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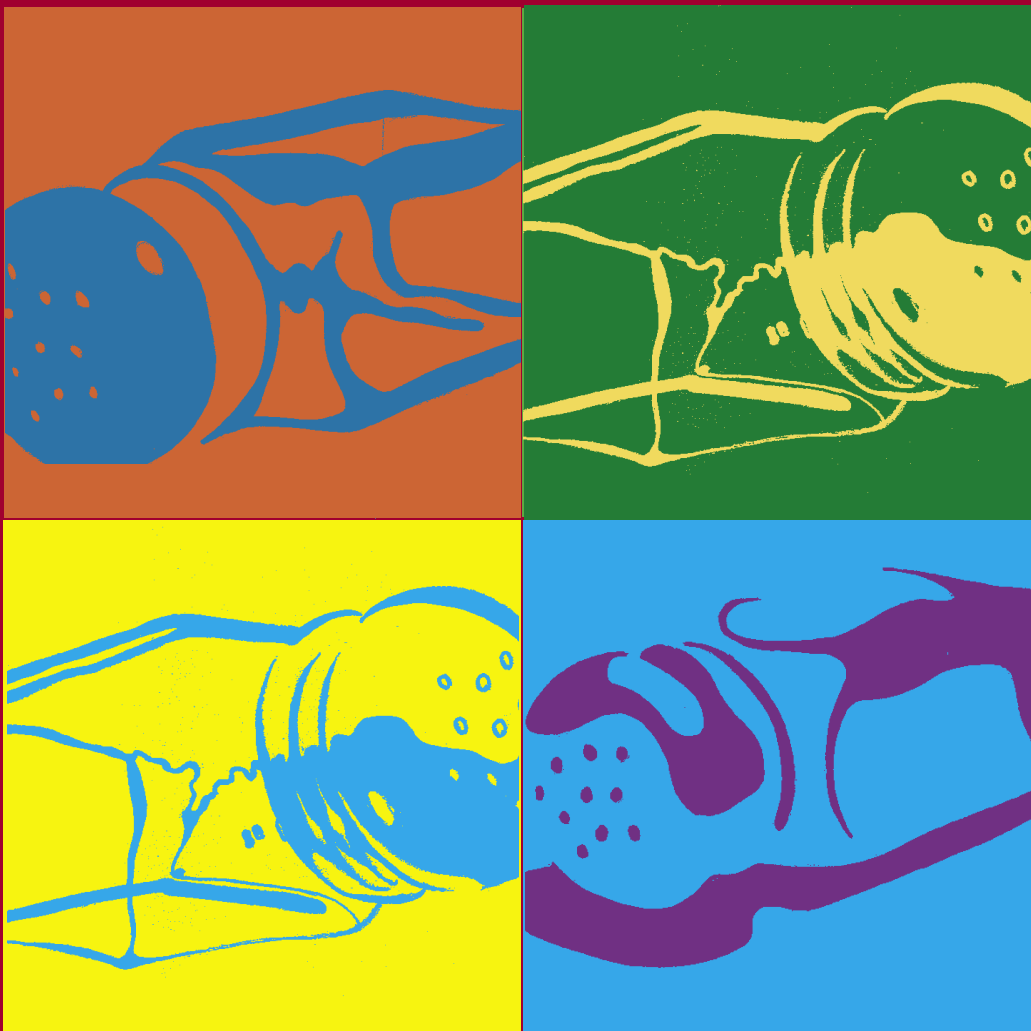


BRIDGEWATER
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VOLUME VII
2010-2011

The Undergraduate Review

A JOURNAL OF UNDERGRADUATE RESEARCH AND CREATIVE WORK



Adapted from Andrew Linde

Andrade, Baptista, Berglund, Blackmon, Engley, Faustino, Frare, Fuller, Holt, Linde, LaMotte, Myllmaki, Pacha-Sucharzewski, Paton, Schaen, Speranza, Hughes, Pumphrey, Scarbrough, Spooner, Westgate, Liousas, Rocha

Letter from the editor

“Nothing has such power to broaden the mind as the ability to investigate systematically and truly all that comes under thy observation in life.

Marcus Aurelius

Anyone who knows me knows I love a good quote. So, I’m guessing that many of you are probably thinking, *Marcus Aurelius, really?* There was no one to quote who lived beyond the year 180? But hear me out: While Aurelius is probably best known for his cunning leadership as Emperor of Rome (161-180 CE) he was also a mathematician, a lover of law and science, a philosopher, a politician, an avid writer and reader. If he were alive today, he would subscribe to *The UR*, he would friend us on Facebook, even, because we publish what every dabbler enjoys—a little of everything. Volume VII features work from the social and natural sciences, mathematics, humanities, and arts. Aurelius was a thinker, a ponderer, an observer, and a systematic investigator, like the students featured in this year’s volume. The research on display in this year’s journal required inquiry and relentless pursuit of observation, resulting in some of the best, most polished work published by *The Review* thus far. And while he wouldn’t tear up over the aesthetics of it, or entertain any of the editorial whining about the layout issues or proofing the math formulas (he was a Stoic, after all) I like to think he would have it on his coffee table.

As always, the staff of *The Undergraduate Review* would like to thank the Adrian Tinsley Program (ATP) for funding the journal, The Office of the President, the Bridgewater Foundation, The Office of Undergraduate Research, and the faculty readers. Most of all, thank you to the dedicated BSU students and mentors for their time, effort, and hard work on display here.

I invite you to witness this “broadening of minds” as you read the diverse collection of scholarly and creative work showcased in this volume—a true testament of the conquering quest for knowledge here at BSU.

It is my pleasure to present to you Volume VII of *The Undergraduate Review*

STACY M NISTENDIRK

Managing Editor, *The Undergraduate Review*

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*National Conference on Undergraduate Research (NCUR) 2011 Presenter

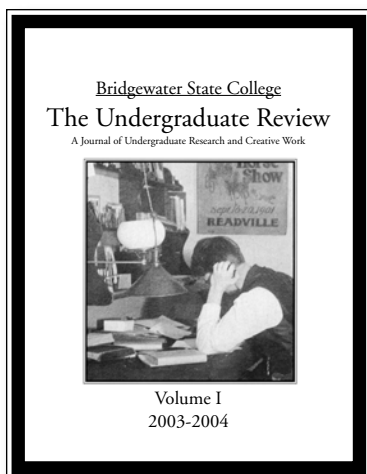
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Inaugural Volume

This journal can tell you a lot.

S herry Blackmon's article on the threat posed by Triclosan to municipal drinking water, for instance, guarantees that you won't ever look at antibacterial household products the same way again. Andrew Linde's graphic art will likely invoke deeper appreciation of the superbly functional design of items of "ordinary" use. (Think salt shakers.) And Sarah Fuller's examination of otherwise-forgotten primary historical documents may well inspire your curiosity about the reasons some powerful women of the early 20th century fought *against* the right to vote.

Within these and all of the fascinating research articles selected for inclusion in *The Undergraduate Review* is also a story of tremendous achievement about which Bridgewater State University can be very proud. It is a story that impelled me to move with my family halfway across the country to take on this job of directing the undergraduate research program at BSU. And it's a story that engages the hardest-working faculty I've ever seen in the challenging and exhilarating endeavor of mentoring student researchers.

You see, this journal tells a story about an undergraduate research program that is like no other: a program that offers access to and support for research opportunities to a true diversity of students. Our researchers are not required to be honors students, though we certainly have many of those. And they do not typically have a family legacy of higher education to set them up for scholarly achievement. What they have instead of certain advantages before they arrive at BSU, are incredible supports once they get here: research and presentation opportunities (at appropriate levels of rigor) from their first semester of coursework; faculty mentors who engage their interest in inquiry and provide supportive initiation into the expectations of scholarly work; and the financial backing of Adrian Tinsley Program (ATP) grants to make it possible to purchase the lab supplies and books needed for research, to travel to research sites and conferences, and to gain a measure of relief from the demands of full-time work in order to secure the necessary time to conduct research.

That degree of access and support to research opportunities is remarkable in and of itself. The fact that the program maintains excellence in student scholarship makes undergraduate research at BSU all the more extraordinary. A student who hopes to become one of the few Cape Verdeans ever to achieve a doctorate in Physics will get his research start in this program. Some of our many students who are the first in their families to attend college will conduct research in China this summer with ATP funding. With the development of strong research skills, dedicated mentoring, and financial support, BSU students who might never have imagined themselves as proficient scholars are becoming bona fide researchers, engaged in some of the most compelling questions and modes of inquiry in their fields.

That exceptional commitment to both access and excellence is the story this journal tells. The articles have been written by students new to college as well as seniors writing honors theses; first-generation college students and grandchildren of teachers; immigrants to this country along with those whose entire extended families live in southeastern Massachusetts—all of whom have taken on the demanding and exacting work of scholarly research, and whose results are proudly shared with you.

JENNY OLIN SHANAHAN, PH.D.
Director of Undergraduate Research

The Undergraduate Review

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ATP Grants

THE UNDERGRADUATE REVIEW
VOL. VII

The Adrian Tinsley Program Grants section contains the results of the work of students who worked under the guidance of a faculty mentor during the ATP Summer Grant program. The opportunity for this ten-week research experience is open to all undergraduates, including both students with outstanding academic histories and students who show great promise. Grants were approved based on the quality of student proposals, and you will see the results of the extraordinary efforts these students produced.

Le Mélange of Francophone Culture in William Wells Brown's *Clotel*

SANDRA ANDRADE



Sandra Andrade is a senior double majoring in English and History. She is also minoring in Secondary Education.

She conducted her research with funding from a 2010 Adrain Tinsley Program Summer Grant under the mentorship of Dr. Molly Robey of the English Department. Her work was accepted for presentation at the 2011 National Conference on Undergraduate Research. After graduate school, Sandra's future plans are to teach English as a Secondary Language along with History in high schools.

In *Clotel; Or, The President's Daughter*, William Wells Brown argues that for fugitive African American slaves France represented freedom. This connection between African Americans and France that is familiar to many Americans in the twentieth century was existent at the time of Brown's own escape. The Francophone culture became a major motivator in the author's personal life and also in his writings. This project covers many themes, including the "tragic mulatta", American identity, American freedom and slavery, and explores readings from Anna Brickhouse's *Transamerican Literary Relations and the Nineteenth-Century Public Sphere*, and Eve A. Raimon's *The Tragic Mulatta Revisited*. Brown questions not only the impossibility of being accepted in the American society as a person of mixed race but argues that the French are better interpreters of the Declaration of Independence than the Americans. In France, Brown found a secure home among French elites and his positive experience with francophone culture helped shape his most well-known work of literature, the novel *Clotel*. In this sentimental novel, Brown creates a character whose hope for freedom is based upon the author's experiences in France. Being the first western European nation to abolish slavery in its colonies, France provided hope to many African Americans.

The French and Haitian Revolutions

To better understand the abolishment of slavery in the French colonies, it is vital to understand the French Revolution, which began in 1789. The recent, successful American Revolution influenced the French during their revolution. A new form of government was created, the National Assembly, which drafted the first French constitution, known as *Déclaration des Droits de l'Homme et du Citoyen de 1789* (The Declaration of the Rights of Man and of the Citizen). In 1794, the National Assembly abolished slavery in all French colonies.

During the French Revolution, across the Atlantic Ocean, the French colony known as Saint-Domingue (Haiti) began their own pursuit of freedom. Haiti's successful revolt against slavery from the French stood as a threatening example to other colonizing nations and served as an inspiration to many slaves who hoped for freedom. By 1800, Toussaint L'Ouverture, leader of the Haitian slave revolt, had taken over the whole colony, leaving the French with only one alternative, freeing all the slaves. However, the Haitian Revolution created anxiety in France, the United States and other slave holding countries. On January 1, 1804 Haiti became the first and only black colony to have

succeeded in gaining their independence in the world. The Republic of Haiti became the first black Republic.

The Haitians' Success Becomes the Anxiety of the Americans

In the United States, Americans were aware of the Haitian Revolution. Not only was Haiti a threat to slaveholders in the US, but the independent country was also viewed as a danger by President Thomas Jefferson. By 1806, all maritime connections were abolished between Haitians and Americans by the US government. After the Haitian Revolution, Louisiana inspired American anxiety as well. In this case, an isolation of the territory and the US was impossible. The Haitian Revolution accented the French's power and threat towards the US. Many Americans thought that the French would install on the territory. This concern would be resolved in 1803 with the Louisiana Purchase.

Anna Brickhouse's *Transamerican Literary Relations And the Nineteenth-Century Public Sphere* demonstrates the importance of Haitian and African American fellowship through print culture. Brickhouse argues that "though much less studied than its Anglophone counterpart, a dissenting francophone print culture emerging in the early nineteenth-century United States became the logical scapegoat for a slaveholding South already terrorized by the history of Haiti and convinced of the dangers of mass migrations from the French West Indies" (85). She alludes to the *Revue*, a newspaper that "was devoted explicitly to material of and about the colonies of Western imperialism, largely those of Americans" developed by Caribbean scholars (Brickhouse 86). The *Revue* addressed thoughts, ideas, problems and the injustice that Africans and African American slaves were enduring during the nineteenth century.

Many American slaves tried to escape or revolt against the unjust system. William Wells Brown was one such slave. The author escaped slavery in 1834, with "the love of liberty that had been burning in his bosom for years" (*Clotel* 17). Brown was born in Lexington, Kentucky in 1815 to an enslaved mother and a relative of his owner. After enduring much harsh treatment from several masters, he decided to try to escape slavery twice, once alone and once with his mother, both resulting in failure. He finally escaped on January 1, 1834 from the help of a Quaker, from whom Brown would adopt his name Wells Brown. Soon the fugitive slave reached Canada and resided there for a few years before joining the Western New York Anti-Slavery Society. Brown would go on to publish major works such as the *Narrative of Williams W. Brown, a Fugitive Slave, Written By Himself* (1847), *Three Years in Europe: Or, Places I Have Seen and People I Have Met* (1852) and *The Black Man: His Antecedents, His Genius, and His Achievements* (1863). At the end of his

life, Brown devoted his life to fight for the struggles of African Americans. He died in 1884 in Chelsea, Massachusetts

France Represents Freedom

In *Clotel*, the reader finds many references to France being a safe haven for fugitive slaves. Brown refers to great French philosophers such as Rousseau in the novel, and the novel's famous ending terminates in France. These examples suggest that Brown's connection with France is much more than a simple historical context. His earlier work of nonfiction, *Three Years in Europe: Or, Places I Have Seen and People I Have Met*, provides an enhanced perspective on the significance of Brown's interest in France.

Three Years in Europe, published in London in 1852, became the first African American travel narrative. This collection of letters written by Brown gives an account of his experience in Europe and dedicates three letters out of twenty-three to France. This book later leads him to write *Clotel*, in which he is able to transcribe certain European thoughts and ideas about liberty. In this manuscript, "Brown's deliberate repudiation of his homeland and the construction of an interracial nation elsewhere" is perceived (Raimon 13). A comparison of the European nations with United States allowed Brown to show his appreciation of his acceptance in Europe. The author was allowed to assist at many conventions throughout Europe and share his own belief of abolishing slavery with many "friends of peace" (*Three Years in Europe* 17). One of the main reasons why the author travelled to France was to assist at the Second International Peace Conference in 1849. As Brown states in his travel narrative, "my coloured face and curly hair did not prevent my getting the invitation" (*Three Years in Europe* 50). Brown's exhilaration at his color not being a factor of refusal was a major influence on his impression of the French culture. The conference raised global awareness of the injustice in the world and also established a global engagement to abolish slavery. Amongst the crowd "of a good sprinkling of the French" Brown was able to meet Victor Hugo, the President of the Congress (*Three Years in Europe* 23). After the reception, Brown was introduced to many French delegates, most importantly Madame de Tocqueville, the wife of the Minister of Foreign Affairs, who states to Brown, "I hope you feel yourself free in Paris" (*Three Years in Europe* 36). Although Brown was known as "an American slave," no French man or woman denied his welcome into the country (*Three Years in Europe* 36). Another episode that allowed Brown to compare the Americans and the French was during the convention. Americans were invited to the convention, and at the sight of Brown, two Americans continued to insult him by stating, "That nigger had better be on his master's farm" (*Three Years in Europe* 24). Brown demonstrates the ability of the French to

accept a person of color. However, he obviously demonstrates that certain Americans are still not prepared for this change. To Brown, France represented the “progress of civilization, and the refinement of the nineteenth century,” a growth that the United States was not experiencing (*Three Years in Europe* 20). This “progress of civilization” was happening in the ex-colonies of France. Brown’s experience in France was not his only link to francophone culture. In the next few paragraphs, I will connect Brown’s life and his experiences with three dominant centers of francophone culture during this era, Haiti, New Orleans, and Canada. These former colonies of France had a different connection with Brown than the “motherland,” which remained significant in his life.

Brown’s courage to escape increased after Haiti’s great revolution for freedom. Later in his career Brown would express his gratitude towards the Haitian Revolution in his book *The Black Man: His Antecedents, His Genius and His Achievements*. This book, published in 1863, expressed Brown’s revolutionary mindset, and in it he dedicates a section to Toussaint L’Ouverture. Brown goes as far as to compare L’Ouverture to the United States’ first president George Washington and the American struggle for freedom. Brown states,

Toussaint’s career as a Christian, a statesman, and a general, will lose nothing by a comparison with that of Washington. Each was the leader of an oppressed and outraged people, each had a powerful enemy to contend with, and each succeeded in founding a government in the new world. Toussaint’s government made liberty its watchword, incorporated it in its constitution, abolished the slave trade, and made freedom universal amongst the people. Washington’s government incorporated slavery and the slave trade, and enacted laws by which chains were fastened upon the limbs of millions of people. Toussaint liberated his countrymen; Washington enslaved a portion of his. When impartial history shall do justice to the St. Domingo revolution, the name of Toussaint L’Ouverture will be placed high upon the roll of fame. (*The Black Man* 105)

Brown’s struggle for freedom continued far into New Orleans. Brown’s most tragic moments occurred during his employment as a “superintendent of the slave gangs” (*Clotel* 7). Brown’s job consisted in preparing slaves for the New Orleans market to be sold. This was not only “a subsequent period of forced employment for a slave trader in New Orleans [which] induced [Brown] to flee the South” (Hodges v). For the author it was a period of terrible separation from his siblings, the sale of his own mother in the New Orleans market, deaths, abuse and the injustice towards slaves.

Brown escaped in 1834 where he follows the North Star to lead him to what was once referred to as New France, Canada. Thousands and thousands of slaves had found their freedom in Canada. As a worker on the steamers on Lake Erie, Brown continued to help other slaves cross the border to freedom. In 1842 he “conveyed no less than sixty-nine runaway slaves across Lake Erie, and placed them safe on the soil of Canada” (*Clotel* 24).

***Clotel* and France**

By analyzing *Clotel*’s thoughts and feelings and different episodes in the novel, we understand how Brown’s thoughts about freedom and race develop in the 1850s. *Clotel* was written in 1853. *Clotel* is not only the name of the novel, but also one of the main characters. She is the daughter of the former president Thomas Jefferson. Throughout the novel we follow the life of *Clotel* and her sister, Althesa, both of whom are sold into slavery as sexual objects. Brown recreates the impossible situation in which society’s laws do not allow *Clotel* to escape slavery. She is able to escape the South, but is unable to continue her journey to freedom because of her attachment to her daughter, Mary. She returns to the South where she is captured and soon chooses death over slavery.

At the beginning of the novel, we are presented with *Clotel*’s family, the mother Curren and her two daughters, *Clotel* and Althesa. Although all three females are slaves, Curren manages to situate herself in what the author refers to as a “higher aspiration . . . that of becoming the finely-dressed mistress of some white man” (*Clotel* 45). The impossibility of *Clotel*’s escape from slavery is due to society and generational inheritance. Brown challenges his readers when he doesn’t give Curren just any slaveholder as her partner. Being the mistress of Thomas Jefferson, Curren gives the reader false hopes that freedom from slavery is possible. The use of Thomas Jefferson, one of the Founding Fathers of America, as the father of *Clotel* “was a strategic literary choice” (Fabi 8). The paradox between American liberty and the acceptance of slavery is an essential theme in *Clotel*.

In the novel “Jefferson being called to Washington to fill a government appointment,” is soon contrasted with the selling of his mistress and his two daughters (*Clotel* 45). By using Thomas Jefferson as a character in the novel, Brown is able to compare the French constitution and the American constitution. The Declaration of Independence was a model for the Déclaration des droits de l’Homme et du Citoyen. Although the Declaration of Independence heavily influenced the French constitution, Brown argues that the French are better interpreters than the Americans of their own constitution. In the French constitution, “men are born and remain free and

equal in rights” regardless of color whereas in the Declaration of Independence, “all men are created equal” except black Americans. After the Déclaration des droits de l’Homme et du Citoyen was established, the liberty of all people, whites blacks, men, women, farmers and slaves was secured. However, the Declaration of Independence only protected the liberty of white Americans.

Arriving at the Conference in Paris, Brown immediately compares both constitutions when he states, “Had I been in America, where colour is considered a crime, I would not have been seen at such a gathering, unless as a servant” (*Three Years in Europe* 35). His invitation to a gathering of white and black men demonstrated that he was accepted. In Brown’s narrative, the French already understand the importance of African Americans in the US nation and culture. Even if blacks were not accepted in the US their opinion was of importance elsewhere. The participation of blacks in important international and national affairs occurred at a slower pace in the US. Clotel’s fate shows the consequences of the slow progression of American mentality during the nineteenth century and her biracial background represents that “America’s identity is both interracial and tragic from its earliest beginnings” (Raimon 12).

Brown claimed France to be a safe refuge compared to the US, and he rejoiced in the philosophy of the French philosopher, Rousseau. In the novel the author discusses the French ideology of freedom that dates back to eighteenth century Europe. A conversation between two old school friends, Mr. Peck, Curren’s slaveholder, and Carlton, a Northerner, demonstrates Brown’s learning from Rousseau. Brown explains in *Three Years in Europe*, “the love of freedom is one of the those natural impulses of the human breast which cannot be extinguished. Even the brute animals of the creation feel and show sorrow and affection when deprived of their liberty. Therefore is a distinguished writer justified in saying, “Man is free, even were he born in chains”” (163). As Mr. Peck defends the reasoning of slavery through the Bible, Carlton answers, “I regret I cannot see eye to eye with you, [...] I am a disciple of Rousseau, and have for years made the rights of man my study; and I must confess to you that I can see no difference between white men and black men as it regards liberty” (*Clotel* 71). Here Brown shows that both men studied in Northern states but one has been transformed by slavery while the other has remained untouched by slavery. Slavery has influenced Mr. Peck to believe that the Bible supports the idea of inhumane treatment towards blacks. On the other hand Carlton, who remained in the North, continued to support the French philosopher’s idea that liberty has no color because every man is free and becomes a slave due to the injustice of society. Rousseau’s

philosophy, best known by the phrase “Man is born free, but he is everywhere in chains,” helps support Brown’s idea that society’s pressure or chains shouldn’t allow one human to have control over another.

Clotel and the Tragic Ending

The tragic fate that Brown announces in the beginning of the book through Curren is a prime example of the fate of an American “mulatta” woman compared to what is shown at the end of the novel, a “mulatta” woman living in France. As we learn in *The Tragic Mulatta Revisited*, the definition of a “tragic mulatta” is “a single drop of midnight in her veins, [she will] go down to a tragic end” (5). With this description of a “tragic mulatta” Brown is able to demonstrate a never-ending cycle of the females in the *Clotel* until Mary reaches France. Before learning the tragic ending of Clotel, Brown prepares his readers in the chapter “To-Day A Mistress, To-Morrow A Slave” of his novel. Curren has offspring from a powerful man but cannot escape slavery due to her predestined future. Although Althesa’s future was promising, she dies also, leaving the harsh ruling of slavery on her two daughters, Ellen and Jane. Their doom would begin like their ancestors, “after a fierce contest of the bidders, the young ladies were sold, one for 2,300 dollars and the other for 3,000 dollars” and end like a ‘tragic mulatta,’ both ladies preferring death than slavery (*Clotel* 171).

This inescapable fate drove Clotel to marry her white lover Horatio and hope to leave the US. Soon after her marriage “Clotel now urged Horatio to remove to France or England where both her and her child would be free and where colour was not a crime” (*Clotel* 64). The novel is not only about escaping slavery but also about escaping the traditional “tragic mulatta” theme. Removing to France would end the lineage of slavery at Clotel and not be passed onto Mary. The curse of the “tragic mulatta” was already in Mary’s veins. Her existence was already a crime, “[Mary’s] complexion was still lighter than her mother,” but would still not permit her from enduring slavery; her only hope was to escape (*Clotel* 63). Clotel already knew her future by looking at her mother’s future. She also knew her daughter’s future; “as [Mary] grew older, [she] more and more resembled [her] mother” (*Clotel* 63). In the original sentence Mary is not even given a name in the description but is referred to as “it.” Clotel’s daughter is already referred to as insignificant to US society. Clotel’s fear is not imaginary; it is real.

Clotel dreams of escaping, but as the novel develops it becomes clear that France offers greater freedoms than England. One of the novel’s characters, the fugitive slave George Green, offers some answers to why the author would prefer France to England. George, a former slave belonging to Horatio, also “could boast that his father was an American statesman. His

name was George. His mother had been employed as a servant in one of the principal hotels in Washington, where members of Congress usually put up. ... George was as white as most white persons. No one would suppose that any African blood coursed through his veins" (*Clotel* 187). Through George's love for liberty and a possible free life with Mary, George escapes slavery. An interesting passage struck me in George's story. After reaching England, "George was so white as easily to pass for a white man, and being somewhat ashamed of his African descent, he never once mentioned the fact of his having been a slave" (*Clotel* 195). Brown situates the character in England, where he could be free. However, George didn't feel comfortable enough to mention his African background. Instead the fugitive slave resented his ancestors. An episode in *Three Years in Europe* made me think that not only was George's episode important to take into consideration but also that Brown's own experience was different in France than in England. Brown wrote while in Edinburgh, "I saw the changed experienced by every fugitive slave in his first month's residence in his country. A sixteen months' residence has not yet familiarized me with the change" (*Three Years in Europe* 115). Brown's stay in England was difficult, and the author continued to think about his stay in France. Although he travelled all over England, the author wrote, "I have seen nothing in the way of public grounds to compare with the gardens of Versailles, or the Champs Elysses at Paris" (*Three Years in Europe* 113). Brown's connection with France seemed far greater than with England. Paul Gilroy states, "some speak of, like Wells and Wright, in terms of a rebirth that Europe offered them," I believe that Europe didn't give Brown a rebirth but more confidence in his struggle with slavery (*The Black Atlantic* 19). The author and George were connected to France. George was able to reveal who he was when he visited France and not when he was living in England. The story of George Green is not only told in *Clotel* but also in *Three Years in Europe*, demonstrating its importance.

Clotel and her niece Jane foresee the future that France could provide for them. Jane had hoped for freedom when she was trapped into slavery after her mother's death; "Jane though only in her fifteen year, had become strongly attached to Volney Lapuc, a young Frenchman" who she put her hope for escape into. Her expectation died along with her and her lover, who was killed by her owner (*Clotel* 172). In this episode in the novel, an American kills a Frenchman, metaphorically signifying the destruction of freedom. The author asserts clearly through Mary that even though her two previous family members didn't reach France and freedom that she would. In this passage Brown speaks of the reunion of both slaves, "We can both but blush for our country's shame when we recall to mind the fact, that while George and Mary Green, and numbers of other fugitives from American slavery, can receive protection

from any of the governments of Europe, they cannot return to their native land without becoming slaves" (*Clotel* 205). France provided Mary with a happy ending. Brown's summary of the country clearly explains his approval of France, "Few nations are more courteous than the French. Here the stranger, let him come from what country he may, and be ever so unacquainted with the people and language, he is sure of a civil reply to any question that he may ask. ... I was not laughed at once while in France" (*Three Years in Europe* 58).

In *Clotel's* final episode, Brown demonstrates freedom and the overshadowing of a racist society as Clotel jumps off the Long Bridge in Washington D.C., preferring death over slavery. He leaves his readers with a paradoxical thought. Clotel controls her life not society. Brown's situation was similar. He escaped slavery and ended up in Europe. Brown's slaveholder, Enoch Price, conveyed to Brown that if he wanted his freedom it would cost 100 pounds. Brown demonstrated his control over his life and answered Enoch Price by saying, "But I cannot accept of Mr. Price's offer to become a purchaser of my body and soul. God made me as free as he did Enoch Price, and Mr. Price shall never receive a dollar from me, or my friends with my consent" (*Narrative ix*).

Both fictional and non-fictional individuals are at odds with American society. Death may be a solution for Clotel, and escape may be a solution for Brown and Mary. Nonetheless, Brown questions if the decisions were of personal choice or was there no solution out of society's chains? In this first African American novel and the author's personal life, the only possible solution is to go where there is acceptance of color and freedom for all.

Conclusion

As Brown put forth in his novel, *Clotel*, France was freedom. At the end of his novel Mary and George Green experience freedom and acceptance in France. A century later, many important African Americans migrated to France hoping to find a more suitable life. Many know of Josephine Baker, the entertainer and actress, Victor Séjour, a playwright and the author of *Le Mulâtre* (The Mulatto) and Barbara Chase-Riboud, a novelist and poet. All these African Americans travelled to France in search for a new life. A life of freedom to sing, entertain, write, and be acknowledged.

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A Cross-National Examination of Body Image and Media Exposure Comparisons Between Jordanian and American Women

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Body image, defined by Cash and Pruzinsky (2002), as “the multifaceted psychological experience of embodiment,” is a combination of attitudes, thoughts, emotions, and behaviors regarding one’s body. Of particular interest to this study are the concepts of evaluation of appearance and investment in appearance. Appearance evaluation refers to one’s feelings of how attractive they consider their body to be, and how satisfied they are with their believed level of attractiveness (Cash, 2000). Appearance orientation refers to how much importance an individual places on attractiveness and how invested that individual is in appearance, often measured by grooming behaviors (Cash, 2000). Body image is an important research area due to the effects a negative body image can have upon self-esteem, eating, and exercising behaviors; which can further lead to problems such as anxiety disorders, depression, and problems with sexual functioning (Cash & Pruzinsky, 2004).

In the West, women have been plagued with body image dissatisfaction to the point where it has become the norm, coined by the phrase “normative discontent” (Rodin, Silberstein, & Striegel-Moore, 1985). Research suggests that the media may be largely to blame for this view (Ruggiero et al., 2000). Non-Western cultures with little to no exposure to Western culture have been found to have fewer body image concerns than Westerners (Lam et al., 2009; Ruggiero et al., 2000). However, as cultures modernize, and subsequently westernize, younger generations appear to experience some negative repercussions from the media (body image concerns and eating disorders) that prior generations had been shielded from (Xu et al., 2009).

The majority of body image research is conducted on samples consisting of young women (Ruticus, Hubley, & Zumbo, 2008; Midlarsky & Nitzburg, 2008). It is important to realize though that body image does not exclusively impact teenage girls. In fact, body image concerns have been found to emerge at a very young age and can continue throughout the lifespan. For example, Davidson, Thill, and Lash (2002) conducted a study to examine children’s body shape preferences in male and female children in the first and fifth grade, from three different countries (United States, China, and Turkey), and found that even at ages as young as six years old, children showed preference for a thinner body type.

Body image issues often become less important to women as they age; perhaps

due to greater emphasis being placed on their career and/or motherhood; but this is not true for all women (Tiggemann & Lynch, 2001). For some women, aging is the factor that brings on body image dissatisfaction and the development of eating disorders (Midlarsky & Nitzburg, 2008). The ideal body type is even more unattainable as one gets older, yet midlife and elderly women still report feeling pressure to obtain a figure of youthfulness. The presence of wrinkles, gray or thinning hair, reduced elasticity of skin, and weight gain associated with menopause make it even harder to maintain youthful looks, and can lead to increased body image dissatisfaction (Lewis & Cachelin, 2001; Ferraro et al., 2008).

While some women are preoccupied with reaching the thin ideal, they often misconstrue their own true body size (Toriola et al., 1996). Many factors can affect one's perception and satisfaction with their body, including gender, age, body size, and ethnicity. Social factors, including information or comments from parents or peers, such as teasing and modeling, also play a vital role in one's body image satisfaction (Groesz et al., 2002).

The three sociocultural influences correlated with body image dissatisfaction and eating disorders are parents (usually mothers), peers, and the media (Lam et al., 2009, Williams et al., 2006). It has been suggested that it is from these three sources that men and women obtain the information regarding which body size and shape is the most attractive, and the importance of obtaining this ideal shape. Media exposure has been researched extensively and shown to have a powerful effect on body image (Tiggemann et al., 2005; Mazur, 1986). In the West, the body size women are expected to have is a figure that is angular, lean, and toned, generally known as the "thin ideal" (Williams et al., 2006). Women who have obtained this body type are considered to be more beautiful, competent, successful, and have greater self-control than women who are not thin (Toriola et al., 1996). Exposure to the media and the thin ideal can lead to a negative body image, since it is nearly impossible for most women to obtain this body type (Groesz, Levine, & Murnen, 2002).

Although the destructiveness of striving to meet the thin ideal is widely recognized, research examining whether the media is to blame for internalization of the thin ideal suggests that the effects of the media are nuanced. Stice, Schupak-Neuberg, Shaw, and Stein (1994) found that media exposure had a significant effect on eating disorder symptoms and that internalization of sociocultural pressures mediated the adverse effects (eating disordered symptoms and body image concerns) of the thin ideal, but media exposure did not have a direct effect on ideal-body stereotype internalization.

Most of the research examining the effects of the media on body image have focused on the thin ideal; however, the ideal image is not only thin, she is also tall with smooth, tan skin, long blond hair, and large breasts (Groesz et al., 2002; Englis et al., 1994). These unrealistic images are often created by the media by air brushing photographs of women who have often turned to surgical procedures to obtain the body a model is expected to have, though fairly impossible to obtain naturally. Even though the United States is culturally diverse country, it has a narrow concept of beauty that excludes a majority of the population (Groesz et al., 2002).

Until recently, eating disorders were rarely documented in areas outside of the West (Lam et al., 2009). Research shows though that rates of eating disorders and body dissatisfaction are rising as non-Western countries continue to modernize and adopt Western values (Lam et al., 2009). A classic example of the deleterious effects of the media can be seen in research conducted on the island of Fiji (Becker, 1995). Prior to 1995, the women of Fiji had relatively large body sizes, and the larger women were considered to be most attractive. However, soon after the advent of television on this island in 1995, adolescent girls became concerned with losing weight to look more like their favorite television stars and began engaging in disordered eating behaviors, something previously unheard of there (Becker et al., 2002; Becker et al., 2005).

Not all research supports a connection between the media and negative body image. Jane, Hunter, and Lozzi (1999) found that identification with the Cuban culture was more important than media exposure in predicting eating disorders. Culture also has been shown to play a role in body size preferences of children, with Middle Eastern children choosing heavier ideal female body types than both Chinese and American children (Davidson, Thill, & Lash, 2002). Thus, there may be characteristics of Middle Eastern culture that shields its children from ideas such as the thin ideal, allowing them to view a heavier, healthier body type as most attractive. As exposure to Western media increases, so does the risk of falling victim to the standards portrayed in the media, and the emotional toll of attempting to reach those standards.

Abdollahi and Mann (2001) conducted a study comparing Iranian women living in Iran and Iranian women who had immigrated to America. They hypothesized that the Iranian women in America, having substantially more exposure to Western culture and media, would exhibit higher rates of eating disorders. Surprisingly there were hardly any significant differences between the Iranian women living in either country. Two possible explanations for these findings are that Western values still remain in Iran from before the Islamic revolution

of 1978, or that the large sample of Iranians living together in the area sampled (Los Angeles) may be buffering the effects of Western society by preserving the collectivism associated with their culture. Thus, even within the Middle East, vast differences are likely to be found due to remnants of previous Western presence in some areas and current increasing Western presence in other areas.

Jordan

According to the Central Intelligence Agency (2010), the official language of the Hashemite Kingdom of Jordan is Arabic; however, the English language is also widely used. Jordan is one of the more liberal countries in the Middle East, although there are still some areas that are considered conservative. It is not mandatory for women to wear the *hijab*, the headscarf, but many women opt to wear it anyway. The initial reason for wearing the *hijab* was to protect women from sexual harassment and to promote equality among the sexes (Nydell, 2006). Unlike Westerners, many Arabs do not view this as a sign of oppression. In fact, the percent of women wearing the *hijab* has increased over the last 20 years, at the same time that their society is being Westernized and modernized (Nydell, 2006). The one study examining whether Western advertising has a negative impact upon eating and body image in Jordanian women found that internalization of the media was related to restrained and emotional eating and desired weight loss, but the media did not appear to have negatively affected body image (Madanat, Brown, and Hawks, 2007).

The principal aim of the current study was to examine the effect of media exposure and internalization on body image in two distinctly different cultures: a Western culture, using a college sample from the U.S., and a Middle Eastern culture, using a college sample from Jordan. In order to also investigate generational effects, a smaller sample of some of the mothers of the participants was also obtained. It was hypothesized that the American women would report greater body dissatisfaction and media exposure than the Jordanian women. It was also hypothesized that the Jordanian college students would have had greater exposure to the media and therefore exhibit greater body image dissatisfaction than the sample of their mothers. Finally, it was hypothesized that American women would report significantly higher appearance orientation scores than Jordanian women; furthermore, that Jordanian college women would have higher scores than the Jordanian mothers.

METHOD

Participants

The participants were college women and a subset of their mothers from two separate countries, Jordan and the United States. A total of 293 Jordanian college women from Yarmouk

University located in Irbid, Jordan and 62 of their mothers participated in this study as well as 149 college women from Bridgewater State University located in Massachusetts, United States of America and 26 of their mothers. The Jordanian students had a mean age of 20.79 years compared to 19.73 years for the American students. The Jordanian mothers averaged 46.08 years versus 48.27 years for the American mothers. Body Mass Index scores (BMI), a measure of body fat based on the relation of an individual's height to weight, were 23.42 for American students, 25.38 for American mothers, 21.67 for Jordanian students, and 39.56 for Jordanian mothers. The BMI of the American students was significantly greater than the Jordanian students and the Jordanian mothers had a significantly greater BMI than both the American mothers and the Jordanian students.

Procedure

American participants were recruited through an introductory psychology participant pool. All participants signed a consent form agreeing to participate. Participants were informed that they would be filling out questionnaires about their personal views, feelings, and attitudes, and were assured that their responses would be confidential. After completion of the battery of questionnaires, participants were debriefed and questions and/or concerns were addressed by the experimenters. All procedures were approved by Bridgewater State University's Institutional Review Board. Even though the northern Jordanian university did not have a formal institutional review board, its president granted permission to collect data at the university.

Consent forms and questionnaires given to Jordanian participants were translated from English to Arabic by a translator and then reviewed for accuracy by a second translator. Research assistants recruited Jordanian student participants from classrooms at the university. The research assistants assured students that participation was voluntary and that responses would be anonymous. Once informed consent documents were read and signed by students, questionnaire packets were dispensed. A research assistant was available throughout the process to answer any questions by participants. Upon completion of the questionnaire packet, a subset of the college women in both Jordan and the United States were given a debriefing form and a shortened questionnaire packet to send home to their mothers for voluntary participation.

Measures

Body image dissatisfaction was measured using the Multidimensional Body-Self Relations Questionnaire- Appearance Scales (MBSRQ-AS; Cash, 2000). The MBSRQ-AS consists of 34 questions yielding five subscales, three of which were used

to measure body image dissatisfaction: Appearance Evaluation (AE), Appearance Orientation (AO), and Overweight Preoccupation (OWP). Internalization of the media was assessed through the use of the SATAQ-3 (Thompson, 2004). The SATAQ-3 consists of 30 statements concerning the media and the feelings invoked by it and yields four subscales, three of which were used in this study: Internalization-General, Pressures, and Information. Two additional questions asked the participant to list the number of hours spent watching television in the last week, based on five different categories (News & Current Events, Health & Fitness, Fashion, Entertainment & Gossip, and Sports and Activities). Participants were then asked to do the same with the number of magazines read in the last week for each of these categories. The category for Sports and Activities was not used for this particular study.

Results

A 2 X 2 analysis of covariance (ANCOVA) was conducted to evaluate the effects of culture and generation on body image, while controlling for BMI. For this analysis, the appearance evaluation subscale served as the dependent variable. Generation and culture served as the independent variables and BMI as the covariate. There was a significant main effect for culture, $F(1,469) = 57.65, p < .01$, partial $\eta^2 = .11$. The covariate of BMI

significantly influenced the dependent variable of appearance evaluation, $F(1,469) = 43.02, p < .01$, partial $\eta^2 = .08$. Sample means and standard deviations for BMI and all other variables are presented in Table 1. Correlations among the variables by group are presented in Tables 2 and 3.

