traversing the forest floor. Through digging the turf, the badger creates a “great hugh burrow in the ferns and brakes” (line 4), and literally, Clare shows the badger building its sett, or underground abode. Such behavior is innate to the badger, and the animal is not acting beguiling in any way. Its home is simply within the ground.

The hunters, however, are noticeably away from their home. In the lines quoted above, hunters, or “woodmen”, are shown to “often” fall into the steep holes the badger digs. In this way, Clare juxtaposes the natural actions of the badger with those of the human hunter; where the badger acts innately within the forest, building his home in his habitat and ecosystem, the hunter, in leaving his own home, must impose upon the woods, and subsequently falls into the badger’s den, an obvious foreigner in the world he’s entered. In this way, Clare depicts a natural separation or division between the physical environments of the badger and hunters. Further, the verse acknowledges that the breaching of such a separation is caused solely by the actions of man; the hunters intrude upon the natural environment of the forest, causing the “old fox” to “drop his goose”, and the “old hare”, despite being crippled with gunshot, to “buzz” away¹. The badger himself, however, never willingly or naturally enters the path of humans, and he must be “clapt”, “bore”, and “bait(ed)” (lines 22-25) if he is to enter the town.

¹ We might be obliged to believe Clare’s characterization of the animals as “old”, and thus learned enough to sense danger, to be a poke at the naïve hunters who fall into deep holes in the ground.
Once there, the badger fights away the dogs, and Clare seemingly personifies the creatures:

…The heavy mastiff savage in the fray
Lies down and licks his feet and turns away
The bull dog knows his match and waxes cold
The badger grins and never leaves his hold… (lines 37 – 40)

The badger fights despite a clear size disadvantage, and he fights despite being grossly outnumbered; set on by every dog of the town and “kicked by boys and men”, “when badgers fight… every ones a foe” (lines 50-51, 31). Yet in the lines above, the dogs realize they are outmatched by the driving badger and begin to surrender; even the most imposing of the group, the “heavy mastiff savage”, “licks his feet” (lines 37-38) and retires. The “bull dog” too recognizes the imminence of his loss, “wax(ing) cold”, while the badger, “grinning”, appears delighted with his own prowess. Clare’s illustration conveys an understanding between the animals, a consciousness of one another. At present the animals are at least distinctly aware of the other’s deathly intentions. The poem’s final stanza, however, reveals that such awareness is limited to the natural world.

Through its discussion of the keeping of badgers for sport, the poem’s final stanza brings the human and the animal worlds into direct contact. The narrative having come full circle, the badger, once “grunting on his woodland track” (line 1), finds himself utterly away from his natural habitat, under the complete control of humans, and yet he seems unable to recognize the plight his keeper has caused. Clare illustrates that to a human’s touch, the badger is docile; he always “licks the patting hand”, and “never bites” nor “runs away” (lines 65 – 66). It’s possible that such a description of the “tame” (line 55) badger fits with Perkins’ contention that pet-keeping influenced society’s conception of wild-animals. Further, his depiction may seem to resemble the notions of Lord Erskine, who emphasized the subservience of animals, and thus their deserved appreciation.

Ultimately though, Clare’s illustration of the affectionate badger reveals its inability to recognize, or to be aware of the danger his keepers have subjected him to. Unlike the understanding held between the badger and the dogs, in which the animals comprehend their deadly relationship to one another, Clare’s badger seems naïve to the cruel dealings of humanity. Thus, the badger’s behavior appears instinctual, reactive only to present circumstance; while he reacts with violent aggression towards the attacking dogs, purposely set into the fray by humans, when shown gentleness he accordingly reacts with affection. We should remember too that the initial interaction between man and animal occurred solely because man knowingly entered the forest and inadvertently fell into the badger’s sett; the badger himself did not act beguilingly or with the intent of injuring the human hunters. Clare appears to be illustrating an inherent separation between the natural and the human worlds, both in levels of consciousness by juxtaposing the animal’s “instinct” and humanity’s “intent”, in addition to the more explicit physical separation between the animal’s natural habitat of the forest and the streets of the human world.

Similarly, his poem “To the Snipe” depicts an environment distinctly apart from human contact, where neither “man nor boy… hath ventured near” (“To the Snipe”, line 35). Clare shows a habitat fit perfectly for the quaggy bird, who is told by the speaker that,

… here thy bill
Suitied by wisdom good
Of rude unseemly length doth delve
And drill
The gelid mass for food…
(lines 17–20).

The snipe’s “unseemly” “bill” reveals the perfect circumstance of his situation. While such a bill may have been ill fit for another habitat, its length is a necessity in the marsh.
Similar to the badger’s setts, this habitat, though well-suited for the snipe, is hazardous for humans, whose feet aren’t supported by the boggy turf (line 6). To bait a badger, or to hunt a snipe, humans must leave their own haunts and venture into areas they are naturally separated from; away from the “boys” who “thread the woods”, the bird is safe in the “stagnant floods” of the marsh. Clare’s poetry reveals that the abuse of wildlife is a wanton cruelty, a crossing of boundaries that terrorizes harmless beings of the natural world. Thus, human presence causes a great deal of terror, fright, and unrest: the “trembling grass / Quakes from the human foot” (“To the Snipe”, line 6), birds in the wild “dread mans sight” (line 46), and creatures scatter at the sound of the hunter’s gunshot (“The Badger”). In his poem “Nutting”, even the simple act of gathering nuts in a forest upsets Nature, who stares glaringly back, causing the speaker to inquire hauntingly, “where is pleasure gone” (line 14, The Midsummer Cushion). Thus, Clare’s poetry is distinguished from Parliamentary legislation of the 19th century, which, while purporting sympathy for animals, was implicitly grounded in concern for human beings. Rather, Clare characterizes humans as intruders upon the natural world, whose presence is terrorizing. In this way, his verse firmly sympathizes with and values only the beings of the natural world that are so affected by our intrusions.

Yet Clare’s verse also forebodingly reveals the inevitability of an interaction between the human and the natural worlds. In the closing lines of “The Badger”, when the animal finally escapes the clutches of man and domestication, even the “hollow trees” he seeks for shelter are only so because they were “burnt by boys to get a swarm of bees” (lines 67 – 68, Wu 1236), and the youth of the perpetrators implies the continuance of humanity’s imposition upon the natural world. Correspondingly, in “To the Snipe”, the human speaker must warn the bird that danger is close, for “instinct knows / Not safetys bounds to shun” (lines 53 – 54), and thus, somewhat paradoxically, a human must impose himself in order to protect the instinctual birds from other humans who use their “intent” for crueler purposes. In his poem “The Robin”, the speaker implies an understanding that the slaying of some animals is necessary, reminding the reader that “distinction with (the farmer) is nothing at all; / Both wren, and the robin, with sparrow must fall.” (lines 21 – 22, Tibble 23). The speaker appears familiar with the distinction between animal creatures, disgusted that the farmer disregards distinguishing between the “wren” and the “robin”, animals who pose no threat to his crops, from the “sparrow”, whose killing, while not necessarily justifiable, is understandable. Ultimately, to a man who realized that even the simple act of gathering nuts in a forest upsets the workings of Nature, the awareness that humans will unavoidably interact with life of the natural world may appear heartbreaking.

In his poem “Remembrances”, Clare recounts his youth with nostalgia, yearning to return to childhood, recognizing a “pleasure past and a winter come at last…” (line 60, Clare 259). He looks upon his childhood settings in dismay, witnessing their destruction at the hands of humanity, while desolately conveying that with it, all “joy had left the paths of men” (line 77). However, as readers of Clare, we are reminded that joy does exist in the “haunts” of nature in which we may feel a “habitual love” (“To the Snipe”, lines 73 – 74). Clare’s verse illustrates a proper interaction with animals, one in which we acknowledge the distinct separation between worlds, and realize the frightful and often brutal harm our impositions may cause. Further, he brings us intimately close to Nature’s creatures, focusing upon the tangible materiality of their being; through a green reading, Clare seems the epitome of an “eco-poet”. In the words of Erica McAlpine, “Clare achieves what Wordsworth pursues” (81), and through his curious observation, sits within Nature without impeding upon it. Along these lines, he achieves a similar “quietism” to Gilbert White (King 533), valuing the natural world for itself, and successfully
avoiding the self-conscious ruminations of other Romantic poets that project human, self-aggrandizing notions upon the natural world. Even through the simplicity of his written verse, uninterrupted by punctuation, Clare depicts natural scenes apart from the intrusions of humanity. Clare reveals the lines drawn between man and nature, shows their frailty and the impossibility of maintaining an ideal separation between the two worlds. Ultimately, the “Pastoral Poet” reminds us that the best way to interact graciously with the natural world is to leave as little of an imprint upon its surface as we can.
Explorations | Art and Humanities

Works Cited


Creative Work: Belleza Hueca

**Artist:** Daniela Jimenez  
**Faculty Mentor:** Brandon Sanderson  
**Affiliation:** University of North Carolina at Pembroke  
**Dimensions:** 9 x 11”  
**Medium:** Lithography

**Artist Statement:** *Belleza Hueca* is part of a series that explores the varieties of human behavior. The focus of this particular piece is pulchritude, or beauty. That is, to explore the importance of beauty in contemporary society. We emphasize physical appearance over intelligence. The mark making and composition of this work investigate and portray beauty, but the fish depicts a personality devoid of intellectual capacity. The still life tradition is used as a tool to convey the work’s meaning.
Beleza Hueca, Daniela Jimenez 2013
Science,
Mathematics,
and Technology
Comparison of Mammalian LAT1 and Bacterial BrnQ Transport Proteins Suggests Potential for Orally-Active Drug Uptake by Intestinal Bacteria

Anna-Kay Edwards
Livingstone College
Faculty Mentor: Rufus M. Williamson
Livingstone College

Abstract
Transport proteins mediate the permeability of biological membranes for a variety of substrates. Individual classes of transport proteins are capable of discriminatingly recognizing specific substrates from a vast excess of structurally diverse molecules. Prokaryotic and eukaryotic cells generally share a broad range of transport capabilities. It is known that eukaryotic cells have transport proteins with the capacity to mediate drug transport. With the exception of antibiotics, it is not known whether prokaryotic cells share the capacity to mediate drug transport. A comparative study between transport proteins LAT1 from rabbit and BrnQ from the intestinal bacterium Escherichia coli was conducted. Both proteins facilitate the transport of amino acids such as leucine, isoleucine, and valine, and LAT1 is known to mediate the transport of orally active drugs. Results of amino acid sequence analyses revealed that LAT1 displays a 42.1% amino acid sequence similarity to the BrnQ protein. Reliability estimates indicated that the likelihood that the two proteins belong to the same family of the proteins was approximately 99.6%. Secondary structural and topological modeling studies suggest that LAT1 and BrnQ have similar structural characteristics. Thus, the results suggest that the two proteins are analogous; i.e., the two proteins share homologous functions but have heterologous evolutionary origins. The observations supported the hypothesis that intestinal bacteria may have the capacity to transport and accumulate orally active medications.
The permeability of biological membranes is mediated by transport proteins. Transport proteins are integral membrane proteins which are embedded in the membrane. Membrane transport proteins play essential roles in cellular metabolism and activities. They function in the acquisition of nutrients such as simple sugars, amino acids, and metals, as well as, maintenance of ion homeostasis (1). A large family of proteins has been identified which mediate the permeability of biological membranes for a diverse variety of substrates (2, 3). Individual classes of transport proteins are capable of discriminately recognizing and binding specific substrate molecules from a vast excess of structurally diverse molecules.

Many eukaryotic and prokaryotic genomes encode proteins whose function is to facilitate the transport of common substrates. For example, both eukaryotic and prokaryotic cells have the ability to permit selective passage of the same types of substrates (e.g., simple sugars, amino acids, and metals). Yet, despite similarities in the chemical structures of the substrates, the proteins are evolutionarily unrelated and may have arisen through independent evolutionary events (4).

Many drugs are administered via the oral route (i.e., through the mouth), and certain types of orally active drugs utilize membrane transport proteins to facilitate absorption across the lining of the intestine tract (5, 6). Antibiotics are a well-known class of drugs that are transported into bacterial cells by membrane transport proteins (7-9). However, whether other classes of orally active drugs utilize bacterial transport proteins for entry into bacterial cells is unknown. Also the effects of orally active medications on the growth and metabolism of bacteria have not been studied. Many bacteria such as *Escherichia coli* are common inhabitants of the microbial flora commonly found in the lower intestines (10), and a question is whether orally-active medications potentially serve as substrates for bacterial transporters in the intestinal tract.

The Large-neutral Amino Acid Transporter 1 (LAT1) in mammalian cells is a membrane transport protein which mediates transport of large-neutral amino acids (e.g., leucine, isoleucine, phenylalanine, tyrosine, arginine and tryptophan) (11). LAT1 also transports several amino-acid-related drugs, such as the anti-Parkinsonian drug L-dopa, the anticonvulsant medication gabapentin, as well as, thyroid hormones such as triiodothyronine (12-14). A functionally equivalent transporter exists in the bacteria. The BrnQ transporter mediates uptake of the branched-chain amino acids leucine, isoleucine, and valine. (15-17). However, it is not known whether BrnQ has the potential for transporting amino-acid-related drugs similar to that of LAT1. We considered the hypothesis that if mammalian and bacterial transporters share substrate specificity for naturally occurring substrates, then they might also share specificity for non-natural substrates such as orally-active medications. We reasoned that proteins which transport common molecules might also share similarities in manner in which the transport proteins recognized may recognize common molecules. Thus, we searched for similarities in protein sequences between mammalian and bacterial transporters which specificity for the same substrate molecules, using the intestinal bacterium *Escherichia coli* as a model organism.

**Methods**

*Amino Acid Sequence Analysis*

The source of data and computational tools used in the study are listed in Table 1. Amino acid sequences for LAT1 and BrnQ proteins were obtained from the Swiss-Prot database (18). Swiss-Prot is a comprehensive database that contains publicly available nucleotide and/or protein sequences, as well as, functional information. Amino acid sequences for the proteins were aligned using the Clustal W software (19). Identical amino acids were aligned, and gaps were introduced to improve similarity. Conserved amino acid substitutions, i.e., replacements of an amino acid residue with another one with similar properties, were considered. Also,
semi-conserved substitution amino acid, defined as replacement of an amino acid residue with another that has similar steric conformation, but does not share chemical properties were also considered. The one-letter code for amino acids is a useful way to display to represent amino acids. Amino acid replacement groups for conservative replacements in one-letter code are STA, NEQK, NHQK, NDEQ, QHRK, MILV, MILF, HY, and FYW. Semi-conservative amino acid replacements are CSA, ATV, SAG, STNK, STPA, SGND, SNGND, NDEQK, NDEQHK, NEQHRK, FVLIM, and HFY.

**Protein Secondary Structure and Topological Studies.**

Consensus secondary structure predictions, derived from several prediction algorithms, were performed using the Network Protein Sequence Analysis Tool (20). Secondary structural elements are indicated by solid color coils (α-helices), coils (random coils) and rods (extended strand) along the primary sequence, and where (---) indicate sequence interruptions. Topological models of protein structures were constructed using the TMPRED software to determine predictions of membrane-spanning regions and their orientation (21). The algorithm is based on the statistical analysis of naturally occurring transmembrane proteins. Results were used as input for the TOPO2 software which generates two dimensional topological representations of proteins (22).

**Results and Discussion**

LAT1 is an integral membrane protein that is 507 amino acids in length. The transporter is highly conserved in most mammalian species (23, 24). Conserved among bacteria, BrnQ is an integral membrane protein that is 439 amino acids in length (17). Sequence alignment studies revealed that LAT1 from rabbit was found displaying 42.1% overall similarity to BrnQ sequence from *E. coli* with 13.5% identical residues and where 28.6% constituted conservative or semiconservative sequence matches (Figure 1). To achieve optimal similarity between the proteins, 6 small gaps were introduced in the alignment. A reliability estimate, derived from a set of 58 classes of proteins among 1300 sequences, produced a probability of 99.6% for the likelihood that the two proteins belongs to the same family of the proteins (25).

Secondary structural predictions indicate the alpha helical characteristics of the BrnQ protein is 53.1% and is higher than that observed in LAT1 where alpha helical characteristics is 39.4% of the protein. The LAT1 transporter has a higher extended strand potential comprising 11.9% of the protein as compared to BrnQ with 6.8%. Both proteins have the same random coli potential. In LAT1, the random coli potential was 48.7% as compared to BrnQ with 40.1%. The overall distribution of structural characteristics was found to be similar through much of the two proteins. An analysis of the topology of the two protein suggest that LAT1 has 13 regions of the protein that are transmembrane domains, whereas, BrnQ has 12 predicted transmembrane domains. The predicted orientations of the two proteins differ at the carboxyl terminus where LAT1 is oriented on the outside face of the membrane, while in BrnQ the carboxyl terminus is oriented to the inside face of the membrane.