A 2 X 2 analysis of variance (ANOVA) was conducted to evaluate the effects of culture and generation on appearance orientation, or the extent to which an individual is invested in physical appearance. Appearance orientation served as the dependent variable and culture and generation as the independent variables. Results indicated a significant main effect for culture, $F(1,509) = 46.61, p < .01$, partial $\eta^2 = .08$, and generation, $F(1,509) = 28.58, p < .01$, partial $\eta^2 = .05$, as well as a significant interaction effect, $F(1,509) = 8.13, p < .01$, partial $\eta^2 = .02$ (see Figure 1). Due to the significant interaction between culture and generation, differences among generation for Americans and Jordanians were examined separately. There were no significant differences among the Americans, but there were significant differences among the Jordanians $F(1, 509) = 52.89, p < .01$. Follow-up tests indicated the Jordanian college women had significantly higher appearance orientation scores than the Jordanian mothers.

Table 1

Measure	Jordanian Mothers	Jordanian Students	American Mothers	American Students
	N = 61	N = 292	N = 26	N = 147
	M(SD)	M(SD)	M(SD)	M(SD)
Age	48.11 (5.94)	20.79 (2.81)	48.27 (4.63)	19.73 (3.29)
BMI	28.98 (4.83)	21.67 (3.96)	25.38 (4.73)	23.42 (4.45)
AE	3.59 (.63)	4.09 (.61)	3.26 (.76)	3.25 (.73)
AO	3.70 (.58)	4.22 (.42)	3.45 (.57)	3.61 (.56)
OWP	2.78 (.76)	2.89 (.93)	2.63 (.74)	2.74 (.99)
Intern-Gen	2.53 (.53)	2.78 (.67)	2.12 (.70)	3.21 (1.04)
Pressures	2.61 (.65)	2.82 (.68)	2.24 (.89)	2.98 (1.09)
Information	2.95 (.50)	3.27 (.50)	2.53 (.84)	2.84 (.94)
News	2.77 (3.89)	3.16 (6.02)	6.20 (3.99)	1.48 (1.56)
Health	1.68 (2.10)	2.60 (4.17)	1.06 (1.78)	1.02 (1.70)
Fashion	1.56 (2.22)	4.08 (5.84)	.85 (.79)	2.37 (2.64)
Entertainment	3.31 (4.25)	5.98 (7.89)	2.60 (2.81)	5.44 (4.70)

Table 2. Summary of Intercorrelations as a Function of Culture in College Women

Measure	1	2	3	4	5	6	7	8	9	10	11
1. BMI	--	-.26**	-.15*	.29**	.04	.05	-.07	.06	.05	-.15*	-.06
2. AE	-.33**	--	.28**	-.06	-.11	-.09	-.01	.05	.00	.09	.08
3. AO	.09	-.34**	--	.19**	.21**	.18**	.17**	-.00	.09	.23**	.14*
4. OWP	.14	-.56**	.45**	--	.20**	.43**	.04	-.09	.07	-.07	.00
5. Intern-Gen	.02	-.38**	.44**	.49**	--	.57**	.45**	-.20**	-.06	.17**	.06
6. Pressures	.11	-.42**	.38**	.45**	.80**	--	.46**	-.10	.04	.05	.06
7. Information	.07	-.17*	.38**	.26**	.66**	.63**	--	-.13*	-.07	.22**	.16*
8. News	-.13	.14	-.07	-.09	-.04	.04	.09	--	.67**	.17**	.15*
9. Health	.00	-.09	-.13	.22*	.19*	.17	.13	.19*	--	.38**	.13*
10. Fashion	-.07	.15	.04	-.03	.16	.17*	.22*	.25**	.27**	--	.57**
11. Entertainment-	-.13	.18*	.06	-.16	.06	.06	.12	.20*	.07	.53**	--

Note. Intercorrelations for Jordanian college women ($n = 292$) are presented above the diagonal, and intercorrelations for American college women ($n = 147$) are presented below the diagonal. Higher scores on BMI indicate a higher body mass index. Higher scores on AE indicate more positive feelings regarding body image. Higher scores on AO indicate greater concern with appearance, and higher scores on OWP indicate greater concern with becoming overweight. Higher scores on Internalization-General indicates greater internalization of media ideas. Higher scores on Pressures indicate greater pressure felt from the media to look a certain way. Higher scores on Information indicate greater reference to the media as a source of information regarding beauty ideals. Higher scores on News, Health, Fashion, and Entertainment indicate greater time spent exposed to media in each of these categories. BMI = Body Mass Index; AE = Appearance Evaluation; AO = Appearance Orientation; OWP = Overweight Preoccupation.

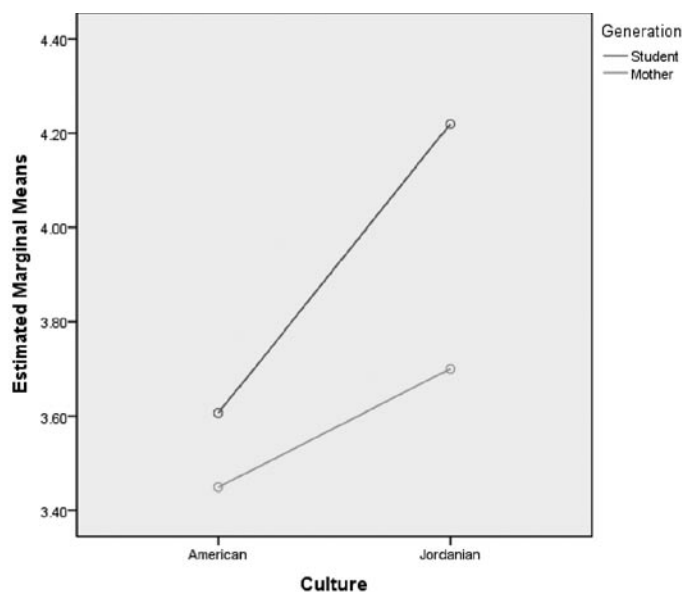


Figure 1. Estimated Marginal Means of Appearance Orientation.

Cross-cultural differences: College women. As presented in Table 1, the American college women were significantly younger than the Jordanian college women ($t(430) = -3.51, p < .01$) and had significantly larger BMI's ($t(409) = 3.98, p < .01$). The Jordanian college women had significantly higher appearance

evaluation scores ($t(434) = -12.02, p < .01$), appearance orientation scores ($t(428) = -11.66, p < .01$), information scores ($t(426) = -5.25, p < .01$), and spent significantly more time exposed to news ($t(380) = -4.15, p < .01$), health ($t(378) = -5.21, p < .01$), and fashion-related media ($t(383) = -3.94, p < .01$). The Americans had significantly higher internalization-general scores ($t(430) = 4.80, p < .01$).

Cross-cultural differences: Mothers. As presented in Table 1, the Jordanian mothers had significantly larger BMI's ($t(69) = -3.05, p < .01$) and higher scores on internalization-general ($t(80) = -2.64, p < .01$). The only significant difference in media exposure was that the American mothers reported greater exposure to news-related media ($t(65) = 3.28, p < .01$).

Cross-generational differences: Jordanians. Jordanian mothers had a significantly larger BMI ($t(308) = -9.62, p < .01$) than the college women (see Table 1). The college women had significantly higher scores on appearance evaluation ($t(342) = 5.67, p < .01$), appearance orientation ($t(338) = 6.39, p < .01$), internalization-general ($t(339) = 2.81, p < .01$), and information ($t(335) = 4.42, p < .01$). They also spent significantly more time exposed to fashion ($t(293) = 5.14, p < .01$) and entertainment-related media ($t(292) = 3.36, p < .01$).

Table 3. Summary of Intercorrelations as a Function of Culture in Mothers

Measure	1	2	3	4	5	6	7	8	9	10	11
1. BMI	--	-.32	-.16	-.11	.06	.16	.30	-.21	-.12	-.40	-.24
2. AE	-.28	--	.33	-.03	-.24	-.58**	-.02	.42	-.28	.07	.06
3. AO	-.09	.59**	--	.31	.43*	.24	.06	.44	-.30	.13	-.24
4. OWP	-.21	.12	.55**	--	.51**	.27	.02	-.20	.30	.59*	-.43
5. Intern-General	-.19	-.01	.28*	.61**	--	.73**	.24	.07	-.02	.17	-.30
6. Pressures	-.21	.20	.38**	.68**	.47**	--	.32	.05	.41	.20	-.28
7. Information	-.28	.14	.43**	.42**	.34*	.42**	--	.14	.33	-.27	-.38
8. News	-.02	.06	-.03	-.22	-.23	-.07	-.12	--	-.17	-.10	.01
9. Health	.01	-.11	.18	.18	.07	.21	.10	.21	--	.30	-.27
10. Fashion	-.31	.17	.19	.36*	.20	.30*	.26	.06	.61**	--	-.14
11. Entertainment	-.37*	.24	.21	.39**	.42**	.34*	.26	.05	.36*	.57**	--

Note. Intercorrelations for American mothers ($n = 26$) are presented above the diagonal, and intercorrelations for Jordanian mothers ($n = 61$) are presented below the diagonal. Higher scores on BMI indicate a higher body mass index. Higher scores on AE indicate more positive feelings regarding body image. Higher scores on AO indicate greater concern with appearance, and higher scores on OWP indicate greater concern with becoming overweight. Higher scores on Internalization-General indicates greater internalization of media ideas. Higher scores on Pressures indicate greater pressure felt from the media to look a certain way. Higher scores on Information indicate greater reference to the media as a source of information regarding beauty ideals. Higher scores on News, Health, Fashion, and Entertainment indicate greater time spent exposed to media in each of these categories. BMI = Body Mass Index; AE = Appearance Evaluation; AO = Appearance Orientation; OWP = Overweight Preoccupation.

Cross-generational differences: Americans. The college women scored significantly higher on internalization-general ($t(171) = 6.65, p < .01$) and pressures ($t(172) = 3.79, p < .01$). They also watched or read significantly more fashion ($t(153) = 5.15, p < .01$) and entertainment-related media ($t(160) = 2.63, p < .01$). The mothers were exposed to significantly more news-related media ($t(152) = -5.23, p < .01$; see Table 1).

Discussion

As hypothesized, culture showed a significant effect on body image satisfaction with Jordanians reporting significantly greater body image satisfaction than Americans. Surprisingly, the Jordanian students appeared to have greater media exposure than the American students, and the American mothers only surpassed the Jordanian mothers in news-related media exposure. American students reported greater internalization of media messages, but it was the Jordanian students who reported obtaining more appearance-related information from the media. Although Jordanian college women did report greater media exposure and internalization than the Jordanian mothers, the Jordanian mothers reported greater body image dissatisfaction, contrary to my hypothesis

For the Jordanian students, media exposure and internalization were not significantly correlated with appearance evaluation, suggesting that the media is not having a significant effect on these women's body image satisfaction. On the other hand, appearance orientation was associated with internalization of the media's messages regarding appearance and exposure to media related to fashion and entertainment. It is interesting that the Jordanian college women report significantly greater investment in their appearance, concern about their weight, and greater use of media for information about appearance than the American students, yet report a more positive body image.

Although the Jordanian college women reported spending more time with media than the American students, they reported significantly less internalization of appearance ideals than the American students. These results suggest that there may be cultural factors affecting internalization of the media. Two cultural differences between the U.S. and Jordan that have been shown to be related to body image are modesty of dress (Mustafa, 1992; Dunkel et al., 2010) and strength of their religious faith (Boyatzis & Quinlan, 2003; Mahoney, et al., (2005). The Qur'an asserts that the wearing of the *hijab* is not meant to be oppressive, but to protect the women from

being judged by their appearance (Nydell, 2006). Instead of struggling to change their bodies to meet the standards of the media, they may be more likely to accept their bodies as they are because they believe that is how God wished for them to look.

Appearance evaluation, appearance orientation scores and overweight preoccupation were all associated with media internalization in American college women, but not media exposure. It is possible that American students are not watching as much television or reading as many magazines as they normally would since they are reporting hours of exposure during the school year, when they are concentrating on homework and studying. The high media internalization may be residual from previous media exposure. As the research of Davidson et al., (2002) and Cash and Pruzinsky (2004) suggests, beauty ideals are established in childhood and stay with individuals until adulthood.

Like their daughters, appearance evaluation in Jordanian mothers does not appear to be associated with the media exposure or internalization, but appearance orientation and overweight preoccupation are positively correlated with media internalization. These results support the assumption that cultural factors may be allowing the Jordanians to increase their investment in their appearance without experiencing body image dissatisfaction. The research of Madanat et al. (2007) and Davidson et al (2002) supports the assertion of cultural protective factors in the Middle East, in particular an ideal body size that is larger and healthier than the ideal body size in the West. This acceptance of a healthier ideal weight may explain why the Jordanian women did not report as much body dissatisfaction as the Americans.

For the American mothers, appearance evaluation was negatively associated with pressures from the media and appearance orientation and overweight preoccupation were positively associated with general internalization of the media. No significant differences were found between the two samples of mothers on any of the body image subscales, regardless of the fact that the Jordanian women had a significantly larger BMI. This again supports the idea that Jordanians are more accepting of larger body sizes. Even more surprising, the Jordanian mothers reported higher internalization of the media than the American mothers.

Limitations of this study include issues with measurement equivalence when translating measures into a different language, the small sample size of American mothers, problems comparing media exposure in two cultures, and the representativeness of the participants. Although research shows that the Middle East

is experiencing an increase in westernization (Nydell, 2006; Lam et al., 2009; Dwairy, 2006; Madanat et al., 2007), we cannot be sure that the media content viewed by the Jordanians contains all the same messages regarding appearance as the media viewed by the Americans. The term Arab encompasses a wide array of people from different regions who are not all exactly alike; therefore, research on one particular culture, such as Jordan, may not necessarily be generalized to the entire Arab community, or even the whole country of Jordan.

In conclusion, the body image evaluations of Jordanian women appear to benefit from some sort of cultural protective factor. Due to the ever increasing process of westernization, it is important that these factors be identified so that younger generations of Jordanians do not find themselves at risk when they are bombarded with Western influences. More importantly, mental health specialists should be alert to body image dissatisfaction and the consequences of it, as they are likely to come in contact with these problems on a more frequent basis. Having never had to deal with problems such as eating disorders before, it is easy for the therapist and client to misinterpret the symptoms (Dwairy, 2006). Finally, more research is needed that examines the Middle Eastern culture to determine which behaviors and customs benefit body image and possibly use this information to design more effective interventions for treating the body image dissatisfaction plaguing our society.

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Analyzing the Galois Groups of Fifth-Degree and Fourth-Degree Polynomials

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It is known that the general equations of fourth-degree or lower are solvable by formula and general equations of fifth-degree or higher are not. To get an understanding of the differences between these two types of equations, Galois theory and Field theory will be applied. The Galois groups of field extensions will be analyzed, and give the solution to the query “What is the difference between unsolvable fifth-degree equations and fourth-degree equations?”

Introduction

Babylonian society (2000–600B.C.) was rapidly evolving and required massive records of supplies and distribution of goods. Computational methods were also needed for business transactions, agricultural projects, and the making of wills. It was because of these demands that the Babylonians created the most advanced mathematics of their time. It is their hard work and dedication that created the linear formula as a solution to the linear equation.

$$\text{Linear equation: } ax + b = 0 \quad \text{Linear formula: } x = -\frac{b}{a}$$

The ancient Babylonians, classical Greeks, and especially Hindu mathematicians of the seventh century knew how to solve quadratic equations of various types. It was not until five hundred years later that a complete solution comes to fruition. The solution appeared in a book in Europe only during the twelfth century. The author of the book was the Spanish Jewish mathematician Abraham Bar Hiyya Ha-nasi (1070–1136). The book was called *Treatise on Measurement and Calculation*. Abraham Bar Hiyya states, “Who wishes correctly to learn the ways to measure areas and to divide them, must necessarily thoroughly understand the general theorems of geometry and arithmetic, on which the teaching of measurement...rests. If he has completely mastered these ideas he...can never deviate from the truth” (Livio). It was this arduous train of thought that had taken the quadratic equation and transformed it into the quadratic formula.

$$\text{Quadratic equation: } ax^2 + bx + c = 0$$

$$\text{Quadratic formula: } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The early Babylonians were able to solve specific cubic equations using tables. A geometric solution that solved a few more was invented by the Persian poet-mathematician Omar Khayyam during the twelfth century. Nevertheless, mathematicians were unable to break the code for the general cubic equation until the sixteenth century. In Italy during the 1500s, mathematical tournaments were a popular pastime. The people involved kept their methods secret. Niccolo of Brescia (1500-1557), commonly referred to as Tartaglia (“the stammerer”), owned the secret to the cubic equation. This gave him a distinct advantage in the tournaments. Girolamo Cardano (1501-1576) had discovered that Tartaglia had the secret, and asked him for the solution. Tartaglia refused to give him the solution for some time. Eventually Tartaglia reluctantly gave Cardano the solution, but swore him to secrecy. The solution was published in Cardano’s work *Ars Magna* (1545) breaking his word which started a feud between the two mathematicians. After four hundred years the solution to the general cubic equation had come to light. Further contributions from Scipione del Ferro would lead to the complete cubic formula. The procedure for the extraction of the cubic solution is quite different than that of its smaller brethren. Without loss of generality, let a_0 of the general cubic equation

$$a_0x^3 + a_1x^2 + a_2x + a_3 = 0$$

equal one. Now, with the equation

$$x^3 + ax^2 + bx + c = 0$$

it is necessary to eliminate the x^2 term. To do this, substitute

$$x = z - \frac{a}{3}$$

into the equation. Executing this will yield

$$z^3 + pz + q = 0$$

where $p = \frac{3b - a^2}{3}$ (1) and $q = \frac{2a^3 - 9ab + 27c}{27}$ (2)

Next observe that if we substitute

$$z = u + v \text{ and } p = -3uv$$

into the expression, it produces

$$u^3 + v^3 + q = 0$$

From this point we get

$$v = -\frac{p}{3u}$$

to obtain

$$u^3 - \frac{p^3}{27u^3} + q = 0 .$$

Multiplying both sides by u^3 gives

$$u^6 + qu^3 - \frac{p^3}{27} = 0 ,$$

which is a quadratic equation for u^3 . Completing the square and solving for u generates

$$u = \sqrt[3]{-\frac{q}{2} \pm \sqrt{\frac{q^2}{4} + \frac{p^3}{27}}} \quad (3) .$$

Amalgamating

$$x = z - \frac{a}{3}, \quad z = u + v \text{ and } v = -\frac{p}{3u}$$

solving for x we obtain

$$x = u - \frac{p}{3u} - \frac{a}{3} \quad (4) .$$

With equation one, two, three, and four in hand the complete cubic formula is realized.

Cubic Formula

$$p = \frac{3b - a^2}{3} \quad q = \frac{2a^3 - 9ab + 27c}{27} \quad u = \sqrt[3]{-\frac{q}{2} \pm \sqrt{\frac{q^2}{4} + \frac{p^3}{27}}}$$

$$x = u - \frac{p}{3u} - \frac{a}{3}$$

Shortly after the contributions of the cubic formula by Del Ferro, Tartaglia, and Cardano; Ferrari, who was a student of Cardano, found the solutions to the general quartic equation. The quartic is even more complicated than the cubic, requiring more substitution and algebraic manipulation. Without loss of generality, let the leading coefficient be equal to one. With the equation

$$x^4 + ax^3 + bx^2 + cx + d = 0$$

the x^3 must be eliminated. Letting $x = z - \frac{a}{4}$ in the expression produces

$$z^4 + pz^2 + qz + r = 0$$

where $p = \frac{8b - 3a^2}{8}$, $q = \frac{a^3 - 4ab + 8c}{8}$, and $r = \frac{16a^2b - 3a^4 - 64ac + 256d}{256}$.

For the next step add $2pz^2$ and p^2 to both sides completing the square to get

$$z^4 + 2pz^2 + p^2 + qz + r = pz^2 + p^2.$$

Factor $z^4 + 2pz^2 + p^2$ to obtain $(z^2 + p)^2 + qz + r = pz^2 + p^2$.

Add $2y(z^2 + p) + y^2$ to both sides of

$$(z^2 + p)^2 + qz + r = pz^2 + p^2$$

to get

$$(z^2 + p)^2 + 2y(z^2 + p)q + y^2 + qz + r = pz^2 + p^2 + 2y(z^2 + p) + y^2,$$

which simplifies to

$$(z^2 + p + y)^2 = (p + 2y)z^2 - qz + (y^2 + 2yp + p^2 - r).$$

We must now consider the discriminant

$$(-q^2) - 4(p + 2y)(y^2 + 2yp + p^2 - r)$$

– an expression which gives information about the polynomial roots – of the quadratic equation and because it is a perfect square it is equal to zero. Simplifying this expression gives the resolvent cubic – a quartic equation that has been algebraically broken down to a cubic – which is

$$y^3 + \frac{5}{2}py^2 + (2p^2 - r)y + \left(\frac{p^3}{2} - \frac{pr}{2} - \frac{q^2}{8}\right) = 0.$$

This is a cubic which can be solved for by using the previous method. We are left with the quartic formula.

$$p = \frac{8b - 3a^2}{8} \quad q = \frac{a^3 - 4ab + 8c}{8}$$

$$r = \frac{16a^2b - 3a^4 - 64ac + 256d}{256}$$

$$u = \sqrt[3]{-\frac{k}{2} \pm \sqrt{\frac{k^2}{4} + \frac{h^3}{27}}} \quad y = u - \frac{h}{3u} - \frac{5}{6}p$$

$$h = \frac{-p^2 - 12r}{12} \quad k = \frac{72pr - 2p^3 - 27q^2}{216}$$

$$x = -\frac{a}{4} + \frac{\pm\sqrt{p+2y} \pm \sqrt{-\left(3p+2y \pm \frac{2q}{\sqrt{p+2y}}\right)}}{2}$$

The formulas involved in all of these general equations were solved using the four arithmetic operations and the extraction of roots. Paolo Ruffini (1765-1822) claimed to have proof that the general quintic equation could not be solved by these methods. Unfortunately, there was a critical gap in his proof. Not long after the failed proof by Ruffini, the mathematician Niels Henrik Abel (1802-1829) worked on the general quintic and tried to solve it with great vigor, but he could not. Even after his ineffective attempt to solve the quintic by formula, this subject did not leave Abel's relentless mind. After only a few months of vigorous work, the twenty-one year old Abel had solved this century old problem. He proved what is now called, "Abel's Impossibility Theorem". This theorem shows that it is impossible to solve general polynomials of fifth-degree or higher, using the four arithmetic operations and the extraction of roots.

Not long after Abel's Theorem became known, Evariste Galois (1811-1832) would create a new branch of algebra known as Galois Theory. He would make a connection between the putative solutions and the permutations of these solutions. Galois was able to find the "key" of an equation – the Galois group of the equation – and determine from its properties whether it was solvable by formula or not.

Definitions:

To continue any further we will need some definitions to help clarify the following statements.

abelian A group, $(G, *)$, is abelian (also known as commutative) if and only if $a * b = b * a$, for all elements $a, b \in G$.

automorphism A one-to-one correspondence mapping the elements of a set onto itself, so the domain and range of the function are the same. For example, $f(x) = x + 2$ is an automorphism on \mathbb{R} but $g(x) = \cos x$ is not.

composition series Given a group G , a sequence of groups G_0, \dots, G_n , is called a composition series for G if

$$\{e\} = G_0 \triangleleft G_1 \triangleleft G_2 \cdots \triangleleft G_{n-1} \triangleleft G_n = G,$$

where G_1 has no proper normal subgroup. The groups G_i / G_{i-1} are called quotient groups of G , their number n is the length of the series, and the integers $|G_i / G_{i-1}|$ are the quotient groups' orders.

Eisenstein irreducibility criterion Let

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$$

where the coefficients are all integers. If there exists a prime p such that: (i) p divides each of a_0, a_1, \dots, a_{n-1} ; (ii) p does not divide a_n ; and (iii) p^2 does not divide a_0 ; then f is irreducible over \mathbb{Q} .

Galois group The Galois group of a polynomial is the set of permutations on the solutions of that polynomial. So, to get a better idea of what a Galois group is, let's look at how Galois perceived it. As an example take $f(x) = x^2 - 2 = 0$. The solutions are $\alpha = \sqrt{2}$ and $\beta = -\sqrt{2}$.

The set of permutations on two objects includes the identity where α and β get mapped to themselves denoted by

$$1: \alpha \mapsto \alpha \quad \beta \mapsto \beta$$

and where α and β get mapped to each other signified by

$$\sigma: \alpha \mapsto \beta \quad \beta \mapsto \alpha.$$

These form the set of all automorphism's of 2 elements. This can be called the Galois group S_2 .

general polynomial function An expression of the form

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$$

where $a_n, a_{n-1}, \dots, a_1, a_0$ are rational numbers ($a_n \neq 0$) and n is a nonnegative integer.

group A group is a nonempty set G together with a binary operation $*$ on the elements of G such that:

- 1) G is closed under $*$.
- 2) $*$ is associative.
- 3) G contains an identity element for $*$.

4) Each element in G has an inverse in G under $*$.

Examples of groups:

Addition mod n groups - Z_n where $n \in \mathbb{N}$

Alternating group - A_n where $n \in \mathbb{N}$

Dihedral group - D_n where $n \in \mathbb{N}$

Klein four group - V

Symmetric group - S_n where $n \in \mathbb{N}$

identity A group that only contains the identity element.

identity element An element that is combined with another element with a particular binary operation that yields that element. Let $(G, *)$ be a group and $e, a \in G$. If $e * a = a$ the e is the identity.

homomorphism Let $(G, *)$ and (H, \circ) be two groups. Let f be a function from G to H . f is a homomorphism (an operation preserving function) from $(G, *)$ to (H, \circ) if and only if for every pair of elements, $a, b \in G$, $f(a * b) = f(a) \circ f(b)$.

irreducible polynomial The polynomial $x^2 - 5$ is irreducible over \mathbb{Q} . The roots of the polynomial are $\sqrt{5}$ and $-\sqrt{5}$.

These values are not within the field \mathbb{Q} . Therefore, the polynomial cannot be reduced to a factored form with values from the field \mathbb{Q} , but can be with the field $\mathbb{Q}(\sqrt{5})$.

isomorphic Two groups are said to be isomorphic (meaning they have the same structure and properties) if and only if there exists a 1-1, onto, homomorphism.

normal subgroup A subgroup H is normal in a group $(G, *)$ if and only if

$$\forall g \in G, g * H = H * g$$

denoted $H \triangleleft G$.

permutation A permutation is an arrangement or rearrangement of n objects. The number of permutations of n objects is $n!$.

quotient group If $H \triangleleft G$ then G / H is the set of distinct cosets xH , where x, y, \dots range over G and we define an operation $*$ as follows: $(xH) * (yH) = (xyH)$. With this operation, G / H is a group called the *factor* or *quotient group* of G by H .

rational number A number that can be written in the form $\frac{a}{b}$, where a and b are integers, with $b \neq 0$.

Rational Zeros Theorem Let f be a polynomial function of degree 1 or higher of the form

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0, \quad a_n \neq 0, a_0 \neq 0$$

where each coefficient is an integer. If $\frac{p}{q}$, in lowest terms, is a rational zero of f , then p must be a factor of a_0 , and q must be a factor of a_n .

reducible polynomial The polynomial $x^2 - 4$ is reducible over \mathbb{Q} . The roots of the polynomial are 2 and -2. These values are within the field \mathbb{Q} . Therefore, the polynomial can be reduced to a factored form with the values from the field \mathbb{Q} .

Rolle's Theorem Let f be continuous on the closed interval $[a, b]$ and differentiable on the open interval (a, b) . If $f(a) = f(b)$ then there is at least one number c in (a, b) such that $f'(c) = 0$.

splitting field If K is a subfield of \mathbb{C} and f is a polynomial over K , then f splits over K if it can be expressed as a product of linear factors

$$f(t) = k(x - \alpha_1) \cdots (x - \alpha_n)$$

where $k, \alpha_1, \dots, \alpha_n \in K$.

subgroup Let $(G, *)$ be a group. If H is a subgroup of G then $H \subseteq G$ and H is a group under $*$.

symbols

\mathbb{C} - the complex numbers $\{a + bi \mid a, b \in \mathbb{R}\}$

\mathbb{N} - the natural numbers $\{1, 2, 3, \dots\}$

\mathbb{Q} - the rational numbers $\left\{ \frac{a}{b} \mid a, b \in \mathbb{Z} \text{ and } b \neq 0 \right\}$

Δ - the discriminant

symmetric group For any set X , a permutation of X is a one-to-one onto mapping from X to X . If X has n elements there are $n!$ permutations of x and the set of all these, with composition of mappings as the operation, forms a group called the symmetric group of degree n , denoted by S_n .

trivial group A group that only contains the identity element.

What to do?

To find out what the difference is between fifth-degree and fourth-degree polynomials, there is some work to do. First, collect all the possible Galois groups of linear polynomials up to and including quartic polynomials. Next, find a quintic which is unsolvable by radicals and calculate its Galois group. Analyze both sets of groups using Group theory and compare their results.

Case 1:

Polynomials in \mathbb{Q} with all solutions in \mathbb{Q} have the Galois group S_1 .

Let's look at $f(x) = x - 1$ and $f(x) = x^2 + 3x + 2$. Both have coefficients and solutions that lie in \mathbb{Q} . When these conditions are met the only possible permutation on the rational numbers is the identity. Therefore, the Galois group for these types of polynomials is the trivial group S_1 .

Case 2:

A quadratic polynomial that is irreducible in \mathbb{Q} has the Galois group S_2 .

As an example, take the polynomial equation $f(x) = x^2 + 1 = 0$. This is irreducible in the rationals, and is of degree two. Since the splitting field is $\mathbb{Q}(i)$, there are two \mathbb{Q} -automorphisms defined by

$$1: i \mapsto i \quad -i \mapsto -i$$

$$\sigma: i \mapsto -i \quad -i \mapsto i$$

Notice that if the roots are irrational, we have the same Galois group. Let's examine $f(x) = x^2 - 3$. This is also irreducible in the rationals, and is of degree two. The splitting field is $\mathbb{Q}(\sqrt{3})$, therefore, it has two \mathbb{Q} -automorphisms denoted by

$$1: \sqrt{3} \mapsto \sqrt{3} \quad -\sqrt{3} \mapsto -\sqrt{3}$$

$$\sigma: \sqrt{3} \mapsto -\sqrt{3} \quad -\sqrt{3} \mapsto \sqrt{3}$$

For that reason, the Galois group for both of these polynomials is S_2 .

Case 3:

A cubic polynomial that is irreducible in \mathbb{Q} has the Galois group S_3 or A_3 .

Proposition: Let

$$f(x) = x^3 - ax^2 + bx - c \in \mathbb{Q}(x)$$

be irreducible over \mathbb{Q} . Then its Galois group is A_3 if the discriminant of,

$$f \Delta = a^2b^2 + 18abc - 27c^2 - 4a^3c - 4b^3$$

is a perfect square in \mathbb{Q} , and is S_3 otherwise.

Let's take into account $f(x) = x^3 - 2$. This is irreducible by *Eisenstein's Criterion* and has the discriminant $\Delta = -108$, which is not a square. Hence, its Galois group is S_3 . Another example is $f(x) = x^3 - 3x - 1$. This is irreducible by the *Rational Zeros Theory* and its discriminant is $\Delta = -81$, which is a square. Consequently, its Galois group is A_3 .

Case 4:

A quartic polynomial that is irreducible in \mathbb{Q} , has the Galois group S_4, A_4, D_4, V , or Z_4 . This chart will help to attain the group of a particular quartic.

Δ of f in \mathbb{Q}	Resolvent cubic in $\mathbb{Q}[x]$	Galois Group
$\neq \square$	irreducible	$\rightarrow S_4$
$= \square$	irreducible	$\rightarrow A_4$
$\neq \square$	reducible	$\rightarrow D_4$ or Z_4
$= \square$	reducible	$\rightarrow V$

To achieve these values, the discriminant of f is used along with the resolvent cubic of f . With this machinery, the groups of these quartics are realized. Consider the examples where Δ of

$$f(x) = x^4 + cx + d \text{ is } \Delta = -27c^4 + 256d^3$$

and the cubic resolvent of f is

$$R_3(x) = x^3 - 4dx - c^2.$$

$f(x)$	Δ of f	Resolvent cubic of f	Galois group
$x^4 + 2x + 2$	$101 \cdot 4^2$	$x^3 - 8x - 4$	S_4
$x^4 + 8x + 12$	576^2	$x^3 - 48x - 64$	A_4
$x^4 + 3x + 3$	$21 \cdot 15^2$	$(x+3)(x^2 - 3x - 3)$	D_4 or Z_4
$x^4 + 36x + 63$	4320^2	$(x-18)(x+6)(x+12)$	V

As a result, there are only five Galois groups that occur for any irreducible quartic.

Case 5:

Let p be a prime, and let f be an irreducible polynomial of degree p over \mathbb{Q} . Suppose that f has precisely two nonreal zeros in \mathbb{C} . Then the Galois group of f over \mathbb{Q} is isomorphic to the symmetric group S_p .

Take the example $f(x) = x^5 - 4x + 2$. By *Eisenstein's Criterion* f is irreducible over the rationals. By *Rolle's Theorem* the zeros of f are separated by the zeros of the derivative of f . Since $5x^4 - 4$ has zeros at $\pm\sqrt[4]{4/5}$, f has three real zeros each with multiplicity one, and as a consequence has two complex zeros. Also, f has degree five. Thus, the Galois group is isomorphic to S_5 .

From the linear to the quartic

Now, let's take a look at the first four cases. In each case for the Galois groups that occur, there is a series of normal subgroups whose quotient groups are abelian.

Case 1:

$$1 \\ 1 \triangleleft 1 \text{ and } 1/1=1$$

Case 2:

$$S_2 \\ 1 \triangleleft S_2 \text{ and } S_2 / 1 = S_2$$

Case 3:

$$S_3 \text{ or } A_3 \\ 1 \triangleleft A_3 \triangleleft S_3, S_3 / A_3 = Z_2, \text{ and } A_3 / 1 = A_3$$

Case 4:

$$S_4, A_4, D_4, V, \text{ or } Z_4 \\ 1 \triangleleft V \triangleleft A_4 \triangleleft S_4, S_4 / A_4 = Z_2, A_4 / V = Z_3, \text{ and } V / 1 = V \\ 1 \triangleleft V \triangleleft D_4 \text{ or } 1 \triangleleft Z_4 \triangleleft D_4, \text{ and } D_4 / Z_4 = D_4 / V = Z_2$$

The unsolvable quintic

Looking at the Galois group for the unsolvable quintic, there is a discrepancy when compared to the properties of the previous cases. All polynomials of fourth-degree or below have a series of normal subgroups in which their quotient groups are abelian.

Case 5:

$$S_5$$

$$1 \triangleleft A_5 \triangleleft S_5, S_5 / A_5 = Z_2$$

but $A_5 / 1 = A_5$ which is

not abelian

The unsolvable quintic does not have a series of normal subgroups in which all the quotient groups are abelian. This demonstrates the difference between an unsolvable quintic and equations of fourth-degree or lower. Therefore, a polynomial is solvable by radicals if it has a Galois group with a composition series containing quotient groups that are abelian.

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Does Triclosan Exposure and Tolerance Lead to Chlorine Resistant Bacteria?

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research, conducted over the past year under the mentorship of Dr. Jonathan Roling, was funded by the Center for Sustainability and by the Adrian Tinsley Program. Sherry presented her research at the 2011 National Society of Toxicology conference. She also presented her research at the 2011 Eastern New England Biology Conference, the 2010 New England Undergraduate Symposium on Sustainability and the Environment and the 2010 Adrian Tinsley Summer Research Symposium. After graduation she is attending Purdue University School of Veterinary Medicine as a summer research fellow and plans to apply to veterinary school.

Triclosan is an antimicrobial agent added to a wide variety of medical and consumer care products such as soaps, deodorants, toothpastes, and cleaning supplies. Bacterial exposure to triclosan could lead to chlorine resistant bacteria. These bacteria may survive chlorination, the standard method used to disinfect our drinking water. Water samples were obtained downstream a wastewater treatment plant (WWTP) in Bridgewater, MA and reference virgin stream (VS) in Monroe, MA. Bacteria were isolated from water samples, exposed to triclosan (0.001 or 0.05mg/mL), and then exposed to chlorine (0.05g/mL). 49% of all bacterial strains increased chlorine resistance after at least one triclosan exposure. Bacteria from WWTP increased chlorine resistance 80% while VS only increased resistance 19%. However, the concentration of triclosan (0.001 and 0.05mg/mL) was not significant regarding whether bacteria gained chlorine resistance (38% and 35%, respectively).

Introduction

Triclosan is used as a synthetic broad-spectrum antimicrobial agent. It was introduced as a surgical scrub containing 0.3% triclosan in 1972 and used to prevent the spread of infection in health care settings (Serafini et al., 2009). Since the mid-1990s, triclosan has been added to many personal care products including toothpaste, body soap, hand soap, hand lotions and creams, mouthwashes, and underarm deodorants (Serafini et al., 2009). These personal care products typically contain 0.1% triclosan at bacteriostatic concentrations. At bacteriostatic concentrations triclosan interferes with bacterial growth and reproduction by binding to the active site of the enoyl-acyl carrier protein reductase (ENR) enzyme (Yazdankhah et al., 2006). This target enzyme is present in microbes but not in humans.

Optimal wastewater treatment can degrade and remove 95% of triclosan (Samsoe-Petersen 2003). However, the remaining 5% may pass through the treatment plants and be released into rivers. Triclosan was found in 58 percent of 85 streams across the U.S. (Kolpin et al., 2002), the likely result of its presence in wastewater effluent.

Triclosan (2,4,4'-trichloro-2'-hydroxydiphenyl ether) is a chlorinated aromatic compound. Its functional groups include both phenols and ethers (Figure 1).

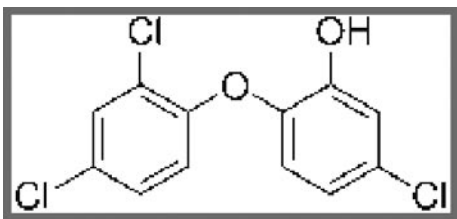


Figure 1: Molecular structure of triclosan

Overuse of triclosan at bacteriostatic concentrations by otherwise healthy consumers could cause strains of resistant bacteria to develop. Triclosan resistant bacteria may develop chlorine resistance due to the reactivity of the three chlorine atoms that may become bioavailable. Chlorine tolerant bacteria may survive municipal water disinfection. The standard method used to disinfect our municipal water supply is to add chlorine at concentrations sufficient to ensure a 2.0 mg/L residual chlorine concentration. Bacteria resistant to chlorine could potentially survive standard disinfection, thereby threatening the safety of our drinking water and increasing the risk for human illness. The goal of this project is to identify if triclosan can lead to chlorine tolerance in environmental bacteria strains.

Methodology

Two water samples containing bacteria were collected in October and November, 2009. The source of these samples was a virgin stream (VS) in Monroe, MA located at 42°44'7.30"N, 73° 0'26.44"W and from the Taunton River, downstream from the wastewater treatment plant (WWTP) in Bridgewater, MA located at 41°59'48.04"N, 70°58'3.30"W. The VS, a tributary of the Deerfield River, was used as a reference site due to its geographic isolation. The area consists of mountainous terrain without anthropogenic influence. Bacteria obtained from an environment with minimal human impact are not expected to have been previously exposed to chemicals such as triclosan as is typically found in municipal waste.

The WWTP bacteria collected in Bridgewater, MA were obtained from the Taunton River. The Taunton River Watershed includes all or part of 43 communities in southeastern Massachusetts, including Brockton, Fall River, Foxboro, Wrentham, Plymouth and Carver. Water from the river is first collected by an up-stream city or town and is disinfected by chlorination. Once disinfected, the water is pumped to homes and businesses as drinking water. Used water sewers is collected by the WWTP where it is filtered and pollutants are bacterially degraded for safe release back into the river for collection by the next town downstream where the disinfection process will repeat.

The WWTP bacteria obtained for this research were obtained

from the effluent released by the Bridgewater wastewater treatment plant. Bacteria contained in the effluent have faced prior chemical exposure to substances such as triclosan and may have developed tolerance. VS bacteria would not be expected to have had previous triclosan exposure.