LAT1 and BrnQ proteins lack a high level of amino acid sequence similarity. However, the two proteins have similar secondary structural and topological features, and share the same substrate specificity. Such proteins are said to have analogous function. The implication is that analogous proteins followed evolutionary pathways from different origins to converge upon the same function. Thus, analogous proteins are considered a product of convergent evolution. Because LAT1 is involved in drug transport, it is postulated the BrnQ may also utilize orally-active medications as alternative substrates. This calls attention to the viewpoint that orally-active drugs may serve as alternative substrates for bacterial transporters. Absorption of orally-active drugs by bacterial cells might decrease absorption by mammalian hosts, thereby making drugs less effective to the hosts.
Alternatively, utilizing the property of bacterial transport proteins, such ingested drugs could alter the metabolism and growth of bacteria and may prove to be effective in inhibiting or killing intestinal bacteria. Future studies involving a survey of bacterial transporters with sharing substrate specificity with mammalian transport proteins could provide additional support for this view. Also, direct experimental observations of uptake of orally-active drugs by bacteria would provide additional support for the hypothesis.

**Acknowledgements**

The author would like to thank the referees for many helpful suggestions on revisions of this manuscript.

**TABLE 1**

<table>
<thead>
<tr>
<th>Tools</th>
<th>Description</th>
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<tr>
<td>Swiss-Prot Database</td>
<td>A central repository of protein data</td>
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<td>Clustal W</td>
<td>Nucleotide and protein sequence alignment program</td>
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<td>Network Protein Sequence Analysis Tool</td>
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<td>TMPRED</td>
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<td>TOPO2</td>
<td>A software for creating transmembrane protein 2 dimensional topology images</td>
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**Figure 1:** Predicted membrane topology of LAT1 and BrnQ proteins. Open circles: membrane protein structures were determined using the TOPO2, transmembrane protein display software (22).
References


Observing and Analyzing Coastal Hellenistic Fortifications with Remote Sensing and GIS

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Abstract

Fortifications were a dominant feature in the landscape of the ancient world. During the Hellenistic Period in Greece (323-31 BC), fortifications reached a widespread and diverse usage. Fortifications are not just defensive walls encircling a city, however. Fortifications carry cultural, social, and political significance that is displayed in their placement, form, and function within a landscape. During a two week field survey, I visited several fortifications along the coastline of the Aegean Sea. These coastal fortifications, bearing many similarities evident in the field, unveiled a host of contrasting elements when observed with the modern technologies of Remote Sensing and Geographic Information Sciences. By observing satellite imagery of Greece with Google Earth, the sites were examined within their surrounding landscape, telling us far more about a location than walls and towers can alone. With this understanding, previously established notions concerning these locations can be challenged, impacting the historical comprehension of these sites.

Remote sensing and Geographic Information Science (GIS) have rapidly become crucial resources in the modern archaeologist’s toolkit. As archaeologists began to look for newer and more technologically sophisticated ways to study and present their data, remote sensing and GIS moved to the forefront of the study of geologic and geographic formations. As leading Egyptologist Sarah Parcak says in her 2009 book *Satellite Remote Sensing for Archaeology*, “Remote sensing is, at its core, how radiation reflected off the Earth’s surface is captured and interpreted, while GIS is about evaluation, analyzing, comparing, and contrasting layers of imported data” (1999, 106). With these technologies, archaeology has transcended the philosophic aspects of the discipline to test concrete assumptions based on calculated, observable fact.

The current project was initiated to explore fortifications from the Hellenistic Age (323 BC-31 BC). These fortifications were studied with first-hand survey and the freely accessible GIS tool, Google Earth. Google Earth, as well as other GIS tools, has a wide variety of applications that, when combined with the reality of first-hand survey, can provide
a thorough analysis of the geographic conditions in which any given fortification was constructed. According to Parcak, “without detailed ground surveys, information collected from remotely sensed satellite images loses much of its potential meaning” (1999, 173). Through this research, I found that remote sensing is useful to not only identify a fortification but also to classify the fortification by correlating photography from field survey with images from Google Earth to observe cognitive patterns within the structure and landscape of the fortification.

**Research Objectives**

The central focus of this project concerned classification of fortifications, a subject that requires remote sensing to attain a truly thorough study. However, it was also procedural in nature— an examination of the free technology that allows a viewer to see the world from his or her laptop, tablet, or smart phone. A fortification is defined as any type of wall designed to protect a society from the intrusion of an armed aggression that “would have represented a commitment of communal resources on a greater scale than many more glamorous temples” by comparison (McNicoll 1997, vi). The protective characteristics of fortifications do not mean that they must be built or occupied by a military force or that their function cannot be multi-purpose or carry a sense of prestige. Fortifications were extremely expensive in terms of resources, suggesting that a town with a wall is a town with something to protect. However, when the forts were actually in use, that is, when their inhabitants were attacking or being attacked, the structures’ purposes were entirely militaristic.

During the Hellenistic Era there was a great deal of warfare, as the might of Classical Athens and Sparta, the greatest powers in the Mediterranean at the time, decreased while the power and territory of Macedonia and Rome increased to fill the power vacuum. In fact, with the invention of the siege tower, a machine used to tear down or climb over a wall, warfare changed dramatically, depending not only on the fortification wall, but also on the accessibility of that wall. This transformation began to also affect the idea of a community’s landscape. Societies choose different ways to

…create the places wherein they can situate themselves and also the frames through which they can view the rest of the world. People therefore live between a number of landscapes, which include the personal, family, daily, economic, ceremonial, and the exceptional. The boundaries which frame these landscapes are not rigidly fixed but are under constant renegotiation as one landscape is encountered through the inhabitation of another (Vavouranakis 2002, 233).

Therefore, the landscape took precedence to the wall, and by extension, the town itself. This is why remote sensing and Google Earth are so useful. At the outset of this project, the goal was to use image interpretation, a technique in which the landscape is examined to find man-made structures embedded archaeologically, to search for fortifications in Greece. Methods of interpretation include, but are not limited to, size, shape, shadow, color, texture, association, and pattern. As the study of the six separate fortifications began (Figure 1), it was clear that these fortifications had certain traits that were similar according to this method of interpretation, especially concerning the patterns related to both the selection of fortifications as well as construction of the actual walls.

**Parameters**

All six fortifications chosen were located near Greece’s coastline, usually on a peninsula that jutted out into the sea, creating an ideal harbor. This was the first in a list of parameters that soon developed based on observations of spatial settlement patterns. From Google Earth alone, Parcak explains, users can do the following:

…turn on or off geographic content, roads, borders, labels, extensive global
photo-gallery, terrain, and 3D buildings. Users have the ability to mark particular places of interest and polygons can be drawn over features, with varying colors, shapes, and lines. Users also may choose to have polygons appear at a certain altitude, or specific exact latitude and longitude (1999, 46).

In the current study, it was also possible to gather data on whether or not the forts had any naturally defensive topographic characteristics. For example, if one of the three sides of the peninsula consisted of a steep, rocky slope, then this feature could have been taken into account by those who constructed the fortification.

These datasets were combined with primary resources consisting of excavation reports at the various fortifications as well as historical documentation (such as Pausanias) to attempt to classify fortifications based on purpose. Purpose-driven research extended beyond the realm of simply locating fortifications. By studying the function of the sites based on pattern, there seemed to be four clear classifications of coastal fortifications. These classifications were all based on function: trade centers, lookouts or observation posts, demes, and military installations. The purpose of this classification was to gain an understanding of not just the fortifications but the people that built and occupied those fortifications and what their lives most likely consisted of on a daily basis. These classifications detailed a wide scope of coastal activity concerning constructions of this magnitude.

Advantages of Google Earth

There are a great number of benefits to using a resource such as Google Earth for an undergraduate project. First, it can be accessed from any internet connection and, most recently, made the jump to the iPhone and Android operating systems. This means that students no longer have to rely on black and white aerial photographs to see larger landscape views of archaeological sites discussed in class: Lecturers now use images from Google Earth in most archaeological lectures, bringing landscapes and past people to life (Parcak 2009, 45).

The fact that this kind of technology can now be held in the palm of one’s hand gives it a portability that is crucial to efficient field archaeology. With its increasingly improving image quality, Google Earth has developed into a full-fledged research tool. The images are projected through the WGS84 coordinate system which is a very accurate model for the earth’s shape and contours. WGS84 can be used to observe and analyze any chosen

![Figure 1: The six sites observed and analyzed in this project.](image-url)
landscape in the world. Most importantly to the undergraduate student with limited funding opportunities, the high-quality Google Earth images are free to the public.

In some instances, imagery provided by the United States Geological Survey for free to the casual researcher has a number of disadvantages. First, if the researcher wanted to actually perform any further analysis of the imagery with such technology as ArcGIS, he or she must purchase expensive imagery with higher resolution than the free imagery provided through the USGS. Google allows researchers to view the landscape but not to download it. Thus, one would need access to a more cost-effective analysis than the costly USGS imagery. Secondly, the images available through USGS may not be focused on the areas that have been selected for the study. If an object falls outside of the focal point of an instrument, the only solution is to write a grant proposal asking for a satellite or an airplane to fly the region specifically for the purpose of research. This is very costly and could require renting extremely sensitive equipment and obtaining flight or satellite permissions. Additionally, these images will belong exclusively to the country in which they were taken. Another way to attain this holistic view of the landscape, the fine-tuned spatial details that are necessary for studying an archaeological site in its surrounding landscape which may only be a few miles wide, is by acquiring them from the government or military of the country in which the research is conducted. While this is less expensive, actually getting this imagery can be extremely laborious, requiring an individual to be working in the country of study and working for the government that has the images a researcher needs. At the undergraduate level, it is particularly complicated to approach the inner echelons of this kind of research. This is why Google Earth is the primary choice for this research.

In addition, fortifications are frequently overgrown, and their once extravagant upper walls have been removed over time to build other structures. These locations were significant in their day, but their current location and state of preservation make them difficult to find. Pinpoint accuracy and high resolution imagery are needed to study a fortification wall that may not stand out in lower resolution images. High resolution images, belonging to Google, are capable of changing the way an undergraduate archaeologist, as well as a professional archaeologist doing preliminary research, can understand an archaeological site. Google Earth and its high resolution satellite imagery may come to define the world of archaeology in the not-so-distant future, making it far more accessible not only to the professionals but also to the public who may want to learn about the archaeology but find themselves unable to meet the financial commitments of traveling around the world to see them.

Although satellite imagery and Google Earth are wonderful tools for observing archaeological sites, they do not provide any method of analysis or comparison. They merely show the world as it was the day that the satellite image was taken. If one desires to move beyond observation into analysis, one needs to manipulate the images to show certain discrete features extant in the landscape that the Google Earth image captures but does not display. A perfect example of this discrete data would be elevation. Google Earth indicates the elevation of any location on the globe, but it cannot show the steepness of a slope or what lies within the visibility of a certain location. This is where technology such as ArcGIS is critical. This technology can take satellite imagery and relate it to the user, and, by extension to the viewer in a way that human beings understand best: three dimensional perspectives. Through a three dimensional display of the landscape, a viewer can more clearly interpret the image, and, by extension, the place of interest, based on site association and pattern. However, as mentioned earlier, the imagery is still expensive and difficult to attain to most researchers. Much of Greece has been documented with high resolution cameras, but it is still classified by the government and costly to obtain.
Thus, for most practical purposes, especially on the undergraduate level, Google Earth images provide enough embedded information to comprehend the basic situation of nearly any site in the world.

Source Material for the Current Study

Using remote sensing to find the location of fortifications was inspired by a book called Mapping Different Geographies. For example in the text, there is a discussion on the interpretation of coin finds through GIS. Markus Breier performed an analysis to predict where coin finds could be located within a landscape. In an attempt to answer questions such as “Where might other coins be found?” and “How did the coins get from their place of minting to their place of finding?” (Breier 172), Breier performed a least cost analysis using ArcGIS software. The analysis located the easiest path between any and all known coin finds in a specific area, taking into account continuous data such as slope and elevation.

When comparing Breier’s research to the research goals of this project, it became clear that one could use these same methods to answer questions such as “Where might other fortifications be found?” and “How does the construction of this fortification give us insights into the lives of the people who built it?” The point of these questions was to find out more about the individual lives and communities that occupied the landscape of these fortifications. No two societies existing during the Hellenistic Period were identical, and their individualities provided for a multitude of predispositions concerning the people who lived and worked there. One of the largest livelihoods during ancient times was mercantilism, and it is actually a defining trait of class-based society. Therefore, trade centers and outposts and their fortifications were quite common in such societies. Two such fortifications were investigated in this research, and both are displayed in Figures 2 and 3.

Typologies

Trade Centers

These particular fortifications have distinct features that allow them to be considered trade centers. Most likely, they were fortified out of fear of piracy or some other sudden circumstance that could compromise trade. For example, Trypetos and Mochlos are both located on the island of Crete. Though both of these trade centers have small harbors compared to some of the large bays of mainland Greece, they are some of the best natural harbors on Crete and were utilized for thousands of years stretching back before the Hellenistic Era. For centuries, these locations were known as primary stops on the circum-Mediterranean trade route. In fact, during the Minoan period (3000-1430 BC), the ancestors of the Hellenistic inhabitants of Crete built a trade system that was so efficient it bordered on the verge of a thalassocracy, that is, ruling by the domination of the sea and all activities within it (Mountjoy 2000, 184). The trade system developed because of a general lack of metal ores on Crete that caused inhabitants to go abroad to find these precious goods. From the Minoan period up to the Hellenistic era, the Cretans continued to trade for metals and pottery abroad, occasionally bringing them into contact with pirates. Through the years, the island of Crete had become more accessible to other Mediterranean societies, which drove the Cretans to build fortifications. However, these fortifications may not have been built for a constant military occupation. Rather, they were designed as a way to delay attackers in those few short moments before pirates ravaged the towns for metals and other valuables. During the Hellenistic Period, Crete was also in decline with the provinces of Trypetos and Mochlos first falling under Ierapetra, a southern city on Crete, then under the control of Cleopatra of Egypt. Both Ierapetra and Egypt seemed content in building fortifications for their trade centers in order to help Trypetos and Mochlos to protect the goods that actually belonged not to the two centers but to their overlords. At both Mochlos and Trypetos, walls were built
Both Mochlos and Trypetos are located on peninsulas, and these peninsulas have the advantage of high ground. Mochlos, whose peninsula collapsed due to seismic activity, also has a significantly steep and rocky perimeter, with nearly all three sides of the trade center being impossible to scale with a military force. The one accessible side is the south side, where the port most likely was located, but one would still have a steep climb ahead to reach the summit. Most trade activity took place on the low slopes, and when invaders arrived the occupants could flee to the summit of the peninsula where Mochlos’ fortification was centralized. Due to the lack of tumbled stones, it is possible that the wall was actually made of sun-dried mud brick. Building walls of mud brick is an ancient technique and is much more cost effective than quarrying stone for walls. Mud brick also provides just as good a wall as stone, especially when it is in a relatively inaccessible location. At Mochlos the terrain was the true fortification. Between the wall and the towering mass of sheer rock that composed the peninsula, at that time most likely 3-5 meters higher than its current elevation (Soles 2009, 108-109), it is clear why Mochlos was not only one of the best harbors in Crete, but also one of the most secure locations through which trade goods were passed.

Trypetos shows many of the same features although it is relatively more accessible than Mochlos. At Trypetos, the landscape is much like Mochlos -- rocky and steep. It is also clear that Trypetos was very involved in trade due to the docking bay on the east of the peninsula. The houses of this town form a tight cluster that may have functioned similarly to a fortification wall with many of the spaces having common walls. Additionally, there was a true fortification wall that separated the peninsula from the mainland perpendicularly (Westgate 2007, 438). This wall, similar to the one at Mochlos, may have been made of mud brick. Interestingly, when comparing the surrounding landscapes of Mochlos and Trypetos, it is clear that Trypetos is far more accessible by land than Mochlos, which is located deep in a ravine whereas Trypetos is on the north side of a plain.

Both sites depended on their natural topography to defend them from attack from pirates and later from invading Roman forces. The fact that they are fortified by a simple wall that protected them does not take away from the significance of their locations (see Figures 4 and 5). It was likely that only a few assailants could reach the top at once, at which time, they could successfully defend their locations with little reinforcement.

This level of analysis can only be understood from a remote sensing apparatus due to the fact that one cannot see the full scope of this during a first-hand (on the ground) survey. Once consistent European data can be attained, an ArcGIS analysis can display more clearly the optimal locations that were chosen for these fortifications.

Observation Post

Though Google Earth is an incredibly useful tool, sometimes it can only provide a limited understanding of a fortification. This was the case for Vayia, a site that lies in southeast Corinth on the Saronic Gulf (Figure 6).

On the basis of Google Earth images and first-hand survey, the condition of the walls was poor, and anything that still existed was clearly conserved by the team that initially researched it. A feature here that does stand out clearly is a tower on the far side of the bay from the fortification wall. The harbor on which Vayia lies is an ideal location for concealment with a deep bay that allows the landscape to camouflage activity. Vayia was poorly fortified, possibly less than even the trade centers previously discussed. Its landscape did not lend itself particularly well to defense, and its tower, Lychnari, on the opposite side of the bay, was completely standalone. However, the tower did have multiple advantages. First, the tower was at a high elevation compared to its surroundings. According to the excavators, the “height could be 2–2.5 times [its] diameter. If this is even a rough indicator, the tower may have...
stood to over 15 m in height” (Caraher 2010, 402). Second, it was in a prime location to observe activities in the Saronic Gulf, a possible alternative passage for an enemy force to make an approach to Corinth (see Figure 7). By sea, a force could approach Corinth unaware, drop an army on shore, and attack Corinth on its weak side. Vayia was situated to be able to function as a lookout for such an activity. The installment has a fortification more for a barracks than for defense, and the tower was clearly the focus of the location. This understanding is once again dependent on aerial analysis. It is clear from the Google Earth imagery that Vayia was in a prime location for observation of a crucial channel in the Corinthian landscape. Although first-hand survey does not shed light on the choice of location for the site, a combination of slope analysis with viewshe analysis can, which again will take place once high quality data of Greece can be attained.

**Military Installations**

Lookouts are a type of military outpost with a very specific purpose. Usually, most military installations have a more general intent. A pair of true military forts will be classified, both in ideal defensive positions with more than enough impassible terrain and fortification walls to stop any siege for a time.
Military installations are usually thought to go hand in hand with fortifications. They are the ideal example of the power of ancient militaries. Two such fortifications were identified in this survey: Asine and Koroni (Figures 8 and 9 on next page).

“When the Spartans under King Nikander invaded the Argolid, the Asinaians invaded with them and helped them destroy the countryside. When the Spartan expedition went home, the Argives under King Eratos marched on Asine. For a time the Asinaians fought back from their fortress...the wall was taken...The Argives overthrew Asine to the foundations and annexed its territory” (Pausanias 2.36.5).

Asine was an ideal stronghold even though it was initially destroyed in the 8th century BC. Afterwards, it was left unfortified for nearly 500 years until it was refortified, possibly by resettled Macedonians (Shipley 2005, 321). Most likely the refortification and militarization of the site was done by Demetrios Poliorketes, a Macedonian general who knew not only how to attack a stronghold but also how to defend it (Penttinen 1996). He chose to refortify the same location as before, but, with 500 years of technological advancement, the walls were reconstructed stronger and became well-suited for the warfare of the day. Asine is the highest location on the coastline, is heavily fortified, and has large cisterns to catch rainwater in case of a siege. If under attack, its people could flee to the fort for protection. Once there, no army could break those walls, and, due to the high costs of siege warfare, they would be forced to turn back. This fort is full of rooms and lookouts which imply a constant occupation by at least some type of rudimentary force. This is where Koroni, a contemporary military installation, is the most different from Asine.

Koroni stands as evidence of a fortification that served only one purpose for one society. This location was built during the Chremonidean War against Macedonia when the Ptolemies of Egypt came to the aid of the Athenians and the Spartans. Coin finds in the fortification made it possible not only to date Koroni to the Hellenistic period, but also to identify it as Ptolemaic Egyptian by the designs on the coins (Vanderpool 1962, 59). It seems that the Ptolemaic army sailed into the area of Athens and took up camp waiting for orders. No further evidence was recorded historically of the involvement of a force at Koroni, but they definitely seem to have been there. They built a fine wall, although it was not neatly faced like the walls of Asine. Additionally, it had “no landward gate,” signifying that it was not particularly involved in trade or coming and going of any kind (Pausanias 1.1.1, note 3). Koroni had a wall of rough stone stacked neatly to form a long and winding wall (Figure 10). Asine, in contrast, had colossal architecture of massive faced stones adopted from the Mycenaean times as a base for the Hellenistic wall. With a cleanly faced Hellenistic wall of smaller stones built on the top of the Mycenaean wall, it can be inferred that the construction was done with time and effort, not thrown up quickly in the face of assault (compare Figure 10 to Figure 11).

Both of these locations, Asine and Koroni, were on topographically defensive terrain with all three sides by no means easy to scale. The difficulty of the terrain seems to clearly define them as military fortifications. Until now, remote sensing has not been used on these forts. Once high quality satellite imagery can be obtained, a contour map and a slope map can be generated to display both the height of these locations when compared to their surrounding landscapes and the steepness of the natural terrain used to defend them.

Deme

In all of these classifications, the fortification at Rhamnous was considerably troubling when applied to the rubric of pattern and function (Figure 12 and 13).

To begin with, it must be understood that although the classification used in the present analysis only outlines four types of fortifications in a coastal environment, it is logical that certain features that seem to only lie in one classification can be found in others. For
example, Mochlos has a tower not dissimilar from the one at Vayia, which is actually the defining feature of the lookout-style fortification. However, when research concerning the towers of northeast Crete was done, there seem to have been multiple towers that stretched along the east coast. It is possible that these towers were purposefully in sight of each other so that visible messages could be sent to each other concerning trade, invasion, or even the arrival of envoys of prestigious individuals. The tower is not a feature of a lookout in this instance; it is a feature of an advanced, experienced trade organization that knows how to properly situate itself within a landscape (Figure 14).

Yet, there are sites such as Rhamnous that have too many features of the other classes to be classified as a single type of structure. For example, the fort at Rhamnous is not at a very high elevation; this signifies an involvement in trade on a coastal level. In addition, its location near the Euboean Strait means that it can easily allow observation of the coming and goings of the area without the necessity of high ground (Figure 15). It does not lie on a peninsula which is usually a defining defensive advantage. It also does not have any particularly defensive terrain that protects it. However, there is one feature in particular that kept the residents of Rhamnous safe: its massive walls (Figure 16).

Much of Rhamnous’ impressive walls still stand around this location. The temple to Nemesis, the goddess of divine retribution, just outside the walls of the city, points towards Rhamnous being a permanent settlement in the style of an autonomous county or deme. Additional evidence of this site’s significance derives from the fact that after the Persian War, in return for Rhamnous’ participation in supplying grain to Marathon, the famous sculptor “Pheidias carved [a] block [of marble] to make a statue of Nemesis, with a crown on her head ornamented with deer and tiny Victories [the goddess of victory, Nike]” (Pausanias 1.33.3).

The complexity of this multi-purpose site

![Figure 4: Photograph of the fortification at Mochlos taken by Luke Kaiser August 3, 2012.](image)

![Figure 5: Section of the Trypetos fortification wall. Photograph taken by Luke Kaiser May 29, 2012.](image)
is hard to comprehend, even with the advantages of Google Earth. In this instance, first-hand survey is crucial to understanding its locational advantage, while many types of GIS analysis cannot truly provide much information. However, it is certain that Rhamnous was autonomous if not independent, due to the wide variety of activities taking place there. This is a fortification built for a deme, a county of Athens, which protected the people who lived there as they went about their everyday life. The wall created the border of the city, and with this border, it defined what may have fallen under the jurisdiction and responsibility of the city, for example, the Temple of Nemesis. During the Hellenistic Era, Rhamnous most likely had a garrison placed there permanently (Kent 1941, 347). Unfortunately, the garrison was not large enough for its proper defense. Because of the accessibility of Rhamnous and the disregard of defensive terrain and high elevation in respect to the surrounding landscape as compared to the other fortifications observed in this survey, Rhamnous was left relatively open to siege, even with its spectacular walls.

For instance, Philip V, a Macedonian king, went around Attica destroying many sacred places of the demes. Of interest to this survey was the damage at Rhamnous. It was caused by the armies of Philip V of Macedon during his raids in 200 B.C. Deliberate damage and destruction of sanctuaries by the troops of this king is documented by ancient sources. The Temple of Nemesis, lying above the fortress at Rhamnous and across the strait from Euboia where Philip was encamped, would have been a likely target for his marauding (Miles 1989, 236).

In accordance with this observation, it is clear that damage was done to this temple and that stones had to be replaced due to the destruction. Because of this damage, the effectiveness of not the walls of Rhamnous but the placement of its town within a broader landscape must be called into question.

Conclusions
Through the analysis of fortifications found in the Aegean, I have developed clear typologies of fortifications. With the current research model, I was able to strategically
use survey and photography to examine the architecture of a fortification and then strategically use Google Earth examine at the regional patterns of the fortification. After these two separate observations were made, the two forms of data generated a synthesis so intertwined that all sites in the study were more completely observed than they could be through any other model. Although some aspects of the four typology categories do overlap, and even though there are occasional anomalies that still exist, the classifications define distinct aspects and parameters needed to place any fortification in the Aegean into one of these groups. By creating this typology, analysis of Aegean fortifications now has a structured model by which their function can be ascertained. This allows modern archaeologists to look at the fortifications within their surrounding landscape to determine function without relying on historical documents alone. This is critical because the historical documents are subject to speculation from the author. By prioritizing theory and technology over historical documentation, archaeologists can analyze sites in more concrete terms based on material culture and architectural evidence which should be devoid of subjective opinion.

However, even though the datasets are recorded with highly sensitive equipment, it does not mean that it is impossible to misinterpret. Further, even though Google Earth seems simple to use, it does require significant education before academic interpretation can be performed on what is displayed by the projection. This is the chief caution when using such methods of analysis. Google Earth and other types of geological data are raw, and because they are raw, they must be interpreted with specific objectives in mind before they are able to be used to contribute to a research model.

Lastly, it should be noted that at its core, this model of research is capable of exceeding the scope of the current project. This model of research hangs on the frame of survey, photography, and remotely sensed imagery and their ability to draw both comparative and contrasting observations in an archaeological setting. The current project is limited in that it is procedural in nature. However, I do outline a theoretical model that can be applied to any type of survey-heavy research that focused on analyzing a site in terms of its holistic landscape. With this type of model established, more complex analysis of sites can be done with higher quality data that may exceed the financial support of an undergraduate study such as this. However, having the model of analysis and familiarity with the technology will allow me to more thoroughly investigate possible scope of GIS analysis, adding more variables and attempting to test more complex hypotheses in the future.
Figure 8: Satellite imagery of Asine. Polygon shows the path of the fortification wall as it runs around the peninsula.

Figure 9: Satellite image of Koroni provided by Google Earth. Polygon shows the path of the fortification wall.
Figure 10: The fortification wall of Koroni. Photograph taken by Luke Kaiser May 20, 2012.

Figure 11: Asine’s Hellenistic addition. Photograph taken by Luke Kaiser May 24, 2012.
Figure 12: Satellite imagery of Rhamnous provided by Google Earth. Polygon highlights the fortification walls.

Figure 13: Additional Satellite imagery of Rhamnous within the Gulf of Euboea. Imagery provided by Google Earth.

Figure 14: The view to the east from the tower at Mochlos. Photograph taken by Luke Kaiser August 3, 2012.
Figure 15: Photograph of Rhamnous. Provided by Wikimedia under the GNU Free Documentation License.

Figure 16: Photograph of a section of the fortification wall at Rhamnous. Provided by Wikimedia under the GNU Free Documentation License.

Bibliography


Abstract

In this article, we present the results of porting a desktop Python program (that is, a classroom example for entry level programming course) to the Android mobile platform by using Scripting Layer for Android (SL4A) and Python for Android (P4A). We show that the mobile platform can be used successfully to study interests in entry level programming courses while maintaining the choice of programming languages for simplicity. We also enhanced our ported program with Android specific features to further arouse students’ interest.

1. Introduction

There are two goals in the algorithm design process: to create a correctly behaving algorithm and to make it as effective as possible. With today’s abundant computing powers, the latter goal is usually not much of a concern; except in some very difficult problems, see [3][4] for example. The first goal, on the other hand, remains a concern. Programmers need to spend a large amount of time in coding and/or testing to create a correctly behaving algorithm. A good foundation in programming courses may provide good start on understanding algorithm design and it would be convenient for students to be able to practice wherever they are. In this study, we look at the possibility of using mobile devices as a platform to teach programming.

2. Background Information

2.1. Python

Programming languages have a large impact on software development. In theory, once an algorithm has been developed and verified to be correct, it should be straightforward to translate it into software using a language of the programmer’s choice. However, the choice of programming languages may be influenced by many factors: the client, the employer, the programmer, or even the targeted software platform. The client may dictate that the software is to be developed in a particular language: for example, the United States Department of Defense once required all software developed for them to use the Ada programming language [11]. The programmer may be more familiar with one...
language than another: for example, a large percentage of students at Fayetteville State University choose to use Python to code their senior projects because that is the language with which they are most familiar. And finally, not all languages are available for all platforms. This is usually the case for smartphone platforms that only support limited choices of programming languages due to hardware limitations.

Python is a language designed to be easy to learn and easy to use [10]. It is very suitable for use in teaching introductory programming courses because some of its syntax enforces good programming styles (e.g., the use of indentation has a meaning in Python programs compared to most other languages in which indentation is used merely for to enhance readability). Also, the non-compiling (that is, Python is mostly an interpreted language) approach makes it easy for students to see immediate results of their code, hence allowing positive feedback to the students’ learning experience. In fact, many institutions have converted their entry-level programming courses to use Python. Some institutions (such as Fayetteville State University) have been using Python for the entire entry level programming courses up to CS2 (Data Structures and Algorithms) [1]. There are also numerous textbooks designed for introducing Python as a first language in programming for these entry-level courses (for example, see [7] and [12]).

2.2. Android

Google, along with other handset manufacturers, formed the Open Handset Alliance (OHA) in 2007 [5]. The main goal of the alliance was to develop the next generation wireless platform. Unlike other platforms available at the time, the goal of OHA was the creation of an open platform that was freely available. In the following year, OHA introduced the Android platform and launched a beta program for developers. The first Android handset began shipping in late 2008. Today, the latest version of Android is version 4 [8].

Before Android, almost all mobile platforms available were proprietary and controlled by a single company (for example, iOS by Apple, Blackberry OS by Research-In-Motion, and Windows CE by Microsoft). Probably the only exception was the Java 2 Mobile Edition (J2ME), which was designed to target the mobile platform. Although many proprietary mobile platforms are actually J2ME-based (one example is the Blackberry OS), it has not achieved the popularity as planned. Developers for mobile devices were still required to work with proprietary systems. This made it very difficult to develop software to target multiple hardware platforms. The availability of Android platform broke this monopoly. Not only do phone manufacturers now have an additional choice in phone OS, this new choice is also open source – meaning that anyone interested can look into the design to see how it works and maybe even contribute to the development of the OS.

Android is based on a specialized Java virtual machine (the Dalvik Virtual Machine, or DVM), which is implemented on top of a Linux platform. Almost all Android applications are written in Java. However, the main difference between Android Java applications and desktop Java applications (and mobile applications for other wireless platforms) is that Android also utilizes XML to describe the layouts of the applications, therefore decoupling the user interfaces from the applications’ functionalities. One obvious advantage is that it is now easier to modify the layouts of the applications without affecting the code that controls the functionalities of the software.

2.3. Scripting Layer for Android

The Scripting Layer for Android (SL4A) was an experimentation environment developed by Google. The purpose of SL4A is to allow programmers to write programs using their scripting languages of choice. Release 3 of SL4A required the written programs (the scripts) to run within the environment.
Release 4 and later allows the developers to package the scripts in a way that looks like other native Android applications [5].

SL4A is a generic scripting platform for Android [6]. It supports several scripting languages, including BeanShell (an interpreted version of the Java language), JRuby, Linux shell, Lua, Perl, PHP, Python, and Rhino. Like the Android platform, SL4A, along with the interpreters it supports, is available as a free download from Google [8].

3. Methodology

In this article, we describe our project on porting and enhancing existing Python programs originally developed for the desktop environment to the Android platform using SL4A. One of the purposes of this project was to study the feasibility of building a set of curriculum material to introduce mobile programming using Python in entry level programming courses.

Each student in the class was assigned to work on one program; in this report we describe the findings from the project to move desktop Python programs to Android. Other students in the class did different projects; for example, other students investigated porting a desktop Blackjack game using SL4A.

We began with a desktop Python program – a text-based Mastermind game – from a textbook used in a software development course [7]. We first moved the program to SL4A and verified that it worked as described in the textbook. This is not a difficult step as the Python version in SL4A (Python for Android, or P4A) contains a virtually complete subset of the normal Python distribution [1]. We note that the program we were porting is a text-based program as the graphics library commonly used in desktop Python (e.g., Tkinter) is not available in P4A due to hardware differences.

Next we enhanced the program with two features that are only available on the mobile platforms. The first was to text-to-speech (TTS) technology to make the mobile devices “say” the text displayed on the screen; the other was adding dialog boxes.

3.1. Text-To-Speech (TTS)

TTS is a feature of the Android platform. This feature allows the application to “speak” the content of choice through automated human voice. This is basically a safety feature. One example of how this feature is utilized is to let the Android smart phone “speak” the content of incoming text messages. This frees the user from looking at the phone screen in order to know what the text messages are about.

SL4A exposes the TTS feature to scripts (of all languages supported) through a special Android object. In Python for Android (P4A), this object is available in the android package. Once created, we can use the “ttsSpeak” method of this Android object to say any contents of our choice [1]. The process is simple, we searched though our code to find all instance of the Python “print” statements, and added a corresponding “ttsSpeak” method call after every found “print” statement.