To obtain a chlorine dose-response inhibition assay, four different bacterial colonies were isolated and grown overnight at 37°C and 275 rpm and the next day transferred in a 1:100 dilution. The bacteria were then pipetted into LB nutrient broth containing 2.0 mg/mL, 0.67 mg/mL, 0.22 mg/mL, 0.07 mg/mL, 0.02 mg/mL, 0.008 mg/mL, 0.003 mg/mL or 0 mg/mL chlorine. The bacteria were left in solution and incubated overnight at 37°C and 275 rpm. The next day the sample was read on a spectrophotometer at 600nm and the absorbance measured. Statistical significance was determined using t-test if $p \leq 0.05$.

After obtaining a chlorine dose-response inhibition assay, a similar procedure was followed to obtain a triclosan dose-response inhibition assay. This time three different strains of bacteria were diluted following the same procedure as above. The bacteria were then exposed to LB nutrient broth containing 4.0 mg/mL, 1.0 mg/mL, 0.25 mg/mL, 0.06 mg/mL, 0.02 mg/mL, 0.004 mg/mL, 0.001 mg/mL or 0 mg/mL triclosan. The bacteria were incubated overnight at 37°C and then read on a spectrophotometer at 600nm. Statistical significance was determined using t-test if $p \leq 0.05$.

The next experiments isolated bacteria that increased chlorine tolerance after triclosan exposure. 84 WWTP bacterial strains were cultured in a 96 well-plate containing nutrient broth and grown overnight at 37°C and 275 rpm. The next day the bacteria were diluted in a 1:100 dilution and pipetted to a 96 well-plate containing plain nutrient broth, 0.001 mg/mL triclosan (triclosan low), 0.05 mg/mL triclosan (triclosan high), or 0.05 g/mL chlorine. The bacteria were incubated overnight at 37°C and 275 rpm and then read on a spectrophotometer at 600nm. The bacteria in the triclosan low and triclosan high microplates were diluted in a 1:100 dilution and then exposed to 0.05g/mL chlorine. The bacteria were incubated overnight at 37°C and 275 rpm and then read on a spectrophotometer at 600nm. The entire process was then repeated using 84 VS bacterial strains.

Results

A chlorine dose-response inhibition assay was obtained. Bacterial strains expressed a dose response inhibition to chlorine (Figure 2). The Lowest Observed Effect Concentration (LOEC) was 0.67 mg/mL chlorine. This value represents the lowest chlorine concentration resulting in bacterial growth

distinguishable from the normal (control) bacterial growth under the same exposure conditions. The No Observed Effect Concentration (NOEC) was 0.22 mg/mL chlorine. This value represents the chlorine concentration that produced no detectable alteration in bacterial growth when compared to the normal (control) bacterial growth.

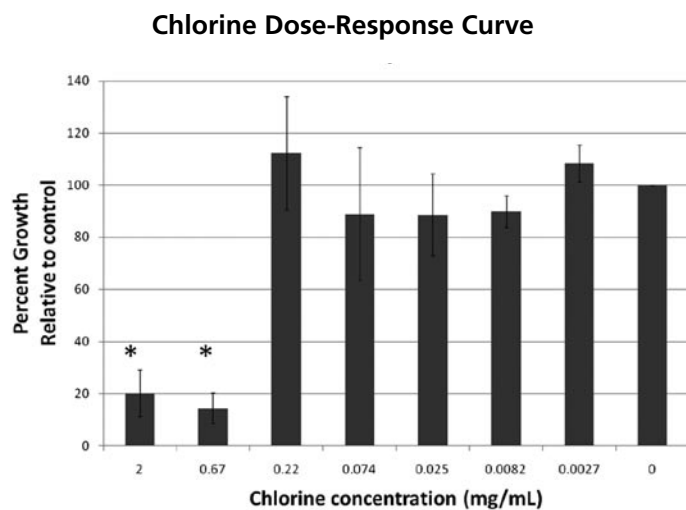


Figure 2: Chlorine bacterial inhibition assay. Bacteria were isolated and grown in LB overnight. They were diluted and exposed to varying concentrations of chlorine. The bacteria were incubated overnight and the absorbance measured at 600nm. LOEC was 0.67 mg/mL chlorine. NOEC was 0.22 mg/mL chlorine. * = p value \leq 0.01, n=4, mean \pm standard deviation.

Bacterial strains also expressed a dose response inhibition to Ticlosan (Figure 3). The Lowest Observed Effect Concentration (LOEC) was 0.004 mg/mL triclosan. The highest concentration of triclosan that did not effect bacterial growth (NOEC) was 0.0001mg/mL.

In both samples (VS & WWTP) the bacterial strains showed an increase in chlorine tolerance after exposure to both high and low concentrations of triclosan (Figure 4). 49% of all bacterial strains (82/168 strains) showed increased resistance to chlorine following one of the triclosan exposures. WWTP bacterial strains significantly increased chlorine resistance after triclosan exposure (80%) when compared to VS bacterial strains (19%). There was no significant difference in chlorine resistance regardless of triclosan concentration: 38% (65/168 bacterial strains) increased resistance to chlorine following exposure to low triclosan (0.001 mg/mL) whereas 35% (59/168 bacterial strains) increased resistance to chlorine following exposure to high triclosan (0.05 mg/mL). Significantly fewer strains (0% and 6%) decreased resistance to chlorine following low and high triclosan, respectively.

Triclosan Dose-Response Curve

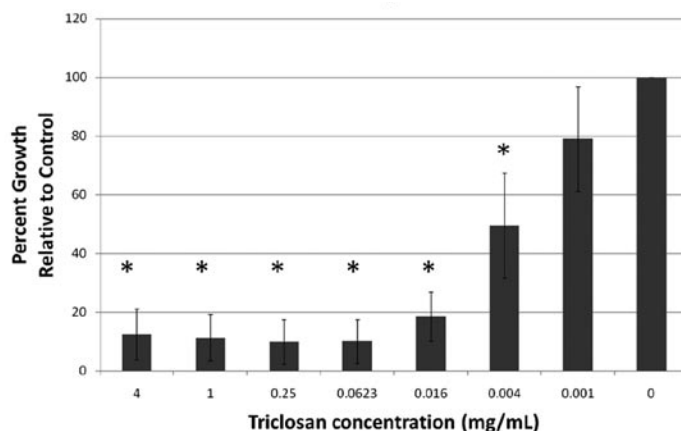


Figure 3: Triclosan dose-response inhibition assay. Bacteria were isolated and grown in LB overnight. They were diluted and exposed to varying concentrations of triclosan. The bacteria were incubated overnight and the absorbance measured at 600nm. LOEC was 0.004 mg/mL triclosan. NOEC was 0.0001mg/mL triclosan. * = p value \leq 0.01, n=4, mean \pm standard deviation.

	Virgin Stream (VS)	Wastewater Treatment Plant (WWTP)
Change in chlorine tolerance (0.001 mg/mL triclosan)	7 (+) 0 (-)	58 (+) 0 (-)
Change in chlorine tolerance (0.05 mg/mL triclosan)	12 (+) 6 (-)	47 (+) 4 (-)

Table 1: Bacterial acclimation to chlorine after triclosan exposure, (+) indicates an increase in chlorine resistance after triclosan exposure. (-) indicates a decrease in chlorine resistance after triclosan exposure.

Discussion

49% of all bacterial strains showed increased resistance to chlorine following exposure to triclosan. Bacteria resistant to triclosan could potentially survive chlorination, thereby threatening the safety of our drinking water and increasing the risk of human illness. While alternatives to chlorination do exist, they are more expensive and our infrastructure is not currently well suited to accommodate these alternative methods of water disinfection.

Furthermore, while half of all bacterial strains showed resistance to chlorine, perhaps of greater concern is the distribution of bacteria showing chlorine resistance. 80% of WWTP bacteria showed increased resistance to chlorine and these bacteria pose a potentially greater risk to human health than the 19% VS bacterial strains showing resistance to chlorine. The VS

bacterial strains have likely had no previous triclosan exposure as they were obtained from an area with minimal human impact, whereas the WWTP bacteria are more likely to have been previously exposed to chemical compounds such as triclosan. In addition to the potential threat to the safety of our municipal water supply, chlorine resistant bacteria in the 80% range could alter the ecology of the Taunton River over time.

Acknowledgments

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Aristotle, Performativity, and Perfect Friendship in Shakespeare

RYAN ENGLE



Ryan is a senior majoring in English. The initial research for this project was undertaken during

the summer of 2010, as part of the Adrian Tinsley Program. Ryan worked under the wonderful, yet sometimes infuriating mentorship of Dr. James Crowley. Dr. Crowley, for his part, worked tirelessly for the oftentimes infuriating Ryan Engle. Ryan presented this piece proudly with his mentor in attendance at NC State's "Manifest Identity" Graduate Symposium in February of 2011. This research is being expanded and will culminate in an honors thesis.

From childhood, most of us have been taught that our "identity," both how we see ourselves and how others see us, is shaped at least in part by our friends: "you are the company you keep," as the cliché goes. Experience will teach us that not all friendships are the same, much less equal, even if we never hear of Aristotle and his tripartite scale of friend-types. His categories were of course born of the classical world but, true to fashion, remain valuable barometers for measuring individual identity and desire in friendships. They're useful, too, in understanding Shakespeare's characters and their motivation. Traditional, formalist readings of his plays have long offered us neat and clean ways to understand a character's dramatic function—a foil, an adversary, a confidant, and so forth—and further, to see the role one character plays in the development of another. The drawback, though, is the rigidity of the approach: once a character is assigned a function or a label, it sticks. Shakespeare's best characters, though, are not static. More recent critical opinion, specifically that advanced by practitioners of Queer theory, suggests that we look less at structural function and more at process, or "performativity," in character relations. The drawback here is that characters can appear to have no defined formal function, and Shakespeare's best characters do. In *Much Ado*, Claudio says that "Friendship is constant in all other things / Save in the office and affairs of love" (II.i.175-6). He seems to know more than we do as readers: friendship is both fixed and fluid, and so too is individual identity within the relationship.

Both formalist and Queer theory approaches pose problems when we investigate the notion of friendship. A fusion of the two, however, comes closer, I think, to Shakespeare's sense of identity in friendships. Specifically, I'm interested in what Aristotle termed "perfect" friendship, that is the friendship that exists between two people of equal virtue and like station, and how Shakespeare explores the notion in three plays: *Two Gentlemen of Verona*, *The Merchant of Venice*, and *Othello*. Formal Aristotelian enquiry serves us well in determining structural function; Queer theory opens up questions of process. Together, these divergent but complementary approaches show us a Shakespeare familiar with precedent, but willing to risk great thematic advances.

Although *Two Gentleman of Verona* is an often overlooked play in Shakespeare's canon, we can trace what would later become major Shakespearean themes back to this relatively early work. Scholars, directors and production

companies have preferred comedies that handle the love “knot” better (*Twelfth Night*), or concern locales wherein characters can undergo personal transformation (*A Midsummer Night’s Dream*), or handle the influence and necessity of a cross-dressing female (*As You Like It, Twelfth Night*); and so it is *Verona’s* handling (or mishandling in some cases) of these tropes that make it fascinating. Compared to the later, sophisticated *Twelfth Night*, *Verona* can seem clumsy. Nevertheless, there is much we can learn here about Shakespeare’s attitude toward friendship.

Scholarship has tended to emphasize Valentine’s curious “offer” of Sylvia to Proteus. While this is clearly the play’s talking point, readers run the risk of overlooking some of *Verona’s* inspired moments. After banishing his best friend to the nameless woods between Milan and Mantua, Proteus tries desperately to secure Sylvia’s hand in marriage, despite being betrothed to Julia back home in Verona. Sylvia, anxious to find her beloved Valentine, leaves her father’s castle and sets forth in search of her cruelly banished suitor. Then, in what could be charitably described as a moment of temporary insanity, Proteus forces himself on Sylvia after failing to woo her with the “gentle spirit of moving words” (V.iv.55). Valentine emerges from the woods to stop his former friend from committing a regrettable act, delivering a speech that seems to cure Proteus of his indelicate desires and the compulsive mood that took possession of him upon his arrival in Milan:

Proteus,
I am sorry I must never trust thee more,
But count the world a stranger for thy sake.
The private wound is deepest: O time most accurst!
‘Mongst all foes that a friend should be the worst!
(V. iv.68-72)

As the place setting reminds us, we are between two states: physically, in woods somewhere between Milan and Mantua, emotionally, in a place between enemies and friends. The unique and special bond Proteus and Valentine have shared since they were children is at a dangerous intersection, with their friendship on the verge of permanent dissolution.

Tom McFaul’s recent study of male friendship in Shakespeare explores the humanist notion of true or perfect friendship. Renaissance humanists generally understood perfect friendship as Aristotle characterized it in the *Nicomachean Ethics*: it furnishes a second self. McFaul sees this as a fractured or unattainable ideal, enormous in its importance to social bonds, but as mystical and fictional as ancient legend. He argues that pursuing perfect friendship ultimately leaves a Shakespearean character “disappointed” and “alienated from himself” (2).

McFaul writes, “Having identified with another, even when this identification is exploded as a fiction, the self will never quite feel one’s own” (2). Readers need to do little more than recall Egeus or Malvolio to know that in Shakespeare, refusing to engage in society or friendship leads to loss of self and alienation. While McFaul claims Shakespeare and other dramatists saw through the fantasy of expressly equal friendship, I contend that Shakespeare does not see the humanist ideal of perfect friendship as that which stunts the growth of identity; he shows, rather, that people do not arrive at their best possible selves until they are met with their perfect pair. McFaul correctly states that Shakespeare’s notion is somewhat removed from the Aristotelian ideal of perfect friendship. Shakespeare does not, however, eschew Aristotle’s virtues wholesale: in Shakespeare, friendship is the gateway to identity and self-understanding. McFaul’s observations are valuable in that they open up an understanding of Shakespeare’s approach to friendship as a something of a nuanced evolution of Aristotle’s older, perhaps rigid definition. We could, however, take this in a more focused direction by incorporating principles of Queer theory. Born out of Gay and Lesbian criticism, Queer theory separates itself from its critical predecessors by placing emphasis on identity, specifically on the transient and unfixed nature of the self. Instability of the self is a central issue in Queer theory. Charles Bressler observes:

Gender is not stable, but fluid, so it changes from person to person and from context to context. Like gender, self identity is performative—that is, what one does at a particular time, place, and context determines one’s gender and identity, not a universal concept of who we are. Our identities are not connected to our supposed essence (essentialism) but to what we do and are. Our identities are the *effect*, not the cause, of our performances. (Bressler 260)

Echoing Judith Butler’s notion of performativity, Gil Harris notes, “we are all, effectively, in drag” (125). The ‘queer’ of Queer theory “has designated less an essential identity than a perversion or lack of any such identity” (124). In *Verona*, Valentine and Proteus move from being best friends, to rivals in competition for the hand of one woman, to enemies, and then back to best friends—a concrete instance of the fluidity and mutability Queer theory suggests. In this instance it is the mutual identity of the characters that is in the state of flux. If we merge the principles of mutability and instability with Aristotle’s notion of perfect friendship we can see that in Shakespeare relationships are (until the end of the play) in a highly unfixed state, always marked by growth and change.

A fusion of Aristotle and Queer theory opens the complexity

of Shakespeare's notion of friendship. In *Verona*, we see not an inexperienced Shakespeare offering a series of dramatic set pieces, but a play with every sign of the more complex things to come. Valentine and Proteus are characters whose identities are in constant flux right up until the promise of "one feast, one house, one mutual happiness" that ends the play (V. iv. 174). Proteus is a clear example of what Butler has termed performativity. The reader knows that the Proteus who asks "In love / Who respects friend?" is a perversion of the character we meet in Act I and the character who walks off with Julia at the close of the play (V.iv.53-54). Valentine is similarly changed by his experience as Sheriff of the unnamed woods. He enters the woods heartbroken and fragile; he leaves having rescued Sylvia, having shamed Proteus into regaining his sense of self, and having become a man worthy of marrying a Duke's daughter. As Valentine and Proteus grow individually, so too does their friendship. Having been best friends since birth in the comfort of Verona, Valentine and Proteus have always enjoyed a life of concord. The move from the known of Verona to the new, unknown world of Milan shakes the certainty of their bond. Despite briefly becoming fierce rivals and enemies, they emerge from the unnamed woods having negotiated the discord that threatened to end their friendship.

Shakespeare's notion of friendship in *Verona* is more intricate than recent scholarship has indicated. There is a definite Aristotelian bend here, but Aristotle's template is insufficient in defining Shakespeare's grasp of relationships. The performativity and fluidity emphasized by Queer theory build on that Aristotelian foundation, and a fusion of the two gives us a fairer and fuller understanding.

Like the characters in his plays, Shakespeare's actual treatment of friendship changes and evolves throughout his career. We see substantial development in *The Merchant of Venice*. *Two Gentlemen of Verona* treated us to an ending where the male friends can remain in perfect union *and* be married to their respective (heterosexual) loves under "one house" and "one mutual happiness" (V.iv.173). Written a short two years later, *The Merchant of Venice* does not present this even as a possibility. *Merchant* shows significant advancement not just in Shakespeare's overall dramatic acumen, but specifically in his ability to produce characters and relationships with many different and varying layers. Importantly, we see Shakespeare's notion of perfect friendship drifting farther from the accepted Aristotelian conventions. *Merchant* represents a more mature approach to perfect male friendship and it seems to confirm Shakespeare's support of perfect *female* friendship. Through *Merchant*, Shakespeare presents perfect friendship as a *human* ideal, not strictly a male one. Gone also is any semblance of the thoroughly unrealistic ending of *Verona*, replaced here by

the emotionally trying conclusions met by Antonio, Bassanio and Portia.

Interest in *The Merchant of Venice* has often focused on Antonio's sexuality, but Shakespeare leaves no smoking gun. The impetus stems from the cause of Antonio's depression at the beginning of the play: "In sooth, I know not why I am so sad" (I.i.1). He continues some seventy lines later by evoking *contemptus mundi*: "I hold the world but as the world, Gratiano / A stage, where every man must play a part, / And mine a sad one" (77-79). His sadness, of course, is tied to Bassanio's imminent departure for Belmont: physically, Bassanio will be distant from Antonio, but emotionally, and legally, he will soon be married, a state essentially separating the two perfect friends forever. Identifying an apparent tension between the new commitments of marriage and the difficulty such vows create in maintaining perfect male friendships, Queer theorist Bruce R. Smith writes:

The Two Gentlemen of Verona inaugurates a series of conflicts between male bonds and marriage that continues right to the end of Shakespeare's career in *The Two Noble Kinsmen*. Among the stratagems Shakespeare tries to resolve that standoff are a communal living arrangement among the two friends and their wives (*The Two Gentlemen of Verona*) . . . the wife's buying-out of the friend (*The Merchant of Venice*) [and] . . . the husband's murder of the wife (*Othello*). . . . Suffice it to say, the conflict between male bonds and love for women admits of no easy solution. (*Shakespeare and Masculinity* 62)

Smith is both correct and slightly off the mark in his observations. He has identified a consistent thematic underpinning to Shakespeare's work, but has interpreted its function improperly. In Shakespeare, women and wives are not obstacles in the way of perfect friendship, as Smith seems to assert. They are instead capable of friendships with their husbands that are just as serious and meaningful as those with their former best friends.

Elsewhere, on Aristotle's distinction between *philia* (true friendship) and *eros* (sexual desire), Smith writes, "*Philia* is rational; it respects the integrity of the other person. *Eros* is 'a sort of excess of feeling'; it seeks to overwhelm the other person and possess him" (*Homosexual Desire in Shakespeare's England* 36). Antonio's love for Bassanio leans more toward *philia* than *eros*. Antonio respects Bassanio's "integrity" so much that at no point in the play does he attempt any sort of erotic or romantic overture toward his dear friend. Joseph Pequigney rightly observes, "Neither of the Venetian friends ever makes reference

to physical beauty in the other, or ever speaks in amorous terms to or about the other” (213). The closest Antonio ever comes to an outright declaration of homosexual love is in his somewhat reserved letter to Bassanio, written while Antonio awaits trial. He begs Bassanio to tell his “honorable wife,” “how I lov’d you” and to “bid her judge / Whether Bassanio had not once a love” (IV.i.269-73). If we accept Antonio as a gay character, we can almost picture the restraint it took for him not to write “Whether Bassanio had not once a *lover*.” The letter asks not for financial compensation to free Antonio from his fate; in it Antonio asks simply to see his friend one more time. He ‘holds the world as the world,’ but holds Bassanio in such rarified regard that merely a glimpse of him is all Antonio requires before he is due to meet an unjust end. This is homoerotically suggestive, but no more.

Throughout the play Antonio demonstrates the selflessness of his love for Bassanio. He never approaches Bassanio with any amorous overtures, either for fear of rejection or (more likely) for fear of destroying the friendship he values. Simple desire takes a back seat to the higher estate of perfect friendship. Though their relationship has no guarantee of a future at the end of the play, Antonio and Bassanio’s bond is no less perfect. Shakespeare shows us that even though two people may love each other very much, the very real requirements of adult life can irrevocably change their relationship.

Laurie Shannon writes that “*Merchant’s* Portia starts with a “marriage” in the matrimonial sense and then uses her considerable verbal and economic assets to leverage a second marriage in a Neoplatonic affective sense that entails friendship” (9). Portia’s journey to personal completion takes her from the concord of Belmont to the discord of Venice, from a female to a disguised male, from the “lord” of a large estate to a physician/lawyer and most importantly, from being Bassanio’s wife (something they both want) to becoming his best friend (something they both need). Similar to Bassanio with Antonio, Portia has a dear friend in Nerissa, yet these relationships are not wholly fulfilling for either of them. They both long for “something else,” and find a perfect union with each other. Portia, for her part, must take on different roles and assume varied identities to secure the life she desires.

Both Portia’s gender and her identity are “performative” in *Merchant*. Portia understands the special bond Bassanio has with Antonio (calling Antonio “the bosom lover of my lord” III.iv.17) and seeks to incorporate the strength of perfect friendship in her marriage. By personally rescuing Antonio from the jaws of death, Portia displays her love for the “bosom lover” of Bassanio and undergoes a conversion from wife to friend. Shakespeare looks past the literal interpretation of

Aristotle’s notion of “perfect friendship,” exhibiting his own understanding of it as being other than gender-specific.

By the time Shakespeare writes *Othello*, seven or eight years after *The Merchant of Venice*, but a world away from its ‘comic milieu,’ he explodes the bounds of his own investigation of friendship. Where questions of Antonio’s sexuality might have been left pleasantly ambiguous, there is no question of the sexual tension that drives the Othello/Iago relationship. *Othello* functions as a corruption of everything we have seen thus far. In fact, Iago and Othello’s relationship serves as a foil to Shakespeare’s notion of friendship by highlighting virtues that oppose those in the comedies. As Michael Neill has shown, the culture and quality of the setting in *Othello* is vital. Neill writes, “Venice is the city of the play, its metropolitan center and repository of civil values, but the civilization it represents proves, on closer inspection, to be no more ideal than that of its counterpart in *The Merchant of Venice*” (Neill 208). The Venice of *Merchant* is a world of *philia*; that same locale in *Othello* is thoroughly a world of *eros*. Shakespeare uses the same city to show us two very different edges in male friendship: even the locale evolves. Where *Merchant* showed us selfless—even if homoerotic—love in the friendship of Antonio and Bassanio, and then understanding and concord in the perfect friendship of Bassanio and Portia, *Othello* works in another, darker realm. Othello and Desdemona’s relationship is marked by disharmony and jealousy; Othello and Iago’s by selfishness and cruel devising. As Jonathan Dollimore argues, “Conservative world views work in terms of binaries and by analogy: as ordered government is the antithesis of anarchy, so natural love (heterosexual, patriarchal, etc.) is the opposite of sexual deviation” (Dollimore 160). Dollimore contends that a world ordered by these ‘binary lies’ is inherently unbalanced. With *Othello*, Shakespeare shows us the mutability of friendship and the incredibly fragile, easily unbalanced construction it ultimately is.

An Aristotelian reading of *Othello* allows us to see Iago’s contradictory and unstable nature. He is of course a foil in his perversity to Othello and his idealistic love. Iago claims many times that he hates the Moor, but desires him sexually and seems maniacally driven to make Othello his best or perfect friend. Yet, even after the dramatic exchange of vows between Iago and Othello that cements their friendship at the close of III.iii, Iago continues to treat Othello as a friend of utility which, in Aristotle, is one retained because he serves a useful purpose. He is a means to an end. Othello, used by Iago, becomes the unwitting means to his own demise.

A fusion with Queer theory here is invaluable, as it further illuminates Iago’s corruption, or perversion, to use Dollimore’s

idiom, of the sacrosanct notion of perfect friendship. Jonathan Gil Harris writes, “A queer reading of a text does not necessarily aim to identify homosexuals. Instead, as in Dollimore’s interpretation, it seeks to reveal the larger processes of displacement that produce and trouble categories of sexual normality and perversion” (Harris 134). Just as Neill emphasizes the “place” of *Othello*, “displacement” is similarly important. *Othello* contains a series of events that serve to displace the established relationships within. The play begins with Iago’s feeling of displacement, being snubbed for the position of Othello’s lieutenant. He bristles at the favoritism shown toward Cassio, shaking Iago’s conception of his relationship with the Moor. Whereas Othello views Iago as simply a comrade in arms at the play’s start (a friend of lesser station), Iago evidently sees their friendship as something more substantial. The imbalanced affections between the play’s principal characters are shown to the reader at the opening, evoking the notion of *eros* that will dominate the tragedy’s central relationship.

While Iago fashions himself a man in total control, the text suggests a man who only *thinks* he is in control. He is, rather, totally controlled by his emotions. Iago is fueled almost exclusively by destructive urges and highly erotic feelings. Sexual intercourse, at its foundation a creative and unifying act, is in Iago’s terms reduced to a violent animal overmastering. To Brabantio, Iago says, “Even now, now, very now, an old black ram / Is tugging your white ewe,” in the act of “making the beast with two backs” (I.i.88-89, 116-117). By debasing the physical act of love, Iago is emblematic of Dollimore’s notion of the perverse dynamic. We see Iago displacing the loving reality of Othello and Desdemona’s relationship with absurdly brutal language. He never misses an opportunity to do this throughout the play.

Being Iago’s best friend displaces Othello’s mental state. After vowing “I am your own for ever,” Iago becomes synthesized with Othello (III.iii.480). In *Verona* and *Merchant* best friends help to bring clarity to individual identity. In *Othello*, the friendship of Iago and the Moor destroys the latter. After “letting Iago in,” Othello suffers two fits of epilepsy, or madness, and starts to talk like him, mounting reference upon reference to weapon, little arm, and sword in V.ii—hardly coincidental allusions to his own penis that echo Iago’s earlier debasing depictions of sex. Iago is an affront to the institution of perfect friendship, substituting the mutually affirming power of human relationships with his own destructive bent. Iago causes Othello to *devolve*, and while he stands in Aristotelian terms as very much the destructive static foil to the Moor’s initial innocence or optimism, we do well to see him as participant in, or director of, the displacement of Othello’s natural desires and attitudes. Throughout the play, Iago’s identity is highly

performative; he assumes many roles in order to “make the net / that shall enmesh” all within his sway (II.iii.361-62).

From the early *Verona* through *Merchant* and on to *Othello*, we see nearly ten years of Shakespearean art—a representative sampling of his work, and a profitable one for us considering the growth and development of his notion of friendship. The two critical approaches we have considered, formalist Aristotelianism and Queer theory, likewise illustrate the growing complexity of critical debate. Were we to use but one of these approaches we would find ourselves overlooking important insights offered by the other. Aristotle provides a structural framework, Queer theory a performative one. Shakespeare himself seems dissatisfied with a one-dimensional look at the multi-layered notion of human friendship, indeed perfect friendship, as Aristotle would say. As his characters exceeded the bounds of traditional categories so too are we as readers to expand our own vision and explore the ways in which these two divergent, but not wholly incompatible approaches might inform his texts and our reading. In *Twelfth Night*, Viola says that only time can untangle the knot of human relationships. Right she might be, but we can marshal and fuse two critical approaches to help us along.

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Pay Attention! Can the Type of Interaction between Handler and Dog Preceding an Agility Run Affect a Dog's Attention during a Run?

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There has been an increase of interest in investigating human-dog interactions in recent years. One area of interest for dog owners and animal behaviorists is how interactions and play between humans and dogs affect performance on object choice and detour tasks (Rooney & Bradshaw, 2002, Rooney & Bradshaw, 2003, Schwab & Huber, 2006, Pongracz, Miklosi, Timar-Geng, & Csanyi, 2004, Call, Brauer, Kaminski & Tomasell, 2003). Previous research has suggested that play (a pleasurable game or activity which involves both humans and dogs, such as tug-of-war or fetch) is a very important part in a dog's social, cognitive and motor development (Ward, Bauer & smuts, 2008, and Bauer & Smuts, 2007). Also, dog behaviorists have suggested that different types of play can affect dimensions of the dog-human relationship such as dominance, submissiveness, involvement, motivation, avoidance behaviors and aggression (Rooney & Bradshaw, 2003, Toth, Casci, Topal, & Miklosi, 2008). In addition human behavior, such as human attention and how humans interact with dogs can also affect dog behavior such as their obedience and performance in a game situation task (Call, et al., 2003, Schwab & Huber, 2006, Gasci, Miklosi, Varga, 2004). In general, human and dog interactions, and human and dog play can effect dog behavior.

Also, another way humans can affect dog behavior is by their attentional state. An attentional state is defined as the length of time a human's gaze and/or body is oriented toward the dog. Call, et al. (2003), investigated whether domestic dogs were sensitive to attentional states of humans. The results showed that dogs took significantly less food pieces, when told not to, when the experimenter was looking at the dog than when the experimenter was not looking at the dog. In addition when dogs took food when the experimenter was looking at them the dog used an indirect route to reach the food or crawled toward the food. This suggests that the dogs were still aware that the experimenter was looking at them because the dogs were more cautious to take the food. Overall this study supports that the level of attention a human gives toward a dog can affect how a dog behaves. In another similar study Schwab

& Huber (2006), looked at how the attentional state of an owner affected their dogs' behavior. They found that dogs got up from the lay down position quicker when their owner told them to lie down and then did not look at the dog compared to an owner who was looking at their dog and commanded them to lie down. This indicates that dogs are aware of their owner's attentional state based on human communication cues such as eye contact and body orientation. Dogs whose owners were more attentive showed more obedient behavior than dogs with un-attentive owners. In addition another study examined whether dogs are capable of perceiving the attentional state of a human in different contexts, showed similar results (Gasci, et al., 2004). The findings of this study indicated that dogs performed better at game situations such as fetch and retrieval when their owner was facing towards them and not blindfolded than when the owner was facing away and had a blindfold over their eyes. In addition dogs were more likely to beg from a person who was gazing at them, than a person who was not gazing at them. Overall the results show that dogs are able to rely on facial cues as communicative signals of attention, which suggests that dogs are able to assess the level of attention in humans.

Furthermore, dog dependency on their owners' behavior and communicative signals and a dog's previous training can also affect dog behavior and performance on a task. In studies by Gaunet (2008, 2010) it was found that guide dogs of blind owners and pet dogs of sighted owners ask for food and for toys/ play with similar behaviors. Both pet dogs and guide dogs gazed at their owner more often than other behaviors such as, physical contact (pawing at the owner), vocalization, mouth licking, and sonorous mouth licking (mouth licking with a loud noise). This result suggests that gazing at the owner is important for dog and human interactions and communication. Although gazing at the owner for communicative signals may be important to all dogs, one study suggests that this behavior is found more often in agility dogs (Marshall-Pescini, Passalacqua, Barnard, Valescchi, Prato-Previde, 2009). In the study they investigated how different training can affect a dog's behavior in a socio-cognitive task. The authors specifically looked at the difference between agility and rescue dogs. The results showed that agility dogs looked longer and more often at their owner than rescue dogs and dogs that had no specific training. In addition agility dogs only looked at their owner, while untrained and rescue dogs looked at the experimenter and their owner for almost equal amounts of time. The findings of these studies suggest that different training backgrounds and dog dependency on their owners' behavior and communicative signals can affect how a dog behaves in a socio-cognitive task.

Dogs have lived in cohabitation with humans for over 100 thousand years, and so it is believed that through this evolutionary process, dogs and humans have developed a unique relationship, and that dogs have a more enhanced ability to understand human behaviors and communicative signals compared to horses, primates and wolves (Udell, Dorey, Clive, Wynne, 2010, Mckinley, Sambrook, 2003, Topal, Miklosi, Csanyi, 1997). Pongcracz et al. (2004) found that certain types of communication affect a dogs' performance on a detour task. Results showed that verbal communication and having a dog learn from a human demonstrator were more efficient at getting the dog to the target than not having a human demonstrator and using hand signals (pointing) from a human. This suggests that dogs are able to infer directional cues from a human, which may indicate that humans and dogs are able to understand one another's communicative signals. An earlier study done by Pongcracz, Miklosi, Kuybinyi, Gurobi, Topalt, and Csanyi, (2001), looked at the effect of a human demonstrator on the performance of dogs in a detour task. The results showed that dogs completed the detour in significantly less time when the dog observed a human demonstrator complete the task than when the dog did not observe a demonstration. Therefore this suggests that human behavior or demonstration can affect a dog's performance on a specific task. Thus because dogs are able to learn from human demonstration it can be inferred that dogs are sensitive to human behavior. Another study examined the comprehension of human communicative signs in dogs (Soproni, Miklosi, Topal, Csanyi, 2001). The results showed that dogs performed better when the human directed the dog at the target by pointing directly at the target, then when the human glanced at the target or when the human pointed above the target. This indicates that dogs are sensitive to the attentional gestures of humans, and can differentiate between different human communicative signals.

Feeding techniques and enrichment have also been shown to affect learning abilities in dogs. A study by Gaines, Rooney, and Bradshaw (2008), looked at the effect of enrichment feeding on the working ability of kenneled working dogs. Enrichment feeding is defined as implementing a device or toy that a dog plays with or uses to attain food, for example a ball with food inside. The results showed that over time dogs with feeding enrichment increased in their ability to learn new commands from being rewarded. This suggests that a dog's ability to learn new commands can increase over time with feeding enrichment and this ability is a desirable trait for a working dog, or an agility dog. This study shows that feeding enrichment can be used to increase working ability in dogs.

As well as feeding enrichment, dog and human play has also been found to affect dog behavior. Toth, Gasci, Topal and

Miklosi (2008), examined the factors affecting the individual differences in the behavior of dogs playing with humans such as; the familiarity of the playing partner, the type of game, the daily active interaction between owner and dog, gender, age, and breed. Their results showed that dogs who received more playful interactions with their owners showed less fear and avoidant behaviors during play in an unfamiliar place than owners who did not play with their dogs as often, and also these dogs showed stronger motivation to play tug-of-war than dogs who did not play with their owners as often. In another study, Rooney and Bradshaw (2002) found that dogs who were considered more playful achieved higher scores on involvement and attention seeking when they won a game of tug-of-war (gaining possession of the object being tugged) with their owner in contrast to when they lost (losing possession of the object being tugged) a game. This implies that play is rewarding for a dog and can affect other dimensions of dog behavior such as involvement and attentiveness. In a later study, Rooney and Bradshaw (2003) looked at the link between play and dimensions of attachment or dominance regarding dog and human relationships. They found that dogs that played rough and tumble games (tug-of-war, smacking/wrestling the dog) scored significantly lower for separation related behavior than dogs that did not play the rough and tumble game. In addition dogs that played tug of war scored higher for confident interactivity and involvement during the game than dogs that played any other game, which suggests that playing tug-of-war with a dog increases their involvement. This implies that dogs that play tug-of-war are more involved with their owner during these play sessions, which could cause them to be more attentive during a performance task immediately after the play session.

Furthermore, types of human and dog interactions can also be helpful for dog training, such as training dogs for agility. An agility trial is an obstacle course that a dog must complete in a particular sequence. There are many different obstacles they must complete such as: running through a tunnel, jumping over various heights of bars, completing contact obstacles such as a dog-walk and weaving around poles. Handlers and their dogs come to these agility trials to compete with other handler and dog teams to see how fast and efficiently they can complete the obstacle course. Many handlers at agility trials take into consideration that how they interact with their dog before a run can affect how their dog performs during the run. Two of the most common types of interactions seen between handlers and dogs at agility trials are either feeding or playing tug-of-war to attain their dog's attention (Shyne, A., personal communication, June, 2010). The current study seeks to investigate these interactive behaviors and how they affect their dogs' attention during the agility trial run. Previous research

has shown that agility dogs are more attentive and dependent on their owner for communicative signals, which indicates that dog attention toward their handler is a key component in agility training (Marshall-Pescini et al. 2009).

The current study will examine how human and dog interactions can affect a dog's attention in a performance task, specifically an agility run. I hypothesize that there will be a positive correlation with handler attention level before the run and dog attention level during the agility run. I also hypothesize that the type of interaction (tugging or feeding) will affect the dog's attention and performance in the run. There has been no previous research investigating how human-dog interactions affect a dogs' attention in a performance task, which makes the proposed research significant within the field of Psychology and animal behavior research. The implications of this study may be useful to dog owners who are training their dogs for agility trials, and may also have broader implications on efficient ways to train service dogs, or drug dogs. Overall this study will aid in further understanding of how animals and humans interact with one another and how these interactions can better help humans understand dog behavior.

METHODOLOGY

Subjects

The subjects in this study include handlers and their dogs competing at agility trials in Massachusetts, Rhode Island and Maine. Pairs (handler and dog teams) in novice and open levels were observed and videotaped at three different agility trials; Granby, MA on May 29, 2010; Westford, MA on June 6, 2010; Cumberland, ME on June 26 and 27, 2010; and Northsmithfield, RI on July 24, 2010. Teams run in a predetermined order, and there is only one team in the ring at a time, so every other pair of handler and dog was selected to be observed. This was done so that there was an ample amount of time for the researcher to write down a few notes on each team. The pairs next in line were easily distinguished because they were lined up near the entrance gate to enter the ring, therefore easy to spot and videotape. There were a variety of breeds observed of all different ages and sizes. No personal information on the handler was recorded, because this information was difficult to obtain accurately and also because it was not relevant to the study.

Procedure:

Naturalistic observations were taken at the agility trials during the summer months in Massachusetts, Rhode Island and Maine. At each trial there were three levels of difficulty: novice, open and excellent. However, novice and open were the only levels observed because dogs in these levels are less experienced

and are more prone to lose their focus on their handlers, while excellent dogs are very experienced and less likely to lose focus on their handlers (Shyne, A., personal communication, June, 2010). In addition there are three different types of courses, jumpers, fast and standard. Jumpers and standard courses are ordered obstacle courses which the judge designs and the handlers must negotiate with their dogs by communicating a specific route using verbal commands and hand signals. A fast course is an unmarked obstacle course during which each handler designs and runs in their own sequence by communicating with their dog using verbal commands and hand signals. During each team's run the following data were recorded: breed, level (novice or open) and the type of course (standard, jumpers or fast). Each team was taped between 30-80 seconds immediately before they entered the ring and the video clip was ended when the dog completed the last obstacle or when the buzzer/whistle sounded. Videotaping continued in the same sequence after the next dog had finished the run (this was to save battery power). After the agility trials the remaining observations on human attention, dog attention, and human and dog interactions were done by watching the video clips taken at the trials.

Type of Human-dog Interactions

Before each team's run the type of interactions that were observed and recorded were tug-of-war, feeding, other and none. Tug-of-war was when the handler plays tug-of-war for ten seconds or more during the time observed, and consists of the dog and handler tugging at each end of the rope simultaneously. Feeding was when the handler feeds the dog treats for ten seconds or more, before they run the agility course. Other was when the handler interacted with their dog in other ways than tugging or feeding for more than ten seconds during the time observed, such as, petting, talking to their dog, or playing touch (when the handler holds out their hand and commands the dog to touch it by jumping up and putting its nose to their hand). And lastly, none was when the handler does not engage in any type of interaction with the dog for the duration of the time observed.

Human Attention

Before the run the handler's attention level, low or high, was also recorded. Low human attention was when the handler made little or no eye contact with their dog (fifteen seconds or less). High human attention was when the handler made frequent eye contact with the dog (sixteen seconds or more).

Dog Attention

During the agility trial the dogs' attention towards the handler was observed and recorded. It included high, medium and low dog attention. High dog attention was when the dog looked at

the handler for the duration of the course and/or was following the handler's directions for the duration of the course. Medium dog attention was when the dog lost focus on the handler once or twice during the run, and/or the owner had to call the dog back to the course. Low dog attention was when the dog lost focus on the handler more than twice during the run, and/or the handler was not able to call the dog back after it lost focus.