There was one difficulty in this procedure. Originally, our program printed out a list of color patterns using color initials (for example “RGBYW” to represent a color pattern of red-green-blue-yellow-white). The use of initials in text output is acceptable in the text-based output (and may be essential as it makes the output easier to comprehend), but becomes a problem as the TTS engine treats the string as a word. Because most color initials are consonants and cannot form a word, the TTS produces a very strange sound and usually cannot be understood. Even in the rare case that the initials actually form a word (e.g. “PIG” – stands for “purple-ivory-green”), TTS will not produce the right sound. In this example, it will say “pig” (as a word). What we want is to have TTS to spell out the initials as letters, so it should actually say “P-I-G” instead of “pig”.

To solve this problem, we put a space character between each letter of the pattern. In this way, TTS will treat each letter as a single word, and by default, it will spell out and “say” only that letter.

Using TTS in the scripts is a useful feature
as some of the users may be driving a car when they use the program. Of course, the users should not be playing games while driving, but the same technology can also be applied to other software developed under SL4A.

3.2. Dialog Boxes

While TTS is used to handle the output in the mobile environment, dialog boxes can be used to handle both the input and visual output. Even in the desktop environment, dialog boxes are often used to give user important information that the user needs to respond to before allowed to move forward, or to collect input from the user.

The advantage of using dialog boxes is twofold. First, it can reduce or eliminate keyboard input by providing buttons and/or combo boxes; these widgets will also make the program more user-friendly. Second, by reducing or completely eliminating keyboard input, it can reduce or eliminate user errors.

The advantage of using dialog boxes in mobile platforms is more obvious. Most phones have a small screen size (4- to 5-inch for phones, 6- to 10-inch for tablets) compared to the desktop environment (12- to 21-inch or larger). If we take into consideration that many phones do not come with a built-in keyboard and have to depend on a virtual keyboard, it is clear that the virtual keyboard, though it usually takes up half of the screen, will be too small for the fingers of many users. Thus, it would be inconvenient to have the users type input responses to the application through keyboard. Using dialog boxes can partially solve this problem, although it still cannot solve all the problems of requiring user input in multi-tasking situations.

There are several ways to use dialog boxes in SL4A, all through the same Android object described in the last subsection. In fact, the Android object is a gigantic object that exposes almost all Android features (called Android Facades [6]) to the supported scripting languages in SL4A.

The easiest way to use a dialog-like service is to use the “makeToast” API call. This will show an alert box briefly on screen, and the alert box will be dismissed after some predetermined delay. However, we did not use the “makeToast” API call in our program. We used three dialog-related API calls in our program. The “getInput” API call will create an input dialog to allow the user to enter his/her name. This will require the user to use the keyboard to type a response as there is no other way to obtain this information easily. The same method call, when used in conjunction with the “dialogSetItems”, can also be used to create a dialog box with choices.

The “dialogCreateAlert” API call creates an alert box to display information to the user. Unlike the “makeToast” method, the alert box will not be dismissed until the user clicks a button.

4. Testing

Testing was mainly accomplished using the Android simulator under the Windows environment. The Android simulator that comes with the Android Development Kit (ADK) is a fairly complete simulation of an Android phone and/or tablet. Because we do not use special features (such as GPS, networking, accelerometer, camera, or the phone functionality), we were able to test the software completely in the simulator until it was stable enough to be tested on real device (it is well known that, unlike a desktop or laptop computer, it is very difficult to restore a smart phone to the factory state once it has been corrupted).

Once the software was running consistently, we downloaded the software to a real Android phone (HTC rhyme, running Android 2.3 Gingerbread) and made sure it performed as expected on the real phone. We also made sure it did not interfere with other software and/or functionalities on the phone. In order for the game to be considered stable and performing as expected, the game had to be able to be played several times on the phone without the game or phone crashing. Figure 1 shows our testing procedure in the Android emulator.
5. Response to the Project and Future Work

This project and the resulting software have been presented and demonstrated in several intra-college symposia [9]. The presentations were well-received and generated discussion and suggestions. The initial project was finished within five weeks. With follow-up improvements, we were able to finish in one year. This shows that the procedure of porting Python game to the Android platform can be efficient and effective. Further, we did not see any suspected interference on the phone.

We believe most classroom examples can be similarly ported to the SL4A platform without many problems so that they can be used as successful teaching tools. Probably the only exceptions are those with graphics. SL4A does not support graphics at this time, and we do not know if Google has any plans to include graphical support in SL4A.

One way to enhance the project would be to develop a graphical API for P4A, and provide a bridge interface binding to commonly used classroom graphical packages to allow use the graphical API to use this graphics. One of the graphical packages used in an entry level classroom is Calico. Within Calico, many packages can be used to create various objects. For instance, during an entry level class, a project consisted of creating a class, using Python, that allowed one to input bank number and information would show in a box. But utilizing that graphical package provides more “creativity” with a project.

In this article, we have described our project of porting a desktop Python program (that is a classroom example for entry level programming course) to the Android mobile platform by using Scripting Layer for Android (SL4A) and Python for Android (P4A). The experience we obtained was positive and exciting. However, while most of the classroom examples (those that involve only text input and output) can easily be ported to the Android platform, others (especially those involve using graphics) still need work to make the porting experience seamless.

Tierra Montgomery
Figure 1: Steps involved in the testing process. Upper panel from left to right: SL4A showing a list of available scripts; MasterMind game begins with request for user to enter name and number of pegs in pattern. Middle panel from left to right: Program requests colors, number of rounds and set of color choices. Bottom panel from left to right: Result displayed after colors are entered, process repeats across rounds, and at end of game, player has choice to play another set or cancel the game.
References


On the Tzitzeica Curve Equation

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Abstract
The Tzitzeica curve equation is a nonlinear ordinary differential equation whose solutions are called Tzitzeica curves. The aim of this paper is to present the Tzitzeica curve equation along with new, particular families of Tzitzeica curves.

1. INTRODUCTION

Gheorghe Tzitzeica (1873-1939), one of the most prominent Romanian mathematicians, introduced in 1911 a new class of spatial curves with the property

\[ \frac{\tau}{d^2} = \alpha, \]

where \( \tau \) is the curve torsion, and \( d^2 \) is both the square of the distance from the origin to the osculating plane at an arbitrary point of the curve and a nonzero constant [13]. These curves are known today as Tzitzeica curves and represent early examples of centro-affine invariants: the image of a Tzitzeica curve through a centro-affine transformation is also a Tzitzeica curve. Although these curves have appeared sporadically through the mathematics literature, their defining differential equation has not been studied deeply. Moreover, there are known only a few curves that satisfy (1.1). For instance, in [4], Crășmăreanu found that there are elliptic and hyperbolic Tzitzeica curves that can be obtained from the solutions of specific forced harmonic oscillator equations. In [13], Tzitzeica studied the connection of these curves to a class of surfaces that he introduced in his works, known nowadays as Tzitzeica surfaces. While briefly reviewing Tzitzeica’s theory on curves and surfaces, Agnew et al. discussed the use of the MATHEMATICA software in the context of particular Tzitzeica curves [1].

The aim of this paper is to derive the Tzitzeica curve ordinary differential equation (ODE) - this equation has not been written about explicitly previously, nor has there been an effort to find new exact solutions. In particular, we consider the case when two of the curve’s defining functions have the specific forms given in (3.1). In (3.3) and (3.5), new Tzitzeica curves are presented. Several curves from these families, (3.4) and (3.6), are illustrated in Figures 2 and 3, respectively. It is also shown that, by using certain transformations (translations and equi-affine transformations) that leave the Tzitzeica curve equation invariant, we can obtain new solutions from the known solutions (see Figures 4 and 5). The software MAPLE was used for complex mathematical calculations and for the visualizations of the results.
In Section 2 of this manuscript, the Tzitzeica curve equation (2.4) is derived. In Section 3, new families of Tzitzeica curves are found (see Cases 1 and 2 in Section 3.1.). The invariance of the Tzitzeica curve equation with respect to translations and equi-affine transformations is presented in Sections 3.2 and 3.3. The last section is reserved for concluding remarks.

2. THE TZITZEICA CURVE EQUATION

Consider a regular smooth space curve given parametrically by
\[ r(t) = (x(t), y(t), z(t)), \]
where \( t \in I \) is the curve parameter and \( I \subset \mathbb{R} \) is an interval. The curve (2.1) is smooth if all the derivatives of \( r \) exist and are continuous and is regular if the tangent vector \( r' \) does not vanish on the interval \( I \).

2.1. The Frenet-Serret Frame. In the following, we present specific theoretical notions related to the theory of space curves that are needed to derive the Tzitzeica curve equation (more details can be found in [9] and [12]). Each point of the curve defines three unit vectors, \( T, N, \) and \( B \), that are perpendicular to each other and form a basis called the Frenet-Serret frame (see Figure 1). The unit tangent vector indicates the direction of the curve and is defined as
\[ T(t) = \frac{r'(t)}{\|r'(t)\|}, \quad t \in I, \]
where \( \|r'(t)\| \) is the magnitude of the tangent vector \( r' \). The vector \( T \) changes direction quickly when the curve bends or twists sharply and changes direction slowly when the curve is almost straight. The curvature of (2.1) is given by
\[ k(t) = \frac{\|r'(t)\|}{\|r''(t)\|}, \quad t \in I, \]
where \( T'(t) \) is the derivative of the unit tangent vector, and measures how quickly the curve changes direction at a particular point of the curve (see [12], p. 709, for the definition of \( k \) in terms of the arc length parametrization). Assume that the curvature \( k \) of the curve (2.1) does not vanish on the interval \( I \). In this case,
\[ N(t) = \frac{T'(t)}{\|T'(t)\|}, \quad t \in I, \]
is called the (principal) unit normal vector and \( B(t) = T(t) \times N(t) \) is named the unit binormal vector. The planes of the Frenet-Serret frame are: the normal plane, the osculating plane, and the tangent plane. The normal plane is determined by \( N \) and \( B \), the osculating plane is generated by \( T \) and \( N \), while the tangent plane is spanned by \( B \) and \( T \). At each of the point, the torsion of (2.1) is defined as
\[ \tau(t) = \frac{\langle r'(t), r''(t), r'''(t) \rangle}{\|r'(t) \times r''(t)\|^2}, \quad t \in I, \]
where \( r' \times r'' \) is the cross product of the tangent vector \( r' \) and the acceleration vector \( r'' \) and
\[ \langle r'(t), r''(t), r'''(t) \rangle = \langle r'(t) \times r''(t) \rangle \cdot r'''(t) = \begin{vmatrix} x'(t) & y'(t) & z'(t) \\ x''(t) & y''(t) & z''(t) \\ x'''(t) & y'''(t) & z'''(t) \end{vmatrix} \]
is the scalar triple product of the vectors \( r', r'' \) and \( r''' \) (see, for instance, [9], p. 48). The torsion of a curve measures the degree of twisting of the curve at a particular point. For instance, the
torsion of a plane curve is zero. Throughout this paper, we assume that the torsion $\tau$ of the curve (2.1) does not vanish on $I$.

2.2. The Tzitzeica curve equation. In what follows, we show that the condition (1.1) can be written in terms of the defining functions $x$, $y$, and $z$ of the curve (2.1). Since the osculating plane at an arbitrary point of the curve is generated by $T$ and $N$ (or, equivalently, by $r'$ and $r''$), its equation can be written as

$$\begin{vmatrix} x - x(t) & y - y(t) & z - z(t) \\ x'(t) & y'(t) & z'(t) \\ x''(t) & y''(t) & z''(t) \end{vmatrix} = 0.$$ 

On the other hand, the distance $d$ from the origin to the osculating plane can be calculated by using the point-plane distance formula ([12], p. 669). Thus, we have  

$$d^2 = \frac{1}{\|r'(t) \times r''(t)\|^2} \begin{vmatrix} x(t) & y(t) & z(t) \\ x'(t) & y'(t) & z'(t) \\ x''(t) & y''(t) & z''(t) \end{vmatrix}^2.$$ 

Replacing $\tau$ and $d^2$ in (1.1) gives  

$$\frac{1}{\|r'(t) \times r''(t)\|^2} \begin{vmatrix} x'(t) & y'(t) & z'(t) \\ x''(t) & y''(t) & z''(t) \\ x'''(t) & y'''(t) & z'''(t) \end{vmatrix} = \frac{\alpha}{\|r'(t) \times r''(t)\|^2} \begin{vmatrix} x(t) & y(t) & z(t) \\ x'(t) & y'(t) & z'(t) \\ x''(t) & y''(t) & z''(t) \end{vmatrix}^2,$$

which can be written as  

$$\begin{vmatrix} x'(t) & y'(t) & z'(t) \\ x''(t) & y''(t) & z''(t) \\ x'''(t) & y'''(t) & z'''(t) \end{vmatrix} = \alpha \begin{vmatrix} x(t) & y(t) & z(t) \\ x'(t) & y'(t) & z'(t) \\ x''(t) & y''(t) & z''(t) \end{vmatrix}^2.$$

The above condition is equivalent to the following nonlinear ODE  

$$z'''(x'y'' - x''y') - z''(x'y''' - x'''y') + z'(x''y'' - x'y'') = \alpha \{z''(x'y' - x' y) - z'(x'y'' - x''y') + z(x''y'' - x'y'')\}^2.$$ 

Thus, we have proven the following result:

**Proposition 2.1.** The functions $x$, $y$, and $z$ define a regular smooth Tzitzeica curve (2.1) if and only if they satisfy the following nonlinear ODE  

$$az''' - a'z'' + bz' = \alpha (cz'' - c'z' + az)^2,$$

where the functions $a$, $b$, and $c$ are given by  

$$a = x'y'' - x''y', \quad b = x''y''' - x'''y'', \quad c = xy' - x'y.$$

**Definition 2.2.** The nonlinear ODE (2.4) is called the Tzitzeica curve equation.

**Remark.** The Tzitzeica curve equation (2.4) is a nonlinear ODE in the unknown functions $x$, $y$, and $z$. The same equation can also be viewed as a nonlinear equation in the unknown function $z$, where $x$ and $y$ are arbitrary functions.
3. Tzigzeica Curves

3.1. New Tzigzeica curves. In this section, we discuss the case when the defining functions \( x \) and \( y \) of the curve (2.1) are given by

\[
x(t) = t^m \quad \text{and} \quad y(t) = t^n,
\]

where \( m, n \in \mathbb{R} \setminus \{0,1\} \) and \( m \neq n \) (these restrictions on \( m \) and \( n \) are related to the assumption that (2.1) is a space curve whose curvature and torsion do not vanish on \( t \)). Substituting (3.1) into (2.4) yields the ODE

\[
t^2z''' - (m + n - 3)tz'' + (m - 1)(n - 1)z' = \frac{\alpha(n - m)}{mn} t^{m+n-1}[t^2z'' - (m + n - 1)tz' + mnz]^2.
\]

Next, we will consider the cases \( n = -2m \) and \( n = -m/2 \) in which the solutions of (3.2) can be written in terms of the elementary functions.

**Case 1.** If \( n = -2m \), then (3.2) implies \( y(t) = t^{-2m} \), where \( m \in \mathbb{R} \setminus \{0,1\} \). After replacing \( n = -2m \) into (3.2), the following nonlinear third-order ODE is obtained

\[
2t^2z''' + 2(m + 3)tz'' - 2(2m + 1)(m - 1)z' = \frac{3\alpha}{m} t^{-m-1}[t^2z'' + (m + 1)tz' - 2n^2z]^2.
\]

The above equation can be solved explicitly in terms of elementary functions. Its solution leads to the following new family of Tzigzeica curves

\[
x(t) = t^m
\]

\[
y(t) = t^{-2m}
\]

\[
z(t) = \frac{k_2}{m} t^{-2m} + 18\alpha k_1 t^{-m} - k_1 + k_3 t^m + \frac{2m}{9\alpha} t^m \ln t
\]

\[- \frac{2}{9\alpha} t^m \ln(t^m + 9\alpha k_1) - 16\alpha^2 k_1^3 t^{-2m} \ln(t^m + 9\alpha k_1),
\]

where \( t > 0, t^m + 9\alpha k_1 > 0 \), and \( k_1, k_2 \) and \( k_3 \) are real numbers. In particular, by replacing \( m = 2, \alpha = 1, k_1 = k_2 = k_3 = 1 \) in (3.3), we find the Tzigzeica curve

\[
x(t) = t^2
\]

\[
y(t) = t^{-4}
\]

\[
z(t) = \frac{1}{2t^2} + \frac{10}{t^2} - 1 + t^2 + \frac{4}{9} t^2 \ln t - \frac{2}{9} t^2 \ln(t^2 + 9) - \frac{162}{t^4} \ln(t^2 + 9),
\]

that is defined for \( t > 0 \) (see Figure 2).