Tugging Sample

Because there was a small sample of handlers tugging with their dog before the run further measures were taken to increase the sample. At the agility trial in Northsmithfield RI, I waited at the entrance and exit of each ring and approached handlers and told them I was doing research investigating handler-dog interactions. I then proceeded to ask them if they could tug with their dogs about a minute before entering the ring, and if their dogs did not tug that was fine. At this particular trial videotaping handler-dog teams that were tugging was the main focus. Therefore videotaping only occurred if handler-dog teams were tugging, and after they had finished their run the next team in line was also videotaped to keep data as equal as possible.

RESULTS

Human-dog interactions and dog attention levels

A three-way contingency table analysis was conducted to evaluate whether dog attention levels during the run were contingent upon human-dog run interactions before the run. The two variables were human-dog interactions before the run with four types (tugging, feeding, other, and none) and dog attention level during the run (low dog attention, medium dog attention, and high dog attention). A 4x3 contingency table analysis between dog attention level and human-dog interactions was found to be statistically significant, Pearson X^2 (6, N=147) = 20.857, $p = 0.005$, Cramer's $V = 0.266$. Individual comparisons were calculated as 2x3 contingency table analyses to investigate which groups were significantly related.

The first 2x3 contingency table analysis was used to test whether there was a contingency between the interaction types (feeding vs. none) and dog attention. The results showed that there was no significant relationship between the feeding and none interaction type and dog attention, Pearson X^2 (3, N=105) = 0.258, $p = 0.005$, Cramer's $V = 0.05$. A second 2x3 contingency table was used to analyze whether there was a significant relationship between the interaction type (feeding vs. other interactions) and dog attention. The results of the test showed that there were significantly more dogs who had high attention during the run when they engaged in other interactions

Figure 1. Relationship Between Handler-Dog Interactions and Dog Attention

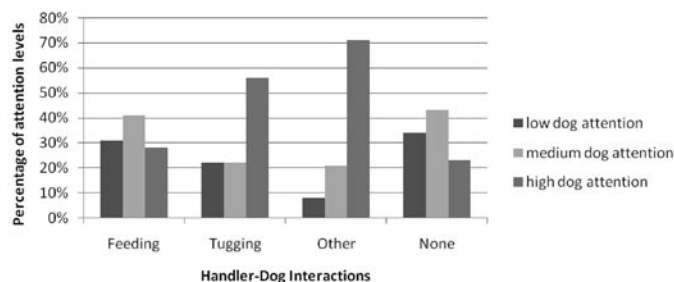
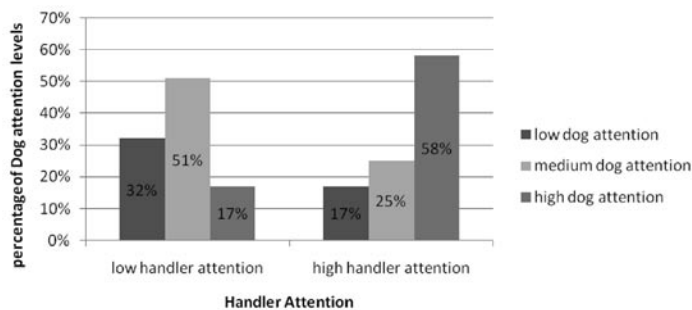


Figure 2. Relationship Between Handler and Dog Attention



before the run, than when dogs engaged in feeding before the run, Pearson $X^2 (2, N=82) = 13.502, p = 0.005$, Cramer's $V = 0.406$. A third 2x3 contingency table analyses was used to determine whether there was a significant relationship between type of interaction (tugging vs. feeding) and dog attention. The test showed that there was no significant relationship between tugging and feeding interactions and dog attention, Pearson $X^2 (2, N = 76) = 4.878, p = 0.005$, Cramer's $V = 0.253$. A fourth 2x3 contingency table analyses was used to test whether there was a significant relationship between type of interaction (tugging vs. none) and dog attention. The results showed that dogs who engaged in tugging before the run had higher attention levels during the run, than dogs who did not engage in any interaction, Pearson $X^2 (2, N = 65) = 6.212, p = 0.05$, Cramer's $V = 0.309$. A fifth 2x3 contingency table analyses was used to determine whether there was a significant relationship between the type of interaction (tugging vs. other) and dog attention. The results showed that there was no significant relationship between these two interactions and dog attention, Pearson $X^2 (2, N = 42) = 1.772, p = 0.005$, Cramer's $V = 0.205$. A sixth and final 2x3 contingency table analysis was used to test whether there was a significant relationship between the type of interaction (none vs. other) and dog attention. The test showed that dogs who engaged in other interactions before the run had higher levels of dog attention during the run, than dogs who did not engage in any interaction, Pearson $X^2 (2, N = 71) = 15.333, p = 0.005$, Cramer's $V = 0.465$.

Handler attention and dog attention

A two-way contingency table analysis was conducted to evaluate whether there was a significant relationship between handler attention before the run (high handler attention, and low handler attention), and dog attention during the run (high dog attention, medium dog attention, and low dog attention). Overall analyses of all the groups showed that dog attention was contingent upon handler attention, Pearson $X^2 (2, N = 138) = 25.970, p = 0.005$, Cramer's $V = 0.434$. However, to assess

which groups were significantly contingent to one another further 2x2 contingency table analyses were conducted.

The first two-way contingency table analysis was conducted to evaluate whether there was a significant relationship between handler attention levels and medium and high dog attention levels. The analysis showed that high handler attention before the run had significantly more dogs with high dog attention during the run, than low handler attention, Pearson $X^2 (2, N = 103) = 21.378, p = 0.005$, Cramer's $V = 0.456$. A second two-way contingency table analysis was conducted to evaluate whether there was a significant relationship between handler attention and low and high dog attention. The analysis showed that high handler attention before the run had significantly more high dog attention, and significantly less low dog attention, than low handler attention, Pearson $X^2 (2, N = 79) = 13.301, p = 0.005$, Cramer's $V = 0.410$. A final two-way contingency table analysis was conducted to evaluate whether there was a significant relationship between handler attention, and low and medium dog attention. The results showed that there was no significant relationship between the groups, Pearson $X^2 (2, N = 69) = 0.962, p = 0.005$, Cramer's $V = 0.118$.

DISCUSSION

The results of this study suggest that dog attention is contingent upon handler attention. When handlers are attentive to their dogs (high handler attention) before they enter the ring, it is likely that during the run dogs will also be attentive to their handler (high or medium dog attention). These results support the first hypothesis; however the second hypothesis was not fully supported. The results show that only some human-dog interactions before an agility run affect dog attention during the run. Overall the results indicate that handler attention towards their dog before an agility run is more effective at keeping their dogs attention during the run than the type of handler-dog interaction before the run.

Human attention may affect dog attention more than the type of human-dog interactions because previous research has shown that dogs are sensitive to the attentional states of humans (Call, Brauer, Kaminski & Tomasell, 2003, Schwab, Huber, 2006, Gacsi, Miklosi, Varga, 2004). Dogs are more obedient and perform better at tasks when their owners are attentive to them. These studies reinforce the current study's findings because handlers who were more attentive toward their dogs before they entered the ring had more attentive and obedient dogs during the run, because these dogs were paying attention and obeying the commands of their handlers during the run. In addition the results showed that handlers who showed low attention toward their dogs before they entered the ring had dogs who were far less attentive towards them during the run, which supports previous research that handlers or owners who do not pay attention toward their dog have less obedient, and poorer performing dogs. Dogs may become more attentive to their handlers if their handlers are more attentive to their dogs, therefore it may be a reciprocated behavior. Overall the results of the current study support previous research that human attention can affect dog performance, obedience and attention.

Results also showed that some types of play between humans and dogs before an agility run can also affect dog attention during an agility run. However this hypothesis was not strongly supported. Results showed that overall any handler-dog interaction before a run affects dog attention during the run. Results indicated that tugging and other interactions were significantly more effective on dog attention than no interaction (none). This may suggest that the type of interaction a handler engages with its dog is not important, but that interaction alone, with a dog before an agility run is important for keeping a dogs attention during a run. In addition feeding may not be effective at keeping a dogs attention during the run since results showed it was significantly less affective at keeping a dogs attention than other interactions, and it showed to have the same effect on dog attention as no interactions. In general interacting with a dog before it enters the ring, regardless of what type of interaction, is effective at keeping a dogs attention during an the run.

Although Rooney and Bradshaw (2003) found that tugging was linked with more dog involvement than other types of play such as fetch, this was not found in the current study. This may be due to the lack of handler teams engaging in tugging before the ring, which may have affected the results. However in future studies a larger sample of handler and dog teams tugging before a run may be necessary to support the hypothesis that tugging effects dog attention significantly more than other types of interactions.

In conclusion the current study found that before a run, human attention toward a dog is more effective than the type of human-dog interactions at keeping a dog's attention during the run. However it was found that interacting with a dog before a run does affect dog attention compared to no interactions. Given the limitations of time, money, and opportunities the sample size was not large enough to generalize to all handler-dog teams, therefore in future studies a larger sample covering more agility trials around the United States may be needed for more generalized results. The implications of this study may be useful for handlers training their dogs for agility, training drug dogs or service dogs, and may be helpful to better understand the affects of human and dog interactions, and how human behavior can affect dog behavior.

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Development of Biomarkers for Endocrine Disrupting Compounds in the Fathead Minnow, *Pimephales promelas*

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was funded by a 2010 Adrian Tinsley
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under the mentorship of Dr. Jonathan
Roling. It was presented at the 2010
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Undergraduate Research (NCUR) in
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Organic waste compounds (OWC's) are an environmental concern that can have adverse effects on humans, animals, and the environment. Ethinyl estradiol (EE2) is one common OWC and is an active ingredient in oral birth control pills. The presence of EE2 in aquatic environments and drinking water can be linked to decreased fertility and altered physiology in fish. I am developing Q-PCR biomarkers to detect changes in fish at low concentrations before adverse effects occur at higher concentrations. RNA was extracted from twenty fathead minnows that had not been exposed to OWC's and will be used to synthesize cDNA. Thus far I have tested Q-PCR primers to measure vitellogenin RNA transcription. A standard curve and melt curve demonstrated proper amplification of a single product. A 96 hour exposure of 40 fathead minnows was conducted using EE2 at 0, 3, 17 and 100ng/L. Three 96 hour exposures of triclosan using 36 fathead minnows was conducted at 0, 0.1, 1 ug/L. Livers were dissected from the fish and are currently stored in the -80°C freezer to be used in the future.

Introduction:

Many chemicals used in today's society have adverse effects on animals and the environment. Some of these chemicals are deposited in our rivers, streams and estuaries via effluents of sewage treatment plants. Exposure to these chemicals can lead to reproductive changes in animals. We want to monitor these changes before significant reproductive and population alterations occur. These small changes can be used as biomarkers. A biomarker is a characteristic of molecular change that can be measured and evaluated as an indicator of a normal or pathogenic biological process. My research project this summer was to develop biomarkers for endocrine disrupting compounds in the fathead minnow.

One class of these chemicals that enter through the effluents are the components in oral contraceptives. These synthetic substances act like hormones in the endocrine system. The endocrine system produces hormones that regulate many functions of an organism such as growth, tissue formation and reproduction. When an organism is exposed to synthetic hormones the endocrine system may be come disrupted causing normal growth and reproduction to be altered. These chemicals are called endocrine disrupting compounds (EDCs).

One such EDC is ethinyl estradiol (EE2), the active ingredient in birth control pills. The presence of ethinyl estradiol in aquatic environments can be linked to changes in reproductive rates including decreased fertility in fish species (Folmer et al. 2001). A gene known as vitellogenin is an egg yolk precursor expressed in female fish and should never be expressed in male fish. After exposure to estrogenic EDCs, male fish can express the vitellogenin gene. This causes a feminization of male fish, causing them to no longer be able to reproduce. This expression of the vitellogenin gene in male fish is used as a biomarker for EE2 exposure.

Because physiological change can be caused by EE2, we want to identify and monitor the effects of low dose exposure before physiological alterations occur. Detecting these changes at low dose exposure is critical so that more adverse effects do not occur at higher concentrations. Using biomarkers will enable us to monitor exposure of EE2 in the same low doses observed in the environment. If these fish are continually exposed to EE2 in the aquatic systems reproduction can become impaired or completely halted.

Methods and Materials:

General methods for animal exposures:

All exposures were completed using fathead minnows. 96 hours exposures were completed with a water exchange at 48 hours. Fish were fed AquaTox fish food daily. Water was aerated during exposure. After 96 hours fish were euthanized and weighed. Liver tissue was extracted for future RNA extraction.

EE2 Exposure 06/09/2010:

An exposure tank was set up using forty aerated 800ml or greater beakers. EE2 was dissolved in ethanol to 1mg/L. EE2 was then diluted to the highest concentration of 100ng/L EE2 with 1% ethanol. Subsequent exposures were prepared by mixing one fifth dilutions from the higher concentration while maintaining 1% ethanol. Treatment concentrations were divided evenly among ten beakers. A control exposure was performed at 1% ethanol.

Forty fathead minnows were randomly selected from the BSU aquaculture facility and placed in individual beakers. After 48 hours a 90% water change was performed. Dilutions were prepared as described above. 90% of the water in each beaker was discarded into a waste container, and replaced with fresh dilutions. After 96 hours fish were euthanized on an RNase free area. Liver tissue was dissected out and placed in 800 ul of STAT-60 solution on ice. After samples were collected they were placed in the -80°C freezer. Fish were weighed were measured after liver dissection.

Triclosan Exposure 06/25/2010:

An exposure tank was set up using forty aerated 800ml or greater beakers. A stock concentration of triclosan was dissolved to 1g/L. Triclosan was diluted to 10ug/L at 0.02% ethanol. The subsequent concentrations were prepared using 1/10 dilutions while maintaining 0.02% ethanol. A control exposure was prepared with 0.02% ethanol.

Forty fathead minnows were randomly selected from the BSU aquaculture facility and placed in individual beakers. After 48 hours a 90% water change was performed. Dilutions were prepared as described above. 90% of the water in each beaker was discarded into a waste container, and replaced with fresh dilutions. After 96 hours fish were removed from the solutions and euthanized on an RNase free area. Liver tissue was dissected out and placed in 800 ul of STAT-60 solution on ice. After samples were collected they were placed in the -80°C freezer. Fish were weighed and measured after liver dissection.

Triclosan Exposure 07/07/2010:

An exposure tank was set up using 12 ten gallon aerated fish tanks. Each aquarium was filled with 20 liters of water. Concentrations remained the same as previously described.

Thirty six fathead minnows were randomly selected from the BSU aquaculture facility three fish were placed in each aquarium. After 48 hours a 50% water change was performed. Dilutions were prepared as described above. At the time of the water change air stones were added to the air hoses to increase the concentration of oxygen in the tanks. After 96 hours fish were removed from the solutions and euthanized on an RNase free area. Liver tissue was dissected out and placed in 800 ul of STAT-60 solution on ice. After samples were collected they were placed in the -80°C freezer. Fish were weighed and measured after liver dissection.

Triclosan Exposure 07/16/2010:

An exposure tank was set up following all methods described in the previous triclosan exposure. The only exception being that air stones were added to the tanks at the onset of the exposure. Water change and dissection procedures also remained constant with the previous exposure.

Testing of 11βHSD primer set:

Using Quantitative polymerase chain reaction (Q-PCR) samples of cDNA were run to determine if the primer was

binding to the correct target gene sequences, and allowing the Q-PCR to amplify the correct target. Reagents per reaction were 15m moles primer, 1X Sybr Green Supermix (BioRad inc., Hercules, CA), and fathead minnow cDNA. 11 β HSD primers were 5'-gCATCggCgAgCagTTg-3' and 5'-CTCCTCgCCggTgATAACgA-3'. Forty cycles of Q-PCR were performed at 95C for 30 seconds, 60C for thirty seconds, and 72C for thirty seconds using BioRad iQ5 real time PCR machine (BioRad inc. Hercules CA). After amplification a melt curve was analyzed.

Results and Discussion:

An exposure of EE2 was successfully completed after each exposure the fish were weighed. It was determined that there was no significant difference ($P \leq 0.05$) in the weights of the fish (Figure1). This was expected, to ensure similar size fish to eliminate differences of fish age. All tissues extracted from the EE2 exposure are currently stored in the -80°C freezer and will be used for extraction of RNA. This RNA will be used to synthesize cDNA. cDNA samples will be run through Q-PCR to determine if expression of the vitellogenin is seen in fathead minnows exposed to EE2.

exposure an additional triclosan exposure was preformed. Ten gallon aquariums were used for the second exposure to provide more water for the fish and prevent hypoxia. Three fish were placed in each tank. We eliminated the 10ug/L concentration due to space constraints in the raceway and the extremely high toxicant concentration. In the second exposure six fish were dead after 48 hours. At this time we added air stones to the air hoses to increase oxygen concentrations in the water. After 96 hours the fish were euthanized and liver tissue was extracted. Tissue samples are currently being stored at -80°C for future analysis. Another triclosan exposure was completed this time using air stones in the tanks at the onset of the exposure to ensure proper oxygenation of the water. Six fish fatalities were noted during this exposure. It is uncertain why these fish died. After 96 hours the remaining fish were euthanized and liver tissue was extracted. Tissue samples are currently being stored at -80°C

After each exposure the fish were weighed. It was determined that there was no significant difference ($P \leq 0.05$) in the weights of the fish (Figure1). This was expected, to ensure similar size fish to eliminate differences of fish age.

Testing of primer 11 β HSD was done to determine if the primer would correctly amplify the target gene sequences. Previously isolated fathead minnow cDNA were used for vitellogenin primer testing. The amplification curve (Figure2a) shows expected sigmoidal amplification of the product. The standard

Average Weights of Fish

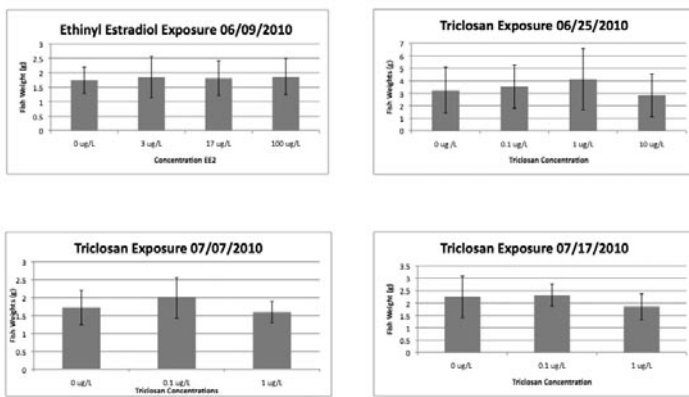


Figure 1: Average Weights of Fish. Fathead minnows were exposed to EE2 at 0,3,17, 100ng/L. Three triclosan exposures were completed at 0, 0.1, 1ug/L. After liver extraction fish were weighed and measured to ensure consistency between treatments. None of the fish weights were statistically significant than the control fish. n = 10, mean + standard deviation, p < 0.05.

In the first triclosan exposure that was completed we experienced a high mortality rate of the fish during the exposure time. In all 21 fish died. Liver tissue from the remaining fish is currently being stored in the freezer for future RNA extraction. Because the beaker size may have been too small for the fish, the oxygen levels in the beakers were low. Due to the outcome of this

Figure 2a

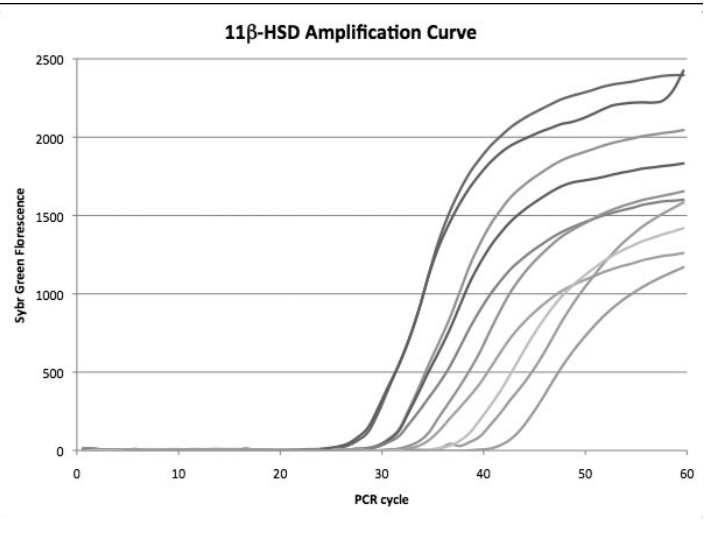


Figure 2b

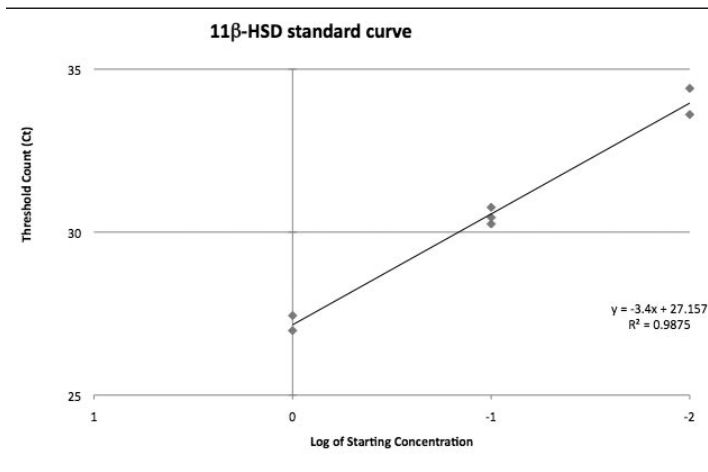


Figure 2c

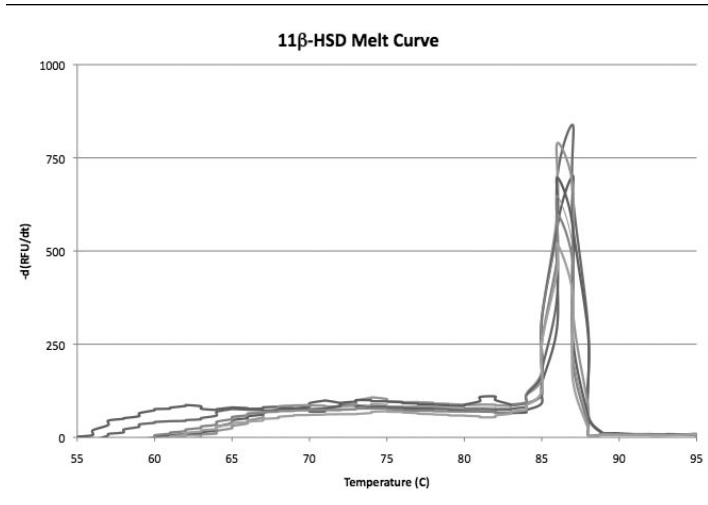


Figure 2: Determination of efficiency of 11βHSD Development Using Q-PCR Primer. Samples of cDNA were run to determine if the primers were binding to the correct target gene sequences, and allowing the Q-PCR to amplify the correct target. The amplification curve (Figure 2a) showed expected sigmoidal amplification of the product. The standard curve (Figure 2b) has a 96.9% efficiency rate. The Melt Curve (Figure2c) showed only one product, the gene of interest.

curve (Figure2b) has a 96.9% efficiency rate. The melt curve (Figure 2c) shows only one product, the gene of interest. We determined that 11βHSD did successfully bind to the target gene sequence.

Conclusions and Future Work:

One successful exposure using EE2 was completed. During the fall and spring semester I will continue my research. I will extract RNA from the liver tissue I dissected and use the RNA to synthesize cDNA. Q_PCR will be run using tissue from the exposed fish, and I will determine if EE2 exposure leads to expression of the vitellogenin gene in the fish. The vitellogenin gene will be cloned and sent out for sequencing in order to verify that the correct gene of interest was amplified.

Three exposures of triclosan were completed. Due to the high mortality rate of the first exposure we will be unable to use any data gathered from the remaining fish tissue because our sample number is low. This tissue will be used for primer testing only. The results of the subsequent triclosan exposures are still unknown and it is uncertain why so many fish died during this exposure.

We determined that there was no significant difference in the weights of the fish used in the exposures. We determined that 11βHSD primers were successfully binding to the correct target gene sequence. This primer set will be used in the fall when my research continues examining 11bHSD to monitor changes in fish populations.

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A Slip of Paper in a Black Walnut Box: An Examination of the Suffrage Debate in Beverly, Massachusetts 1913-1915

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Sarah is a senior majoring in History with a minor in Secondary Education and Art History. This

research was performed during the Summer of 2010 as an Adrian Tinsley Program Summer Grant. Sarah's studies were completed under the wonderful guidance and mentorship of Dr. Margaret Lowe. Sarah plans to pursue her master's degree in History and looks forward to being able to use her research in the classroom. She also plans to further her research in the field of women's studies throughout graduate school.

*I*t was not until 1920, 72 years after the birth of the suffrage movement, that Massachusetts women gained the right to vote. While other state suffrage associations succeeded in persuading their governments to pass laws securing the vote for women, Massachusetts reformers were met with an overwhelming amount of resistance. The forces behind much of this resistance were the white, middle-class women active in small cities and towns throughout the Commonwealth. Women in support, as well as in opposition, to suffrage in Massachusetts at the turn-of-the twentieth century were the same women swept up in the changing gender roles of the time. It was this confusing social, and in turn, political climate in Massachusetts that created some of the most dynamic and fascinating suffrage discourse in the nation. And there is no better place to find this rich dialogue than in the primary sources of the small cities and towns of Massachusetts. It is the small historical societies of towns like Beverly, MA that provide insight into the complexity of the local suffrage debate.

Historians of the pro and anti women's suffrage movements often focus on the national and sometimes individual state stories, paying particular attention to such elements as class and race, as well as the changing gender relations that were present in the early twentieth century. While their contributions provide a rich body of literature, they ignore a critical aspect of the history of women's suffrage: the local, town-by-town campaigns. By presenting never before analyzed primary source documents recently discovered in the archives of the local Beverly Historical Society in Beverly, MA, this study shines light on the local narrative; a missing piece of the state and national suffrage picture.

Before the suffrage debate gained momentum in the town of Beverly, between 1913 and 1915, women involved themselves in city affairs by forming and participating in different women's groups aimed at benefiting the town in ways only women's organizations could. Staying true to the charitable and nurturing ways of groups that had come before them, the women's groups of Beverly supplied the opportunity for public involvement many "New Women" of Beverly craved, while still keeping their members within the female realm of influence deemed appropriate by society. Some of these groups had religious affiliations like the Washington St. Girls Club and the Unitarian Club; other groups, such as the Mayflower Club, focused on charitable efforts. These groups laid the ground work for more politically driven organizations that

would later form in the Beverly community, including those most important to this study, the Beverly Equal Franchise League and the Beverly Anti-Suffrage Association.

As did all of the clubs that came before them, the Beverly Equal Franchise League and the Beverly Anti-Suffrage Association used the written word to publicize both their activities and their political perspective. Beverly women felt completely comfortable expressing their opinions in public, despite their somewhat controversial group affiliation. This is best seen in a document only recently unearthed at the Beverly Historical Society. *The Beverly Beacon* was a women's newspaper published in the town of Beverly, Massachusetts. Published by the Women's Auxiliary to the Y.M.C.A in 1913, this document was issued only once. As its editors wrote, *The Beverly Beacon* intended to give Beverly women their own printed, widely circulated voice where they could broadcast their views on all manners of local and national issues. As its banner proclaimed:

It is a paper with a purpose...throw light on our city, its past and present, its virtues and faults, and more particularly on the activities and opinions of its women...The Beacon does not aspire to be a lighthouse. It will flash out once and disappear.²

The document, rich in articles and editorials for and by a diverse set of women, includes two pieces which take up the issue of women suffrage. While presenting both sides of the argument, each author takes a specific stance. Interestingly, these articles on suffrage are given an ample and equal amount of space within the newspaper, each taking up a full two-column page within. No other subject in the publication is discussed in such depth. This simple fact of article length may suggest, in the most subtle way, the importance of the suffrage discussion during this period in Beverly.

More evidence of the growing popularity of the topic of suffrage in Beverly local politics can be found in the records of Mary Boyden, the Secretary and Treasurer to the Beverly Anti-Suffrage Association. From the year 1915, this primary document served as a meeting record book, personal diary, and scrapbook to the young group officer. Boyden, beginning in the early months of 1915, began to place clippings from the local newspaper, *The Beverly Times*, into her notebook. These clippings documented the activities of her own organization, the Beverly Anti-Suffrage Association, as well as the activities and opinions of their political opponent, the Beverly Equal Franchise League. By doing so, Boyden has captured the pro and anti-suffrage dialogue in Beverly, allowing for a glimpse into the town's past. It is Mary Boyden's meticulous work as secretary to her organization that now offers historians unique

insight into the Beverly suffrage story, contributing greatly to the larger picture of state and national women's suffrage.

Both the Mary Boyden records and *The Beverly Beacon* display, in the most captivating way, the witty political banter of the local, state, and national suffrage dialogue. The women of Beverly seriously contemplated the pros and cons of inserting themselves into politics via the ballot. Perhaps surprising to our contemporary expectations, it appears that there were an equal amount of women willing to do whatever they could to stop women from voting. Both pro and anti-suffrage women in the town of Beverly believed that women were extremely capable and that in fact, they were central to ensuring national progress. The local debate became rather: would the granting of the ballot to women hurt or help their contribution to national progress?

Both the pro and anti-suffragists of Beverly returned over and over again to three key thematic arguments: women's economic role and other responsibilities within the home and to her family, the natural higher moral tendency of women and whether or not it had a place in the realm of politics, and finally, what the enfranchisement of women would do to the good of the national government and society.

The first thematic argument centered around the impact of the vote on a woman's economic role in the family and how this would affect her pre-established responsibilities within the home. There were many economic changes taking place in America at the turn of the century that brought into question the role of women in the home; instead of self-sustainable households, the industrial revolution had turned the home into a place of consumers. Ellen Richards, founder of the home economics movement, writes, "The flow of industry has passed and left idle the loom in the attic, the soup kettle in the shed."³ Middle-class homemakers now had an unprecedented number of resources available to them which eased or reduced household responsibilities. In addition, family members were spending less time together; men were at work and children were at school for longer periods of time during the day. With less to do and fewer people to care for, women began to reevaluate how they spent their time in the home.

More resources and absent family did not reduce the role of women in the home, only changed it. It was this changed position that led some women to look for a more public role. A debate then arose concerning to what use and what lengths this public role ought to extend. Previously, during the years of intense progressive reform, women had used their public position to fight for the rights of others. But now, women's own rights were up for debate, bringing to the forefront the

issue of suffrage. Many women were not, however, ready to take such a leap; worried that if they did so, their families would be left to care for themselves, resulting in the dissolution of the family unit. An argument used by the anti-suffragists in Beverly, as displayed by Ms. Caroline A. Mason in her article featured in *The Beverly Beacon*, was that if women were to involve themselves in politics and express their opinions in the form of the ballot, it would have catastrophic consequences for family life. She states:

We will not yield place to any suffrage partisan in our estimate of woman's capacity, but she is not capable, has never shown herself and never will show herself capable of sustaining alike the life of the family with all its profound and absorbing demands, and the laborious technique of public life.⁴

The pro suffragists of Beverly would beg to differ on the degree to which female involvement in public life would harm the family. In fact, as displayed in a poem found in the notebook of Mary Boyden, women could stay true to all of her responsibilities at home, while still having an active public life, culminating in the ultimate expression of opinion, the ballot. The suffragists proclaimed: the hand of woman/ A frail hand it is true, / But it can rock the cradle and drop the ballot too.../ and though against that fragile hand/ Distrust and doubt are hurled. / Still, the hand that rocks the cradle/ should help to rule the world.⁵ Both the suffragists and the antis of Beverly believed in the female responsibility to take care of the home and those within. However, it was the degree to which other activities, particularly those of the political variety, should play in the female experience that differed greatly among the two groups.

Suffragists advocated that not only could women run the home and help to nurture the family's growth, but they could also involve themselves in politics. An increase in white, middle and upper-class women's available free time, granted by the influx of technology and resources, provided, in the eyes of the suffragists, opportunity for women to educate themselves on their political responsibilities. Suffragists proposed that rather than whiling away their time with silly games and rounds of social visits, middle-class women ought to shoulder their fair share of the nation's political responsibilities. Anna Tillinghast, a prominent progressive, Reverend, and suffragist spelled this out in the 1913 *Beverly Beacon*:

While the woman of wealth spends nearly every afternoon at the card table, the theatre or some social function, she who is not willing to sacrifice a few hours a week from these places in order to become qualified

to do her part in the amelioration of mankind needs to bow her head in shame.⁶

In a direct response to these types of statements, the anti-suffragists argued that yes, perhaps women had turned to idle, silly socializing but their remedy was not the vote. Instead, such women should exert greater political and social influence from within the confines of the home. Responding in verse, as displayed in *The Beverly Times* they argued: We grant you have intellect, power, and brains, /And meet with great fortitude life's heavy strains. /Watch the babe in the cradle as gently it rocks—/ Not the little white slip in the black walnut box.⁷ With recognition of female value, the antis within this poem, stress that a woman can still serve her community and have a hand in politics from the comfort of her own home. A reoccurring irony consistently appears in all of the documents found in Beverly. All of the women who are commenting on the issue of suffrage, both from the pro and anti camps, are contributing to the public sphere, while at the same time, projecting their views about how women shouldn't do the same.

A prime example of this contradiction, as well as the debate that raged in the Beverly community about the toll suffrage could possibly have on the family, can be found in the "Political Page" of *The Beverly Beacon*. One local woman comments on her role in the family as contrasted by that of her husband's, concluding that woman can best help her community from within her home performing her responsibilities to her family. She states,

In our home it has only been necessary for me to tell John when things were wrong and in time, John's time, of course, they would be righted. It would not seem best to me to undertake to do John's work It seems to me city government is a good deal like household government. John has assumed the care of certain departments and must be responsible himself...⁸

As a member of the Beverly community, she believes in family first, with men and women performing their respective roles. Women should not concern themselves with trying to gain the right to vote and instead use their influential voice within the walls of their own homes; all the while, expressing this opinion in a public forum.

The underlying fear that the female vote would have a negative effect on the family is easily understood given the time period. By the turn of the century, America was undergoing dramatic change. The Progressive era, a period of intense reform activism from the late 1890's to the years just after the conclusion of the First World War in 1918, had altered many

aspects of American life. Battles waged over new labor laws and social welfare policies as new progressive thinkers began to link the fate of the nation's most impoverished sectors with the general welfare of the country.⁹ In this time of great debate and change, women found themselves identifying with two contrasting ideals: one, the public female leader, championing the progressive landscape, fighting to improve the lives of others and the second, the progressive reformer *within* the home. In this version, as wife and mother, a woman kept her family, and in turn, the nation, grounded. Woman's most powerful position to protect American life emanated from her domestic and motherly duties. Granted the right to vote, women's ability to protect all that was held dear to America in those shifting times would be compromised, in the opinion of the anti-suffragists. No matter what side of the debate women favored, issues of family reigned supreme. But this argument surrounding family was not the only one used by the pros and antis of Beverly in hopes of swaying public opinion in their favor.

The second thematic argument between the pro and antis in Beverly was whether the vote would enhance or undermine women's traditional, and what was thought to be biological and God-given position, as the moral authority in American society. Women, particularly in their role as mothers, up until around the turn of the century, were viewed as highly pious individuals, pure in nature and in turn, too delicate and frail for politics. Although this notion had faded slightly from its overwhelming dominance in the form of "true womanhood" in the 1820s-1860s, it continued to influence women's views. However, with the emergence of the "New Woman," a female's moral tendencies were being put to use both within and outside of the home. This often took the form of what was called "social housekeeping," an attempt by women to clean up the supposed filth that seemed to plague the lowest levels of society. Despite the great changes brought on by female participation in the public sphere, many still believed that women's engagement in public politics in the form of the ballot would be using women's higher moral understanding in the wrong arenas. A soul and body meant for prayer and household duties, in addition to influencing members of the family, was not meant for cleaning up politics; were the thoughts of the anti-suffragists of Beverly. Any place outside of the female sphere, said the anti-suffragists, would pose a danger to these faithful individuals. Women did not shy away from this highly moral reputation as evidenced by Beverly's own Women's Auxiliary to the Y.M.C.A. who published *The Beverly Beacon*. In their statement on the purpose of their organization, the authors write:

It has been our constant endeavor to create around our association that atmosphere in which the highest ideals of

moral character and Christian Manhood may be nurtured, and through which spiritual power may be infused into every avenue of its life.¹⁰

Beverly women believed in the female responsibility to "nurture" Christian manhood and that as women, it was up to them to do so. By providing the young men of Beverly the opportunity to learn and practice the responsibilities bestowed upon them by the church via sponsoring and planning Y.M.C.A. activities, these women of the Auxiliary hoped to ensure the growth and success of their community. This responsibility could be upheld because of women's inherent ability to have the best understanding of the "highest ideals of moral character." The Women's Auxiliary to the Y.M.C.A of Beverly is just one example of female public activity that women and the wider public deemed an acceptable move into the public sphere; dictated by their believed superiority in the understanding of a higher moral order.

Although both the pros and antis of Beverly believed women's moral influence should be used for the betterment of others and the greater community, the pros saw these moral, pious tendencies as all the more reason for women to get involved in politics and have a farther reaching public influence, via the ballot. The suffragists of Beverly believed that if both men and women claimed that women had such natural moral superiority, that they should use their pure ways to clean up the filth of politics. Anna Tillinghast, in her article entitled "Equal Suffrage" found in *The Beverly Beacon*, stated, "If the polls are such vile, disorderly places as is claimed, then it is time woman purified them by her presence. Surely the affairs of state need to be conducted with decency and sobriety."¹¹ Let women into the polls and they will improve the atmosphere just as they do within their own realms of influence. In connection to the issues surrounding family, the morality argument clearly served as solid support for both sides of the suffrage debate. With evidence that the women of Beverly themselves believed in female moral tendencies, it leaves historians to wonder which camp used it most to their advantage, winning the support of the public.

The third and final thematic disagreement between the pros and the antis of Beverly, as displayed by the dialogue discovered in the primary source documents, lay in their views on the social and political consequences that would result from women taking up the vote. Both pro and anti-suffrage forces marshaled evidence to prove that the American government, and American society as a whole, would either benefit or in contrast, unravel if women secured the vote. Anti-suffrage women argued that the vote would indeed undermine women's emotional and intellectual balance. As Mary Boyden, the secretary and

treasurer to the Beverly Anti-Suffrage Association, wrote in a letter to Mr. Chase, a congressional minister of Beverly,

I think the effort to expand her personality in the direction of political activity would cramp women's more characteristic development and bring her poorer powers into play, her weakness in logic, her distaste for matters large and abstract outside of her concrete experience, and a tendency to let emotion, prejudice and passion enter into discussion of matters of justice moment upon which there must be difference of opinion...¹²

For the antis, women were indeed more emotional than men and less capable of making objective political decisions.

Dissimilarly, pro-suffrage women had no doubt that women could vote with their heads and not with their hearts. Anna Tillinghast continued her argument in support of suffrage by asserting that women certainly have the intelligence and reasoning power to cast the ballot. She states in her article,

The ballot is simply an expression of an opinion. It was decided by those who had the welfare of society at heart, that there were certain classes of individuals whose opinions for one reason or another, were not worth counting. In most states these classes are children, aliens, idiots, lunatics, criminals and *women*. There are good obvious reasons for making all these exceptions, except the last. But is there any logical reason why the opinion of women should be disregarded?¹³

The pro-suffrage opinion was that time and time again, women had proven themselves level-headed and positively influential. To class her among such low standing individuals was doing a disservice to not only all females but to the country as a whole; leaving Americans starving for the good that could come out of the enfranchisement of women.

Anti-suffragists, in conjunction with their belief that the polls were an unsuitable place for women, also believed that female participation in politics would be detrimental to the inherently pure and moral attributes assigned to women because of their sex; in no way supporting the good of the nation. It is not new in the 1910s for most Americans to view the political arena as a sordid, corrupt environment, one much better suited to the rough and tumble male disposition than that of the naïve, vulnerable female. But with women's suffrage newly on the table, the act of voting—casting a ballot in public, had become especially demonized. Anti-suffragists predicted doom. The boldly public nature of participating in the political process would undermine women's moral sensibilities; the very same

inherent moral fiber that was thought essential to preserve the good of the nation. Based on sex alone, politics endangered women. In a world dominated by corrupt men, they would drown in political filth.

The thought of women entering politics and casting a ballot became even more threatening as Americans watched WWI rage in Europe. With the possibility of impending war, the anti-suffragists stressed that in times of uncertainty and unrest, women and men must remain in their entirely separate domains. It was believed that this separation was vital to keeping all Americans safe. One anti states in *The Beverly Times*:

The question is whether we shall double our present electorate; and I think there can be no doubt, in view of impending problems, that no patriotic man or woman will be in favor of such a far-reaching change in our organic law if it can be shown that the woman's vote, instead of strengthening the arms of the state in time of trouble will result in the weakening of those forces upon which the stability and integrity of our government rests.¹⁴

If women were allowed to voice their opinions via the ballot at a time when it was clear many Americans thought war was on the horizon, it would put the American government and all of its citizens in danger. As stated in a New York pamphlet discovered in the Beverly Historical Society, a man's vote was the only one which should be considered because a man's hand was the only one who could pull a trigger in defense of his country and his country's political decisions:

When the virtuous woman, the well-bred woman, the enlightened woman, goes to the polls, she will meet there no man so ignorant as not to know perfectly well that his ballot has a metallic basis and must be respected, while hers is nothing but paper, and he may respect it or not.¹⁵

To allow women to vote would be putting men in jeopardy of having to fight for a cause that was not their own and placing women in a position where their virtuous talents would be wasted. The presence of such a pamphlet in the town of Beverly not only suggests that these beliefs were held by the antis of the community, but also that pro and anti-suffrage literature was widely circulated across state lines.

In addition, according to the anti-suffragists of Beverly, the vote would serve as the gateway for women to embark upon other detrimental political activities that would further undermine American democracy. As one writer from *The Beverly Times*

lamented, “Woman Suffrage is the opening wedge to Socialism and Feminism, propagandas antagonistic to everything held dear in Christian civilization.”¹⁶ The possibility for the oncoming of Socialism and Feminism in the early twentieth century terrified many Americans because these schools of thought challenged most American ideals. It was thought, by the anti-suffragists, that women were more likely to vote for radical and socialist candidates because their agenda aligned more precisely with those parties than with the rooted Democrats and Republicans. In turn, antis believed that if women won the vote, it would ultimately threaten American democracy. One of the most dramatic claims comes from Beverly’s own Caroline A. Mason when she discusses the decline and eventual downfall of prior civilizations, pointing to female enfranchisement as the leading cause:

An authoritative English writer reviewing the decline and fall of great nations and civilizations in our world history, declares that three symptoms invariably attend the period of decay. These are, first: neglect and contempt of the national religion, whatever it chanced to be; second: the presence in the population whether by conquest or by colonization, of enormous numbers of alien races; third: the coming of women into public life and political prominence. This last factor...the fever of the diseased civilization.¹⁷

The anti-suffragists of Beverly believed that suffrage for women would not only harm all members of American society, but the very ability of America to govern itself. The suffragists it can be assumed, although little of their dialogue focused on their views on the female impact on the national good, would have taken an opposing approach to their anti-counterparts. Suffragists would have advocated that enfranchising women would do nothing but open doors to America’s true political and societal potential.

Thus, this close community study of Beverly reveals that three major themes brought the local suffrage debate to life: women’s expected roles within the home and family, contrasting views of the meaning and uses of women’s supposed moral superiority, and finally, the projected social and political consequences of the female ballot. However, these arguments are not all that these sources have to tell us about the suffrage story. A striking chronological consistency suggests that the documents found in Beverly jive with the national debate. The documents found in Beverly, such as *The Beverly Beacon* and Mary Boyden’s notebook were written between 1913 and 1915. The year 1915 appears to be an important year in the suffrage debate as a major suffrage referendum was presented to the Massachusetts people.

Immediately upon learning of the referendum, the anti-suffragists entered the public sphere, in hopes of gaining support for their cause from Massachusetts citizens. Historian Thomas Jablonsky chronicled the anti-suffragist’s relentless attack, arguing that these women were anything but stagnant in their attempt to give the public access to their claims, going to creative new lengths to do so:

Anti-suffrage speakers crisscrossed the state appearing at women’s clubs, grange meetings, county fairs, and rural crossroads warning their parsimonious Yankee audiences that doubling the electorate by enfranchising women would double the cost of each and every election. Ads were placed in the Harvard Red Book and an anti-suffrage theme song (“Anti-Suffrage Rose”) found its way into nickelodeons, where it played as background to an anti-suffrage slide show. Season schedules for the Boston Red Sox and the Boston Braves were distributed with batting averages and photographs of baseball heroes Tris Speaker and Johnny Evers interspersed among anti-suffrage essays.¹⁸

Only five years before the eventual passage of the nineteenth amendment, the antis of Massachusetts felt in no way that their fight was a soon to be lost cause. As the referendum drew near, and with antis actively gaining the support of Massachusetts’ voters, the suffragists felt it was time for them to prepare for what would perhaps be their biggest battle to date. Despite the support of Socialists, Progressives, Democrats, the State Federation of Labor, and the new Democratic governor of Massachusetts, David Walsh, by 1914, the suffragists still felt anxious that they were not reaching the audience they needed to in order to secure a win.

In response, the Massachusetts Woman Suffrage Association organized a massive pro-suffrage parade for Saturday, October 16, 1915. The group had recruited close to 15,000 marchers alongside 30 bands to conduct a spirited march from the corner of Massachusetts Avenue and Beacon Street to the Public Garden, Boston Common, and State House, onto Tremont, Saint James, then finally Huntington Avenue, ending at Mechanics Hall with a pro-suffrage rally. This parade offered one last opportunity to the suffragists of Beverly to recruit local support. One suffragist wrote in *The Beverly Times*:

The big suffrage parade in Boston Saturday afternoon, October 16th, promises to be one of the most spectacular events of the season...There is no question but what Suffrage will win at the polls on November 2nd, so this will be the last opportunity Beverlylites will have of

marching in a suffrage parade in Massachusetts. When the story of the fight becomes history, you will want to be able to say that you marched in the great victory parade.¹⁹

Despite this kind of local support, the city of Boston, and more widely the state of Massachusetts still wavered in its support of the suffrage cause. As the author, Anna J. Cook vividly described the day; the parade only seemed to heighten the growing tensions within each camp,

According to the *Boston Globe*...Pro-suffrage marchers processed past houses draped with red banners bearing anti-suffrage slogans and motor cars festooned with giant red paper flowers, “hover[ed]...like flying cavalry seeking an opening for a flank attack” as boys ran among the crowd of spectators selling red roses pinned to cards bearing anti-suffrage messages.²⁰

This vivid description showcases the growing tensions of the Massachusetts suffrage movement, eventually culminating in the 1915 referenda debate.

Other excerpts from *The Beverly Times* display complete confidence held by the suffragists of Beverly and elsewhere that the state referendum of 1915 would pass in their favor.

In some of the most captivating and convincing language found in the Beverly documents, one contributor to *The Beverly Times* exudes an air of confidence unmatched by any anti-suffrage dialogue:

This week the woman suffrage movement in Massachusetts turns in to the final six months of the campaign. The end of over fifty years persistent work in this state for the glorified cause is in sight. All signs, like the needles of the world’s compasses, point in the same direction. The fixed North Star of victory is guiding our mariners safely into port. Woman Suffrage in Massachusetts is homeward bound at last. An occasional anti-iceberg is seen, but except for the chill in the air in the immediate vicinity, they offer no real obstacle. The coming summer will see them melt away in the Gulf stream of a cause warmed by the enthusiasm of eternal justice; truth and a wider democracy.²¹

Despite the writer’s confidence and the valiant efforts of the Massachusetts suffragists, the referendum does not pass. The year 1915 marks an important time in the suffrage movement; so close to victory some thought it had already come, while still so far that others believed the discussion would soon fizzle out

into nothingness. This analysis of the Beverly documents reveals that some of the sharpest and most sophisticated debates about women’s suffrage took place in small towns all across America. It also clearly shows the passionate and deeply complex nature of the debate, particularly in the years 1913-1915.

Beverly, Massachusetts provides much more than simply a window into one local, isolated suffrage debate. It offers an avenue through which historians may start to fill in a significant missing piece to the national story. The documents found in Beverly have helped to paint a picture of the women who fought for, and particularly against, suffrage. The Beverly story, in particular, also reveals the depth of the anti-suffrage movement. Not just conservative, stodgy, holdouts, they were actually strong champions of women’s role as local activists and reformers. Anti-suffragists did, however, also hold deeply felt and reasoned concerns about the impact of the granting of the vote to women on the American family, society, and government.

They were right to worry. Much did change. The day after President Wilson signed the 19th amendment, August 27th 1920, *The Beverly Times* reported,

Women Have Set Up New Record Here: 399 registered yesterday for the September primaries. Total on list 1629. Beverly women set up a new registration record when 399 qualified to vote at the September primary yesterday. This is one of the largest registrations of any city the size of Beverly in the state.²²

And with that, the newly registered women of Beverly celebrate the end of a 72-year long campaign to secure the female right to vote.

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¹ “Equal Suffrage,” *Beverly Times*, 20 March 1915, final edition, quoted in Mary Boyden, *Anti-Suffrage Secretary and Treasurer Records* (1915), 35.

² “The Beacon.” *The Beverly Beacon: A Woman’s Newspaper*, 1 November 1913, p. 3.

³ Woloch, Nancy. *Women and the American Experience: A Concise History*. 2nd ed. Boston: McGraw-Hill Higher Education, 2002, pg. 180-218.

⁴ Mason, Caroline A. “Conclusions of an Anti-Suffragist.” *The Beverly Beacon: A Woman’s Newspaper*, 1 November 1913, p. 12-13.

⁵ “Equal Suffrage,” *Beverly Times*, 20 March 1915, final edition, quoted in Mary Boyden, *Anti-Suffrage Secretary and Treasurer Records* (1915), 35.

⁶ Tillinghast, Anna C. M. "Equal Suffrage." *The Beverly Beacon: A Woman's Newspaper*, 1 November 1913, p. 11.

⁷ "Anti-Suffrage," *Beverly Times*, 13 March 1915, final edition, quoted Mary Boyden, *Anti-Suffrage Secretary and Treasurer Records* (1915), 32.

⁸ Overthway, "What People Think About Some Things in Beverly." *The Beverly Beacon: A Woman's Newspaper*, 1 November 1913, p. 17.

⁹ Dubois, Ellen C., and Lynn Dumenil. *Through Women's Eyes: An American History with Documents*. 2nd ed. Boston: Bedford/St. Martin's, 2009, pg. 454-455.

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¹² Boyden, Mary L. "Letter to Mr. Chase, Congregational Minister," *Anti-Suffrage Secretary and Treasurer Records* (1915), 30.

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¹⁴ "Anti Suffrage Meeting: Interesting Speakers; Bids for City Documents; No Landlord's Black List," *Beverly Times*, 19 May 1915, final edition, quoted in Mary Boyden, *Anti-Suffrage Secretary and Treasurer Records* (1915), 51.

¹⁵ Johnson, Rossiter. "The Blank Cartridge Ballot." *New York State Association Opposed to the Extension of the Suffrage to Women*, n.d., 7-18.

¹⁶ "Anti Suffrage," *Beverly Times*, May 1915, final edition, quoted in Mary Boyden, *Anti-Suffrage Secretary and Treasurer Records* (1915), 54.

¹⁷ Mason, Caroline A. "Conclusions of an Anti-Suffragist." *The Beverly Beacon: A Woman's Newspaper*, 1 November 1913, p. 12-13.)

¹⁸ Jablonsky, Thomas. "Female Opposition: The Anti-Suffrage Campaign." In *Votes for Women: The Struggle for Suffrage Revisited*, Jean H. Baker, 119-127. New York: Oxford University Press, 2002.

¹⁹ "For--Suffrage--Against." *The Beverly Times*, 9 October 1915.

²⁰ Cook, Anna J. "A Rash and Dreadful Act for a Woman: The 1915 Woman's Suffrage Parade in Boston." Massachusetts Historical Society. <http://www.masshist.org/objects/2010july.php>.

²¹ Ibid.

²² "Women Have Set Up New Record Here." *The Beverly Times*, 27 August 1920.

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Sedimentary Petrology and Provenance of the Teddy Creek Group SW Montana

RENEE HOLT



Renee conducted this research in southwest Montana, an area that has been the region of study

for several geologic endeavors at Bridgewater State through the Adrian Tinsley Program. Her undergraduate research experience led to a poster presentation at the Geological Society of America conference, a national geology conference. Attending this conference exposed her to graduate research possibilities such as the hydrogeology research she is currently involved with as a graduate in a fellowship program at Central Washington University. Renee hopes to enter a career in hydrogeology after completion of her masters degree program in June of 2012.

A *previously undocumented sequence of sedimentary rocks has been identified within SW Montana and informally named the Teddy Creek Group (TCG). This project focuses on the field relations, mineral compositions, and textures of these rocks to determine their origin and relationship to the more regionally extensive Cenozoic Renova Formation.*

The TCG consists of a basal pebble-conglomerate with distinctive black chert clasts overlain by sandstones interlayered with white-purple volcanic ash. All lithologies have experienced an episode of post-deposition silicification. Petrographic analysis reveals sandstones are compositionally mature with high abundances of quartz and minor amounts of feldspar and muscovite or biotite mica. Most grains and lithic clasts are subrounded; however monocrystalline quartz grains are subangular. The TCG also preserve cross-bedded laminations indicating a fluvial depositional environment as well as fragments of petrified wood. In contrast, the Renova Formation consists mainly of tuffaceous sandstones containing abundant muscovite and biotite micas. The presence of the micas is attributed to the unroofing of the Idaho batholith. However, the general lack of micas, especially biotite, in the TCG suggests a different source than that of the Renova Formation.

Compositional analysis documents distinct differences between the TCG and Renova Formation. Sandstones of the TCG plot within the field of recycled orogen implying they were derived from pre-existing sedimentary and/or metasedimentary rocks at a convergent plate margin. Renova sandstones plot within the dissected arc field indicative of a volcanic arc source which is in agreement with the composition of the Late Cretaceous Idaho batholith.

Introduction

Recently, much work has been done concerning the provenance and tectonic setting of Cenozoic sedimentary rocks within southwestern Montana (Thomas, 1995; Thomas et al., 1995; Stroup et al., 2008). Current tectonic models suggest extensional deformation, associated with low-angle subduction of the Farallon plate beneath the North American resulted in the development of the Basin and Range Province and subsequent topography during the Eocene time (Fields et al., 1985). Deposition of the regionally extensive Renova Formation occurred during this time within semi-isolated extensional rift grabens (Fields et al., 1985). An alternative model proposed

Regional Location Map

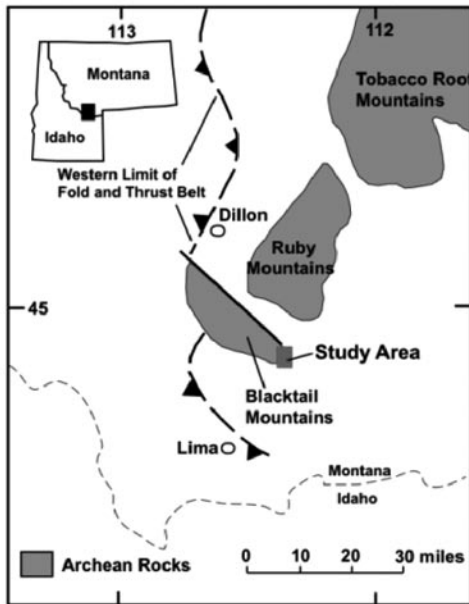


Figure 1. Map of southwest Montana along the Montana-Idaho border. The study area is located in the southern portion of the Blacktail Mountains as indicated by the red box.

for this region suggests a single, large, broad basin extending from central Idaho in the west to an area east of the Ruby Mountains (Figure 1). Within this basin deposition of the fluvial Renova Formation occurred from Middle Eocene to Middle Miocene time (Thomas, 1995). As a consequence of the development of the Pliocene Yellowstone hotspot, the region was dissected by a series of northwest-trending faults which dissected the broad Renova basin into smaller grabens which remain preserved today (Fritz & Sears, 1993; Sears, 1993). However, prior to the disruption of this regionally extensive broad basin, the provenance of the Renova sediment is believed to be derived from the Cretaceous-aged Idaho granite batholith with material being transported eastward within an intricate system of braided streams (Thomas, 1995; Thomas et al., 1995). Much of the evidence for the Idaho batholith as the source for the Renova sediment relies on the presence of two-mica (muscovite and biotite) sandstones (Thomas, 1995; Thomas et al., 1995).

Recent work in the Blacktail Mountains approximately 50 km east of Dillon reveal the presence of a previously undocumented package of sedimentary rocks informally termed the Teddy Creek Group (Muller & Krol, 2004). This project documents the mineralogy and textures of sandstones from the Teddy Creek Group (TCG) which are used to unravel the provenance and transport history of this unit. A major question that is addressed is whether the TCG represents a lithologic unit older than the Renova Formation, or whether it is time-equivalent and thus

part of the Renova sequence. Modal analyses of sandstones from the TCG are compared to the Renova sandstones in an effort to document the tectonic setting of the source material that supplied the detritus to the TCG.

Geologic Setting

The Teddy Creek Group (TCG) occurs within the Rocky Mountain Basin and Range province of the western U.S. Cordillera predominately within the Blacktail Mountains and also within the Ruby Mountains (Figure 1). The TCG is disrupted by several normal faults resulting from extension and rifting. The Blacktail Mountains are one of numerous basement-cored uplifted blocks that occur throughout SW Montana. Basement rocks consist of Archean metamorphic gneisses and Proterozoic mafic intrusions. In the northern portion of the Blacktail Mountains, the basement rocks are overlain by a sequence of Paleozoic and Mesozoic sedimentary rocks. However, in the southern portion of the mountain range, these rocks have been eroded away, and sedimentary rocks unconformably lie on metamorphic basement. The basal unit is a maroon conglomeratic mudstone called the Price Creek unit (PCu). Within the Blacktail Mountains the TCG unconformably overlies the PCu with cobbles of PCu within the basal unit of the TCG (Figure 2).

Results

Mesoscopic and Microscopic Characteristics

Teddy Creek Group

The TCG is a siliclastic unit consisting of chert pebble conglomerates, medium-grained quartz sandstones and very fine-grained volcanic ash. Sandstone units commonly



Figure 2. Field photograph showing contact between Price Creek unit (bottom) and the Teddy Creek Group (top). Notice the rip up clasts of the Price Creek within the overlying Teddy Creek unit. Pencil for scale.



Figure 3. Field photograph of cross-bedding sedimentary structure within TCG sandstone. Quarter for scale.

exhibit cross-bedding indicating a fluvial environment during deposition (Figure 3). Rocks of the TCG are silica-cemented producing highly resistant rock outcrops resulting in high standing topography. Conglomerate layers occur near the base of the TCG and contain clasts that range in composition from chert to granite gneiss, with the gneiss clasts being subordinate. The size of the clasts varies from 1 to 15 cm (Figure 4). Rock fragments are primarily metamorphic in nature, although minor amounts of volcanic detritus is also present. The basal



Figure 4. Silica-cemented basal conglomerate of the TCG. Conglomerate layers repeatedly throughout the stratigraphic column. Note presence of rounded black chert pebbles. Quarter for scale.

TCG contains rounded-subangular clasts of the underlying Price Creek unit. The quartz-rich sandstones are texturally sub-mature with quartz grains being chiefly subangular to

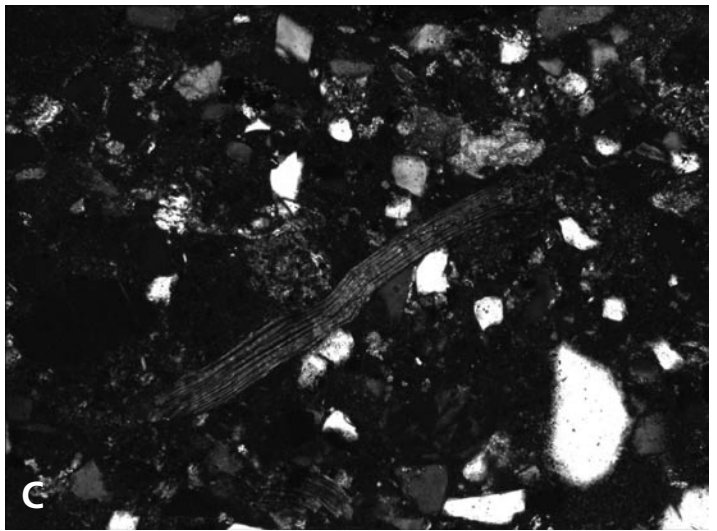
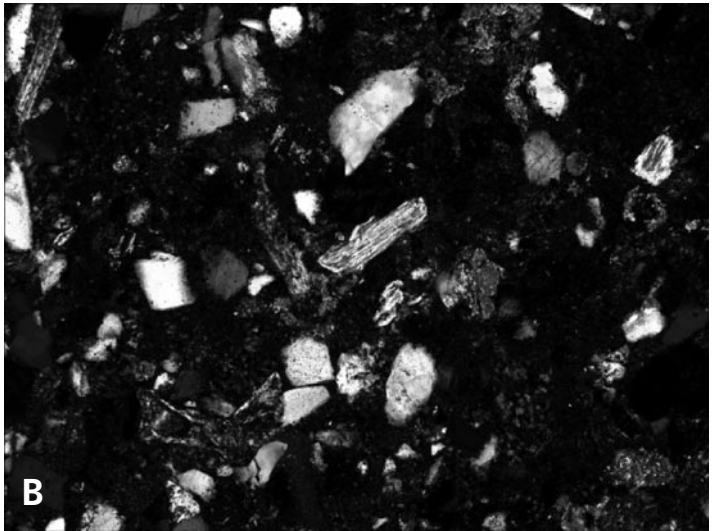
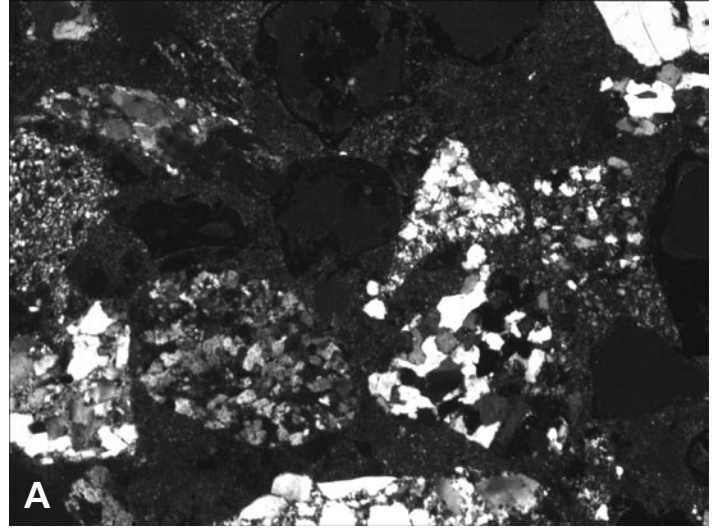


Figure 5. Photomicrographs of clastic units of the TCG. (A) Pebbly sandstone with lithic fragments, chert and chalcedonic quartz clasts in a fine-grained silica matrix. (B) Minor muscovite and subangular to subrounded quartz grains. (C) Kinked biotite grain with subangular quartz grains. Field of view is 2.5 mm.

subrounded. Quartz and lithic clasts are the most abundant with feldspar and kinked micas occurring in minor amounts (Figure 5). Quartz commonly occurs as 0.25 to 2.0 mm grains. Hematite occurs in and around many grains and is found within pore spaces. Very fine grained polycrystalline to cryptocrystalline forms of quartz are abundant although monocrystalline quartz is also present. Distinctive black chert and chalcedonic quartz pebbles are abundant in the conglomerate units and absent in the more uniform sandstone layers.

6). Sandstones are calcite-cemented with biotite and abundant muscovite. Grains are subrounded and show a higher degree of textural maturity than those found in the TCG. Quartz and mica grains range in size from 50 μm to 550 μm . Micas tend to be larger than those of the TCG with some biotite crystals as large as 2.0 mm. The Renova Formation also displays cross-bedded sandstones in places and may contain petrified wood fragments, as well as mammal fossils (Thomas, 1995).

Modal Analysis & Provenance

Point counting analysis was performed on five samples of TCG sandstones in order to compare them with results obtained from the Renova Formation. The objective was to see if we could distinguish the provenance or source terrains between these different clastic units. Point counting is a statistical measure of the mineral components within the sandstones. Results are plotted on a ternary QFL composition diagrams (Q: quartz; F: Feldspar; L: lithic fragments) with superimposed fields of tectonic environments (Dickinson, 1983). Two to three hundred mineral counts were made for each of the five representative TCG samples (Table 1). Figure 8 shows the results of the TCG data along with data reported from the Renova Formation. Results for the TCG sandstones indicate high amounts of quartz and lithic fragments and with the exception of one sample (PC-28b) very little feldspar is present. Four of the five samples plot in a tight cluster within the field of recycled orogen terrain (Figure 7). By definition this indicates sediment derived from pre-existing sedimentary and/or metasedimentary rocks at a convergent plate margins (Dickinson 1983). The source

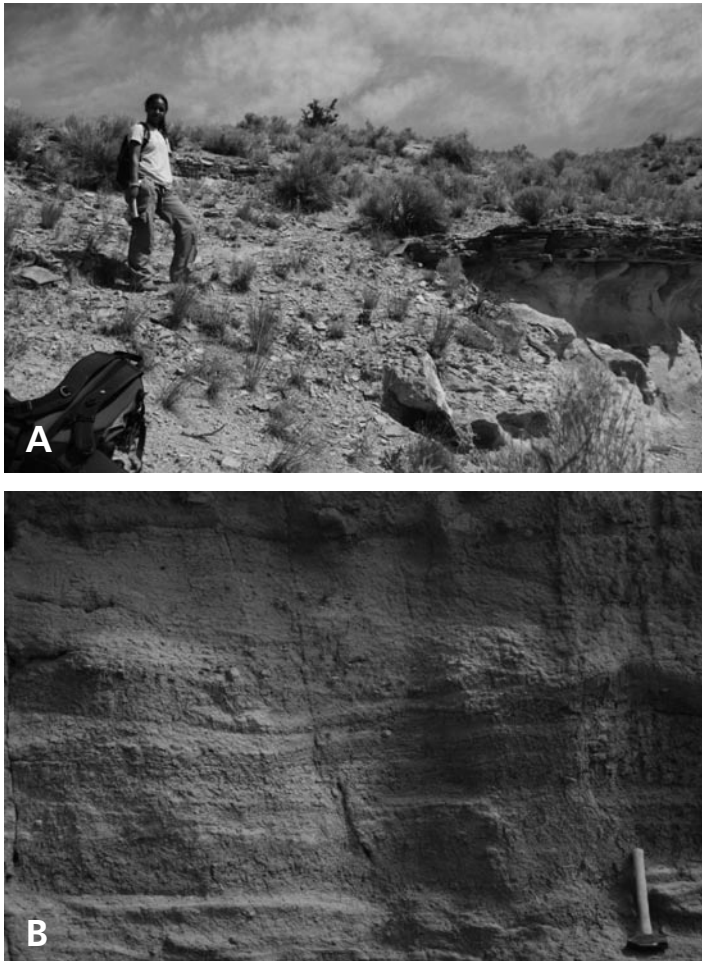


Figure 6. Field photographs of the typical Renova Formation tuffaceous sandstones. Note the poorly lithified nature relative to the sandstones in the Teddy Creek Group. (A) Outcrop of typical interbedded Renova Formation. René Holt for scale. (B) Close-up of tuffaceous Renova Formation. Hammer for scale.

Renova Formation

In contrast, the Renova Formation occupies lower elevations and consists predominantly of interbedded tuffaceous siltstone and quartz-mica sandstones. Layers are significantly less lithified and outcrops are typically friable and crumbly (Figure

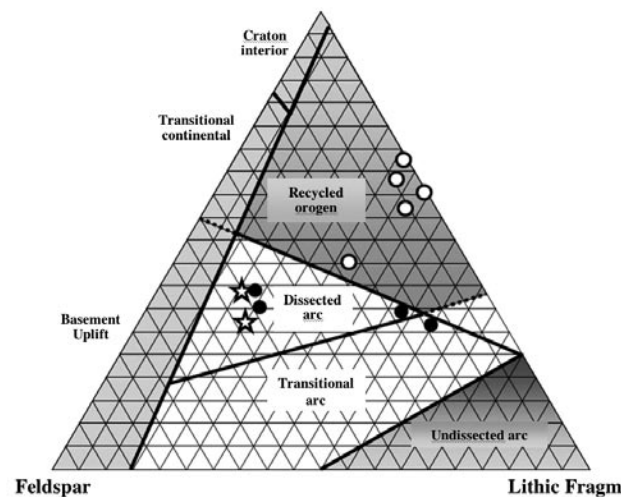


Figure 7. Triangular QFL composition diagram subdivided based upon provenance type (Dickinson 1983; 1985). White circles are TCG sandstone samples (n=5); data points in black are Renova Formation samples (n=4); and white stars represent the Idaho Batholith (n=2). The Renova Formation and Idaho Batholith data are from Stoup et al. (2008).

sediments are exposed to erosion via tectonic uplift of fold belts and thrust sheets. Tectonic settings center on convergence and include subduction complexes, sutured belts of collisional orogens and along thin-skinned foreland fold-thrust belts adjacent to margins of collision orogens (Dickenson 1983). Low amounts of feldspar within the TCG further exclude a significant contribution from an igneous parental.

For comparison modal analysis data from Stroup et al. (2008) for the Renova Formation and the Idaho granite batholiths are also plotted on the QFL diagram (Figure 7). The Renova/Idaho batholiths data plot within the dissected and transitional arc terrains. Both terrains are variations of magmatic volcanic arc settings indicative of igneous source sediment. These plots provide further support the idea that the Idaho batholith was the source of Renova Formation sediment. The compositional diagram highlights the differences between the TCG and Renova Formation sandstones.

Discussion

Compositional QFL diagrams, field relations, mineral compositions, and textures all suggest the TCG is distinctive and older than the regionally extensive Renova Formation. The abundance of two micas in the Renova and the absence of this component in the TCG is a major discriminatory feature. The source rocks for the TCG may have been derived from the recycling of older material eroded from tectonically uplifted areas in the hinterland of the Cordilleran Mountains. This region was shaped by tectonism associated with the Mesozoic Sevier, the Mesozoic-Cenozoic Laramide, and the Cenozoic Basin and Range orogenies. Whereas the Sevier Orogeny was predominantly “thin-skinned” in nature and affected mainly Paleozoic and Mesozoic sedimentary rocks, the Laramide Orogeny was “thick-skinned” and involved significant uplift of Precambrian metamorphic basement and overlying sedimentary cover rocks. During the waning stage of the Laramide and onset of Basin and Range extension, southwest Montana experienced a prolonged phase of magmatic activity.

On the basis of field relations, the TCG appears older than the Renova Formation. If so, then it is most likely that the source of sediment found in the TCG is most likely derived from the regions of basement rocks exposed during the Laramide Orogeny. The material for the Renova Formation appears to be related to the emplacement and subsequent unroofing of the 75 Ma Idaho granite batholith. U-Pb zircon ages from sandstones in the Renova Formation yield dates around 75 Ma, supporting the batholith as the probable source. However, there have been no attempts to date detrital minerals from the TCG. Work in progress at Bridgewater State will shed new insight into the origin and provenance of the TCG sediment with more confidence.

Two questions remain concerning the origin and provenance of the rocks in the TCG. First, although we know that the source of the TCG is distinct from that of the Renova Formation, it remains unclear what the source region was that provided this detritus. The TCG does not contain a compositional signature similar to the Renova so we can rule out the Idaho batholith. Second, micas contained within the TCG and Renova sandstones are kinked and bent suggesting they were derived not from an igneous source, but from a deformed metamorphic source. If so, this would indicate that the surrounding Archean basement gneisses may have been exposed as high-standing topography during a time that was supposed to be characterized by a low-lying broad basin with no significant relief. Understanding the dates of these micas could shed new light on the ultimate source rocks with implications for the topographic and landscape evolution during Late Cretaceous-Early Cenozoic time.

Future Work

In an effort to answer the questions stated above, we plan to date single crystals of muscovite crystals within the sandstones using the ⁴⁰Ar/³⁹Ar laser dating technique. The dates obtained will provide additional constraints on the source rocks for the Teddy Creek sandstones as well as providing a minimum age of deposition. Ages will help confirm or refute the relationship between the Teddy Creek Group and the Renova Formation. Detrital mica ages may shed new information on the possibility that the modern landscape may have existed prior to 4 million years ago as proposed by several workers in the last few years, and may have existed 50-60 million years ago.

Table 1. Compositional and modal analyses (in %) of Teddy Creek Group sandstones. n represents the number of point counts.

Sample #	Quartz	Lithic Fragments	Feldspar	n
PC-28b	43.0	33.6	21.9	234
PC-25A-03	67.1	32.9	0.0	240
PC-18A-03	59.4	39.7	0.1	308
PC-5-02	62.7	32.9	4.4	203
PC-6B-02	55.8	37.4	6.8	333

Acknowledgements

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In Between Seeing and Representing: An Exploration of Visual Expression

ANDREW LINDE



Andrew Linde is a junior majoring in Graphic Design.

This research was undertaken in the

summer of 2010 as an Adrian Tinsley Program Summer Grant project.

These studies were completed under the knowledgeable and encouraging Pr. Donald Tarallo. Andrew plans to pursue his Masters degree in Art and hopes to continue participating in research pertinent to the field of design.

Strong design solutions are rarely arrived at by chance and are often inconceivable without an evolutionary process of ideation. Carefully crafted messages that take into account how a reader interprets an image demand the skills of a designer who is in a sense a translator, visualizing abstract concepts in concrete form. My inquiry revolves around the process of representing a salt shaker through a series of visual studies using diverse methods of expression such as abstraction, reduction, and stylization. The intention was to investigate the question; *What are the limits and possibilities of visual expression in the representation of a simple object?* This project is beneficial to the design community as it reinforces the importance of hand, eye, and critical thinking skills working in unity in a profession taken over by the ease of the computer.

Method

Graphic translation is a specific area of graphic design and is as much design as it is art. The method evolved from the poster tradition of Switzerland and Germany in the early part of the twentieth century and combines attributes of both iconic and symbolic communication. A translation depicts a subject in a literal way like an icon and in non-representational symbolic ways. Graphic translation involves exploring different methods to represent an object using basic elements of point, line, and plain. It is a process of observation and reproduction, and it can result in images of instant recognition with powerful visual impact.

I conducted numerous studies over a ten week period interpreting the salt shaker through different techniques and mediums. I placed the object in different contexts to study its meaning. Each study was linear progressing from a minimal to maximal fashion resulting a wide and varied range of translations. This process helped me see variations comparatively and arrive at conclusions to then make choices for new translations. The work in its entirety is the conclusion and the illustrations are the answers.

17th century German writer and polymath Johann Wolfgang Von Goethe elegantly stated: "The hardest thing to see is what is in front of your eyes". After this experience I have learned to appreciate this truth. The eye constantly is capturing large amounts of complex information. When one attempts to translate onto paper something from the physical reality, there will almost always be details left out, sometimes major and in other circumstances minor

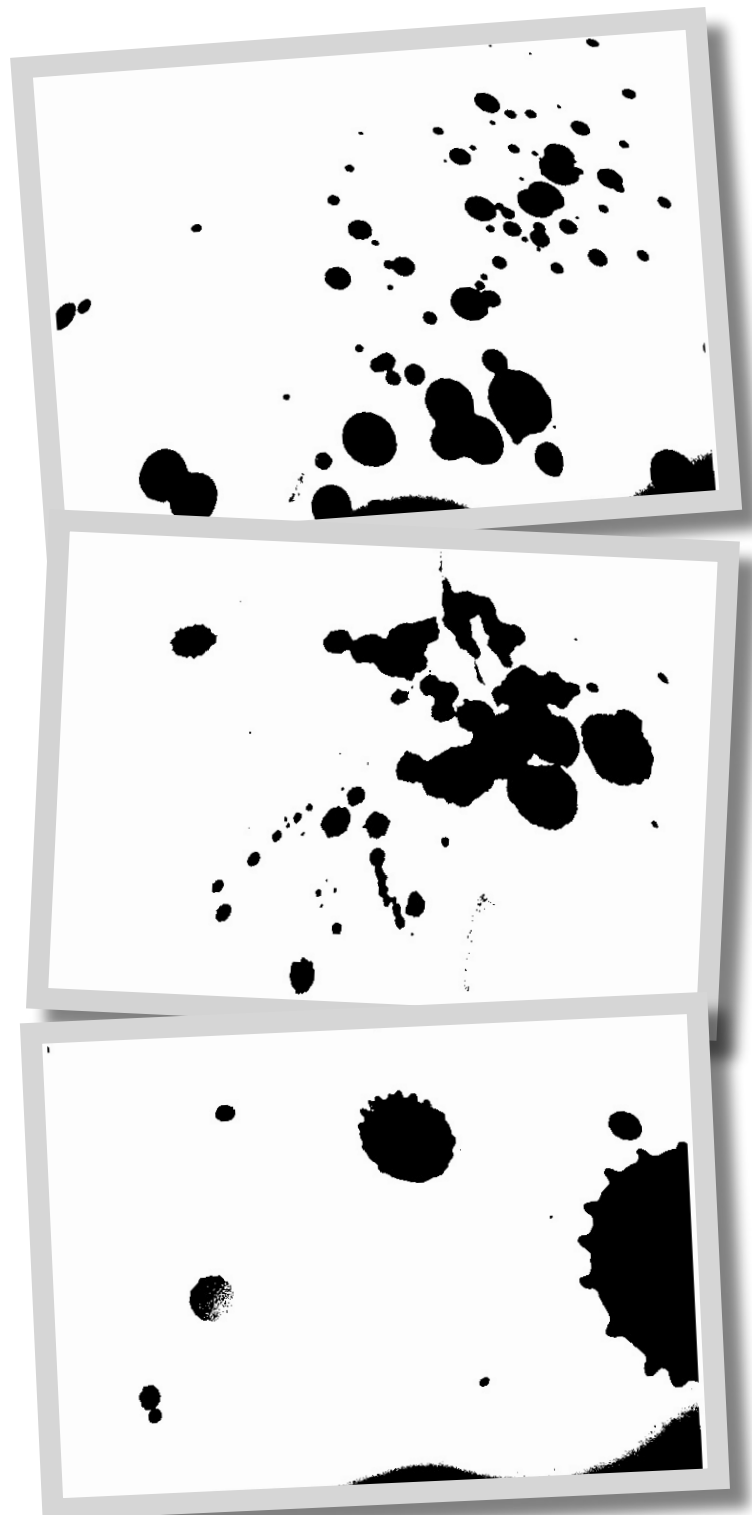
ones. With this in mind it becomes nearly impossible to record everything one sees using traditional mediums and from a designer's approach, this is where decision making comes in. A designer must decide what information should be stressed, left out, simplified, or exaggerated to best translate the three dimensional experience to paper.

Often an objet can be understood using only a few well placed markings extracted from or based on reality. Armin Hoffman (1977) states:

What and how much of things does one want to show? It can never be the goal to convey the most complete or correct replicas of objects since trite realism is boring or banal. The presentation should open itself up to the observer and allow him to turn find his own images and notion within it. He goes on to say "Every drawn design is a reduction or a compression. When he is drawing, the drawer omits, concisely or not, some aspects of the reality he sees. The fact alone that the representation is only two dimensional when compared to the reality he is trying to reproduce, or that color must be left out, shows how definite and decisive simplification can be. It is only in drawing, which occupies an isolated and underprivileged position in the curriculum, that thinking, inventing, representing, transporting and abstracting can be correlated." This quote inspired me to consider more critically what it means to translate and represent something from reality.

Why a salt shaker? The subject of this research could have been many things. I chose this object after much thought and consideration. It is a simple object and is easily identified, ideal for graphic translation. This provides an opportunity to represent beyond what is evident at the surface and discover renderings that can only be found through an extensive process of observing and visualizing it's material and structural qualities. Complex objects can sometimes interrupt the success of graphic translation, hindering effective visual communication and clear design. That is not to say any object is to complex to be simplified into basic forms and represented, but a salt shaker is basic in structure and function.

The salt shaker consists of a duality of material, glass and metal, these surfaces react differently to light. Both materials are reflective and one is transparent, each creating distinct reflections The metal top piece which is detachable has a bulbous head with a star formation of eleven small equally sized ellipses. In working these holes lent themselves to many uses such as the effect of light passing through them, or pattern making. The bottom glass piece is sharp and rectangular with



an inner blown section that is curved. The top of the glass piece opens at the mouth and has a thread running around its half inch neck. These ridges or threads seam up with two lips on the metal top piece. It was these features in addition to the overall form that I visually examined.