**Case 2.** If \( n = -m/2 \), from (3.1) we get \( y(t) = t^{-m/2} \), where \( m \in \mathbb{R} \setminus \{0,1\} \). Substituting \( n = -m/2 \) into (3.2) gives
\[ 2t^2z''' - (m - 6)tz''' - (m + 2)(m - 1)z' = \frac{3\alpha}{2m} t^{-m-2} [2t^2z''' - (m - 2)tz' - m^2z]^2, \]

which is a nonlinear third-order ODE whose solutions can be expressed in terms of the elementary functions. Therefore, the following represents a new class of Tzitzica curves

\[ x(t) = t^m \]

\[ y(t) = t^{-m/2} \]

\[ z(t) = \left( k_3 - \frac{2\ln 6}{9\alpha} \right) t^{-m/2} - \frac{2k_1}{3} - \frac{t}{\alpha} k_1^2 t^m + \frac{2k_2}{3m} t^m \]

\[ + \frac{2}{9\alpha} t^{-m/2} \ln \left( \frac{6t^2 - \frac{1}{\alpha} k_1}{6t^2 - 1} \right) + 24m\alpha^2 k_1^3 t^m \ln t \]

\[ - 48\alpha^2 k_1^3 t^m \ln \left( \frac{6\alpha k_1 t^2}{6 - 1} \right), \]

where \( t > 0, 6\alpha k_1 t^{m/2} - 1 > 0 \) and \( \alpha k_1 > 0 \), with \( k_1, k_2, \) and \( k_3 \) real numbers. For instance, for \( m = 1, \alpha = 1, k_1 = 1, \) and \( k_2 = k_3 = 0 \), we obtain the Tzitzica curve

\[ x(t) = t \]

\[ y(t) = \frac{1}{\sqrt{t}} \]

\[ z(t) = -\frac{2}{3} - 8\sqrt{t} + 24t \ln t - 48t \ln(6\sqrt{t} - 1) \]

\[ - \frac{2\ln 6}{\sqrt{t}} + \frac{2}{9\sqrt{t}} \ln(6\sqrt{t} - 1), \]

that is defined for \( t > 1/36 \) (see Figure 3).

3.2. Deriving Tzitzica curves via symmetries. In this section, we discuss two particular transformations related to the Tzitzica curve equation (2.4) that will be used to construct new solutions: t-translations and equi-affine transformations. These two types of transformations leave the Tzitzica curve equation invariant. A group transformation with this property is called a symmetry group transformation related to the equation. The theory concerned with finding and exploring specific classes of transformations related to differential equations is known today as the symmetry analysis theory. This theory has been widely used in mathematical physics to find exact solutions to mathematical models described especially by nonlinear differential equations. According to the theory of symmetry analysis, a symmetry group transformation applied to a known solution yields a new solution of the same equation (for more details, see [2], [3], [5], [6], and [7]).

3.2.1. Translations. Consider the t-translation of the curve parameter defined by \( \bar{t} = t + \varepsilon \), where \( \varepsilon \in \mathbb{R} \). Assume

\[ \bar{x}(\bar{t}) = (\bar{x}(\bar{t}), \bar{y}(\bar{t}), \bar{z}(\bar{t})), \]
where $\tilde{x}(\tilde{t}), \tilde{y}(\tilde{t})$, and $\tilde{z}(\tilde{t})$ are the images of the functions of $x, y, z$, respectively, through the $t$-translation $\tilde{t} = t + \varepsilon$, that is, $x(\tilde{t}) = \tilde{x}(\tilde{t} - \varepsilon) = \tilde{x}(\tilde{t}), y(\tilde{t}) = \tilde{y}(\tilde{t} - \varepsilon) = \tilde{y}(\tilde{t}),$ and $z(\tilde{t}) = \tilde{z}(\tilde{t} - \varepsilon) = \tilde{z}(\tilde{t})$. The chain rule implies
\[
\frac{d\tilde{x}}{dt} = \frac{dx}{dt} = \frac{dx}{d\tilde{t}} \frac{d\tilde{t}}{dt} = \frac{dx}{d\tilde{t}}, \quad \text{and} \quad \frac{d\tilde{z}}{dt} = \frac{dz}{dt} = \frac{dz}{d\tilde{t}} \frac{d\tilde{t}}{dt} = \frac{dz}{d\tilde{t}}.
\]
Since $dt/d\tilde{t} = 1$, the second and third order derivatives of $\tilde{x}, \tilde{y},$ and $\tilde{z}$ are unchanged under $t$-translations. Indeed, we have
\[
\frac{d^2\tilde{x}}{dt^2} = \frac{dx}{d\tilde{t}} \frac{d^2\tilde{t}}{dt^2} = \frac{dx}{d\tilde{t}}, \quad \text{and} \quad \frac{d^3\tilde{z}}{dt^3} = \frac{dz}{d\tilde{t}} \frac{d^3\tilde{t}}{dt^3} = \frac{dz}{d\tilde{t}},
\]
where $i \in \{2, 3\}$. Replacing the above derivatives into (2.4) gives
\[
\tilde{z}''(\tilde{x}'\tilde{y}'' - \tilde{x}''\tilde{y'}) - \tilde{y}''(\tilde{x}'\tilde{y}'' - \tilde{x}'\tilde{y}'') + \tilde{y}'(\tilde{x}'\tilde{y}'' - \tilde{x}'\tilde{y}'') = \alpha [\tilde{z}''(\tilde{x}'\tilde{y}'' - \tilde{x}''\tilde{y'}) - \tilde{y}''(\tilde{x}'\tilde{y}'' - \tilde{x}'\tilde{y}'') + \tilde{y}'(\tilde{x}'\tilde{y}'' - \tilde{x}'\tilde{y}'')]^2
\]
Here the prime ' denotes the derivatives with respect to the new variable $\tilde{t}$ (i.e., $\tilde{z}' = d\tilde{z}/d\tilde{t}$, etc.). Note the above ODE and the equation (2.4) have the same differential structure, inclusive the same constant $\alpha$.

**Proposition 3.1.** The Tzitzica curve equation (2.4) is invariant under $t$-translations.

**Remark.** The above result can be used to construct new solutions of the equation from the known ones. For instance, from the Tzitzica curve (3.3) obtained in Case 1, we can construct the following family of Tzitzica curves
\[
x(\tilde{t}) = (\tilde{t} - \varepsilon)^m
\]
(3.8) $y(\tilde{t}) = (\tilde{t} - \varepsilon)^{-2m}$
\[
z(\tilde{t}) = \frac{k_2}{m} (\tilde{t} - \varepsilon)^{-2m} + 18ak_1^2(\tilde{t} - \varepsilon)^{-m} - k_1 + k_3(\tilde{t} - \varepsilon)^m + \frac{2m}{9}\alpha(\tilde{t} - \varepsilon)^m \ln(\tilde{t} - \varepsilon)
\]
\[-\frac{2}{9\alpha}(\tilde{t} - \varepsilon)^m \ln[(\tilde{t} - \varepsilon)^m + 9ak_1] - 162a^2k_1^3 \tilde{t}^{-2m} \ln[(\tilde{t} - \varepsilon)^m + 9ak_1],
\]
where $\tilde{t} > \varepsilon$, $(\tilde{t} - \varepsilon)^m + 9ak_1 > 0$, and $k_1, k_2$ and $k_3$ are real numbers. Similarly, from the Tzitzica curve (3.5) obtained in Case 2, we can find the Tzitzica curves
\[
x(\tilde{t}) = (\tilde{t} - \varepsilon)^m
\]
(3.9) $y(\tilde{t}) = (\tilde{t} - \varepsilon)^{-m/2}$
\[
z(\tilde{t}) = \left(\frac{k_3 - 2\ln_{9\alpha}(\tilde{t} - \varepsilon)^{-m/2} - \frac{2k_1}{3}}{3} - 8ak_1^2(\tilde{t} - \varepsilon)^m + \frac{2k_1}{3m} (\tilde{t} - \varepsilon)^m
\]
\[+ \frac{2}{9\alpha}(\tilde{t} - \varepsilon)^m \ln\left[6(\tilde{t} - \varepsilon)^m - \frac{1}{ak_1}\right] + 24\alpha^2k_1^3 (\tilde{t} - \varepsilon)^m \ln(\tilde{t} - \varepsilon)
\]
\[-48\alpha^2k_1^3 (\tilde{t} - \varepsilon)^m \ln\left[6ak_1(\tilde{t} - \varepsilon)^m + 1\right],
\]
where $\tilde{t} > \varepsilon$, $6ak_1(\tilde{t} - \varepsilon)^m - 1 > 0$ and $ak_1 > 0$, with $k_1, k_2$, and $k_3$ real numbers.

In fact, the application of a $t$-translation to a curve implies the change of the curve parameter from $t$ to $\tilde{t} = t - \varepsilon$. According to the theory of curves (see [12], pp. 708–709), the
transformed curve (with the curve parameter $\tilde{t}$) is a reparametrization of the original curve. Consequently, the new Tzitzeica curves (3.8) and (3.9) are reparametrizations of the original curves (3.3) and, respectively, (3.5). For example, the transformed curve corresponding to (3.3) through the $t$-translation for $\varepsilon = 1$ is represented in Figure 4.

3.2.2. Equi-affine transformations. By definition, a (general) affine transformation is a combination of a linear transformation and a translation. In the $xyz$-space, an affine transformation is given by

$$
\begin{bmatrix}
\tilde{x} \\
\tilde{y} \\
\tilde{z}
\end{bmatrix} = \begin{bmatrix}
 a_{11} & a_{12} & a_{13} \\
 a_{21} & a_{22} & a_{23} \\
 a_{31} & a_{32} & a_{33}
\end{bmatrix} \begin{bmatrix}
x \\
y \\
z
\end{bmatrix} + \begin{bmatrix}
b_1 \\
b_2 \\
b_3
\end{bmatrix},
$$

(3.10)

where $A = [a_{ij}]_{1 \leq i,j \leq 3}$ is an invertible real matrix, and $B = [b_i]_{1 \leq i \leq 3}$ is a column matrix with real entries. A centro-affine transformation is an affine transformation (3.10) for which $B = 0$. In the case when $B = 0$ and $A$ is a unit-determinant matrix (i.e. $\det(A) = 1$), the transformation (3.10) is called equi-affine (see, for example, [1] or [8], p. 53).

Consider a Tzitzeica curve (2.1) and the following equi-affine transformation on the space of its defining functions

$$
\begin{bmatrix}
\tilde{x}(t) \\
\tilde{y}(t) \\
\tilde{z}(t)
\end{bmatrix} = \begin{bmatrix}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23} \\
a_{31} & a_{32} & a_{33}
\end{bmatrix} \begin{bmatrix}
x(t) \\
y(t) \\
z(t)
\end{bmatrix},
$$

(3.11)

where $A$ is a unit-determinant matrix. The first three derivatives of $\tilde{x}(t), \tilde{y}(t),$ and $\tilde{z}(t)$ are obtained from (3.11) as follows

$$
\begin{align*}
\frac{d^i \tilde{x}}{dt^i} &= a_{11} \frac{d^i x}{dt^i} + a_{12} \frac{d^i y}{dt^i} + a_{13} \frac{d^i z}{dt^i}, \\
\frac{d^i \tilde{y}}{dt^i} &= a_{21} \frac{d^i x}{dt^i} + a_{22} \frac{d^i y}{dt^i} + a_{23} \frac{d^i z}{dt^i}, \\
\frac{d^i \tilde{z}}{dt^i} &= a_{31} \frac{d^i x}{dt^i} + a_{32} \frac{d^i y}{dt^i} + a_{33} \frac{d^i z}{dt^i},
\end{align*}
$$

where $i \in \{1, 2, 3\}$. Solving the above relations with respect to $d^i x/dt^i, d^i y/dt^i,$ and $d^i z/dt^i$ and substituting them into (2.4) gives

$$
\begin{align*}
\tilde{z}''(\tilde{x}\tilde{y}' - \tilde{x}'\tilde{y}) - \tilde{z}''(\tilde{x}'\tilde{y}'' - \tilde{x}'\tilde{y}'') + \tilde{z}'(\tilde{x}\tilde{y}'' - \tilde{x}'\tilde{y}'') \\
= \alpha(\tilde{z}'(\tilde{x}\tilde{y}' - \tilde{x}'\tilde{y}) - \tilde{z}'(\tilde{x}'\tilde{y}'' - \tilde{x}'\tilde{y}''))^2,
\end{align*}
$$

where we denote by $'$ the derivatives with respect to the curve parameter $t$. Notice that the above ODE and (2.4) have the same differential structure. The curve’s constant $\alpha$ is also preserved and thus it follows.

**Proposition 3.2.** The Tzitzeica curve equation (2.4) is invariant under equi-affine transformations.

**Remark.** According to Proposition 3.2, if an equi-affine transformation (3.11) is applied to a Tzitzeica curve, then the transformed curve $\tilde{F}$ is also a Tzitzeica curve. This property can be used to construct new solutions from the known solutions; in particular, it can be applied to (3.3) and (3.5). Consequently, from (3.3), we can derive the new Tzitzeica curves

$$
\begin{align*}
\tilde{x}(t) &= a_{11} t^n + a_{12} t^{-2m} + a_{13} t^2(t) \\
\tilde{y}(t) &= a_{21} t^n + a_{22} t^{-2m} + a_{23} t^2(t)
\end{align*}
$$

(3.12)
\[ \ddot{z}(t) = a_{31}t^m + a_{32}t^{-m} + a_{32}z(t), \]

where \( z \) is defined in (3.3) and \( A = [a_{ij}]_{15i,15j}^{15i,15j} \) is a unit-determinant matrix. Similarly, applying an equi-affine transformation to the Tzitzéica curve (3.5) gives

\[
\begin{align*}
\ddot{x}(t) &= a_{11}t^m + a_{12}t^{-m/2} + a_{13}z(t) \\
\ddot{y}(t) &= a_{21}t^m + a_{22}t^{-m/2} + a_{23}z(t) \\
\ddot{z}(t) &= a_{31}t^m + a_{32}t^{-m/2} + a_{32}z(t),
\end{align*}
\]

which also represents a Tzitzéica curve (here \( z \) is given by (3.5) and \( A = [a_{ij}]_{15i,15j}^{15i,15j} \) is a unit-determinant matrix). For instance, the transformed curve related to (3.3) through the matrix

\[
A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix}
\]

is represented in Figure 5.

**Remark.** In a similar way, it can be proven that the centro-affine transformations leave the differential structure of the Tzitzéica curve equation invariant but not the curve’s constant \( \alpha \) which is replaced by another constant, say \( \beta \), due to the fact that the matrix \( A \) is not a unit-determinant matrix for a centro-affine transformation. That is, if a centro-affine transformation is applied to a Tzitzéica curve that satisfies (1.1) for a particular value of \( \alpha \), then the transformed curve \( F \) is also a Tzitzéica curve that satisfies (1.1) but for another constant, say \( \beta \). Therefore, the Tzitzéica curves are centro-affine invariants, but the curves’ constants in (1.1) are not kept the same through these transformations.

### 4. Conclusions

In this paper, the Tzitzéica curve equation (2.4) has been studied in the case when (3.1) holds for \( n = -2m \) or \( n = -m/2 \). It has been shown that new, smooth curves given in closed-form may be obtained. From the new Tzitzéica curves (3.3) and (3.5), we have shown that other solutions may be obtained. The symbolic manipulation program MAPLE (see, for instance, [11]) has been used to handle complex calculations and to visualize the new Tzitzéica curves (see Figures 2, 3, 4, and 5). In the future, we are interested in finding relevant applications of the new classes of the Tzitzéica curves presented in this paper. Since the Tzitzéica surfaces have some intriguing applications, such as in soliton theory [10], it will be exciting to make the connection of our results to these applications and to the Tzitzéica surfaces as well. For the moment, we can definitely say that, similar to the case of other plane or space curves, the Tzitzéica curves have applications in terms of architecture, furniture design, and art. However, there are also intriguing applications of specific planar curves to cryptography, and, therefore, it would be interesting to explore the Tzitzéica curves from this point of view as well.

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References


Creative Work: All You’re Worth

**Artist:** Kayla Seedig  
**Faculty Mentor:** Brandon Sanderson  
**Affiliation:** University of North Carolina at Pembroke  
**Dimensions:** 16 x 20”  
**Medium:** Stone Lithography

**Artist Statement:** The objective of *All You’re Worth* is two fold. It addresses the determination of female worth while exploring the various aspects of the censorship of the female body. The expression “bearing fruit” is literally represented in the work as a dialogue on how a woman’s child-bearing capacity is directly related to her social purpose and value. The composition reflects my inability to escape these expectations.
All You’re Worth, Kayla Seedig 2013
Social Sciences
Abstract
Comic book characters are a pop culture phenomenon. Many characters have been in publication for more than half a century and now star in annual blockbuster films. Many of these characters have enduring popularity, but why? Marvel Comics and DC comics have told Captain America and Batman stories since 1940 and 1937, respectively. These two characters have only become more popular with the release of Batman’s Dark Knight Trilogy films and Captain America: The First Avenger and Marvel’s The Avengers. These characters were not always this mainstream, however. In the late 1990s and early 2000s, the comic book speculation market, wherein comic book were bought by collectors and resellers because of their perceived value, had just collapsed, leaving comic book publishers, vendors, and collectors looking to reformat their business practices. Yet Batman and Captain America stories were still published each month. How did these two characters maintain their fans and keep going into more fiscally-stable climates? People will always need heroes, and by acting like classical heroes, teaching and inspiring their readers to be something more than themselves, Batman and Captain America captured an audience, weathered the post-market collapse storm, and are now multi-billion dollar characters. Using content analysis, I found lessons in universal values that can be taken from the comic books of Batman and Captain America and those lessons were consistent throughout the decade between 1999 and 2009. I believe that these lessons are the reasons that these characters have maintained their relevance over time, and I will demonstrate these findings within this thesis.
Introduction

This thesis is designed to show the two types of heroes who are most prevalent in comic books as role models for readers. The two heroes being examined are Batman and Captain America and each of these characters represents the pinnacle of their hero type. Captain America is a typical “Golden Boy” hero with traditional American values, while Batman is a brooding loner whose stories add an element of darkness to his comic books. These heroes are known to many people, even outside of those who regularly read comic books.