The majority of work within my research was created using traditional media such as charcoal, plaka, ink, and washes. Other work was computer generated. Throughout each study I recorded my thoughts, struggles, and conclusions. Analyzing my work involved reviewing each translation and studying the aspects making it visually successful and determining where it could be categorized in the structure of my research. One of the challenges (and at the same time benefits) of creative and artistic research is that each creation can lead to new unplanned ideas resulting in a process that continues to evolve. Early structural drawings and observations of the shaker helped me understand the basic structure of the object. I was able to see the object on deeper level and embark on translations of varying degrees of interpretation.

My research can be broken down into the following studies:

- Structure
- Material
- Simplification
- Stylized/abstracted
- Photography
- Integration of typography
- Indexical representation
- Narrative

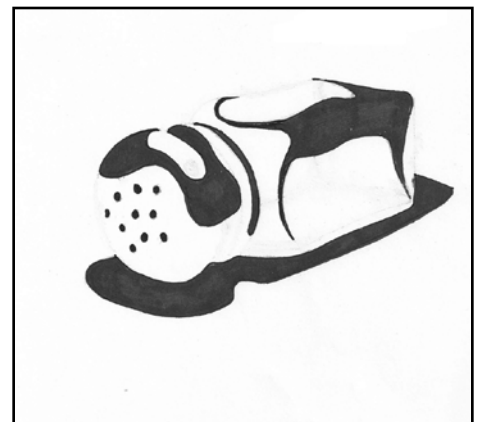
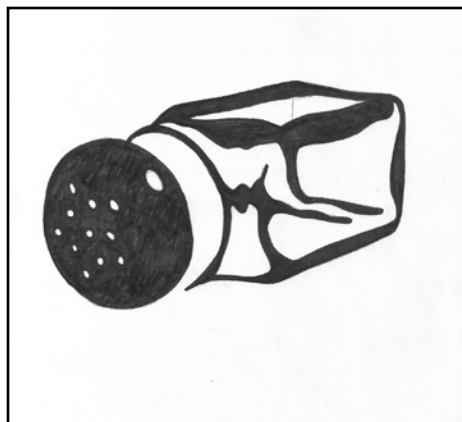
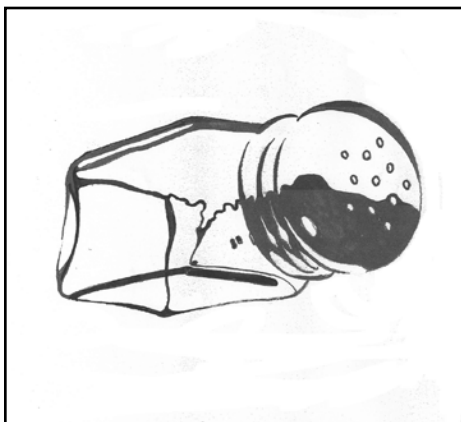
Structural Study

Everything that exists in the physical world has a basic form or is made up of a series of basic forms. Recreating or reproducing something realistically first requires a study of an objects structure. A proper understanding of the subject aids the designer in his or her ability to produce a successful image using whatever method, style, or material. A good way to gain an architectural understanding is by drawing the subject from different views and in different ways to become familiar with it as a form in space.

The purpose of this first study was to draw the object to better understand its unique structure and shape. Information such as color, detail and lighting were set aside. Observing the individual pieces and proportions provided for an understanding of how the parts relate to each other and make up the whole. There were two general approaches used in structural drawing. The first was to start with a skeleton or understructure and add detail from simple to complex. In this approach basic shapes were identified. The other method required drawing an imaginary rectangle and working from the outside inward creating shapes that reveal the structure, much like a sculptor working to carve away stone to reveal the desired form. Using a combination of these two approaches, I was able to break a salt shaker down into its basic shapes. A structural drawing is intended to communicate physical form with an architectural foundation. The benefits of this method in a creative project are obvious in that the drawings become blueprints of specific angles and perspectives that can be used for later translations.

Material Study

These studies were aimed at gaining a greater understanding of how to create a realistic representation. A piece of wood, a coin, and an organism are all made up of atoms that are incredibly minute and when together they are packed so densely that they form a solid object. The reality we see and sense relies on the constant physical properties of the world (such as, color, light, and gravity. The world we see can be difficult to render in its complexity, depth, and detail. I restricted myself to translating the information using only black, white and gray. I focused on expressing the metal and glass, looking at and expressing how they react to different lighting situations and form distinct shapes that can alone define the object. In reference to the study of glass, Peter Olpe (1997) states, “The appearance of glass is rich with continuously shifting shapes and formal elements. A slight movement of the head is enough to uncover different reflections to inspire new ideas for drawings.” This insight



helped me to think less about what I was drawing and focus on reproducing the abstract shapes and formed by the objects material.

Simplification

Simplification is a method of drawing or translating where the aim is to reduce as much information as possible. This approach can create strong images that resemble the object while allowing the viewer to fill in what is not shown. Success lies in eliminating the unnecessary while translating that which is needed for the viewer to understand the illustration. This may seem at first to be an easy method, but typically this is not the case. To simplify something successfully means to communicate generally the same idea but with less information. The challenge is to be so deliberate that in using only a few key elements the same information is conveyed.

Stylized Representation

Abstract art is a large net for many different genres and simplification could also be considered one of these. In general, abstractions are works of art that are often based on an object, concept, or thought from the physical world. But content is rendered loosely, and in unusual ways. It embodies the imagination of the maker. An illustration can have a small degree of abstraction, a large degree, or can be non-representational bearing no reference to reality at all. These studies were approached using basic shapes and forms. The shapes used consisted of ellipses, triangles, dots, lines and crescents. I worked sparingly with these forms and putting them in key places to define the object. The viewer can complete the picture while simultaneously seeing the drawing as an interesting image in it's own right.

Photography

Photography records complex detail, lighting, and a palette of colors making an image that appears similar to what one would with one's eyes. In working with photography I staged the salt

shaker in a context with other objects to create interpretative stories and unusual images. The object was interesting to work with the duality of material under the lighting situations created beautiful imagery.

Integration of typography

When thinking of a new direction for my research I spontaneously came up with the idea to use typography to express the salt shaker. Combining the letters "c" and "n" in varying orientations I used them to express the objects. I also used techniques such as outlining the type to distinguish the glass from metal.

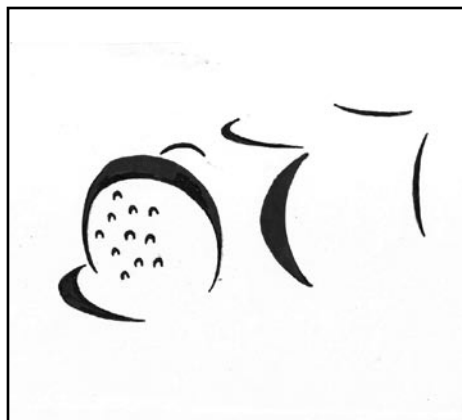
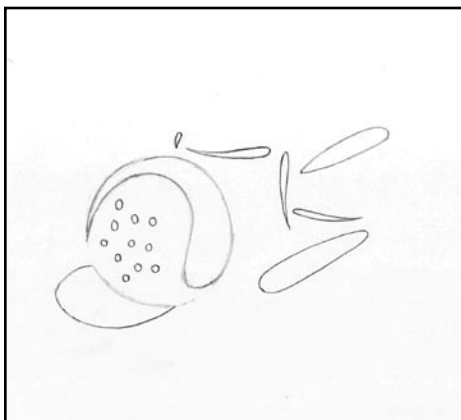
Indexical representation

Indexical representation is a form of expression where one thing refers or points to something else. An example of this would be footprints in the snow, they suggest something beyond what is seen visually - a person was there. Commonly an image in the viewer's mind will be instigated by an indexical design. The images were made by rubbing ink on the object and pressing it onto sheets of paper and by putting ink inside of the salt shaker and projecting it out of the top holes onto paper. These images point to the salt shaker but do not show it.

Many factors influenced the results. The distance between the paper and the shaker when ink exited the holes determined how the droplets made contact with the paper and dispersed. Gravity along with the amount of force applied played a role in the formation of distinct shapes. The results of this study contain some of my favorite images within this research.

Narrative

Working with the salt shaker got me thinking about salt in a bigger picture. Seeing beyond the object itself, a seemingly simple thing. This study is a narrative about the complex world of salt however I discovered that there is much more to salt than what is seen. A salt shaker's contents are a major part of life



from the enhancing of the taste of food to keeping every form of life on this planet alive and balanced. Salt is part of all life. I have decided to use my subject to its own advantage and think beyond visual representation and into the invisible dimensions. A series of panels was constructed that work together as one piece telling the visual story of salt using only imagery. The work is interpretative and visually complex but points back to my realization: salt is a part of all life. The challenge of this step was communicating this through purely visual means.

Conclusion

I experimented with new techniques, methods, and was pushed beyond myself through this project. I have grown on an individual level as a design student by undertaking this project and it has provided me with insight into the technical complexities graphic translation. The research opened my eyes to the variety and depth of communicative potential of a simple object and various media. Through producing a strong catalog of refined work. I have exercised expertise as a designer while developing analytical and organizational skills in visual research. This research is beneficial to the design community as it reinforces the importance of hand, eye, and mind skills

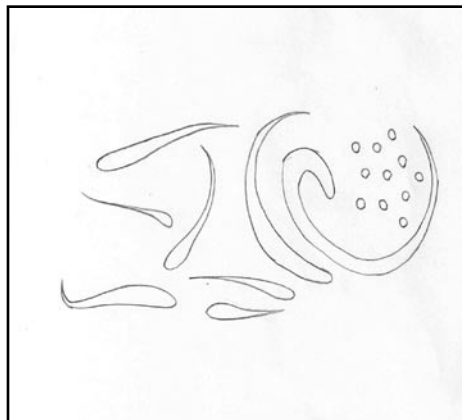
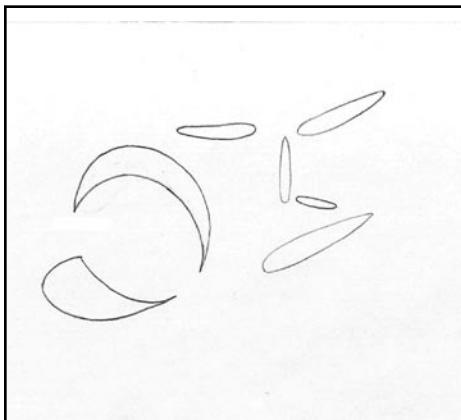
working in unity in a profession taken over by the ease of the computer. It serves as a reminder of the poetic words of Goethe: "The hardest thing to see is what is in front of your eyes".

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Psychotherapeutic Techniques and Play Therapy with Children Who Experienced Trauma: A Review of The Literature

JULIA LAMOTTE



Julia is a senior in the psychology department, graduating in May of 2011. This research

began in the summer of 2010 as an Adrian Tinsley Program Summer Grant under the direction of Dr. John Calicchia and has provided background to a two semester honors thesis on a sub-type of trauma. Julia has presented this research at the 2010 Adrian Tinsley Undergraduate Research Summer Symposium and the Massachusetts Statewide Undergraduate Research Conference. Julia plans to attain a research assistant position after graduation and ultimately pursue a PhD in Clinical Psychology.

This research examined the use of Play Therapy with children who have experienced emotional, physical or psychological trauma. Past research supports other therapeutic modalities as being effective with children after a traumatic experience, though the validity of play therapy lacks comprehensive quantitative and qualitative support. Based on the concept that play is the natural language of children, this form of treatment is developmentally appropriate, specifically with children under the age of twelve. For the purposes of this research, trauma was categorized in to Type 1 (single occurrences) and Type 2 (recurring trauma). A review of the literature found that although there has been an increase in the use of play therapy, there are disparities in the suggested styles; directive versus child-centered. Though play therapy is becoming increasingly more validated, the field lacks longitudinal studies and research outside of the United States.

Keywords: play therapy, trauma, children, literary review

The use of play as a therapeutic modality for communicating with children has been used for over eighty years (Freud, 1928). Over the past twenty to forty years, many researchers have debated the efficacy of this form of treatment and unanimously espoused the need for more qualitative and quantitative studies covering a wider spectrum of childhood disorders (Leblanc & Ritchie, 2001; Baggerly & Bratton, 2010; Snow et al., 2009; Bratton, Ray, Rhine & Jones, 2005). Research on play therapy spans a myriad of disorders and meta-analyses and literary reviews for specific childhood problems are rare or do not exist. Overall, though it is commonly agreed upon that play therapy can be effectively used with children who have experienced trauma, a review of this neglected concept has been yet to be done (Ogawa, 2004). Moreover, evaluating the credibility of play therapy as a whole is important, however, dissecting the validity of specialized forms of play therapy is crucial for understanding its potential applications. The purpose of this paper is to assess and synthesize the literature on action based psychotherapeutic modalities for children in order to present a developmentally based and integrated treatment model that could be used with children who have experienced trauma.

Dyregrov & Yule (2006) concluded that although there was a high prevalence rate of PTSD among children worldwide, there was limited empirical support for treatment interventions. This research showed that Cognitive

Behavioral Therapy (CBT) was the most commonly accepted treatment but failed to consider play therapy. Considering the influx of play therapy research over the past forty years it is interesting that this form of treatment is still fighting to be considered a possible intervention option. A recent study done by Cohen, Mannarino and Rogal (2001) surveyed 240 child and adolescent psychiatrists and nonmedical professionals who worked with children who had experienced some form of trauma. The results of this study showed that pharmacotherapy and psychoanalytic theory were the most preferred modalities among medical respondents whereas CBT and family therapy were most preferred among nonmedical professionals. Responses to a descriptive study regarding play therapy showed that 17.1% of nonmedical respondents used it as their first line of treatment versus 6.8% of medical respondents. The discrepancy between psychiatrists and nonmedical professionals on which form of treatment to use with children raises a red flag as to the professional's reasoning for using particular treatment modalities. However, it is important to note that there is no empirical basis to support the use of psychopharmacological interventions with children who have experienced trauma; nonetheless, 95% of medical respondents endorse this modality. This suggests that children are being unnecessarily medicated when other, validated, forms of therapeutic intervention are available.

Trauma in Children

Terr (1991) defines a traumatic experience as one that affects a child's ordinary coping mechanisms, leaving them temporarily helpless. Childhood trauma can be broken into two categories dependent on the nature of the event. Type I trauma refers to a single event that is relatively time limited and unexpected such as the sudden death of a parent. Type II trauma refers to a reoccurring stressor such as repeated sexual abuse or residing in a war torn country. For the purposes of this literary review, both Type I and Type II trauma were examined.

The diagnosis of PTSD was not included in the Diagnostic and Statistical Manual of Mental Disorders (DSM) until 1980 and is based off symptoms that are relative to typical reactions in adults not children. Childhood manifestations of PTSD can be significantly different from adult symptoms based on the developmental level of the child (Piaget, 2003). Certain behaviors are age-appropriate and normal depending on the developmental level of the child, and therefore one must consider the baseline of normative development in order to conclude that a child's behaviors are abnormal. For example, depression in adults often manifests as lethargy and hopelessness however in children depression is often manifested as irritability and inattention. Since the DSM diagnosis of PTSD is central to adult expressions of the disorder, researchers and clinicians

should not limit diagnosis solely to diagnostic criteria.

The majority of trauma focused research looks at reoccurring traumatic events and often the recommended treatments are relative to this type of trauma. In a review of single incident trauma, Adler-Nevo and Manassis (2005) found that the majority of treatments used CBT or Eye Movement Desensitization and Reprocessing (EMDR) and that little had been published on play therapy. Furthermore, the goal after a single incident trauma is to provide relief in a relatively quick manner by reducing the severity of PTSD symptoms and help the child continue with normative development. Since play therapy is focused on the internal processing of the traumatic event in the child, short term treatment protocol is not readily available. The findings of Adler-Nevo and Manassis (2005) are similar to the present study in that the majority of the examined research focuses on Type II trauma.

Natural Disasters

After a natural disaster, it is instinctual to fulfill one's basic needs by seeking safety. Unfortunately, the psychological effects of a disaster go untreated which can derail development and cause long term impairment. Children, who are at a critical age in development, can suffer tremendously when their experiences are not sufficiently expressed in action and play. Unfortunately, adults often assume that children are capable of using language as a modality of expression to work in therapy. Since children's preferred language of expression is action and play, using language-based therapy is akin to providing adult therapy to a person in a foreign language they do not understand. The purpose of crisis intervention is to restore the victim's functioning to pre-disaster levels (Aguilera & Mesnick, 1974). It is crucial for children to make sense of the events which children can regain a sense of control through play therapy (Shelby & Trednick, 1995).

Let me turn here now to a discussion of play therapy by presenting specific cases and outlining the therapeutic style and outcome. Dugan, Snow and Crowe (2010) describe working with two young boys post Hurricane Katrina. John, age four, exhibited repetitive post traumatic play, distress, separation anxiety, excessive crying and regression in bathroom behaviors. After eight weeks of non-directive play therapy, John ceased aggressive play and appeared to be less anxious. At first John's play themes included violence and abrupt endings but later developed into engaging play with the therapist, introducing themes of nurture. Their second client, Michael age nine, was also experiencing anxious symptoms and had developed many fears especially those associated with change. Michael's initial sessions demonstrated themes of power, control and safety. Though Michael continued therapy for twenty six sessions,

his parents noticed a decrease in aggressive behavior and an increase in a sense of security.

Similarly, Satapathy and Walia (2006) described a ten day home-based psychosocial intervention for a nine year old burn victim in India. Therapists reported a reduction in anxiety levels and social withdrawal cessation by day six. The young girl benefitted from the home-based intervention where her parents could play an active role in her psychological recovery. This supports similar findings that report a strong social support can protect against the development of mental and or physical (Yule et al, 1999). Baggerly (2007) simplifies the therapeutic process in to seven basic steps; normalize symptoms, manage hyper-arousal, manage intrusive re-experiencing, increase accurate cognitions, increase effective coping, seek social support and foster hope. Through this process of support the child will be able to restore normative development to pre-trauma functioning.

Chronic Illness

It has been reported that approximately 10 million children under the age of 18 suffer from some form of chronic illness including mental and physical ailments (Goble, 2004). This paper will focus solely on chronic physical illnesses and their effects on psychological functioning from a developmental perspective. Though the illness may directly affect the child, it is also important to consider the psychological effects on family functioning and school participation. Many chronic illnesses can be more debilitating to young children than adults since their also negotiating crucial developmental milestones while coping with the sequence of events from chronic illness.

Farmer, Clark and Marien (2003) espouse a family-centered care model when working with children with chronic illness; this holistic approach fulfills the medical, educational, therapeutic, and social needs of the patient. Rather than limiting the treatment to the child's disease, this approach attempts to connect the mind and body to heal the child from a holistic paradigm. In considering both biological and environmental factors, this approach fulfills both the physical demands and psychological needs of a sick child. Though the model is idealistic for the patient, within the current health care system it poses financial stress upon insurance carrier's ability to provide benefits. Currently there are limited psychological resources available let alone offered to CSHCN though research argues for their necessity.

Beyond verbal based therapeutic expression of anxiety and depression associated with some chronic illnesses, play therapy can work as an expressive medium for children's underlying psychological distress related to medical interventions. Expressive and creative art therapies are used to help individuals

to express their feelings and obtain symptom relief through symbolic expression (Webb, 2009). Play therapy can also be used, which is based off the idea that playing is a child's most natural form of communication (Landreth, 2002). Hospital visits can be traumatic because of repeated invasive medical procedures which can be better managed by anxiety-reduction techniques. Play therapy can use medical-specific toys to allow children to engage in reenactments to alleviate stress about their illness or up-coming medical procedures. Webb (2009) describes that medical procedures can be disempowering to children and that playing serves to reverse these feelings by gaining back control.

Goodman (2007) narrates a therapist's experiences while working with a young boy suffering from Leukemia. After months of chemotherapy infusions, bone marrow transplants and spinal taps, the boy was introduced to a psychologist to help understand his feelings during these stressful experiences. Using art therapy, the boy initially drew his family as a cactus plants representative of the being poked and prodded. The therapist was able to counter-cat many of this young boy's thoughts my positive re-framing and assurance that he had not acquired the illness from being "bad." It is common for children who are chronically ill to assume blame for their diseases. Therefore the psychologist plays a critical role in thwarting these negative notions.

Chronic illness is more prevalent than acute illness within the United States (Lowe & Lyne, 2000). Hence, it is vitally important that we provide sufficient psychological care for patients going through chronic physical illnesses. This would not only reduce the physical symptoms, it would help the patient manage the psychological costs involved in managing a chronic illness and the resulting financial costs upon the medical community. Considering the crucial developmental changes children go through before the age of eighteen, it is important that we create mechanisms such as play, art and expressive therapies that allow children to restore their psychological functioning back to normal.

Abuse

Within the trauma literature, articles pertaining to the use of play therapy for child abuse and domestic violence are the most voluminous. The National Abuse and Neglect Data System (NANDS) statistics from 2005 found that approximately 3.3 million referrals of child abuse or neglect were received by Child Protective Services and other similar government agencies in the United States. When dealing with maltreated children, Klorer (2000) stresses the main objectives of play therapy as symbolic reenactment of the trauma and safety education to prevent future victimization.

A recent longitudinal study (Reyes and Asbrand, 2005) assessed the trauma symptoms of eighteen sexually abused children from ages seven to sixteen and found a strong association between the perpetrator's relationship to the child and the duration of the abuse. Results show that, the mean length of abuse was two years when the perpetrator was a family member and six months when the perpetrator was a non-family member. At the onset of the study many of the children reported high levels of anxiety, post-traumatic stress, depression and sexual distress. After nine months of play therapy, many of their reported symptoms were ameliorated, however, dissociation, sexual concerns, anger and sexual preoccupation were still prevalent. Perhaps if the study continued on longer, more of the symptoms would have diminished.

More specifically, trauma-focused behavioral therapy (TF-CBT) provides coping skills for children while alleviating distressing thoughts and emotions. Neubauer, Deblinger and Sieger (2007) describe the therapeutic process through their case study with Mary, age six, who had a long history with domestic violence and alleged sexual abuse. Neubauer et. al, outline the course of the sixteen week sessions and the goals of therapy. Since children have a difficult time verbalizing their thoughts, the therapists used different play modalities to explain the difference between one's feelings, behaviors and thoughts. Most importantly, the way that we think about an event in turn affects our feelings and behaviors. Enabling the child to become aware of their thoughts in relation to a specific event and process any negative emotions associated allows the child to regain normal emotional development. All TF-CBT needs to be developmentally appropriate for the child who has experienced the trauma.

Limitations

The majority of the published articles on play therapy with children who have experienced some form of trauma give case studies explaining effective therapy techniques. The problem with this lies in the publishing error, in that only successful cases will be published. Not once was play therapy deemed unnecessary, counter-productive, or a failure. This suggests that play therapy is valuable across all different variables and with all types of trauma. More longitudinal studies are necessary in order to capture a better understanding for the world of play therapy.

Play therapy has been categorized primarily into directive and non-directive therapeutic technique methods. Subset modalities using Jungian (Green, 2008) and Alderian (Morrison, 2009) theories have been used effectively to treat trauma survivors. A study surveying 247 clinicians found that less directive interventions, specifically psychoanalytic theory and cognitive

behavioral therapy as the most preferred line of treatment for childhood post-traumatic stress symptoms (Cohen, et. al, 2001). Post-research analysis suggests that creating an eclectic play therapy model deriving from different schools of psychoanalytic theory would be most beneficial to children who have experienced trauma. Combining both directive and non-directive modalities would allow for a balanced therapeutic relationship between the clinician and the patient. Rather than limiting the therapeutic environment to one theorist, a dynamic approach that combines the use of play therapy and cognitive behavioral therapy would be optimal.

Considering technological advances to the concept of playing, creative freedom is becoming limited through electronic toys. Frey (2006) suggests the use of videos to create a dissociative state for children in which to encourage introspection and insight. Though this form of play therapy deems to be advantageous, increased usage of electronic toys inhibits natural creativity. Children are losing the ability to play freely but rather act out scripts derived from television episodes. The use of play therapy is threatened by the diminishing idea of free-play. If children are no longer able to express themselves through toys, then they are losing their natural ability to convey emotions. Having Hollywood created characters depict feelings does not leave room for children's natural imagination. Hence play therapy becomes insignificant if children lose the ability to play.

Although play therapy remains inadequate in specific scientific criteria (Phillips, 2010), case study examples suggest significant long-term advantages in restoring normative development in children following a traumatic event.

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Exploring Recovery Experiences of Women in Alcoholics Anonymous

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Linda is a senior majoring in Social Work and will graduate in May of 2011. This research

was undertaken in the summer of 2010 as an Adrian Tinsley Program Summer Grant project. These studies were completed with the wisdom, expertise and inspiration of her mentor, Dr. Kathleen Bailey. Linda was able to conduct qualitative research in her field of study and presented her findings at the 2010 ATP Summer Research Symposium and at the National Conference on Undergraduate Research (NCUR) in March of 2011 at Ithaca College. Linda plans to work for DCF after graduating and pursue her Master's degree in Social Work.

Twelve step recovery programs are prevalent in the United States, however, there is relatively little empirical evidence regarding the effectiveness of these programs for female alcoholics or addicts. How women experience the process of recovery within the twelve-step model is critical to our overall understanding of the recovery process. This article reports the results of an exploratory qualitative study of women in Alcoholics Anonymous. Through the use of semi-structured interviews, nine women were asked to discuss their personal experiences of recovery in the AA program. Grounded theory methodology was utilized to analyze the data. Reasons for joining AA, meeting attendance, sponsorship, concepts of a higher power and feelings regarding powerlessness emerged as dominant themes. Results showed external and internal influences played an important role in women's decisions to join AA. Regular attendance at AA meetings, considered essential to recovery in the program, was supported. Women preferred a reciprocal relationship with friends in AA as an alternative to a one-on-one association with a sponsor. All participants developed a concept of a higher power that worked for them that was fundamentally different than the "God" they had been taught about in their childhood religious education. The concept of powerlessness, as defined in Step One of the Twelve Steps of AA, was a positive concept among all women interviewed. This study adds to the knowledge base of evidence-based practice of women in recovery, and enhances knowledge of Twelve Step effectiveness for women.

Treatment specialists encourage their clients to utilize The Twelve Step model of recovery as their number one tool for gaining and maintaining sobriety. The most well-known self-help group is the original Alcoholics Anonymous. Because AA is widely available in most communities, it is easily accessible to all who wish to utilize it, making it a popular choice for people seeking recovery (Matheson & McCollum, 2008). The founders of Alcoholics Anonymous were all men. Shortly after meetings began, the first woman "materialized." The all male group panicked; they did not know what to do about this unexpected development. Resistance was strong against female members. Women were not supposed to be alcoholic; they were socially stigmatized and considered worse than men alcoholics (Makela et al., Institute of Medicine 1996). Female alcoholics now constitute one-third of Alcoholics Anonymous membership (1990), but there is little empirical evidence on the benefits of Alcoholics Anonymous and Narcotics Anonymous to the female alcoholic or addict (Beckman, 1993). Although Twelve Step programs are

promoted by many treatment clinics and recommended by numerous addiction specialists, the efficacy of Twelve Step programs for females is an ongoing debate (Hillhouse, M., & Fiorentine, R., 2001). The first of the Twelve Steps members must embrace in AA states, “We admitted we were powerless over alcohol—and that our lives had become unmanageable” (Alcoholics Anonymous World Services, 1976, p. 59). Many critics, especially some feminists, point to this first step as one that is unhelpful and unhealthy for women who are potentially moving into a healing phase of their lives (Beckman, 1993; Kaskutas, 1996).

LITERATURE REVIEW

A correlational study was designed by Rush (2000) to explore relations among power, spirituality, length of sobriety, and number of weekly meetings attended by sober alcoholic women who were members of Alcoholics Anonymous. The social support network and spiritual orientation of Alcoholics Anonymous were significant predictors of the choice of this study's sample of 125 sober alcoholic women. The research question was to determine whether either length of sobriety or number of weekly meetings attended was correlated to power and spirituality. A random snowball method was used in which subjects were either solicited directly by the researcher or referred by other subjects. The women who wished to participate received the study packet directly from the researcher at the site either before or after the open meeting or from members of the Alcoholics Anonymous network who volunteered to seek participants at meetings not accessible to the researcher, such as “gay” meetings. Self-reported questionnaires were used as the data-gathering instrument. The results of this study indicated that the number of Alcoholics Anonymous meetings attended weekly contributed significantly to power and to spirituality. Length of sobriety was not correlated with power or spirituality. No limitations were indicated for this study (Rush, 2000).

Covington's book, *A Woman's Way Through The Twelve Steps*, focuses on issues unique to women in recovery (Covington, 1994, p. 1-5). Her approach is a feminist view but suggests to women that they can be open to investigation and can modify the Twelve Steps for their own personal recovery. Covington (1994) has endeavored to relate to women on a personal basis, and provide many different perspectives on each step, enabling women to create their own map of recovery. Her Twelve Step guide may be used as a companion to the Twelve Steps and Twelve Traditions of Alcoholics Anonymous or by itself (Covington, 1994, p. 1-5).

METHODOLOGY

This study was an exploratory inquiry using qualitative methods. Face to face interviews were conducted. Because

this study seeks to understand perceptions of women in AA, a qualitative method was deemed best to give voice to the stories of these women. Data was gathered through nonschedule-standarized interviews.

Recruitment

Demographic details are recorded in Table 1 of this study. To locate women for this study, snowball sampling was used. Snowball sampling was initiated by interviewing one female friend who is an active member of AA. The researcher then gave the first participant several cards with researcher's name and phone number and requested that she pass the cards to female acquaintances she knows in the meetings she attends. The cards contained information about the study and requested that potential participants call if they were interested in participating in this study. Cards were given to women in the towns of Abington, Cohasset, Hanover, Hingham, Marshfield, Norwell, Rockland and Scituate, Massachusetts. Interviews were scheduled at the participant's convenience in a place of their designation. Word of mouth, phone calls, e-mails and visits to open AA meetings were also utilized as recruitment methods. Before conducting the interview and the participant signing the Informed Consent, the researcher explained the project and Informed Consent, the assurance of confidentiality, and asked permission for the interview to be digitally recorded. Possible risks, benefits and contact information for the people engaged in this study were also provided to the participant. The criteria were that participants had to be women over 18 using the 12-Step Program of AA for their recovery from alcohol/drug addiction. The total sample interviewed was 9 women.

Data Analysis

This study utilized grounded theory methodology for the analysis of the data. Grounded theory is a qualitative method of inquiry first proposed by Paul Glaser and Anselm Strauss (1967). As defined by Glaser and Strauss, the primary purpose of grounded theory is, “the discovery of theory from data” (p.1). The purpose of this study was to learn of the experiences of and give a voice to the women involved with A.A. Per Charmaz (2006), grounded theorists seek to give voice to the data as its starting point with development of concepts, theories and hypothesis only possible once the data has been heard. This qualitative method was deemed the most appropriate method of analysis.

Interviews were digitally recorded and transcribed as soon as possible after the interview. Open coding and axial coding was utilized to develop relevant themes throughout the data analysis. Transcripts of the interviews were entered into the software program ATLAS.ti to assist with the coding of the

Table 1

Participant #	Age	Relationship		# Years in AA	Reasons
		Status	Education		For Joining AA
1	56	Partnered	Masters	28	Disgusted w/ Lifestyle
2	52	Partnered	14	3	Disgusted w/ Lifestyle
3	53	Divorced	12	18	Conflict w/ Partner
4	41	Partnered	16	3	Ultimatum by Partner
5	56	Partnered	13	15	Conflict w/ Partner
6	49	Partnered	16	9	Ultimatum by Partner
7	55	Divorced	12	8	DUI
8	49	Partnered	Masters	4	DUI
9	54	Partnered	12	24	Disgusted w/ Lifestyle

data. Transcripts were read multiple times to ensure complete investigation of themes. Emerging themes were developed using constant comparative methods.

Results

A total of 9 women were interviewed from June 2010 through August 2010. All nine women were white. Five of the women were married. Two of the women were divorced. Two of the women were gay. Women were between the ages of 49 and 56 with a concentration of women in their fifties. Six of the women had two children, one had one child, and two women had no children. The length of time women reported having been members of Alcoholics Anonymous varied from 3 to 28 years with a mean of 12.4 years in AA. Three women reported themselves as alcoholics and six women were poly-drug users during their using phase.

These interviews were conducted to learn about women’s experiences in the program of AA. Findings included external and internal reasons for initial engagement with AA. Strong themes emerged related to meeting attendance, sponsorship, a higher power and powerlessness. AA contends that meeting attendance, getting a sponsor, developing a concept of a higher power and admitting powerlessness over alcohol are vital components in a person getting sober and maintaining sobriety.

Reasons for Joining Alcoholics Anonymous

There were two primary categories, external and internal, determined from analysis of the interviews as to the reason women gave for joining Alcoholics Anonymous. Five women expressed external reasons as having conflicts with a partner

or an ultimatum by a partner. Two women joined Alcoholics Anonymous because of a DUI. Two women had internal reasons which were articulated as disgusted with their lifestyle.

Meeting Attendance

When participants were questioned about their attendance at AA meetings, all participants stressed that regular meeting attendance was crucial to their recovery. Women reported meeting attendance reduced isolation and increased connections with other alcoholics. The women described meeting attendance as follows:

There are basics; absolutely there are basics that have to be followed, meetings are essential, essential. How many you go to, that’s really up to you. But meetings are essential.

I started going every day, [to meetings] made a commitment, and I was able to make connections which I hadn’t been able to make before. Seven days a week for 6 months I never missed a meeting and it was a variety of meetings.

Interestingly, length of sobriety did not seem to impact regular attendance in that women with longer sobriety continued to stress the importance of regular attendance.

Sponsorship

A sponsor is an Alcoholics Anonymous member who serves as a mentor to a newcomer in the program and guides them through the Twelve Steps. It is strongly suggested in the Alcoholics Anonymous program that everyone have a sponsor.

Women in this study preferred talking with female friends in AA instead of having a one on one relationship with an official sponsor. Reasons they gave for not having an official sponsor varied. One woman who had been sober for 3 years stated the following:

I have no problem with having a few people as my sponsor. Some people need more than others, you know, some people say you should call them every day; I don't believe in that myself. I don't absolutely have to call my sponsor every day. I could call another alcoholic every day, and I know a lot of alcoholics, so you know, I do talk to another alcoholic every day.

Another woman had been a member and sober for 18 years but had never had a sponsor.

I never got a sponsor ever. I haven't ever had one. ...but I felt like I didn't want somebody telling me what to do who was not any healthier than me. I just didn't want an official boss.

This woman has been sober for 3 years and had a negative experience with her sponsor. She gives the following reason as to why she does not want one person as a sponsor.

My sponsor is, ironically, the only thing that has jeopardized my sobriety in 3 years in AA, was my sponsor. Now I take it as a cautionary tale, I don't think sponsorship is inherently bad at all. I'm kind of co-sponsored by about 4 people at the moment but I'm leery about asking another woman to be my sponsor. I have a set of friends...sponsorship works well if it's reciprocal. ...right now, I don't feel like I need a woman with 20 years of sobriety and calling her everyday...I don't need marching orders, I need a friend. The cautionary tale that I took away from my first sponsor is that I don't want to get--she also needs to be somebody who is not going to get too enmeshed in my life.

One woman stated that she doesn't want to deal with the "power grab" that she experienced with her first sponsor.

I have a very, very good friend and I believe I act as a sponsor to her and she acts as a sponsor to me but we are not sponsors. We haven't formalized that at all. For my part, and I think this is true for her, I don't want that power grab with her but what I do want is I will always go to her first to get her opinion on any issues I have. I know she uses me in that context.

But there's nothing like you have to call me every day, there's none of that...

This woman had been in the program for over 9 years and gave a short, curt answer as to the sponsorship question.

I don't have a sponsor, I'm self sponsored. I talk to [her girlfriend] a lot.

This woman is a lesbian and had a difficult experience with a lesbian sponsor. She has never had a sponsor since getting rid of her first sponsor, and she was adamant that she would never have another sponsor.

It never did [sponsorship never worked for her]. No I don't [have a sponsor]. One time I got a lesbian as my sponsor and she fell in love with me and then proceeded—I shared personal stuff—and proceeded to use that to like woo me and I felt like it was incestuous and was pissed.

The responses from these women indicate that a sponsor/sponsee relationship can be challenging, and they prefer having "friends" to talk with about their problems instead of one official sponsor. Several women reported having had a negative experience with a sponsor. One participant had never had a sponsor in her 18 years of sobriety. Two of the women were currently serving as sponsors to other women and they also had a sponsor. Seven of the women had never sponsored another woman.

Higher Power

All 9 women interviewed had developed a higher power that works for them as suggested by the program of AA. It is interesting to note that concepts of a higher power were not necessarily related to the Christian ideal of a higher power. Seven out of 9 women had a different concept of a higher power than the "God" they had learned about as children. When these women were asked their concept of a higher power, they responded as follows:

To have hope, to know that there's forces out and about that are working for me and with me if my mind is in the right place and I ask. Like karma, almost. If I'm doing what I'm supposed to then good things will come to me. Just trying to be a good person and I do believe it comes back.

I don't think of my higher power in a religious sense, I do call my higher power God but it is more of a spiritual connection.

...the closest thing I had come was this feeling of sort of spiritual energy that I had taken away from Buddhist doctrines and readings and to this day I'm fascinated by it. I study it a lot, I read a lot. It just feels like it is a positive energy that's there for anybody and there isn't a lot of judgment, or dogma or hate, and you can't really do it wrong.

I have a very strong connection to a higher power out there that really doesn't have a lot of definition for me, but there's a higher presence, a higher power and it has a lot—there's so much to it and I feel—I almost feel like it is a scientific thing also and I would like to look into that more.

You know, the God thing that the church taught me—the holy being as creator—I don't know if I necessarily believe in that one holy creator anymore. I don't think I'm agnostic and I don't think I'm atheist. I think it is a lot deeper than that for me. I don't feel like we're it. My thoughts have gotten very deep around the concept of us alone as human beings and I don't believe in the 7 days and 7 nights concept of God created us. I don't think that we were created. So my concept of God has changed. I don't think that it is a one being. I think it is a lot deeper than that.

This woman is an agnostic, but has developed a higher power that works for her.

"It's actually kind of neurologic to tell you the truth, but it's not outside of my brain casting, it's you know, it's kind of the prefrontal cortex. I know this to be true because I have researched it—but alcoholism is a physiologic disease too. It's psychological and physiological. People say spiritual and I kind of feel like well spiritual is philosophic or whatever. But there is damage in that prefrontal cortex and I think when you stop drinking, when you connect with other people—I think it's really important to talk about the things that sort of pre...what am I trying to say—predisposed you to becoming an alcoholic...I think what is actually happening is that your brain heals. So, often when I appeal to my higher power, it is actually appealing to the rational thought process that I have...when I engage my rational or higher power brain, I can see that I'm overwrought. You can feel anxious, but you don't need to feel that anxious about it."

"The basic principles of AA, as they are known today, were borrowed mainly from the fields of religion and medicine,

..." (Twelve Steps and Twelve Traditions, p. 16). Having a higher power in AA and believing one can receive direction and guidance from this higher power is an enormous source of spiritual power to these women. Most of them expressed relief that they now have a higher power and they "do not have to run the show." This means that they give up trying to control everything in their lives and the lives of others.

Powerlessness

Step One is defined in AA's Twelve Steps and Twelve Traditions as, "We admitted we were powerless over alcohol—and that our lives had become unmanageable" (Twelve Steps and Twelve Traditions, p. 21). Contrary to some feminists pointing to the first step as one that is obstructive and detrimental for women who are trying to change their lives by joining AA and striving for sobriety, the nine women interviewed had a positive view of powerlessness as it pertains to the first step.

I couldn't stop drinking. Before, powerlessness was a negative thing...it's a freedom I have today where before it was a burden. So, it has gone from burden to freedom.

I couldn't stop drinking. I thought I had no will power. I had no power over alcohol. It completely controlled me once it went into my system—and once it goes in there you can't take it back, it's there.

I wasn't making the decisions, alcohol was making the decisions—and that, to me is powerlessness.

I feel like with any honesty the alcohol made me powerless. Being on that wheel of not being able to trust myself—the amnesia—I still feel not just disgusted but just dismayed that there are parts of my life that I won't remember because of alcohol—that is powerless. And if you don't call it that, that is stupidity.

The participants in this study felt being aware of their powerlessness over alcohol was a strength, not a disadvantage.

Discussion

The intent of this study was to learn about the experiences of women in AA. By focusing on reasons for joining AA, meeting attendance, sponsorship, higher power and powerlessness, this study helped clarify what these experiences were like for the women interviewed.