The purpose of this thesis is to demonstrate that comic books are a useful literary medium through the occurrence of “Heroic Moments”. These Moments indicate that comic books deliver to readers information that they will not only enjoy, but also give them a staging ground from which they can take away something more. The characters examined in this project have been consistently published for nearly seventy years and they have gained mainstream popularity outside of comic book readers. What is it about Batman and Captain America that resonates so strongly with readers?

In order to gather data to measure the “Heroic Moments,” I performed a content analysis on a sample of Detective Comics and Captain America comic books published between 1999 and 2009. Content analysis is a method used to draw numerical data from literary sources such as books, magazines, and movies. I believe the use of content analysis for this project is not only necessary, but vital in order to present a credible argument and conclusion. Content analysis is particularly useful in this line of study, where quantifiable data are not readily available. For this project, I have endeavored to gather both quantitative data for analysis, and qualitative data for narrative discussion. To do this I have taken extra care and time analyzing each comic book, first examining examples of the characters portraying a “Heroic Moment,” or any of the three types of “Moments” detailed below, and then reading the text for a qualitative view of the plot in order to discuss what those moments mean. This research method is not without limitations. By only looking for specific data, it could be easy to miss more qualitative assessments of the text itself (Babbie, 1992). This situation will be remedied by using a two-fold analysis: first looking for the Heroic Moments within the comic books, and then reading the story around them in order to learn more about the context in which they take place. This second pass at the source material will mitigate the risk of losing context surrounding the moments identified in the first pass.

The Heroic Moments I intended to find were Teaching Moments, Archetypal Moments, and Ideal Moments. This is an original technique I designed to better dissect the latent messages of comic books. During preliminary research for this project, I identified these three types of moments as regular features in Captain America and Detective Comics and I wanted to isolate these moments and show them in a new light. In many instances, these moments seemed to insist on themselves, overtly sending a very clear message, and it was that insistence that allowed me to bring the moments out of the context of their stories and isolate them for analysis.

“Superhero” has become a catchall term for fictional heroes who wear costumes or masks, and may or may not have superhuman abilities like flight or super-strength. This group has even come to include aliens and robots too. In spite of the wildly varying traits and abilities of these characters, they are all inherently good, and fight for justice. The general term “superhero” can be divided into several categories: humans with superhuman abilities, costumed vigilantes, gods, goddesses, aliens and robots.

Humans with superhuman abilities are characterized by having some sort of innate ability above that of normal humans. Examples of these abilities are flight, invisibility, telekinesis, and super-strength. The way these characters gain their abilities varies greatly, but the most common methods are genetic mutation (The X-Men by Marvel), irradiation
(Spider-Man, The Incredible Hulk, both by Marvel), or they are given powers by mystical beings (Ghost Rider by Marvel, DC’s Captain Marvel). Heroes with these types of abilities are typically the most powerful overall, using their abilities to dwarf the power of other heroes without superhuman abilities.

The next category of superhero is the costumed vigilante. These characters do not have any superhuman abilities, but typically have some sort of skill or great athletic abilities that are useful to crime-fighting. Examples of this type of superhero are Batman and Green Arrow, both published by DC, and Iron Man, published by Marvel. Also included in this category are humans who are given objects that grant them temporary abilities that can be deactivated with the removal of the object. The primary example of this is the Green Lanterns, published by DC. These heroes operate with a great regard for justice and what is right, often taking to the streets only after they have seen their local law enforcement fail time after time.

The third category is a sort of “everything else” category. This includes various gods and goddesses (Thor, Ares, both by Marvel), aliens (Superman, Martian Manhunter, both by DC), and robots (DC’s Red Tornado, Marvel’s The Vision). These heroes also have widely varied abilities and origins, but they most commonly have powers or abilities equal to the superhumans. This group must also put in extra effort to blend in with society when not operating in their hero guise.

Another important concept in the fictional section of this project is the identification of the time periods during which the stories examined take place. The history of American comic books is commonly divided into the Golden Age, the Silver Age, the Bronze Age, and the Modern Age (Ryall 2009). All of these need to be adequately defined in order to understand the common motifs in comic books during these time periods.

The Golden Age of comic books began in 1938 with the debut of Action Comics #1 and lasted until 1950 (Ryall). During this time period, the superhero archetype was formed and came to be defined as a nearly-mythological figure who, though superpowered, could integrate themselves into a fictional society very much like our own. One of the greatest strengths of a superhero story was the basis of the character and their powers in reality; even early on in comic book history, superheroes saw their stories set in a world that was essentially the real world, grounding their adventures in plausibility. This set the groundwork for more comic book stories in the future. Many popular superheroes debuted during this time period, including Superman, Wonder Woman, Batman, Captain America, and Captain Marvel. The Golden Age was the first time comic books had become a mainstream art medium, with some comic books printing 1.4 million copies per issue (Lavin 1998).

In the real world, the Golden Age covered post-World War I, the Great Depression, and ended with World War II and the atomic era. Though World War II was at the end of the Golden Age, it had arguably the greatest impact on comic book stories during that time. After the atomic bombings of Japan in 1945, superheroes with radiation-gained powers began to emerge; various superheroes fought Nazis and caricaturized Japanese soldiers (Magnussen). Comic books sold even more copies during war time because the stories within them reflected events happening in the real world, thus giving their audience a way to relate to the war effort; though Americans left at home, especially children, were not able to participate on the field of battle during the war, the war stories told in comic books allowed them to feel closer to their fathers, husbands, and friends who were fighting in Europe. In this way, comic books provided readers with vicarious participation in the war through the superhero characters. Within the context of sociology, this is important because of the close ties readers were able to form with the comic book heroes. By associating these heroes with their own, real-life heroes, a psychological tie was formed between the two, perhaps causing a “bleeding” effect between superheroes and military

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personnel serving overseas. After the war, comic sales declined, and in order to retain readers, comic book companies began to diversify their stories from superhero comics. New comic genres that emerged during this time were western, horror, romance, and jungle stories.

The next period of comics was the Silver Age, which began in 1956 with the introduction of the second Flash, Barry Allen (Ryall). This period lasted until 1970, and was characterized by the many renowned and influential artists and writers who came to prominence during this time. Stan Lee, Gil Kane, Steve Ditko, and Jack Kirby all started their careers in the Silver Age, and their stories and characterizations are still in existence today. The Silver Age also had a new Comics Code Authority, a regulatory organization that monitored and controlled violent or questionable content in comic books. Of particular infamy was an incident with a Spider-Man comic involving an anecdotal lesson about the effects of alcoholism. According to the Code, comic book characters could not be seen consuming alcohol, so when Marvel Comics wanted to show a supporting character going through the wringer of alcoholism in order to demonstrate that alcohol addiction was a clear and present danger, they did not gain approval from the CCA. Breaking with tradition, Marvel elected to publish the story anyway, even without CCA approval. This led to the subsequent revisions and eventual abandonment of the Code altogether.

Though there is no unanimous consensus on the end of the Silver Age, Ryall and Tipton (2009) state that the Silver Age ended with The Amazing Spider-Man #121 in 1973, with the death of Gwen Stacey, Spider-Man’s girlfriend. Never before in the Silver Age had such a significant character been killed and certainly not as violently as she was. Though this event can be interpreted as an end to the idyllic stories of the Silver Age, it can also be interpreted as a harbinger of the violence and grittiness that was to come in the Bronze Age.

The Bronze Age of comic books followed the Silver Age and lasted from the 1970s until 1985. The primary characteristic of this time period was the darker storylines that dealt with real-world issues like drugs, violence, and alcoholism. Superheroes from minority backgrounds were first featured during this time period. The common art style changed to incorporate more realism, rather than the stylistic art from the Gold and Silver ages. Characters appeared in other comic books that were not their own more often than ever before (Ryall), and even entire comic book companies crossed over their characters for the first time. The most prime of these events are 1996’s DC vs. Marvel Comics, which resulted in a temporary alliance between the companies called Amalgam Comics, and 2003’s JLA/Avengers, which saw the two superhero teams fight against each other, and then together to defeat an enemy more powerful than either fictional universe could defeat alone.

The Modern age began in the mid-1980s and continues to the present day. At the beginning of this period, the primary storylines were much darker than ever before, especially in the case of the market-changing graphic novel, Watchmen. The modern age also brought company-wide crossover events that rebooted or refreshed continuities every 5-10 years; examples include Civil War, Blackest Night, and Infinite Crisis. Though these types of events have become commonplace, their effects on stories and characters last for several years after the event takes place. This means that even though company-wide crossovers are now commonplace, they are not a one-trick pony where after the crossover is over, the status quo is back to normal. The story elements introduced in these crossovers have ramifications on storylines later on as well.

Setting the stage for my time period of study, the 1990s saw the fall of the comic book speculation market. Since the Silver Age, comic book collecting had become very profitable, and the first appearances of characters, or significant story lines had become valuable. Speculators began to purchase...
comic books that they thought would be valuable. Comic book companies responded by printing many “collectable” issues and memorabilia, like incentive covers, foil-stamped covers, and special extended issues. In order to fulfill the collector demand for these special items, comic book companies began to manufacture them on a much larger scale. Because the supply of these items skyrocketed, the aftermarket prices plummeted, and the comic book market crashed. Without the speculation market, comic book companies were forced to scale back their operations because of decreased revenue. After becoming used to the sales that the special-edition comic books had brought in, the sharp decline in revenue was a shock to comic book companies and their vendors. Nearly twenty years later, comic book companies still have not regained the fiscal confidence that they once had.

The early 2000s provided comic book companies one last chance to get back in the good graces of readers and become marketable again. After focusing on collectability for so long, writers and artists had to tell better stories to get readers purchasing their books again. After this market crash, it was almost a surprise that the 2000s existed in comic book history at all. This decade was perhaps the most exciting of all for many reasons. First, both story and art styles were adjusting to a new audience and a new century; gone were the hard-edged technopunk drawings of the 1990s, and more classic stories were told in their place. Second, the September 11, 2001 terrorist attacks had a great effect on superhero comic books, in that the stories became more focused on “American” values and images of American protection.

**Literature Review**

The best way to demonstrate the central pieces of this project is to illustrate the fictional concepts of the Heroic Moments, and then define the methodological concepts of content analysis. Perhaps the most critical concepts of this project are the fictional concept of “archetypes” and methodological concept of “archetypes.”

The study of heroic archetypes is a well-established field of research. The most influential research on archetypes was perhaps done by Carl Jung in the early 20th century. His work is the basis of my own research on the evolution of the superhero archetype. According to Jung, archetypes are “ancient or archaic images that derive from the collective unconscious” (Jung 1968). An example of a Jungian archetype is that of the Shadow, the mental image of the darker traits that lie within, a darker version of our own selves. Jung’s work on archetypes was a revolution in and of itself; he rejected the tabula rasa theory of human consciousness of his time, and instead theorized that archetypes were evolutionarily common to all people, forming a sort of predestination for an individual. Jung described these archetypes as primordial images. This means that they would be similar among all people, making them universal ideas. Jung came up with hundreds of different archetypes. Archetypal events are birth, death, and marriage; archetypal figures are mother, old man, trickster, and child; and archetypal motifs are the Deluge, the Apocalypse, and the Creation (Jung). One of the more popular archetypes and one that appears in multiple guises is the hero archetype.

While Jung provides the basis for the concept of archetype, Max Weber supplies an application for these ideas in the form of gleaning intelligibility from social behavior. In the study of human behavior, Weber posits two simultaneous orientations, one towards historical significance of events, and one towards sociological events. The sociological perspective is most relevant to this project because the sociological orientation is meant to mentally reconstruct social institutions and their functioning with the help of concepts (Aron 1970). These concepts, within the context of this thesis, are the Jungian archetypes of heroes as shown in the stories of Batman and Captain America. Raymond Aron summarizes Weber’s work as being “defined…by an effort to understand and explain the values men have believed in, to understand the
works produced by men” (228). The values people assign to their heroes, and how superheroes function as role models in real world society are the primary focus of this project; therefore Weberian analysis will be instrumental to the overall quality of the thesis in order to adequately discuss the real-world effects Batman and Captain America have on people.

Before a Weberian analysis can take place, however, I will focus in on one subgenre of the hero archetype. Though there are many types of heroes, including child heroes, romantic heroes and tragic heroes, I have focused on a relatively new type of hero: the superhero. Superheroes have only existed in their current form for just over eighty years, but the superhero is based upon heroic figures from classic mythology. The work of LoCicero (2008) supports the argument for the relationship by drawing specific comparisons between modern superheroes and mythic heroes (LoCicero 2008). Since that research is well-established, I will be focusing on the presentation of the superhero archetype alone.

The work of Mark and Pearson (2001) demonstrates the importance of any archetype in marketing products to an audience. In addition to Jung’s work, their research operationally defines archetype as it applies to a “real” practice, rather than an abstract concept. This means that this work shows the real world significance of archetypes, rather than just defining them in literature. Because this work is extant, I will not be going into great detail about how archetypes can be important to an individual’s everyday life. This work served to bridge the fictional subjects of my research to analytical application in the real world, allowing the reader to form a practical basis from which to understand my project.

There have been numerous studies of comic books (Lavin (1998), LoCicero (2008), Magnussen (2000)), though none have taken the route that I took during the course of my thesis. There have been numerous character studies done on superheroes, like Anthony Kolenic’s Madness in the Making, a study of The Joker and Batman from the film, The Dark Knight. That project compared the Joker’s complete unpredictability and madness to the persona created by Seung-Hui Cho, the student who opened fire at Virginia Tech in 2007, killing 32 people and wounding 17 others, eventually taking his own life as well (Kolenic 2009). The basic design of Madness is of similar design to my own project in that attributes of a fictional character can be observed in real-world situations. Kolenic was able to demonstrate that the shooter, though seemingly unpredictable like the Joker, was given by the media an easily-understood persona for the benefit of the viewing audience. The audience needed to understand the shooter as a person with a mental condition, having a cause for what he did; the Joker in The Dark Knight was made more villainous because there was no verifiable cause for the violent acts he committed.

My own research relates to Kolenic’s research but is not quite of the same form. By analyzing the character traits of the Joker, and comparing them to character traits attributed to the Virginia Tech shooter, he creates a parallel from the comic book world to the real world. Kolenic’s character analysis allows for the reader to see the need for a real person to have an identifiable persona versus the lack of that need for a fictional character.

**Methodology**

Keeping in mind Jung’s work on archetypes and Weber’s methodology for applying those types of concepts to the real world, the key questions of this project are as follows:

1. Can the Heroic Moments defined in this thesis indicate a relationship between the comic book superheroes and their audiences?

2. Do Batman and Captain America follow traditional heroic archetypes?

To answer the questions above, the methods of this project include content analysis of two superhero comic book titles from the
2000s. Content analysis will be the primary research device for my thesis, in the form of observing occurrences of certain attributes within selected comic books in the 1999-2009 decade. This decade is important for two primary reasons. First, this decade was a rebuilding time for the comic book industry; after the collapse of the comic book speculation market during the 1990s, comic book companies were trying to regain the trust of their readers by improving the quality of their stories and internal artwork, rather than relying upon limited-edition book covers. This time period was also significant in the real world; how comic books dealt with the terrorist attacks of September 11, 2001 and the rise of terrorism paranoia in the United States is a very interesting topic that is potentially culturally significant.

Items for analysis will include the aforementioned “teaching moments,” defined as moments where the heroes act in a manner that is obviously aimed to teach a lesson, “archetypal moments,” wherein a hero acts in a very traditionally heroic way, based on the Jungian “hero” archetype, and “ideal moments,” when a hero appears to act in a manner that is meant to inspire the reader to act in the same way.

I analyzed every fourth issue of Batman, and Captain America comics from January 1999 through September 2009. While this percentage does not include every issue, a 25 percent sample will be an adequate representation of the general stories being told during this time period. That sample accounts for a total of sixty-six comic book issues for the observed time period, with thirty-three issues for each series analyzed.

This observed decade was chosen because of the conditions the comic book industry and the primary audience were in during the 2000s. After the comic book speculation market crash of the late 1990s, it was an uncertain time for comic books: publishers had to scale back their ventures and become more focused on what readers wanted to buy, initiating a new relationship between entertainment producers and consumers. In a way, publishers were trying to get into the “good graces” of their readers again, and that practice was radically different from the business practices of the 20th century. Secondly, post 9/11 America saw comic books turn to a different group of villains. DC Comics went with more fantastic villains in order to perhaps give readers a villain they could understand as evil, but one who was not necessarily real. Marvel, on the other hand, confronted terrorism in a more realistic way. Whereas the Avengers previously fought supervillains, they began fighting terrorists in the homeland and abroad and later delved into such contemporary issues as personal privacy and corporate greed. This difference in corporate story policy was a large contributor to my analysis of one character from each company.