Each woman had a choice as to whether they wanted to join AA to find out if they could stop drinking, but external and internal

influences played an important role in their decisions. No one shows up at the door of AA if they do not have a drinking problem. Several women I interviewed proclaimed that conflict with and an ultimatum by their husband forced their decision to attend AA. Other reasons women gave for joining AA was a first DUI. For a first DUI, a person is required to attend drug/alcohol classes and a requirement for this program is to attend AA meetings. The women disgusted with themselves and their lifestyles were afraid that if they continued to drink, they would lose their jobs and the lives they had spent many years working for. No one specifically told them to go to AA or move out. Women decide to join AA for various reasons and at different stages in their addiction cycle.

Attending meetings appeared to be essential to recovery. Even women who had been in AA for many years still attended meetings on a regular basis. The women with less time in AA also found meetings vital for their sobriety. Often times, women isolate and drink alone because they try to hide their alcoholism because of shame and guilt (Matheson & McCollum, 2008). Many of their acquaintances would be shocked to learn that they have a drinking problem. When these women decide to do something about their drinking by joining AA, they find other women there with similar stories and drinking histories. This knowledge helps them feel that they are not alone and that there is hope. They now have other women to talk with whom they can relate. Meeting attendance on a regular basis is an important element of AA because it connects new people entering recovery with members who have been in recovery longer. This connection dispels isolation. Women in my study appeared to heal in connection with other women. They entered into the sisterhood of AA and sometimes found best friends who become a major positive part of their life. Women reported connections with other women would be difficult to cultivate if one does not attend meetings on a regular basis. It appears that women in my study utilize AA as most AA attendees would who are serious about their recovery.

As stated earlier, a sponsor is an Alcoholics Anonymous member who serves as a mentor to a newcomer in the program and guides them through the Twelve Steps. It is strongly suggested in the Alcoholics Anonymous program that everyone have a sponsor. According to this study, having a relationship with an official sponsor in AA for new women can be an exasperating and challenging experience on their road to recovery. As one woman explained, "My sponsor is, ironically, the only thing that has jeopardized my sobriety..." There are no "rules" in AA, only suggestions (Twelve Steps and Twelve Traditions, p. 26). However, newcomers are told by other members that it is wise and in their best interest to engage a sponsor as soon as possible. They are attempting to follow all the suggestions and may feel

pressure to ask a woman to be their sponsor who is not a good match for them. When women are attempting sobriety for the first time, having a sponsor may feel like a positive step, but in reality could become a negative experience as related by several of the women who were interviewed. The negative experiences with sponsors, as related by the participants in this study, included their sponsor crossing boundaries by demanding that they not make their own personal decisions about how to live their lives, being jealous of them and raging at them, talking behind their backs, falling in love with them, having angry outbursts at them, and being too busy to listen to them.

Most participants in this study were not inherently against having one person as an official sponsor, but because of their personal experiences, they preferred not to be attached to one person.

This study revealed that the majority of women interviewed had changed their concept of a higher power from the "God" they had been taught as children. AA suggests that having a higher power in one's life will definitely aid sobriety and provide a better and healthier life. Some of these women explained that the "God" they were taught about as a child was a punishing God and they were fearful of him. AA has opened up a new path and new way of conceptualizing a higher power for most of these women. They have been able to "reframe" their concept of a higher power to one that works for them. This new way of understanding a higher power is not relegated only to the women in this study, it is a basic tenet of AA's Twelve Steps, specifically the third step which states, "Made a decision to turn our will and our lives over to the care of God as we understood Him" (Twelve Steps and Twelve Traditions, p. 34).

All 9 women in this study understood the sociopolitical thought of being powerless as it applies to women. Constructive ways of changing their thoughts concerning powerlessness developed over time through their recovery, and they realized that there are other aspects of life that they are powerless over. These are different from the helplessness they may have known as a woman in a male dominated society. The women in this study are not obstructed by the word powerlessness that frequently invokes thoughts and images of repression and domination. They did not feel powerless in their lives; they just felt powerless when they drank alcohol, because once they consumed that first drink, they could not control their drinking. Contrary to critics of the Twelve Step association with powerlessness, especially some feminists (Clemmons, 1991), this research indicates that the 9 women interviewed saw the concept of powerlessness as a positive ingredient in their lives as taught to them by the Twelve Steps of AA, specifically Step One.

The women I interviewed found AA to be a powerful tool in their recovery. Some felt they had no choice but to attend AA because of domestic issues or DUI's, while others joined because they feared that if they continued to drink they would lose everything. All of the women agreed that attending meetings on a regular basis is vital to their recovery. While 7 out of the 9 women interviewed did not have "official sponsors," they all had strong connections to other women they could confide in and seek counsel. Most had a different perception of their childhood "God." They learned, through AA, how to develop their own concept of a higher power that works for them. All women in this study viewed powerlessness as presented in Step One as empowering and agreed that this is one of the paradoxes of AA. This study revealed that these 9 women reframed some of AA's Twelve Steps to fit their own needs. They did not feel that they had to do everything AA suggests to remain sober and live a fulfilling and rewarding life.

Limitations

This study has a few limitations. The sample (n=9) was small and from the same geographical area, thereby expressing only the opinions of this geographical area. Also, this research only included one interview per subject. More than one interview could have given the participants time to think about their AA experiences and explore their feelings in more depth. This study utilized a snowball sampling method therefore the sample is not random and participants may be members of the same AA meeting groups and therefore not as representative of diverse experiences.

Implications

Treatment specialists need to be aware of gender-sensitive treatment and the various reasons why women join AA and how their connections and relationships with other women alcoholics help them to achieve and maintain sobriety. Results from this study indicate that new women in AA could potentially be harmed emotionally by a sponsor and could end up in relapse if they have not developed relationships with other women who would be willing to come to their aid if their sponsor places them in distress. Women need to be coached and cautioned about choosing a sponsor, and should be informed that their sponsor should not be allowed to control their lives and make all decisions for them.

Concepts of powerlessness do not seem to impact women negatively in the AA program and is opposite to some feminist's views of powerlessness as proposed in Step One. The majority of treatment programs advocate a Twelve Step approach, but few advise women that there are other perspectives of the Twelve Steps such as Stephanie Covington's, *A Woman's Way through the Twelve Steps* (Covington, 1994). Her version may give women

a clearer understanding and a more intimate experience of the Steps because it is written in a modern woman friendly style.

Lastly, women in this study developed their own meaning about higher power. Women were able to find hope and strength from this exploration and often came to versions of the concept of higher power that were not directly related to their childhood education of what a higher power was or the traditional Christian basis prevalent in AA. Practitioners should be aware that promoting this exploration can be beneficial and empowering for women.

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Analysis of the “Travelling Salesman Problem” and an Application of Heuristic Techniques for Finding a New Solution

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This project was mentored by Dr. Ward Heilman and funded by the Adrian Tinsley Program for Undergraduate Research (ATP) in the summer of 2010. Currently, under the guidance of Dr. Heilman, Matt is continuing his research, working on an Honors Thesis. Matt plans graduate work in math and computer science.

In 1832, a German travelling salesman published a handbook describing his profession. Sadly, his name is unknown; he only stated that the book was written by “one old travelling salesman.” However, he has come down in history thanks to a rather simple and quite obvious observation. He pointed out that when one goes on a business trip, one should plan it carefully; by doing so, one can “win” a great deal of time and increase the trip’s “economy.” Two centuries later, mathematicians and scientists are still struggling with what is now known as the “Travelling Salesman Problem” (TSP).

The Problem

The authors of *The Traveling Salesman Problem: The Computational Study* define the TSP as follows: “Given a set of cities along with the cost of travel between each pair of them,” the problem “is to find the cheapest way of visiting all the cities and returning to the starting point” (1). In other words, the shortest possible route between a number of cities has to be found. The task does not seem to be difficult -- all of the possibilities have to be checked. Unfortunately, that is where problems start....

For small examples of the TSP (often called “instances” of the TSP), say four or five cities, optimal routes can be identified fairly quickly. The only “advanced” math that has to be applied is addition (adding the distances of used roads produces the tour’s length) and a comparison of the results for each possibility; however, with additional cities the number of possibilities for tours grows rapidly, making the TSP unsolvable within a reasonable time frame. Table 1 illustrates the issue.

Table 1

Number of Cities	Number of Possibilities
5	$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$
25	$25! = 25 \cdot 24 \cdot 23 \cdot \dots \cdot 3 \cdot 2 \cdot 1 = 15,511,210,043,330,985,984,000,000$
100	$100! = 93,326,215,443,944,152,681,699,238,856,266,700,490,715,968,264,381,621,468,592,963,895,217,599,993,229,915,608,941,463,976,156,518,286,253,697,920,827,223,758,251,185,210,916,864,000,000,000,000,000,000,000,000$

The large numbers shown in the Table 1 are truly horrifying; they are impossible to be named and even worse to be grasped. Clearly, larger instances of the TSP cannot be solved by a human with pencil and paper. Luckily, with modern computer technology those numbers probably should not scare us. For instance, assuming that we have a supercomputer capable of checking a billion possibilities every second, 25-city example should be solved fairly quickly. Unfortunately, after a thousand years it would have checked only 31,557,600,000,000,000,000 possibilities, and that is not even close!

NP-Completeness

Millions of years of supercomputer computations would bring solutions even to some of the large instances. Therefore, the TSP is, in fact, solvable; however it is not solvable in polynomial time. That means that the TSP is an NP-complete problem. NP-complete problems (NP is an abbreviation for “nondeterministic polynomial time”) cannot be solved in a reasonable amount of time due to the extreme number of cases. However, if a perfect solution is known, a test of any given solution would not take long. It is best described by the statement that “if only we could guess the right solution, we could then quickly test it” (Eppstein). Math is not about guessing, though: It is about solving and proving. As David Eppstein very accurately pointed out, “NP-completeness is a form of bad news: evidence that many important problems can’t be solved quickly.”

History

In the mid-nineteenth century, mathematicians were already looking at the TSP. The best known among them was Sir William Rowan Hamilton, an Irish scientist who is famous for his contributions to mathematics (especially graph theory) and physics. However, the TSP was not officially recognized to be a problem in mathematics until the 1930s when Dr. Karl Menger, Professor of Mathematics at the Illinois Institute of Technology, shaped the definition of the TSP.

The interest in the problem seemed to have its peak at the beginning of the twenty-first century. The Clay Mathematics Institute, a mathematical non-profit foundation established in 1998 by London T. Clay, a Boston businessman, to “increase and disseminate mathematical knowledge,” created a list of Millennium Prize Problems and the TSP is one of them. The Clay Institute offers \$1,000,000 for anyone whose TSP solution succeeds perfectly.

Applications

The incredible amount of money offered by the Clay Institute may be surprising. However, when taking into consideration how much money and possibly time various government and non-government institutions and companies may save by having

the ability of finding a perfect solution to any TSP example, the reward value becomes understandable. For example, according to the United States Postal Service, their fleet travels about one and a quarter billion miles every year. More efficient routes could result in millions of dollars in savings on fuel then. And that applies to basically any organization connected to delivering goods or providing on-site services. A perfect TSP solution could also be helpful with machine sequencing in industry and genome sequencing problems in genetics (Chen, 139).

The TSP in Mathematics

In search of a perfect solution for the TSP, mathematicians were and are trying different approaches, quite often using geometry and linear algebra. However, over time, the problem is best settled in graph theory. Graph theory allows visual representations of mathematical problems. Its basic element, a graph, is a set of vertices connected by edges. In other words, it is a collection of dots connected with lines. If all of the vertices are directly connected with each other, then the graph is complete.

The TSP instances can be well transformed into (usually complete) graphs; every vertex can have a city assigned to it while edges may carry the values of distances between the cities.

Human Performance

Psychologists are not surprised that graph theory overpowered other areas of mathematics, claiming the TSP as its own. The key to the mystery seems to lie in how we comprehend things. Once a TSP example is represented visually, the human brain is capable of quickly finding good solutions. Dr. Iris van Rooij conducted a study where the participants were given sheets of paper with sets of dots on them and were asked to connect them as efficiently as they can. Table 2 (source: *The Traveling Salesman Problem: A Computational Study*) shows the average results achieved by the participants; the percentage indicates additional tour length in comparison to the optimal tours.

Table 2

Number of Cities	7-Year-Olds	12-Year-Olds	Adults
5	3.8%	2.5%	1.7%
10	5.8%	3.4%	1.7%
15	9.4%	5.0%	2.7%

Results of the study by Dr. Iris van Rooij

Source: *The Traveling Salesman Problem: A Computational Study*

Interestingly, age greatly contributes to better results. According to the researchers, when the brain develops, “both perception and cognition” improve (Applegate, 35); there also is “a modest correlation between TSP performance and the scores of individuals on a standard nonverbal intelligence test” (Applegate, 36), and they all play a key role in identifying more efficient solutions. Psychologists also point out “a human desire for minimal structures” and an appreciation of aesthetics (Applegate, 32). Dr. Douglas Vickers, an Australian psychologist, pointed out that: “the link with intelligence, and the occurrence of optimal structure in the natural world, suggest that the perception of optimal structure may have some adaptive utility” (qtd. by Applegate, 35).

Important Observation

The appreciation for tour aesthetics combined with graphical representations of the TSP resulted in an important discovery. Namely, no optimal TSP solution has roads that cross each other. Allow me to demonstrate:

Let four random cities of a TSP tour be named A, B, C and D. City A is connected to D with edge AD and B is connected to C with edge BC, and the cities are positioned such that those edges cross each other at point M (Figure 1 illustrates the situation). So, $|AD| = |AM| + |DM|$ and $|BC| = |BM| + |CM|$. There are also unused alternative edges AB and CD that connect cities A with B and C with D (where AB and CD do not cross each other). The edges create two triangles: $\triangle ABM$ and $\triangle CDM$, with M being a common vertex. In order to have a triangle, the sum of any two of its edges must be greater than its third edge. So, $|AM| + |BM| > |AB|$ and $|CM| + |DM| > |CD|$. As a result, $|AM| + |BM| + |CM| + |DM| > |AB| + |CD|$, which can be rewritten as $|AD| + |BC| > |AB| + |CD|$. Therefore,

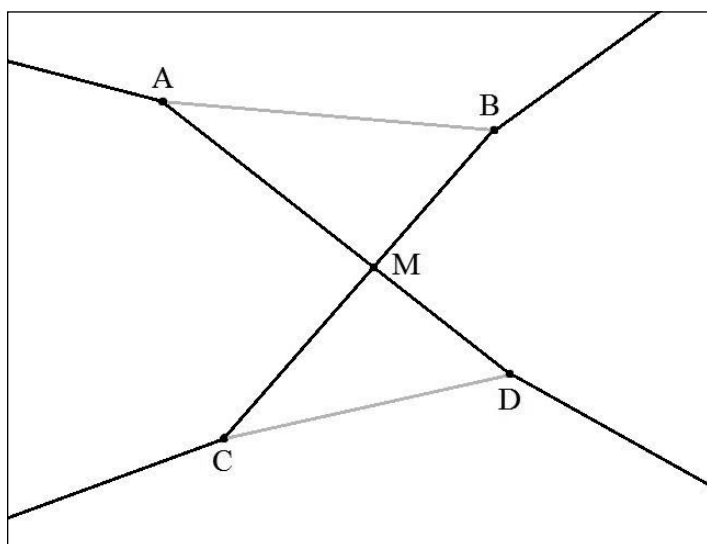


Figure 1

uncrossing edges makes the tour shorter. Thus, no optimal TSP tour contains roads that cross each other. Q.E.D.

Held-Karp Lower Bound (H-Klb) Estimation

Toward the end of 1970s, an important tool was developed which is used to estimate what the length of an optimal tour should be. Designed by Dr. Martin Held and Dr. Richard M. Karp, it is called the Held-Karp lower bound (H-Klb) estimation. Before explaining its principles, I ought to define a few terms.

In the field of graph theory, if a traveling salesperson starts at a vertex (city), visits at least two other vertices, and finishes at the initial one without repeating any of the edges (roads) or vertices along the way, then his/her tour is a cycle. When there are two or more non-empty sets of vertices (every set has to contain at least one vertex) in a graph and there are no edges between those sets, then the graph is disconnected. Using the terms defined above, Dr. Gary Chartrand and Dr. Ping Zhang describe a tree as “an acyclic connected graph” (87). If vertices of a tree are connected such that the sum of all the edges is the smallest possible, that it is called a minimum tree.

H-Klb is based on a minimum 1-tree, which is a minimum tree containing one cycle. The minimum 1-tree undergoes a series of transformations; subsequently multiple formulas alter a number, which at the end becomes the lower bound. Dr. David S. Johnson and his colleagues established that the H-Klb is “on average within 0.8% of the optimum for (...) instances with many thousands of cities” (Jones, 5) and “the gap is almost always less than 2%” (Johnson, 1). Due to extensive numbers of required operations, only computers are used to estimate the lower bound.

Methods

Years of research and tests have brought some interesting techniques, which allow people who work on TSP instances to either find TSP tours from scratch or improve the ones that are already in existence.

n-Opt Moves:

When trying to improve an existing TSP tour, a method called *n-Opt Moves* offers help. Its rules are quite simple: identify and remove *n* edges and replace them with *n* alternative connections, but only if the modified tour will turn out to be more efficient. For instance, a 2-opt move, meaning find 2 edges, remove both and create 2 alternative connections, can be used to uncross edges.

Cutting Planes

“A breakthrough in solution methods for the *traveling salesman*

problem (TSP) came in 1954, when George Dantzig, Ray Fulkerson, and Selmer Johnson (...) published a description of a method for solving the TSP and illustrated the power of this method by solving an instance with 49 cities, an impressive size at that time” (Georgia Institute of Technology). This method is called Cutting Planes and is based on identifying groups of clustered cities (or vertices), described as cutting planes, and separating them from the rest of the cities, creating smaller instances. The small cases can be solved fairly quickly and then reconnected with each other. In 1976, Dr. Martin Grötschel adapted the method and found an optimal tour between 120 cities in Germany. Figure 2 (source: *The Traveling Salesman Problem: A Computational Study*) shows Grötschel’s hand drawing that identifies cutting planes (Applegate, 111).

Control Zones and Moats:

As I briefly mentioned before, geometry also has a role to play in the problem. The method called Control Zones and Moats is purely geometrical. The technique calls for every city to be

surrounded with a circular area with an arbitrary radius, and every area should connect with two other ones, but they cannot overlap with each other. Those areas are called control zones. If there is a gap between some areas that causes some clustered control zones to be separated from the rest, then additional larger circular areas, called moats, are assigned to create the missing connections. Figure 3 (source: Georgia Institute of Technology: <http://www.tsp.gatech.edu/>) shows control zones marked in light gray and moats in dark gray.

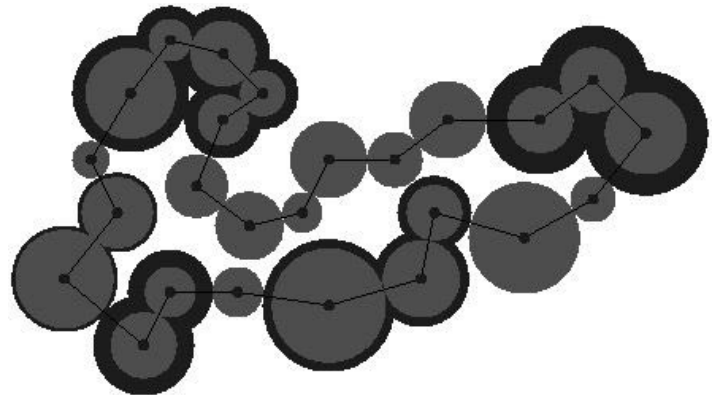


Figure 3

Algorithms

In addition to the above methods for attempting to solve the TSP, there are TSP algorithms. An algorithm is a specific set of rules which establishes how to treat a given problem; usually it defines a step-by-step repetitious procedure which has to be followed. Before I describe some of the TSP algorithms, I should explain that the number of edges incident with (connected to) a vertex is called a degree (Chartrand, 27).

Greedy Algorithm

The Greedy Algorithm is based on building a tour by selecting and using the shortest possible edges. The initial step is to make a list of all edges in order of their increasing length. Once the list is completed, the shortest available edges are repeatedly chosen and included in the tour. While selecting the edges, it is necessary to make sure that the next edge intended to be used will neither close a smaller cycle, excluding some vertices, nor connect to a vertex which already has a degree 2. The algorithm’s results exceed optimal tours by 14% on average, judging by the H-Klb.

Vertex Insertion Algorithms

Vertex Insertion Algorithms are based on picking an initial vertex and then including the rest of the vertices into a tour, adding one at a time. There are different ways of choosing which vertex should be included next.

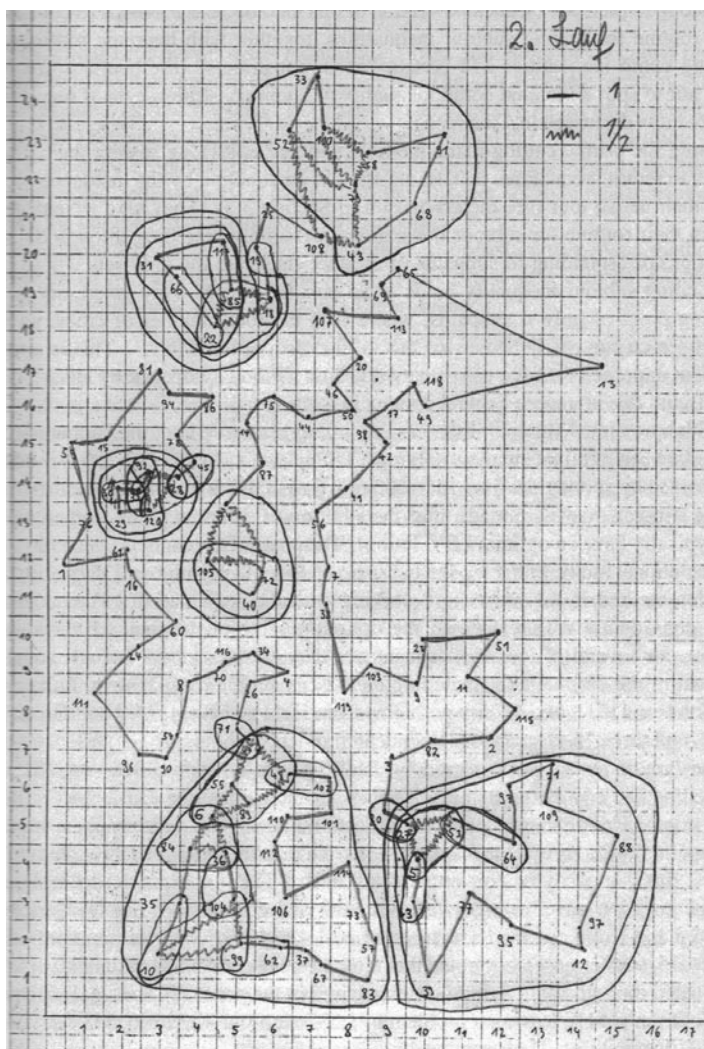


Figure 2

The Cheapest Insertion Algorithm inserts a “free” vertex into a partial tour such that the tour-length increase will be the smallest possible. This variation of Vertex Insertion provides tours that are about 27% longer than suggested by the H-Klb. Nearest Insertion and Farthest Insertion algorithms insert a “free” vertex which is respectively the closest to or the farthest from any of the vertices that are already a part of the tour. The Nearest exceeds the H-Klb by 22% and the Farthest goes over the bound by only 11%. The best among the Vertex Insertion Algorithms turns out to be the Random Insertion Algorithm. Just as the name suggests, a purely random “free” vertex is inserted into the partial tour; the entire tour at the end goes beyond the H-Klb estimation by 9%.

The last but not the least among the Vertex Insertion algorithms is the Angle Selection Algorithm which is based on geometry; therefore it can only be used on geometric graphs of the TSP (where relative positions of every vertex and distances between the vertices correspond adequately to its real life equivalents). This algorithm, which has a similar principle to the Cheapest Insertion (lowest possible increases in the partial tour’s length), inserts a “free” vertex into a partial tour such that the angle created by the two new edges connecting the newest city to the rest of the tour will be as close to 180° as possible. Figure 4 shows an example of two possible angles, AMB and ANB, which can be created by including cities M and N into the tour. Visibly, adding city M and the angle AMB, which is closer to 180° than the angle ANB, into the tour will result in a smaller length increase (note that the edge AB will disappear after including city M).

Nearest Neighbor Algorithms

Two Nearest Neighbor Algorithms are named perfectly; they also resemble the Nearest Insertion Algorithm. For both, an initial vertex has to be chosen. At this point, a travelling salesperson has to make a decision on how to build his/her tour. The basic Nearest Neighbor algorithm asks the person to expand the trip in just one direction -- from the initial city the

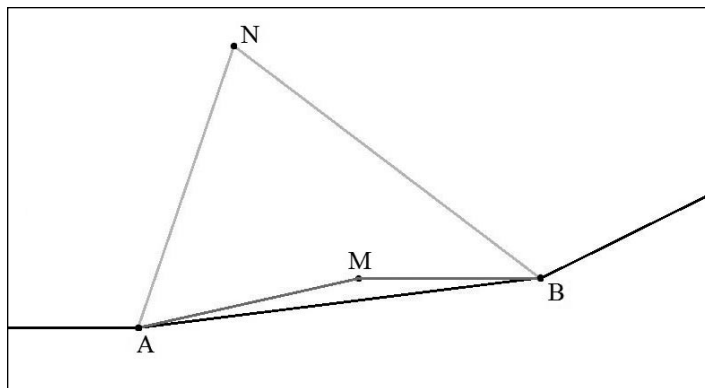


Figure 4

person has to visit its closest neighbor, from the neighbor to the neighbor’s closest neighbor, without repeating any cities, and so on; when no more “free” cities are left, the salesperson goes back directly to the initial city, closing a cycle. For the Double-Ended Nearest Neighbor Algorithm, once the salesperson has the first two vertices connected with an edge, he/she has to check which of the two cities has the closest “free” neighbor available and connect it to the trip. In other words, the trip can be expanded in two directions, until a cycle is closed at the very end. Once again, a short cycle cannot be closed, excluding some vertices. Both variations exceed the H-Klb by circa 23%.

Heavy Edge and Degree (HEaD) Algorithm

The HEaD Algorithm is my own creation. As I discovered during my TSP research, I approached the problem differently than anybody else, in a way creating an opposition to the Greedy Algorithm, actually even before being aware of the existence of the Greedy Algorithm. This is how HEaD works:

The TSP instance has to be presented as a complete graph, unless there are vertices that simply do not have a direct connection between them, and every vertex needs to have a degree of at least 2. First, I start with identifying the degrees of the vertices. Then, I focus only on the vertices that uniquely hold or share the highest degree among all. Following that, I find the longest edge connected to any of those high degree vertices, and remove it. At that point, the two of the vertices which were previously connected by the removed edge go down by a degree. I keep identifying the high degree vertices and removing the longest edges connected to them until every vertex has a degree 2 -- I then have a cycle.

There are a couple of things that I have to be careful about, though. When removing an edge, I have to make sure that the removal will cause neither of the two vertices that the edge connects together to go below degree 2 or force me to close a short cycle. Also, if there are multiple longest edges which connect to a highest degree vertex, which one should be removed? In such a case, I look at the vertices that the longest edges are connected to at their other ends, and remove the edge which at its other end has the highest possible degrees (the highest degree here does not have to be the highest in the graph at the time). I should point out that there could be an instance where the by-the-rules edge removal determination (which among the multiple longest edges connected to a highest degree vertex should be removed) would be impossible, and then the edge choice must be arbitrary. An extreme example of such an instance can be a complete graph that has all the edges of the same length.

So far, HEaD turned out to be able to provide optimal tours for some TSP instances, on average exceeding the H-Klb by about 5%.

Why Do Algorithms Fail?

The difficulty with the TSP instances is that the shortest possible edge may not always be included in an optimal tour while sometimes the longest possible one has to be a part of an optimum. That is why, for instance, both Greedy and HEaD algorithms fail, providing results which exceed optimums. The Greedy Algorithm may force the use of an unwanted short edge, while HEaD may eliminate a long edge that should be used in an optimal tour. So far, no one has discovered a way around the issue and all of the current algorithms produce results only fairly close to optimal according to H-Klb, even though there are TSP examples where certain algorithms do produce optimal tours.

There is also an undefined step for Greedy algorithm: Let two edges have the same length, which would be the shortest length available at the moment. If the use of both those edges would result in closing a smaller cycle, then only one of them could be used. However, there is no rule which can determine which one of the edges to choose and include in the tour.

Combining Algorithms

At this point the best method for attempting to solve TSP instances is using multiple algorithms and techniques for a single instance. For example, a tour can be produced by the Greedy Algorithm, and then a series of 2-opt moves can be used to improve the tour.

Solved cases

There is also a computer program called Concorde based on multiple algorithms. Over the years, with some improvements along the way, it has shown to be a wonderful tool capable of fairly quickly finding near optimal solutions.

The largest instance that the Concorde was working on is the World TSP Tour of 1,904,711 places around the globe. “The current best lower bound on the length of a tour for the World TSP is 7,512,218,268” (Georgia Institute of Technology: <http://www.tsp.gatech.edu/>) with the best found tour length of 7,515,796,609. “The bound shows that Keld Helsgaun’s tour,” of 7,515,877,991, (best until May 4, 2010) “has length at most 0.0477% greater than the length of an optimal tour” (Georgia Institute of Technology: <http://www.tsp.gatech.edu/>) which is extremely close!

The TSP has been and still is unsolvable but there is a hope for a perfect solution!

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Machiavelli At Wits End: Virtue, Fortune and the Purpose of Comedy

KATHERINE PATON



Katherine Paton is a political science major, studying political theory. She began research on this project

in the Fall semester of 09-10 with an ATP semester grant. She continued research with the ATP summer grant during the summer of 2010, and will be presenting the entire work at the Midwest Political Science Association conference in April 2011. This part of her research is part of her honors thesis, which will be completed and defending during Spring 2011. Katherine will be attending graduate school in the fall to pursue her Ph.D. in political theory.

The scholarly ambiguity over the proper understanding of Machiavelli's political thought characterizes the scholarship in his literary works as well. The tragic interpretation of Machiavelli's literary works posits that Machiavelli's understanding of virtue fails to provide humanity the means by which fortune can be overcome. In contrast, the comic interpretation argues that man is virtuous and prudent enough to conquer fortune. To accomplish this, one must only follow Machiavelli's political teaching. I address this tension through analysis of conspiracy in Machiavelli's *Clizia*. Sofronia's successful conspiracy attests to the utility of Machiavelli's account of virtue in overcoming fortune and speaks to the comic quality of Machiavelli's political and literary works. The argument advanced here also speaks to the conspiratorial quality of Machiavelli's political and philosophic enterprise.

Considerable controversy exists over Machiavelli's treatment of comedy and tragedy. In one school of thought, the dark quality of Machiavelli's political writings encourages a tragic interpretation of his plays, letters, and other various works (Jacobitti 2000, Pitkin 1999). His political teaching of virtue, especially in regards to the abilities of a prince to overcome fortune, allows the dismissal of tragedy as an aspect of his intention within his teaching (Strauss 1958, Mansfield 2000). Central to this controversy is the concept of fortune and whether or not Machiavellian virtue is strong enough to overcome this powerful force.¹ Machiavelli's ideal man is virtuous and prudent enough to conquer fortune; the man that succumbs to a tragic fate has only his own lack of these qualities to blame (*Prince* 138).² If Machiavelli's thought is solely comic, his prince will always be able to find a way around fortune or chance. If it is tragic, these and other forces will always be able to triumph due to human weakness.

Here I evaluate Machiavelli's play *Clizia* as it relates to his political works. First, I provide an overview of the existing scholarly debate over his treatment of comedy and tragedy. The next section provides an analysis of conspiracy as developed in Machiavelli's *Discourses* and *Prince*. Having laid this foundation for Machiavelli's politics, I then assess his play, *Clizia*, as it relates to Machiavelli's teaching regarding conspiracy. I focus on Sofronia's successful conspiracy as the best demonstration of Machiavellian politics. From here, I am able to conclude that Sofronia embodies Machiavellian virtue and that *Clizia* is properly understood as a comedy.

Machiavelli's Literary Works: Tragic and Comic Evaluations

Machiavelli's plays have been evaluated by most scholars as either works of comedy or tragedy. Michael Harvey (2000) considers Machiavelli's works to be tragic. While Machiavelli suggests that the most virtuous prince is capable of subduing anything in his path, Harvey does not believe such a man exists. In a similar interpretation, Franco Fido's (2000) analysis of Machiavelli's work as a whole concludes that Machiavelli resigns himself to the weakness of humanity and the triumph of fortune. Hanna Pitkin (1999) similarly sees Machiavelli's prince as virtuous but in only one way. As she considers the manly virtue given by Machiavelli to be his most necessary and therefore most emphasized quality, the prince is not correctly prepared to overcome fortune. Instead, Machiavelli's prince is inflexible and therefore will fall to fortune and other powerful forces. For tragedians, while Machiavelli's prince is a man who could conquer all, Machiavelli is ambiguous or even critical of the actual possibility of such a man existing. Thus, while he spells out what is necessary in order to escape tragedy, his lack of confidence in the actuality of such a man leads his thought to a tragic conclusion.

Others deny the existence of a tragic element in Machiavelli's political thought (Strauss 1958, Mansfield 2000). Strauss considers Machiavelli's use of literature as a representation of his own comic nature; not as a tragic element to his politics. Machiavelli's overall goal is to introduce new modes and orders into Italy, political philosophy and politics in general. By introducing these new modes and orders, Machiavelli advises men on how to become great and powerful. Machiavelli writes, "the most excellent men will have a proper estimate of their worth and of the conduct becoming to them, and they will not be shaken in their opinion and their conduct by the whims of fortune" (Strauss 1958, 192). The successful prince will not succumb to tragedy – if he follows the counsel of Machiavelli, fortune will be defeated. A true prince, being of the highest prudence and virtue, "is then subject to nature and necessity in such a way that by virtue of nature's gift of 'brain' and through knowledge of nature and necessity he is enabled to use necessity and to transform matter" (Strauss 1958, 253).³ Strauss argues that Machiavelli creates a man of such virtue and strength that no tragedy will force itself upon him. Instead, that man will be able to flexibly use his ability to combat and conquer fortune.⁴ In Strauss' view, Machiavelli's examples that do succumb to fortune do so not because of her superior strength, but because they failed in judging the most prudent actions based on the time and situation. Thus, "in Machiavelli we find comedies, parodies, and satires but nothing reminding of tragedy. One half of humanity remains outside of his thought. There is no tragedy in Machiavelli" (Strauss 1958, 292). The faults and

failures of imprudent men cannot be judged as tragedy, as their downfall was preventable had errors not been made.

Conspiracy in Machiavelli's Literary Works

Machiavelli's use of conspiracy can be linked to the debate between the comic and tragic interpretations of Machiavelli. Though conspiracy is clearly a crime, as it is planned by one or more men against the current modes and orders, conspiracy can be beneficial, and thus less reprehensible when compared to other serious crimes. In the event that a conspiracy is successful, and new modes and orders are in fact put in place, the intensity of the crime is actually lessened (Strauss 1958). The new modes and orders are by necessity stronger and more virtuous than the existing ones, and thus become a common benefit. Deriving power from a successful conspiracy, the prince who establishes these new modes enables himself to overcome fortune and tragedy.

This is evident in Machiavelli's analysis of conspiracies. While he begins with advice on how to avoid being conspired against, he ultimately points to what one needs to do in order to successfully conspire (Strauss 1958). Before the conspiracy begins, danger is found in preparing to attack. Successful conspirators will keep their plot to themselves, only sharing with one person when absolutely necessary. To be free with one's plans is to essentially foil an attempt before it can begin (*Discourses* III.6.3). The danger of a conspiracy being uncovered is also found in conjecture, where a schemer is unable to prevent clues of his plot from being revealed. In this case, while the plot itself is not told to the wrong person, certain hints allow a conclusion to be drawn that also leads to a ruined conspiracy (*Discourses* III.6.3). When others are involved in the plot, the leader of the rebellion must also be prepared for the possibility of another member leaking the plot, whether by mistake, on purpose or by force. The danger found in the next step of the conspiracy, the execution, is obvious – the risk of something going wrong is high. Thus, Machiavelli warns that such dangers "arise either from varying the order, or from spirit lacking in him who executes, or from an error that the executor makes through lack of prudence or through not bringing the thing to perfection by leaving alive part of those who were planned to be killed" (*Discourses* III.6.12). Here, it falls on the conspirator to look to his manliness and prudence to follow through with his plot; without doing this he risks his own life. He must have a plan and be willing to adhere to it, as the plotter who is prevented from achieving his goal by a guilty conscience risks the chance of death. However, accident can lead to a change of plan, which the conspirator must not let affect his final goal. He must prudently revise the plan in light of these changes. After the conspiracy has been performed, the final danger is assessed in a manner similar to the middle stage. If there

has been someone left alive who now has a serious grievance against the conspirator, he has put himself in further danger by not eliminating every threat against him (*Discourses* III.6.12). When someone has been left alive, the danger actually escalates from that during the execution. Thus, it is absolutely necessary to execute the sons of Brutus (see *Discourses* III.6).

Virtue is essential in executing a successful conspiracy. Machiavelli writes that a city is “more or less difficult to keep according to whether the one who has acquired them is more or less virtuous” (*Prince* 32). He who expects to be successful in his conspiracy must be truly virtuous in Machiavellian terms. For a private man to become a prince, he must follow the modes of others, where “fortune provided them with nothing other than the occasion which gave them the matter into which they could introduce whatever form they pleased” (*Prince* 33). Not only must he have virtue to conspire, he must only use fortune in respect to the time and place, using his own strength and not fortune to achieve his ends. This virtue and lack of reliance on fortune allows him to overcome his opponent. Even against a strong enemy, his virtue gives him the ability to weaken their forces. Machiavelli identifies the Romans as strong conspirators, as they “sent colonies, kept and provided for the less powerful without increasing their power, put down the powers and never let powerful foreigners gain a reputation” (*Prince* 15). Like the Romans, a private man who aims to conquer must utilize conspiracy as he is incapable of engaging in war.

As a new prince, the successful conspirator must balance his own desires and that which he must implement for “states and security” (*Prince* 34). This task is far from simple, as “nothing is more difficult to deal with nor more dubious of success nor more dangerous to manage than making oneself the head in the introduction of new orders” (*Prince* 34). The successful conspirator must rely on his virtue and his ability to deceive. Deception is necessary to achieve the end goal of a conspiracy, as he who becomes the new prince must work around his lack of arms. In order to have the best chance at being successful, both with the original conspiracy and with keeping his state, the prince must realize that “he who lets go that which is done for that which ought to be done learns his ruin rather than his preservation – for a man who wishes to profess the good in everything needs must fall among the many who are not good” (*Prince* 93). While he would be wise to have the appearance of accord with that which ought to be done, he must not lose sight of that which needs to be done. The cunning, foxy side of the prince allows this, as it is necessary “to be a great hypocrite and deceiver . . . that he who deceives will always find one who will let himself be deceived” (*Prince* 108). To have the foxy nature is important for a private man who intends to become a

prince; along with his virtue, prudent use of deception allows him to successfully conspire.

Sofronia’s Successful Conspiracy

Sofronia’s conspiracy is successful and is true to the Machiavellian teaching on conspiracies. In order for a conspiracy to be justified or have the possibility of success, the injuries done to those who conspire must be “in property, in blood, or in honor” (*Discourses* III.6.2). Honor is where Sofronia feels that she has felt injury. Nicomaco’s desire for Clizia causes him to become consumed with her. Consequently, “his business was neglected, his farms were laid waste, his business dealings went to ruin . . . the servants, seeing this, made fun of him, and his son cast aside his reverence . . . this poor household will come to ruin” (*Clizia* II.4.22). Sofronia feels that her family, which was once respected by others, has been lead down a path to disrepute due to the actions of Nicomaco that are fueled directly from his desire. Sofronia, as she is determined to stop the plot of Nicomaco to sleep with Clizia, which will lead to the ruin of her family, embodies the virtuous conspirator most likely to achieve success. Her drive, along with her position in relation to her opposing force, her husband, are advantageous as “weak men and those not familiar to the prince lack all those hopes and all those occasions that are required for execution of a conspiracy” (*Discourses* III.6.3).