Even though Batman and Captain America fought very different kinds of villains during this time period, they both continued to appear in stories that resonated with their audiences. How Batman and Captain America were presented during this time period is an especially interesting topic, ripe for the study of the function of superheroes.

It was essential to narrow down the qualifications for any given scene in the story or frame or artwork within an analyzed comic book for it to be considered a “moment”. Therefore, I determined that any “moment” had to be performed by Batman or Captain America, with the exception of one notable instance described in the Findings section. This meant that observed moments could not be performed by alter ego Bruce Wayne or Steve Rogers; only when the character was in his superhero persona could a moment be observed. During the course of the story for each of these characters during the observed decade, both Batman and Captain America were killed and had other heroes rise to take their mantles. These new versions of Batman and Captain America were also included in Moment recognition as well, as long as they were in the Batman or Captain America personas.

Images were included in moment recognition because comic books are such visual
media that relying on speech and text alone would have made my analysis incomplete. The internal artwork of a comic book is perhaps the most important part of the book as a whole. A story and script are also necessary, but those items cannot be conveyed as effectively without the artwork; the artwork is meant to draw readers in and keep them there for the duration of the story. Simply looking at dialogue would have meant missing perhaps the richest and certainly the most unique area of comic book research.

A Teaching Moment occurs within dialogue or narration when the text is written to imply a life lesson. This lesson can be simple or complex, ranging from mundane tasks to ethical values. As long as there is a textual indication that a lesson should be learned in that moment, it was counted.

An Archetypal Moment can occur within text or artwork when the hero observed does or says something that is in line with the traditional heroic archetype of Carl Jung. In text, an Archetypal Moment can occur if the hero says that he will save someone or do something heroic, or the same moment could occur within the artwork of the hero actually carrying out that action. An Archetypal Moment can also occur solely in the artwork by showcasing the traditional heroic physique of large muscles, square jaws, and heroic posing that goes beyond “normal” depictions of these heroes.

An Ideal Moment can also occur within text or artwork, and may be related to the Teaching Moment in that lessons are to be learned in both. However, whereas the Teaching Moment tells or shows the reader what is to be learned directly, the Ideal Moments are usually more nuanced. Ideal Moments are meant to give readers inspiration and aspirations of greatness.

The search for and cataloging of these moments served as the primary research of this project.

**Findings**

Through the analysis of thirty-three comic books from Detective Comics and Captain America (sixty-six comic book in total), I found that Detective Comics had eight Teaching Moments, six Archetypal Moments, and four Ideal Moments. Captain America had six Teaching Moments, eight Archetypal Moments, and two Ideal Moments (see Figure 1 below).

Batman’s archetypal moments primarily emerged from imagery. This reinforces elements from Batman’s own origin story wherein he designed his costume in order to intimidate his enemies. To show just how visual Batman’s “moments” are, five out of his six Archetypal Moments were visual, and one out of four Ideal Moments was visual. Typically, these images involve Batman appearing out of nowhere to confront a villain (issues 732, 760, 836, and 844). Sometimes, however, these images are reserved for something more profound. In issue 788, after a particularly devastating rampage by that issue’s villain du jour—a wrongly-accused and now superpowered man named Eddie Hurst—Batman is seen carrying an injured policeman to a medical center. Though Batman and the Gotham City Police Department do not always get along, he recognizes that they essentially have the same mission: protecting the people of Gotham City.

The rest of Batman’s “moments” are lessons in justice and/or why people do bad things. In issues 736 and 800, the issues of bad childhoods and religion are brought up. The stories suggest that growing up badly does not give someone the right to be a criminal later in life, and that religion cannot protect someone from justice. It can be further extrapolated that one is always accountable for his or her own actions, no matter the cause. If the characters addressed in these issues willingly commit a crime, they must be willing to face the consequences. Unfortunately for them, in Gotham City, the consequence is often Batman, the Dark Knight. This suggests that justice and the law enforcement system may not always be the same entity despite having the same goal.

Captain America’s moments are much more about dialogue than Batman’s imagery.
Of the 16 moments observed in Captain America, only three of those moments were based purely on images, while all of the rest, barring one notable exception, were based on dialogue. For example, Volume 5, Issue 13 has three quotable moments on its own: two teaching moments involving the discussion of morality among a backdrop of heroes and villains and a mention by Captain America that he would prefer to face his opponents fairly in battle. The same issue also features an Archetypal Moment, wherein Captain America can be seen lamenting the loss of freedom of speech which was then being suppressed in the story. These moments were singled out in my research because of their perceived significance to the reader.

As stated above, Detective Comics had eight Teaching Moments, six Archetypal Moments, and four Ideal Moments while Captain America had six Teaching Moments, eight Archetypal Moments, and two Ideal Moments. Because this is a 25% sample of all of the issues of Captain America and Detective Comics from 1999-2009, it can be extrapolated by multiplying the observed results by four that Detective Comics featured roughly thirty-two Teaching Moments, twenty-four Archetypal Moments, and sixteen Ideal Moments for a total of sixty-two moments during the ten-year observation period. Using the same reasoning, Captain America should have had twenty-four Teaching Moments, thirty-two Archetypal Moments, and eight Ideal Moments for a total of sixty-four moments.

Assuming these estimates are roughly correct, the data above suggests that Detective Comics had a 60% rate of “moment” occurrence during the ten-year observation period. Captain America’s rate of “moment” occurrence came to 53%. This suggests that 60% of Detective Comics issues and 53% of Captain America issues from 1999-2009 probably contained a Heroic Moment.

To gain intelligibility from these findings, a researcher like Max Weber would apply these data to the real world and mentally reconstruct what these heroic concepts mean to the people who observe them. With the observed moments occurring with such frequency, it seems that the stories observed in Detective Comics and Captain America are ones that are important to teach and the stories that readers want to learn. That these moments happen at all suggests that people assign values to these heroes and think they are important enough to engage at a basic level. Since the three types of moments were observed with such high frequency, it can be inferred that Batman and Captain America serve as role models for their audiences.

Conclusions

What does this research mean within the realm of established knowledge? I believe that the rates of moment occurrence that I observed can be used to suggest a relationship between the way these characters act in their stories and the way their readers can interpret these Teaching Moments, Ideal Moments, and Archetypal Moments.

The number of Archetypal moments observed shows a strong relationship between Batman and Captain America and the Jungian hero. By perpetuating this hero type, a large percentage of society has shown that it is important to have these heroes in the collective consciousness. Weber endeavored to explain the works of men, from literature and art to governmental policies, and to find the reasons behind recurring concepts. Weber’s conclusions assist in the interpretation of the significance of various intangible aspects of works. By understanding the origins of the concepts, it is possible to understand the significance of their continued recurrence. Within the context of this thesis, these concepts were the heroes themselves and their importance to much of the larger society. By continuing the heroic tradition, Captain America’s and Batman’s continual popularity suggests that there is a desire by much of humanity to keep the heroic archetype alive in popular literature.

The Teaching and Ideal Moments are both meant to convey a message, and following from Weber’s theory of social constructs, it
is evident that these messages are embraced by many consumers of popular culture. The primary message within the observed comic books is what it means to be a hero. The dedication, self-sacrifice, and vigilance of Batman and Captain America suggest to readers that being a hero does not necessarily mean having superpowers or wearing a costume. Instead, being a hero can simply mean being a good person. Without this deep meaning, these comic books and characters could not have existed for as long as they have.

These stories perpetuate the hegemonic ethos of a dominant cultural association by reinforcing the existing social constructs of the Jungian hero and teaching readers what it means to be a hero. As a serial media, comic books must be tied into the trends of the larger culture and often must rapidly adapt to changing social conditions. That Batman and Captain America comic books have been released in this monthly fashion for so long is indicative of their social significance. The moments that I found are important because they are the moments that much of the larger society seems to value. With that in mind, comic books will continue to have Heroic Moments, and readers will continue to appreciate them.

![Moments By Year](image)

*Figure 1*

### Works Cited


Friendship Group Hierarchy

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Abstract
Friendship is a link between two persons that is a common outgrowth of human interaction and existence. This investigation seeks to examine the extent to which friendships depend upon individuals having similar qualities and practices. Specifically, this investigation examines the extent to which individual qualities (e.g., attractiveness, intelligence) are perceived by individuals to be similar to those of their friends. Do close friends necessarily share similar interests and qualities as opposed to individuals who are not? A study of friendship intensity and the extent to which characteristics overlap amongst friends of different intensities was conducted using ninety college students as participants. Each participant was asked to complete a Personal Quality Scale and a Friendship Group Quality Scale. The Personal Quality Scale examines attitudes towards attractiveness, popularity, intelligence, athleticism, religion, stress levels, academics, dramatic personalities, creativity, and spontaneity. The Friendship Group Quality Scale asked participants to divide friends into three distinct groups (primary, secondary and tertiary) based on self disclosure, support, interaction, and affection. When participants were asked to rate their own qualities along with the perceived qualities of three groups of friends, results showed a significant gradient between primary, secondary, and tertiary groups suggesting a hierarchy. Participants described the attitudes and qualities of friends in the primary group as closer to their own, followed by secondary friends, and lastly friends in the tertiary group. Implications of the findings for friendship formation are discussed.

One of the most pondered questions regarding relationships is “Do birds of a feather flock together?” That is, is the foundation of a strong social relationship built upon similarities between individuals? Research on both friendships and romantic relationships suggests that commonality between two persons may increase the likelihood of friendship or attraction (e.g., Berscheid & Reis, 1998; Gonzaga, Campos, & Bradbury, 2007; Newcomb & Bagwell, 1995). It seems likely that homophily, the tendency of individuals to associate with others like them, may play a role in forming and preserving, but its exact role, particularly with adults, is still unclear.

At least two potential explanations of the role similarity plays in friendships come from Steglich and Snijders (2006). Network autocorrelation is defined as “the empirical finding that social ties occur more frequently among demographically or behaviorally
similar actors than among dissimilar actors” (Steglich & Snijders, 2006). One attempt to explain the importance similarity plays in friendships is the “homophily principle” which argues that “it is easier or more rewarding for an actor to interact with a similar other than with a dissimilar other” (Steglich & Snijders, 2006). The homophily principle implies that friendship occurs more frequently due to similar actor attributes. A second explanation is the “assimilation principle” which states that “network actors adapt their own individual characteristics to match those of their social neighborhood” (Steglich & Snijders, 2006). In this case, network autocorrelation can occur over time due to processes of social influence. From the research, it is not entirely clear which principle may be more responsible in terms of friendship formation, or whether both principles may apply and may actually work together.

For example, Newcomb (1961) found that most transfer students became friends with those who they thought were most like them. Originally, the friendships developed from perceived similarities. As the friendships continued, however, actual similarities began to appear and friendships were altered to account for them. Thus while similarity seems important in friendship development, it is not clear whether it is an elicitor of friendship, a consequence of friendship, or a combination of both.

A preliminary step towards teasing apart the role of similarity in friendship might be to examine the extent to which individuals themselves perceive similarity differences in those friendships they describe as being of great and lesser importance. Specifically, if asked to differentiate between close and less close relationships, to what extent do individuals identify more or less perceived similarity as being important to friendships?

In this investigation, it was predicted that participants would perceive the greatest similarity with those they were the closest to, while those friends who were perceived as less close would also be perceived to have fewer similarities with the participant. Specifically, after dividing friends into primary, secondary, and tertiary groups, it was predicted that perceptions of similarity between friends and the target individual would be greatest for primary friends, less so for secondary friends, and still less for tertiary friends.

Method

Participants
A sample of convenience consisting of 93 college students from a small southern liberal arts college in the United States was recruited. Participants’ ages ranged from 18 to 25. Only 90 participants’ data were used in the final data due to incomplete surveys or improper completion, such as marking only choices on the right hand side. Of the 90 participants, 44 were female and 46 were male. Participants were surveyed within a class setting to simplify data collection. Participants were gathered from history, psychology, and other core curriculum classes. After coordinating with respective class faculty members, students in the classes were asked at the beginning of the class period if they would be willing to participate in an anonymous friendship survey. All students asked to participate were willing to complete the survey.

Materials
The friendship survey consisted of three different parts.

1. Personal Quality Scale
In addition to basic demographic questions such as age, gender, year in school, religious affiliation, ethnicity, and alcohol/drug consumption levels, the Personal Quality Scale asked participants about the extent to which they demonstrated a number of different qualities (see Appendix A). Adapted from the values used by the Personal Value Scales (Scott, 1965), participants were asked to rate the extent to which they felt that ten qualities were representative of themselves on a 5-point Likert scale 1 (not true at all) – 5 (completely true). For this investigation,
the qualities examined were: attractiveness, intelligence, popularity, handles stress well, academic, athletic, dramatic personalities, religious, imaginative, and spontaneous.

2. Friendship Group Information

Participants were asked to think about their current friends and, if possible, to divide them into three groups based on how close they felt they were to various individuals. The Friendship Group Information sheet, (see Appendix B), outlined what friendship was and which friends should be included in each group. Friendships were described as bonds, some of which “we consider to be stronger than others.”

Primary friendships were described as containing high ratings of “self-disclosure, affection, respect, emotional support, trust, and loyalty.” Secondary friendships contained a moderate to high ratings for the aspects, while Tertiary friendships contained the lowest ratings.

3. Friendship Group Quality Scale

Similar to the Personal Quality Scale above, participants were then asked to think about and rate the members of their three friendship groups with regard to whether their qualities were perceived as being highly true or barely true in regard to the same domains as the Personal Quality Scale, (see Appendix C).

Procedure

Participants were given a friendship survey that consisted of a Personal Quality Scale, Friendship Group Information, and a Friendship Group Quality Scale. The Personal Quality Scale was the first to be completed. Upon completion, the participants read the Friendship Group Information. Finally, participants completed the Friendship Group Quality Scale.

Results

Responses to the Friendship Survey yielded four groups of numbers. The first set of numbers involved rating scores of the extent to which individuals thought that they themselves were attractive, intelligent, popular, handled stress well, academic, athletic, dramatic, religious, imaginative, and spontaneous. The second set of numbers reflected the extent to which participants believed their primary friends reflected these same qualities. The third and fourth sets of numbers reflected the extent to which secondary and tertiary groups reflected these same qualities.

In order to examine potential relationships between participants’ ratings of themselves and ratings of the qualities of their three different friendship groups, Pearson Correlations between these variables were calculated (see Tables 1, 2 and 3). In these correlations, a participant’s rating of the extent to which a particular value (such as attractiveness) was true for him or her was compared with his or her ratings of the extent to which primary, secondary, and tertiary friends were thought to be attractive. Results showed that each personal quality was significantly correlated for the primary group with p-values less than .05. For the secondary groups, only popularity, academic level, athleticism, dramatic behavior, religiousness, and imaginativeness were significantly correlated. For the tertiary groups, none of the personal qualities were significantly correlated with tertiary group ratings.

Discussion

The study’s hypothesis supposed that ratings from Personal Quality Scales would show a gradient of matching qualities with the ratings for Primary, Secondary, and Tertiary groups of friends. The hypothesis was supported because all aspects (attractiveness, intelligence, popularity, stress reaction, academic, athleticism, dramatic, religiousness, imaginativeness, spontaneity) of Primary groups revealed p-values of less than .05. For Secondary groups, only popularity, athleticism, dramatic, religiousness, and imaginativeness were significantly related ratings on Personal Quality Scales. For Tertiary groups,
none of the aspects were significantly related. These results show a gradient effect in significance.

This investigation provides support for the idea that individuals are aware of the extent to which their personal qualities and values overlap with those of close and less close friends. Participants in this study believed that their close friends showed qualities and attributes that were closer to their own than less close friends. The question remains, however, of whether similarity is vital to the initiation of friendship or whether it begins to emerge over the course of the relationship.

Future research could begin to tease apart the possible antecedent/consequent nature of such similarity in friendships. An early step may be assessing the extent to which such similarity may only be perceived by the individual or whether such a perception is shared by a third party. It would be particularly interesting to examine similarities longitudinally to see if more similar individuals are more or less likely to form friendships. College campuses may provide the ideal setting to explore friendship relationships longitudinally. For example, it may be possible to survey incoming first-year students with regard to their personal qualities and values before they reach campus. Follow-up surveys of friendship formation would then allow researchers to see if more or less similar individuals from a particular campus-housing unit (i.e., floor, suite) were more or less likely to form close friendships. End-of-year surveys might then reveal the extent to which personal qualities and values were similar to those at time of entry and whether or not developing friendships may have played a role in either changing or maintaining the qualities and values of individuals. Such techniques and settings may prove useful in uncovering the possible role of similarity in friendships.

References


### Tables

#### Table 1
**Intercorrelations Between Scale Ratings for Individuals and Primary Friends**

<table>
<thead>
<tr>
<th>Scale</th>
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<tbody>
<tr>
<td>Attractiveness</td>
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<tr>
<td>Intelligence</td>
<td>.29*</td>
</tr>
<tr>
<td>Popularity</td>
<td>.56**</td>
</tr>
<tr>
<td>Stress</td>
<td>.43**</td>
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<td>Religious</td>
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<td>Imaginative</td>
<td>.41**</td>
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<tr>
<td>Spontaneous</td>
<td>.35**</td>
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*Notes: N = 88, *p < .05, **p < .01*

#### Table 2
**Intercorrelations Between Scale Ratings for Individuals and Secondary Friends**

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<tr>
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<td>Stress</td>
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<td>.20</td>
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<td>Dramatic</td>
<td>.35**</td>
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<tr>
<td>Religious</td>
<td>.24*</td>
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<tr>
<td>Imaginative</td>
<td>.26*</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>.12</td>
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*Notes: N = 88, *p < .05, **p < .01*
Tables (continued)

Table 3
Intercorrelations Between Scale Ratings for Individuals and Tertiary Friends

<table>
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<th>Scale</th>
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<td>-.07</td>
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<td>Religious</td>
<td>-.01</td>
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<td>Imaginative</td>
<td>-.07</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>-.04</td>
</tr>
</tbody>
</table>

Notes: N = 88, *p < .05, **p < .01
Appendix A

Personal Quality Scale

1. How old are you? ____
2. What year are you? Fr, So, Ju, Sen
3. What is your gender? M  F
4. What is your religious affiliation? ___________
5. What is your ethnicity? ____________

6. How often do you consume alcohol per week?
   Never, 1-2 times, 3-4 times, 5 or more times

7. How often do you use controlled substances per week?
   Never, 1-2 times, 3-4 times, 5 or more times

Rate each of the following questions as they relate to you in general.
Where a rating of 1 means you feel it is not true of you at all, and a rating of 5 means you feel it is completely true of you.

1 – Not true at all  2 – Barely true  3 – Slightly true  4 – Mostly true  5 – Completely true

8. I am attractive.        1 2 3 4 5
9. I am intelligent.      1 2 3 4 5
10. I am popular.         1 2 3 4 5
11. I handle stress well. 1 2 3 4 5
12. I am academic.        1 2 3 4 5
13. I am athletic.        1 2 3 4 5
14. I am dramatic         1 2 3 4 5
15. I am independent.     1 2 3 4 5
16. I am a leader.        1 2 3 4 5
17. I am religious.       1 2 3 4 5
18. I am imaginative.     1 2 3 4 5
19. I am spontaneous.     1 2 3 4 5
20. I am self-controlled. 1 2 3 4 5
Appendix B

Friendship Group Information

Friendship is a necessary bond that is formed between two people. This bond can include self-disclosure, affection, respect, emotional support, trust, and loyalty. It also may involve common interests/activities, similarities, and provide assistance. And finally it can be a source of amusement, fun, and recreation.

As humans, we will form many bonds over our lifetime which we consider to be stronger than others. These bonds can be divided into three separate groups called Primary Friendships, Secondary Friendships, and Tertiary Friendships.

1. Primary Friendships will contain high ratings on almost all of these aspects. This group contains those you would consider to be your best friends.

2. Secondary Friendships will contain moderate to high ratings on these aspects. This group contains those you would consider to be your good friends.

3. Tertiary Friendships would contain the lowest ratings on these aspects. This group contains those you would consider to be acquaintances.
## Appendix C

### Friendship Group Quality Scale

For each of the following questions, consider the people in your 3 friendship groups (Primary, Secondary, and Tertiary) and rate each group on a scale from 1 to 5. Where a rating of 1 means that this is not true of the people in that group, and a rating of 5 means that this is true everyone in that group.

1 – None are like this   2 – A few are like this
3 – Some are like this, some are not 4 – Most are like this 5 – All are like this

<table>
<thead>
<tr>
<th>Question</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My ___ group is attractive.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. My ___ group is intelligent.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. My ___ group is popular.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. I’m dependent on those in my ___ group.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. My ___ group is religious.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. My ___ group handles stress well.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. My ___ group is academic.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. My ___ group is athletic.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. I often argue with those in my ___ group.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. My ___ group is creative.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11. My ___ group is dramatic.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>12. My ___ group is spontaneous/outgoing</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>13. I prefer one-on-one with my ___ group.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>14. I would date those in my ___ group.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
About the Student Authors

Julienne Beblo
is a recent graduate of the University of North Carolina Wilmington where she graduated with a BS in Marine Biology, a BA in Studio Art and a minor in English. With this unique combination of disciplines she hopes to pursue a career in Environmental Education, while incorporating her artistic background to improve communication about conservation to a public audience.

Anna-Kay Edwards
is a native of St. Andrew, Jamaica. She is a senior at Livingstone College in Salisbury, North Carolina majoring in Biology. Anna-Kay plans to enter medical school and become a physician. She is involved in various organizations including the Women’s Cross Country and Track and Field teams. She is also the current Miss Livingstone College. She has received several academic awards during her college career.

Lauren Ellerbe
is an undergraduate student at the University of North Carolina at Pembroke, where she is pursuing a BA degree in Art. Her work has been exhibited in 14 national venues. She most recently received an award at the Peach Belt Art Exhibition at the University of South Carolina-Aiken.

Daniela Jimenez
a native of Bogota, Colombia, is currently pursuing a BA degree at the University of North Carolina at Pembroke. Jimenez has participated in over 30 national and international exhibitions and exchanges since 2011. Her work was most recently exhibited in the Switching Costs Exhibition at the University of Sharjah in the United Arab Emirates.

Luke Kaiser
is currently an undergraduate student at the University of North Carolina at Greensboro, where he is pursuing three BAs in Classical Archaeology, Special Programs in Liberal Studies Archaeology, and English with a minor in Geographic Information Science. In addition to his studies, he is the current president of the University Archaeological Association, the Archaeology representative in the Student Anthropological Association, and a two year veteran of the Mochlos Excavation in East Crete. He aspires to continue his education by pursuing a PhD in Prehistoric Archaeology and hopes to one day become an active leader in the Archaeological community as a professor.
Michelle Janine Lanteri earned a second bachelors degree in Art History and Museum Studies in May 2013 from the University of North Carolina at Greensboro. Her first degree concentrated on Media Studies with a Spanish minor. To work with indigenous art collections, Michelle interned at the Museum of Anthropology in Winston-Salem. In addition, she participated in the Mint Museum’s 23rd Annual Regional Collegiate Art History Symposium. Michelle also works as a curatorial assistant at Greenhill: A Space for NC Art in Greensboro. She plans to enter an art history graduate program focused on multicultural ceramics and modern art.

Janelle Martin is a graduate from Johnson C. Smith University located in Charlotte, North Carolina. She has attained a Bachelor of Arts degree in English with a minor in Communication Arts. She will continue her education as a graduate student at Wake Forest University located in Winston-Salem, North Carolina, in which she will attain a Master of Arts degree in English with a concentration in Caribbean literature.

Tierra Montgomery is currently an undergraduate student at Fayetteville State University, and is currently pursuing a BS degree in Computer Science. She is a member of Association of Computing Machinery and Phi Eta Sigma Honor society. Her interest in computer science began while attending a research program over the summer. She aspires to be a computational neuroscientist and plans to continue researching.

Will Parshley is a recent graduate of Guilford College in Greensboro, North Carolina, where he majored in Psychology. He is currently working for a behavioral health agency in his hometown of Portland, Maine, and, over the next year, will be applying to doctoral programs in clinical psychology. In the future, Will plans to work with recent veterans and other victims of trauma. His research interests include substance abuse, posttraumatic stress disorder, psychoanalysis, British Romantic and Victorian literature, and post-structural philosophy. Will loves the Atlantic Ocean, basketball, and all four seasons with equal zeal.
Christian Russell
graduated from Greensboro College in December 2012 with a BS in Liberal Studies and a concentration in Chemistry. While there, he was a member of the Honors program, a member of the Student Government Association, and Editor-in-Chief of the student newspaper. Since graduating, Christian now works as a pharmaceutical representative in Greensboro, NC.

Kayla Seedig
is an undergraduate art education student at the University of North Carolina at Pembroke. In her senior year, she holds a position at the A.D. Gallery on the UNCP campus and was awarded an Undergraduate Scholar Assistantship through the Pembroke Undergraduate Research and Creativity Council to explore photolithography. Upon obtaining her Bachelors degree, she intends to pursue a Masters of Fine Arts degree in the Printmaking area.

Matthew Van Horn
recently graduated from Lees-McRae College in Banner Elk, where he received a BS in Psychology with a minor in History. He plans to continue his education by pursuing a doctoral degree in Social Psychology. His research interest is personal relationships.

Lewis Williams
earned his BS in Mathematics from Fayetteville State University. He is currently a Master’s student at North Carolina Agricultural and Technical State University pursing a degree in Applied Mathematics. In the near future, Lewis aspires to obtain his doctorate in math. His ultimate goal is to teach on a collegiate level where he can share his passion for math with his students.
About the Faculty Mentors

**Nicoleta Bîlă, Ph.D**
grew up in Romania where she was fortunate to learn mathematics from dedicated teachers. Later on, she worked with experienced international researchers who also inspired her throughout her postdoctoral studies and beyond. Likewise, she aspires and wishes to provide the same experience for all her students. Dr. Bila serves as a tenured Associate Professor at the Fayetteville State University in the Department of Mathematics and Computer Science. She received her doctorate in Mathematics from University ‘Politehnica’ of Bucharest, Romania. Her research lies in applied mathematics, particularly in the theory of symmetry analysis of the differential equations.

**Albert Chan, PhD**
earned his Ph.D. degree in Computer Science in 2003. He joined Fayetteville State University in 2004 and has been a faculty member in the Department of Mathematics and Computer Science since then. He is currently an associate professor in the department. His research interests are in the field of Computer Science Education, Algorithms and Data Structures, Computer Graphics, High Performance Computing, Computer Languages, Game Programming, Mobile Computing, and others. He participated as a mentor in several undergraduate and high school research programs in the past several years and will continue to do so in the upcoming years. He is also a member of the advisory board in a technology academy in a local high school.

**James L Carson, PhD**
serves as an associate professor of psychology at Lees-McRae College in Banner Elk, North Carolina. He received a BA in Psychology from the University of Denver and an MA and PhD in Developmental Psychology from the University of Illinois at Urbana-Champaign. His research interest is children’s emotional development.

**James W. Hood, PhD**
teaches nineteenth-century British literature, writing, and environmental studies courses at Guilford College in Greensboro, NC. He holds degrees from Yale Divinity School and UNC-Chapel Hill and has published on Tennyson and nineteenth-century literary annuals.
**Paul Leslie, MA**
is Vice President of Academic Affairs, Dean of the Faculty, and Professor of Sociology at Greensboro College. He earned a BA from Clark University and MA and PhD from Boston University. His research and writing interests are in postmodern theory, popular music, and cultural studies. He continues to teach courses in sociology and honors and advise honors student with their honors theses.

**Elizabeth Perrill, PhD**
began as an assistant professor at UNC Greensboro in 2008. She graduated with honors from Grinnell College, and earned her MA and PhD in African Art History from Indiana University. In her current scholarship, Perrill is exploring cross-cultural comparisons between ceramic art markets, namely South African and the American Southwest. She is consistently engaged with scholarship on the specificity of media and materiality in the South African art world, as well as with the theoretical writings of Nicholas Bourriaud, Okwui Enwezor, and Salah Hassan, among others.

**Sharon Raynor, PhD**
is an Associate Professor of English at Johnson C. Smith University, a Visiting Associate Professor of English at Wake Forest University, and an Adjunct Instructor in the Center for Documentary Studies and Continuing Education at Duke University. Since 1999, she has written and directed two oral history projects with combat veterans in rural North Carolina, ‘Breaking the Silence: The Unspoken Brotherhood of Vietnam Veterans’ and ‘Soldier-to-Soldier: Men and Women Share Legacy of War.’ Her community scholarship and publications focus on the discourse of trauma, silence and identity in war studies and women’s studies. She is a native of Clinton, North Carolina, a graduate of East Carolina University (BA ‘94, MA’96) and holds a PhD in Literature and Criticism from Indiana University of PA (’03). She has held fellowships at Duke University, W.E.B. DuBois Institute for African and African American Research at Harvard University, Gilder-Lehrman Institute of American History and the United States Air Force Academy.
Jeffrey Soles, PhD
has served on the faculty of the University of North Carolina at Greensboro since 1977. He was the founding Department Chair of the Archaeology Program, and the Chair of the Classics Department from 1992 to 1999. He graduated from the University of Pennsylvania with a PhD in Classical Archaeology in 1973. He has been the co-director of the Mochlos Excavation in East Crete, a largely Bronze Age Minoan port town, since 1989. He has published over 40 articles and 8 books with a 9th book forthcoming. Since 1989, he has raised over one million dollars for Minoan Bronze Age research at Mochlos.

Aaron Wilcox, MA
is an Associate Professor of Ceramics at the University of North Carolina Wilmington. He received a BA in Religious Studies and Art and an MA in Liberal Studies from UNC Greensboro, followed by an MFA in Ceramics from the Cranbook Academy of Art in Bloomfield Hills, MI. His most recent exhibit was a solo show presented at the Wilma W. Daniels Gallery, which is operated by the Cape Fear Community College in Wilmington, NC. The show exhibited various ceramic pieces that incorporated the use of zip ties and strips of clay to create sculptures.

Rufus Williamson, PhD
is an assistant professor at Livingstone College. He received a PhD in Microbiology from Meharry Medical College, and pursued postdoctoral studies in Molecular and Computational Biology at the University of Michigan Medical School. He worked at the Parke-Davis Pharmaceutical Research and at Pfizer Global Research Development on the Bioinformatics Research Team. He also served as an adjunct professor of Biology at Concordia University, and also taught at Eastern Michigan University and the University of Michigan. His current research efforts lie in the systems biology of bacteria, and in understanding the large scale organization of transporter complexes and their evolution in microorganisms.

Brandon Sanderson, MFA
has been an Assistant Professor of Art at the University of North Carolina at Pembroke since 2008. Formerly a computer programmer, his research focuses on the revival of technically complex traditional printmaking processes in the context of contemporary culture. Sanderson’s artwork has been shown in over 300 solo, juried, and invitational exhibitions in the United States and abroad. He is currently coordinator of Frogman’s Print Workshops, one of the the largest printmaking workshops in the United States. During his time at UNCP, he has co-organized three national printmaking exhibitions and brought in 30 visiting artists. He has also served as a guest lecturer and visiting artist at 15 universities in 11 states.
Submission Process

Who is Eligible?

The primary author or authors must be undergraduates at a 2 or 4 year college or university in the state of North Carolina working on original research under the direction of a faculty mentor. Works may be co-authored. Students at North Carolina School of Science and Mathematics are also eligible.

What to Submit?

We are seeking research papers, critical essays (literature/research reviews, articles written on a particular topic), or media submissions of performing/fine art endeavors. Text of papers should be no more than 6000 words.

Explorations, the Journal of Undergraduate Research and Creative Activities for the State of North Carolina, provides opportunities for a variety of text and media submissions in the following categories:

- Biological, Earth, and Physical Sciences
- Business and Legal
- Creative Writing and Discourse
- Humanities
- Mathematics
- Performing Arts
- Social Sciences
- Technology and Engineering
- Visual Arts and Design
How to Submit?

Guidelines for publication:

1. Submit all articles (without images) in Word documents (.doc or .docx) only, and indicate where images, graphs, maps, or charts should appear.

2. Submit images, graphs, maps, and charts as separate files. For creating graphs and charts (in Excel, Illustrator, or Paint): make the image as LARGE as possible. This will ensure its visibility in the publication. In addition, also save figures as images (.jpg, see below).

3. Images need to be saved as .jpgs, preferably at high resolution (300dpi).

4. If images are not yours, please obtain permission in writing and cite the copyright owner.

5. Use grayscale (no colors) on all photos, charts, tables, and graphs as Explorations is not published in color. This is also true for visual arts submissions.

6. Submit everything in its original file. (Example: article as Word .doc, image as .jpg.) Do not convert files. Do not embed images into your article. Be sure you indicate image placement when you submit your final manuscript.

7. We ask that you have at least one faculty member other than the faculty mentor review the manuscript before you submit to Explorations. This reviewer should be well-versed in your discipline and able to provide comments to improve your paper.

8. Please attach your submission and all additional forms in an email addressed to: csurf@uncw.edu.
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1. Make sure your name is on everything you submit.

2. Use your initials and submission title as the title of your paper and/or any other email attachments; this way everything can be easily identified.

3. Turn in your required forms with your submission. Submissions sent without all required forms will not be accepted. Detailed information at www.uncw.edu/csurf/explorations/explorations.html.

4. Once your work has been approved by your faculty mentor and reviewed by another faculty member familiar with the research area, you may submit your work yourself or your faculty mentor may submit it. If you are a single author, you will be the main contact. If you are one of multiple authors, decide who will be the main contact and have him/her submit on behalf of all.

5. Proofread, proofread, proofread.

Submission Deadline for Volume IX: June 1, 2014.