In returning her household to the status that it once enjoyed, Sofronia acquires the authority once belonging to Nicomaco as the head of the family. Cleandro is aware that his mother is unwilling to let Nicomaco’s servant Pirro marry Clizia, and Sofronia is aware of the bargain that has been struck between master and servant (*Clizia* V.3.57). However, while Cleandro believes that his mother is free from suspicion of his own designs on Clizia, she slides into conversation with Cleandro that: “if I believed that I’d be taking her out of Nicomaco’s hands just to put her into yours, I wouldn’t intervene in this” (*Clizia* III.3.30). Here she reveals to him that not only is she keeping Clizia from Nicomaco, but she has no intention of Cleandro having her either. In this conversation, she also eludes to her many plans, saying “I have so many things revolving in my head, and I believe that there’s one to spoil his every plan” (*Clizia* III.3.30). From managing this, and preventing Nicomaco from achieving his final goal, she accomplishes her main goal of becoming the prudent head of the family. Her co-conspirators are likely not aware that Nicomaco would only be the visual head of the family, with Sofronia holding the reins behind the scenes. In this way Sofronia is prudent, as Machiavelli states that “if indeed you communicate it [the conspiracy], not to pass beyond one individual,” thus that if it must be spoken of, to choose only one to confide in (*Discourses* III.6.9). The most prudent action is to keep the conspiracy

limited to only oneself, as Sofronia is able to do by keeping the most significant end a secret.

Sofronia's ability to maintain the requisite secrecy speaks to her ability to properly deceive. High on her list of concerns is maintaining the reputation of the family, and Sofronia considers her religious piety an integral part of this status. Sofronia's concern with piety is a quintessential Machiavellian trait, as he writes "nothing is more necessary than to have this last quality [religion]. For men, universally, judge more by the eyes than by the hands" (*Prince* 109). Machiavelli does not actually require piety. He only counsels the appearance of piety as this is more than enough to satisfy the people. Thus, when Nicomaco asks Sofronia why she is attending church during Carnival, a festival similar to Mardi Gras, she retorts that "one ought to do good all the time, and it's so much more welcome for it to be done on those occasions when others are doing evil" (*Clizia* II.3.17). Sofronia knows that she will be viewed well for attending church on any given day, but will be viewed in an even fonder light for attending on a day where indulge in irreligious activities. Thus, she is able to use the appearance of piety to her own advantage in a Machiavellian way.

When Pirro wins the lottery that is to determine who will be the rightful husband of Clizia, Nicomaco thinks that he has solved his problem with Sofronia and Eustachio. He is blinded and unable to see that the prudent Sofronia has already begun to plan for this exact event (see *Clizia* III.7.36). Speaking to Pirro, Nicomaco says "did you see how sad the whole crowd was, and how my wife despaired" (*Clizia* IV.2.41)? He goes on to say how excited he is for the events that he expects to transpire that night – without ever considering that he might in fact be thwarted. Thus, when Nicomaco enters the bed of Clizia on the night she has wed Pirro, he is caught entirely unaware by what is waiting for him there. Upon attempting to bed Clizia, he finds himself aggressively rejected: "I went to kiss her, and with her other hand she pushed my face away, I went to throw myself all over her, and she gave me a shot with her knee, so hard that she broke one of my ribs" (*Clizia* V.2.54). After multiple attempts, his beloved turns onto her frontside, where she/he "held herself tight with her breast on the mattress, so that all the winches in the Opera couldn't have turned her over" (*Clizia* V.2.55). The next morning, Nicomaco is greeted by "being stabbed in the flank and being given five or six accursed shots under the rump" eventually seeing "instead of Clizia, Siro, my servant, upright on the bed, entirely naked" (*Clizia* V.2.55-56). Sofronia's conspiracy leaves her husband emasculated, and he proclaims he is "disgraced for eternity, I have no further remedy, and I can't ever again face my wife, my children, my relatives, my servants" (*Clizia* V.2.53). Nicomaco is completely unsuspecting of his wife's plot, which has lead him

to total humiliation and defeat. She has been successful enough to deprive him of the goal he has been working towards; second of all she has played him the fool in an extremely indecent way.

Nicomaco's fate, created at Sofronia's hands, is to become the less powerful member of the household. During the scene of his self wallowing, Sofronia appears and states "you're the one who's tormenting me, because, while you ought to be comforting me, I have to comfort you, and while you ought to be providing for them, it falls to me to do so" (*Clizia* V.3.57). Sofronia has taken the role that Nicomaco once played for the household, as he has been too consumed by his desires to provide for his family and act in the ways he should act. Nicomaco fully gives up his position of authority when he tells Sofronia to "do as you wish. I'm prepared not to go outside your arrangements, provided that the matter isn't made known" (*Clizia* V.3.58). The decision over the fate of Clizia has been made not by Nicomaco, but by Sofronia, and he has been forced to relinquish the remainder of his authority to her. Similar to a prince that is able to wrest power from past leaders, Sofronia has not only determined the fate of Clizia, but has usurped control of the family. The reversal of roles between the two main characters can be seen as a gender role reversal, where the female comes out as more powerful than the male. In Machiavellian terms, Sofronia emerges as the princelier of the two characters, which allows her to overcome fortune but also initiates the comic interpretation of the play. As Sofronia assumes a powerful, previously male role, the gender role reversal can be seen as a comic device. The woman has become more powerful, while the male head of the household has been stripped of his virtue, masculinity and authority.

Sofronia: The Embodiment of Machiavellian Virtue

The conspiratorial side of Sofronia enables her to be considered a fox, as her wit and cunning help her to become successful. But in the true sense of Machiavellian virtue, her strength is shown in taking power away from her husband. This duality is found first in the *Prince*, where it is said that "there are two kinds of fighting: one with the laws, the other with force. The first one is proper to man; the second to the beasts; but because the first proves many times to be insufficient, one needs must resort to the second" (*Prince* 107). In order to be considered a virtuous leader, one must employ both, as "the lion cannot defend himself from snares, and the fox cannot defend himself from wolves" (*Prince* 108). Just like Machiavelli's ideal prince, Sofronia uses her fox-like wit alongside her ability to terrify Nicomaco. Her virtue leads her conspiracy to a successful end and increases her power by returning her household to first principles.

Even a virtuous man must have the opportunity to act if he is to be successful; the difference is the source of the opportunity. For the weaker man, this opportunity is found in fortune. On the contrary, “in the highest case, the case of the founder, this opportunity consists in the necessity inherent in his matter” (Strauss 1958, 252). Necessity is the prince’s motivation, as “the hands and the tongue of men . . . would not have worked perfectly nor led human works to the height they are seen to be led to had they not been driven by necessity” (*Discourses* III.12.1). Without necessity, the prince is unlikely to find the opportunity needed to achieve his goals. For the same reason, “a captain ought to contrive with all diligence to lift such necessity from its defenders” (*Discourses* III.12.2). This removes both opportunity and motivation from those he is up against, a tactic that enables him to strengthen himself against a weakened opponent. In the example of Gaius Manilius against the Veientians, Manilius manages to block the Veientians in his stockade. Once they realize what has happened, “the Veientes began to combat with so much rage that they killed Manilius” and manage to escape (*Discourses* III.12.2). Thus, necessity is important for he who is attempting a conspiracy, both to have himself but also to take away from another.

Sofronia is able to do this through her appropriate use and manipulation of necessity as recommended by Machiavelli. In considering the family structure as parallel to that of the political structure, it can be said that “all the beginning of sects, republics, and kingdoms must have some goodness in them, by means of which they may gain their first reputation and their first increase” (*Discourses* III.1.1). Throughout the duration of a sect, republic or even family, corruption begins to grow within the ranks, and can eventually cause a decline in virtue. Thus, as Sofronia sees her family rapidly veering off the path from the level of virtue had at its founding, she only has recourse to a return to first principles. For any of these political or private bodies “this return toward the beginning is done through either extrinsic accident or intrinsic prudence” (*Discourses* III.1.1). Sofronia represents intrinsic prudence, as she is a member of the household who employs measures that are calculated in such a way as to achieve a specific end which is in accord with the common good. Such intrinsic measures are “from the simple virtue of one man, without depending on any law that stimulates you to any execution . . . they are of such reputation and so much example that good men desire to imitate them and the wicked are ashamed to hold to a life contrary to them” (*Discourses* III.1.3). The virtue which is capable of returning a corrupt regime back to its ancient virtue and goodness is represented by Sofronia. Just as the Machiavellian character is strong and able to stage a return to these principles, Sofronia prevents Nicomaco from an action that would be imprudent and lead to disrespect for the household. Upon the success of

her plot, she also convinces Nicomaco to return to the man he once was, and to perform his duties as such, though without the authority that she has now assumed.

Part of Sofronia’s ability to accomplish her goals is due to her being an autonomous individual. Virtue, as found in Machiavellian political writings, posits that man is autonomous (Strauss 1958, 244). Machiavelli rejects the proposition that virtue and prudence are compatible with the idea that chance or God govern the actions of man (Strauss 1958). Instead, when men properly utilize virtue and prudence, they limit the ability for chance or fortune to undermine their desires. Machiavelli says of his prince that he must not let chance govern his actions, as “that prince who depends wholly upon fortune falls when she changes” (*Prince* 147). Sofronia is successful due to her autonomy. Sofronia is capable of not only playing a part in the conspiracy, but in orchestrating the entire plot. Her use of others to help her achieve her ends is exactly that – her assessing the utility of others to reach her goal. This autonomy allows her to mastermind the plot with no other source of intellectual input; she only needs help from others to assist her in more laborious aspects of the part. Sofronia’s autonomy allows her to dismiss traditional morality. She transcends the traditional role of wife by doing away with the limitation inherent in this role. Sofronia convinces Siro to lie in bed with her husband and be sexually assaulted, boldly using a lewd scheme instead of choosing a less profane path.

Human qualities, such as ambition, desire and love are all a part of Machiavelli understands of fortune. In order to rise above fortune and act with virtue, one must be flexible and prepared to handle the various obstacles thrown by fortune. These obstacles are not the only problem; time and circumstance allow fortune an even stronger grasp on human action. For humans, this is much easier said than done, as “nor can one find a man so prudent that he would know how to accommodate himself to this; that comes about because he is unable to deviate from that to which nature inclines him” (*Prince* 148). Sofronia represents the virtue that is needed to oppose her. Fortune is hard to stop, as she is one “who demonstrates her power where there is no ordered virtue to resist her” (*Prince* 147). As Sofronia embodies each virtue outlined by Machiavelli in his political works, she can couple that virtue with her prudence to overcome fortune. To an even higher extent, Sofronia represents ordered virtue because of her relation to the return to first principles. Thus, her ability to finally overcome fortune for her own benefit as well as the benefit of her family lends to the comic interpretation of Machiavelli’s literary works. She has not been thwarted by a force, her husband, that is typically considered stronger than herself. Instead, she has prudently calculated a scheme that has triumphed, allowing the conclusion that *Clizia* is a representation of the comic interpretation of Machiavelli.

Conclusion

Clizia sheds a comic light on Machiavelli's political thought. His concepts of virtue, fortune and prudence are all present in his literary works in the same forms that they are provided in his political works. Both genres speak to the necessity of virtue and prudence to overcoming fortune. Sofronia embodies the definition of Machiavellian virtue provided in his political works, and due to this she is able to turn a less than pleasant situation into a successful conspiracy. Within *Clizia*, Machiavelli proves that this advice is applicable to private matters as well. Not only is such advice applicable, but is also more accessible in a genre that is more likely to reach the multitude. As the lead conspirator and the Machiavellian character, had she been unable to triumph over Nicomaco, the play would be considered tragic. However, her success allows a comic interpretation of the play, as she overcomes her opponent at the end of the play.

Unable to employ his own virtue to become a prince, Machiavelli chooses to educate others on the proper understanding of virtue. As an educator of conspirators, Machiavelli is able to institute his own political thought (Strauss 1958). His new modes and orders are to be upheld by those whom he provides the skills to found a city. Seen as such an educator, Machiavelli can be interpreted as a conspirator himself. His writings are similar to others of his genre; he often does not say exactly what he means, choosing instead for the reader to determine his true counsel. In a correspondence, Machiavelli writes, "for a long time I have not said what I believed, nor do I ever believe what I say, and if indeed sometimes I do happen to tell the truth, I hide it among so many lies that it is hard to find" (quoted in Scott and Sullivan 1994, 888). Thus, his conspiracy can be seen as an intellectual one. Not only is he using his writings to teach others, but is also using them to hide his true meaning.

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Endnotes

- ¹Machiavelli considers fortune a force that assaults the prince who is not prepared to defend himself against her. For an excellent analysis of the nature of fortune see Pitkin (1999, 138-169).
- ² Machiavelli's texts will be referenced as follows: *Prince* with page number (s), *Discourses* with book, chapter and section (s) and *Clizia* with act, scene and page number (s).
- ³ Machiavelli identifies three types of brains, one that can understand on its own, one that can comprehend what has already been understood by others, and one that is incapable of understanding on its own or through the intelligence of others (*Prince* 138). Machiavelli's ideal prince is characterized by the first type of brain
- ⁴ The tension between the tragic and comic interpretations of Machiavelli hinges on how one interprets Machiavelli on the topic of flexibility. Pitkin (1999), for example, finds no evidence for this flexibility as Machiavelli's prince is characterized by the virtue of manliness. In addition to Strauss (1958), Mansfield (2000) argues that Machiavelli never provides an example of such a prince because Machiavelli himself represents the requisite flexibility needed to overcome fortune.

Stable Isotopic Constraints of the Turpan Basin in Northwestern China

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began in the summer of 2010 as an Adrian Tinsley Program Summer Grant and was also supported by a Geological Society of America Northeast Section Student Research Grant. This work was present at the 2010 American Geophysical Union Meeting in San Francisco in December. Allen plans to go to graduate school for Geology in the fall of 2011.

Stable isotopic analysis of sedimentary rocks can be used to reconstruct past geologic changes in the elevation and climate of topographic features such as mountain ranges and plateaus. The Tibetan Plateau is an ideal field laboratory for conducting this type of study because of the Plateau's extreme topographic relief and relatively recent geologic growth. Here we present oxygen and carbon isotope compositions from a suite of sedimentary rock samples taken from the western Turpan Basin in northwestern China. This area of the basin collects sediment from weathering and erosion of the Bogda Shan located to the north. The goal of this study is to analyze changes in the stable isotope composition of rocks as a function of stratigraphic position to reconstruct paleoelevations and paleoclimates in this part of the Tibetan Plateau.

The sedimentary rock samples analyzed in this study are Late Jurassic to Neogene age and are primarily mudstone, siltstone, and fine sandstone along with lesser limestone. Samples were powdered and then dissolved with phosphoric acid at 72°C. The liberated CO₂ gas was then analyzed using a Finnigan Delta Plus XL mass spectrometer with a gasbench inlet system. Oxygen isotope values range from -13.72 to -1.62‰ (PDB) and exhibit a large scale trend to more negative values toward the top of the stratigraphic sequence. Superimposed on this large scale trend are systematic variations in isotopic composition as a function of age. The most positive δ¹⁸O values occur at approximately 160, 115, 60, and 5 ma. Conversely, δ¹⁸O minima are observed at 150, 90, and 40 ma. δ¹³C values range from -10.69‰ to 1.40‰ (PDB). The most positive δ¹³C values (-4.3 to 1.4) occur from 120-160 ma. Younger samples display small scale variations with age with notable δ¹³C minima of -10.7, -14.7, and -7.6‰ at 108, 80, and 17 ma, respectively.

The alternating δ¹⁸O and δ¹³C signals during the Late Jurassic and Early Tertiary suggests a tectonic influence and could be a result of the inferred inception of the Turpan Basin in the Jurassic and the Tertiary collision between the Indian and Eurasian plates respectively. Where the δ¹⁸O and δ¹³C track together during the Late Cretaceous suggests that evaporative effects may have altered the isotope record which is consistent with the arid climate and high atmospheric P_{CO2} levels during the warm Mesozoic Era. Taking into account other possible influences on the isotopic record including detrital effects, diagenesis, and evaporation, it is inferred that the primary isotope signals result from two separate tectonic events in the Late Jurassic and Early

Tertiary with changes in climate during Cretaceous dominating in between.

Introduction

Orogenic plateaus form at convergent plate boundaries which, according to tectonic theory, is where two tectonic plates collide uplifting a landmass that is high, vast, and flat. The topography of plateaus, because they are expansive (flat on top and abruptly high) can have profound effects on local and global climate as they control atmospheric circulation. They also offer the chance to study subsurface processes which help refine plate tectonic models. The debate over the geologic history of the Tibetan Plateau is centered on the timing of the collision between the Indian and Eurasian plates along with its uplift scenario: whether the whole plateau uplifted at once or gradually in a stepwise fashion. In order to better understand the tectonic and climate history of the Tibetan Plateau, this study will provide stable isotope data from the Turpan Basin (Fig. 1) that has been derived from detrital sedimentary rocks in order to determine paleoelevations of the adjacent Bogda Shan (Shan is a Chinese term for mountain).

Isotopes are atoms with the same atomic number but different mass numbers, meaning a different number of neutrons in the nucleus. Because oxygen-18 (^{18}O) is heavier than oxygen-16 (^{16}O), it is more likely to precipitate out of a rising air mass first. Thus, as an air mass travels over a topographic barrier (mountain range, plateau) it will become progressively depleted in ^{18}O and more enriched in ^{16}O . This process is called isotope fractionation. The amount of ^{18}O and ^{16}O in precipitation is therefore a reflection of the amount of these isotopes in the air mass it was derived from and the fractionation effect. When this water flows into a sedimentary basin, carbonate minerals such as calcite (CaCO_3) crystallize and incorporate the oxygen isotopes from this ancient H_2O in their mineral structure. As this process occurs throughout geologic time, the sedimentary rocks deposited in the basin will contain a record of ancient ^{18}O values that have been preserved as the Bogda Shan were uplifted. A linear relationship exists between ^{18}O values and elevation worldwide (Poage et al., 2001). Therefore paleoelevations can be determined providing insight into the elevation history of the Bogda Shan and these paleoelevations can be compared with other studies throughout the plateau to delineate any patterns. This will help to distinguish between tectonic models in regards to the area adjacent to the Turpan Basin i.e., whether the Bogda Shan were uplifted as a result of the northward expansion of the Tibetan Plateau due to the Indian-Eurasian collision (Tapponnier et al., 2001), or if the Bogda Shan have been continuously deformed and uplifted as a result of collisions with microcontinents since the Paleozoic (Shao et al. 1999; Shao et al., 2001; Greene et al., 2001)

Previous paleoelevational studies along the Tibetan Plateau provide further insight into the design of its uplift history. From the Oiyug Basin in southern Tibet, paleoelevational studies have been conducted using flora preserved within its lacustrine deposits (Spicer et al., 2003). They estimate paleoelevations of 4650 ± 875 m with floral ages at approximately 15.1 Ma derived from volcanic ash that has been dated using radioactive isotopes. Other work in the Oiyug Basin has been conducted using pedogenic carbonates to estimate paleoelevations of approximately $5200 +1330/-630$ m by 15 Ma (Currie et al., 2005). DeCelles et al. (2007) used stable isotopic data derived from paleosol carbonates and aquatic fossils to establish paleoelevations in the area of the Nima Basin along the southern margin of the Tibetan Plateau. They conclude that central Tibet was at an elevation of $\sim 4500-5000$ m during the Late Oligocene. Rowley and Currie (2006) have conducted paleoelevational studies in the Lunpola Basin which is situated in central Tibet south of the Qaidam Basin. The Lunpola Basin consists of two main stratigraphic units: the Niubao Formation (Paleocene-Oligocene Age) and the Dingqing Formation (Miocene-Pliocene Age) (Rowley and Garzzone, 2007). Rowley and Currie (2006) estimate paleoelevations from the Miocene Age middle Dingqing Formation using isotopic data derived from lacustrine marls and micritic limestones to be $4260 \text{ m} +460/-560$ m. They also report paleoelevational data from the late Eocene-Oligocene Niubao Formation using isotopic data gathered from lacustrine and paleosol carbonates to be $4050 \text{ m} +500/-600$ m. These oxygen isotope estimates have led to the conclusion that the central Tibetan Plateau has exceeded 4000 m since 35 ± 5 Ma (Rowley and Currie 2006). Cyr et al. (2005) used oxygen and carbon isotopes along with Mg/Ca ratios to provide paleoelevation data from the Fenghuoshan Group of the Hoh Xil Basin located in north-central Tibet. They employ this combined technique on Eocene-Oligocene Age lacustrine carbonates to estimate that the Hoh Xil Basin was most likely lower than 2000 m in Eocene Time. This conclusion infers that the Hoh Xil Basin (presently 4700 m) has experienced rapid surface uplift (> 2700 m) since 39 Ma (Cyr et al., 2005). Kent-Corson et al. (2009) used stable isotopic data along with sedimentary techniques to constrain the evolution of climate and topography along the Altyn Tagh Fault south of the Tarim Basin in the northern margin of the Tibetan Plateau. Their data suggest that mountain building in this region began during early to middle Miocene time. When taken as a whole, these paleoelevational studies along the Tibetan Plateau support an uplift scenario of a northward expansion of mountain building through time. The goal of this study is to determine the climate/tectonic influences on the isotopic record of the Bogda Shan which will provide insight into its uplift history.

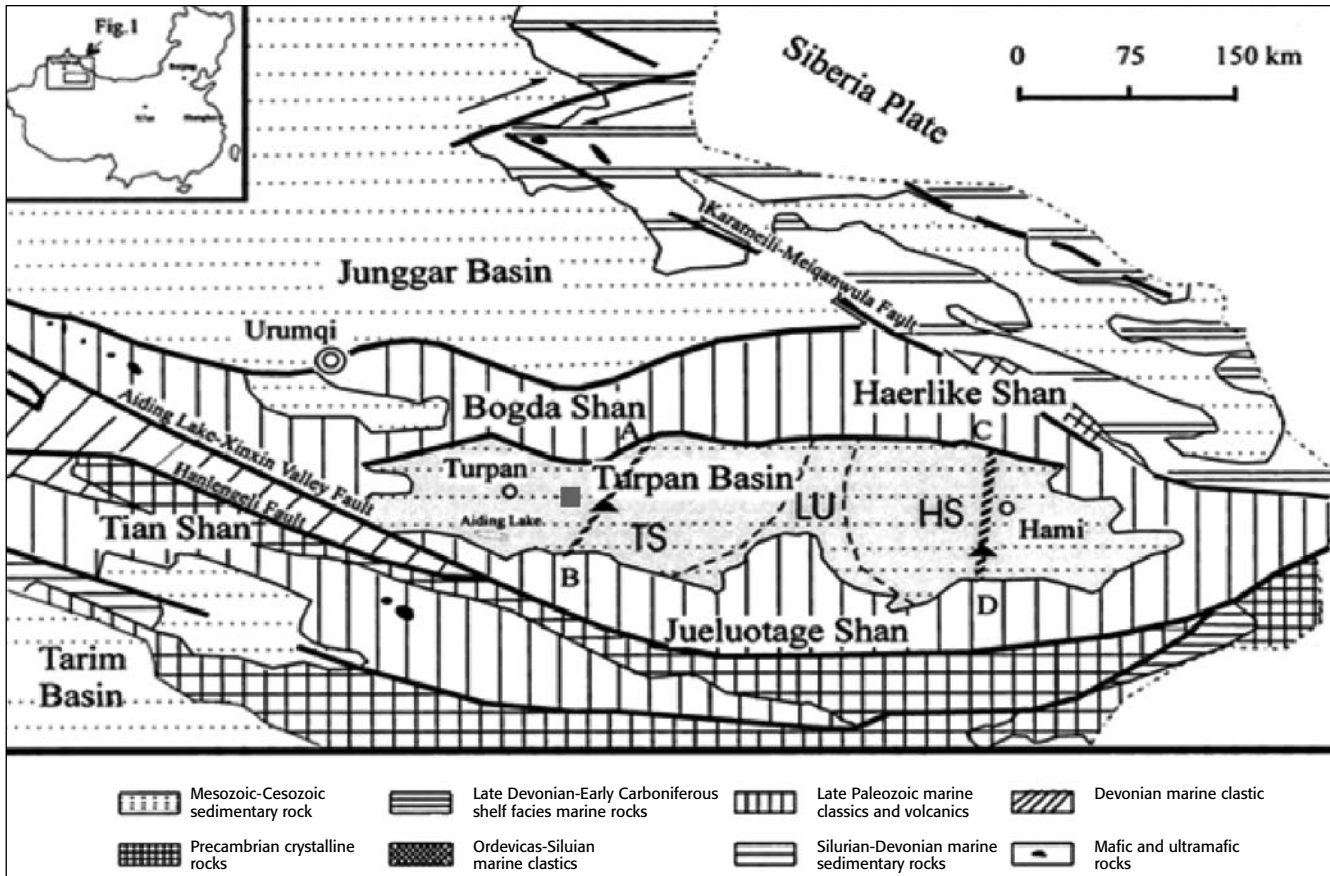


Figure 1: Geologic map of the Turpan Basin (NW China), red square indicates sample locality.

Geologic Background

The Turpan Basin is located in northwestern China in an area of complex and debated tectonic history. It is approximately 500 km long from east to west and 60-100 km wide from north to south, covering an area of 53,500 km² (Shao et al., 2001). The Turpan Basin is an intermontane basin bounded by the Bogda Shan to the north, the Haerlike Shan to the northeast and the Jueluotage Shan to the south, all of which are a part of the Tian Shan orogenic belt (Fig. 1). The Tarim Basin, separated by the Jueluotage Shan, is located to its southwest and the Junggar Basin, separated by the Bogda and Haerlike Shan, is located to its north. The Turpan Basin exhibits the second lowest surface elevation on Earth (-154 m) but is bounded on its northern flank by peaks as high as 5570 m in the Bogda Shan (Greene et al., 2001). The Bogda Shan is made up of Upper Carboniferous volcanoclastic and carbonate strata with some interbedded intermediate to felsic volcanic rocks, Permian continental clastic to pyroclastic rocks along with small amounts of limestone, and Triassic/Jurassic continental formations with coal seams (Shao et al. 1999). The Haerlike Shan, connected to the Bogda Shan from the east, consist of Devonian and Lower Carboniferous clastic to pyroclastic strata along with intermediate to felsic volcanic rocks that have undergone regional metamorphism

(Shao et al. 1999). South of the Turpan, the Jueluotage Shan contains an array of Silurian, Devonian and Carboniferous metamorphosed volcanics (intermediate, felsic, pyroclastic), marine sedimentary strata, and plutonic igneous (ultramafic, mafic, intermediate/felsic) rock formations (Shao et al. 1999).

Due to central Asia's intricate tectonic setting of ancient ocean basins, collision zones, and fault systems, the interpretation of the tectonic and structural history of the Turpan Basin and its surrounding areas vary greatly. Some studies have used paleocurrent, sedimentary, and other stratigraphic data to suggest that the Turpan Basin was established by Early Jurassic time due to compressional uplift of the Bogda Shan (Hendrix et al., 1992; Shao et al., 1999; Shao et al., 2001; Greene et al., 2001). Others suggest that the Turpan Basin is an intermontane basin that formed in the Tian Shan orogenic belt during the Late Paleozoic (Cao, 1990). Still others consider that the Turpan basin was attached to the Junggar Basin prior to Late Permian time as a microcontinent (Hu et al., 1996; Ding et al., 1996). Some have used stratigraphy and volcanics to show that the Turpan Basin formed on oceanic crust (Carroll et al., 1990; 1991). Whether a combination or succession of some or all of these events took place is debated. Sandstone petrology and

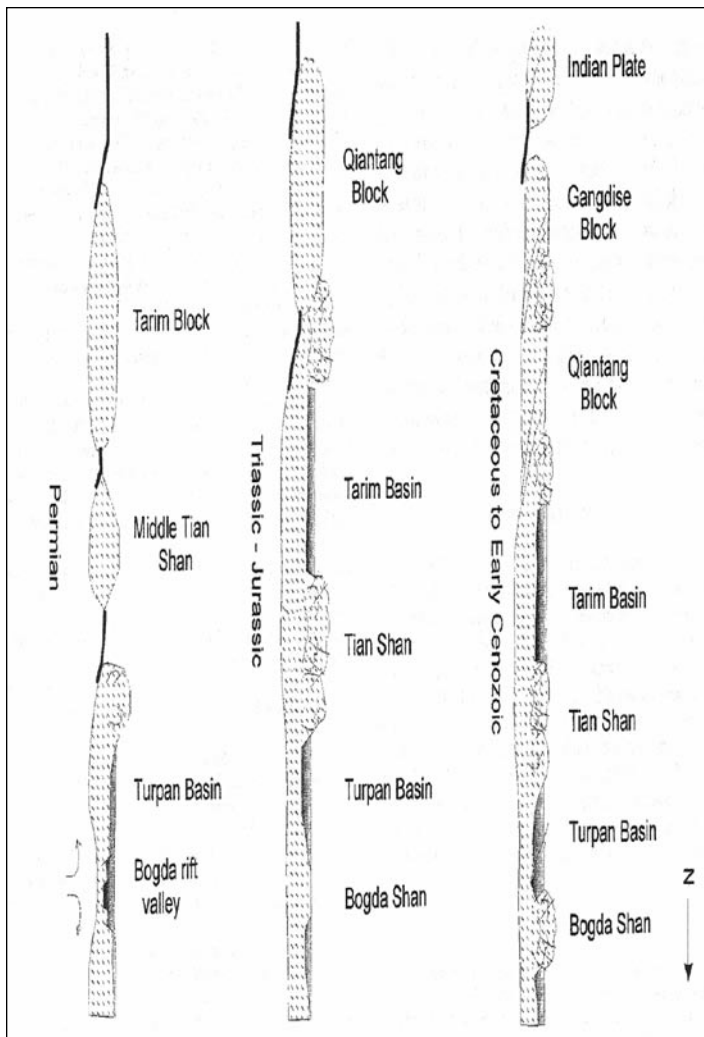


Figure 2: Cross section showing the inferred source regions for sedimentary rocks in the Turpan Basin as a function of time (Shao et al., 2001).

geochemistry has been used to break the tectonic evolution of the Turpan Basin, which is located in the Eurasian plate, into three stages (Shao et al., 2001). It is thought that Late Permian collision with the Tarim Block, a Triassic to Jurassic collision with the Qiangtang Block, and a Cretaceous to Tertiary collision with the Gangdise Block (Fig.2) has occurred in the past (Shao et al., 2001).

The Turpan Basin has been filled with more than 7000 m of continental sediment from the Late Permian to the late Tertiary (Shao et al., 1999). Starting in the Permian and continuing into the Mesozoic and Cenozoic, the Turpan's sedimentary environment changed from marine conditions to fluvial and lacustrine conditions (Zhu et al., 1988; Wu et al., 1997). The complex tectonic history of the Turpan Basin reflects its intricate sedimentary record, with changes from alluvial fan/fluvial conditions to lacustrine conditions

between each sedimentary cycle separated by unconformities (Shao et al., 1999). The Upper Permian stratum consists of generally nonmarine deposits. The middle portion of the basin exhibits lacustrine deposits, whereas the northern and western sections contain alluvial and fluvial conglomerates that have formed from the underlying strata (Carroll et al., 1991). The Triassic strata for the most part consist of red conglomerates, coarse sandstone, and fine clastic sediments that contain coal and coal streaks deposited in an alluvial and lacustrine-fluvial environment (Shao et al., 1999). Shao et al. (1999) describe the Lower and Middle Jurassic stratigraphy of the Turpan Basin to be made up of green and gray clasts and coal that were deposited in a lacustrine-swamp environment. The Upper Jurassic stratum of the Turpan is made up of an array of coarse clastic rocks that were deposited in an arid climate in a plateau-fluvial depositional setting (Li, 1997a; Li, 1997b). Shao et al. 1999 interprets the presence of Late Jurassic red and red-purple sedimentary rocks to reflect a change in paleoclimate from arid to humid. They describe the angular unconformity that separates the Jurassic from the more localized Cretaceous age lacustrine sediments. The Tertiary stratum is more widely distributed than the Cretaceous strata throughout the basin. It consists of coarse clastic sediments in the lower part of the strata that were deposited in a braided fluvial/alluvial setting and fine clastic sediments that were deposited in a lacustrine environment in the upper part of the strata (Shao et al., 1999).

Methods

In 2003, a Stanford University sampling party made up of Bradley Ritts and Yongjun Yue collected sedimentary rock samples from the Turpan Basin south of the city of Urumqi where they keyed the samples into a stratigraphic section and recorded GPS coordinates. Fifty-five of these samples, labeled 03LQ110-03LQ163, from the Liamunqin section east of the city of Turpan (Fig. 1) were provided to me for analysis at Stanford University's Stable Isotope Biochemistry Laboratory. The samples are Late Jurassic to Neogene age fine grained sandstones, siltstones, mudstones and a single limestone. They range in color from red, brown, gray to green. I prepared the samples for analysis by powdering them using a Dremel tool and reacting them with acid to assess their carbonate content. These samples were analyzed for their ^{18}O and ^{13}C content using a Finnigan Delta Plus XL mass spectrometer with a gasbench inlet system. In the gasbench, the samples are placed in sealed containers and flushed with helium gas to purify the sample from the present atmosphere in the vial. They are then reacted with 100% phosphoric acid at 72°C where the sample dissolves, releasing the ancient CO_2 in its mineral structure. This CO_2 gas was sampled and moved to the mass spectrometer where ^{18}O , ^{16}O , ^{13}C , and ^{12}C are separated by mass, from which

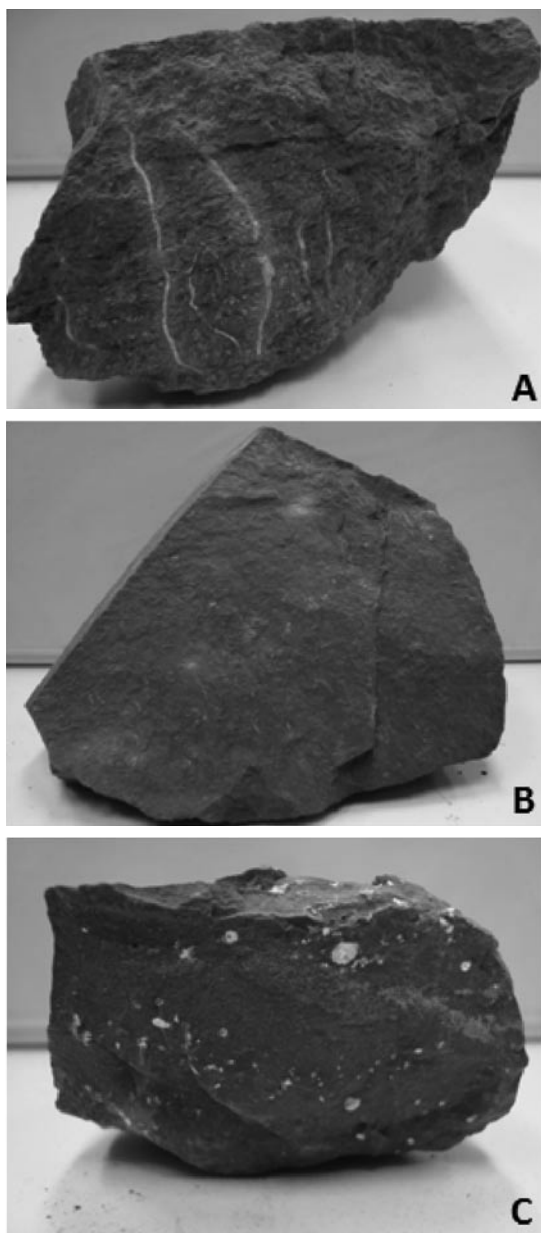


Figure 3: (A) Sample 03LQ137, red siltstone with root casts, (B) Sample 03LQ141, red siltstone with reduction spots, (C) Sample 03LQ140-2 red siltstone with carbonate nodules.

$\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ values are calculated. The “ δ ” notation is used to describe the amount of a particular isotope in the sample in units of per mil (‰), relative to a measured standard. The standard employed in this study for all measurements is the Pee Dee Belemnite (PDB). Thus, a larger $\delta^{18}\text{O}$ value indicates relatively more ^{18}O in the sample compared to ^{16}O and a larger $\delta^{13}\text{C}$ value indicates more ^{13}C in the sample compared to ^{12}C , relative to PDB. All samples were slabbed in order to reveal any micromorphology present. When applicable, root casts, reduction spots, carbonate nodules and incipient carbonate pods were sampled and compared to the rest of the sample (Fig. 3).

Results

In stable isotopic analyses of 55 samples, oxygen isotope values range from -13.72‰ to -1.62‰. Late Jurassic samples exhibit oxygen isotope values ranging from -13.72‰ to -4.08‰. Late Jurassic or Cretaceous samples have oxygen values ranging from -10.59‰ to -7.78‰. Cretaceous samples have oxygen values ranging from -11.09‰ to -1.62‰. Late Cretaceous to Eocene samples have oxygen values ranging from -12.87‰ to -8.29‰. Neogene samples exhibit oxygen values from -11.54‰ to -8.89‰. Of the Late Cretaceous to Eocene samples that have micromorphology, two display more negative oxygen isotope signatures. The root casts taken from sample 03LQ137 have a $\delta^{18}\text{O}$ signature of -12.16‰. The carbonate nodules taken from sample 03LQ140-2 have a $\delta^{18}\text{O}$ signature of -16.42‰ exhibiting the most negative oxygen signature in the whole suite of rocks.

Carbon isotope values of the 55 samples range from -10.69‰ to 1.40‰. Late Jurassic samples have carbon isotope values ranging from -2.18‰ to 0.38‰. Late Jurassic to Cretaceous samples exhibit carbon isotope values from -1.14‰ to 0.42‰. Cretaceous samples have carbon values from -10.69‰ to 0.85‰, Late Cretaceous to Eocene samples have carbon values from -9.56‰ to -5.12‰. Neogene samples range from -7.64‰ to -5.69‰. The carbonate nodules from the Late Cretaceous to Eocene (sample 03LQ140-2) display the most negative $\delta^{13}\text{C}$ signature of the whole suite of rocks at -14.73‰.

Figure 4 shows sample $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ values as a function of their geologic age. Oxygen and carbon are plotted as 9-point running averages and major global climate periods are also shown on the diagram for comparison with the isotopic trends.

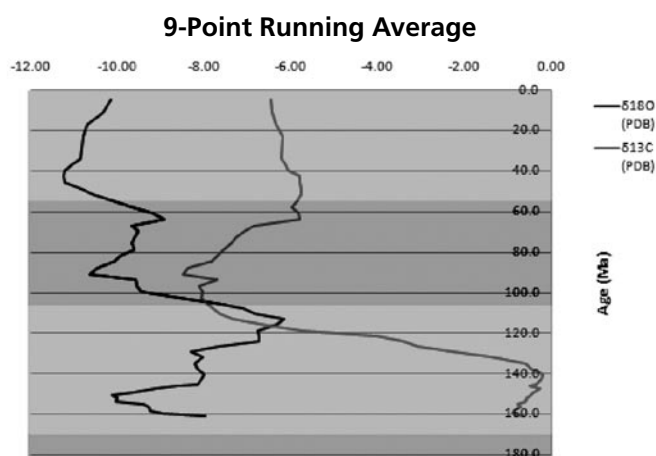


Figure 4: 9-point running average of $\delta^{18}\text{O}$ data (black line) and $\delta^{13}\text{C}$ data (red line). Shading indicates global climate periods. Pink represents warm periods, blue represents cool periods (Frakes, 1992; Vaughan, 2007; Wallmann, 2001).

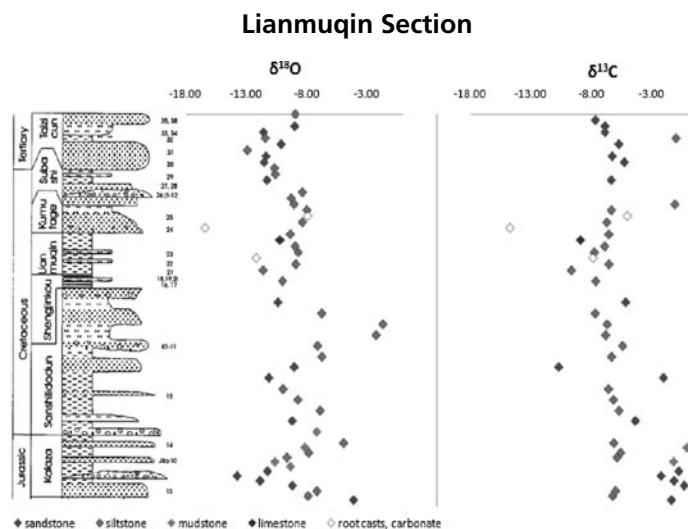


Figure 5: Stratigraphic column from the Lianmuqin Section sample locality plotted against the oxygen and carbon isotope data from this study (column modified from Shao et al., 1999).

Figure 5 shows oxygen and carbon values plotted against the stratigraphic column from the Lianmuqin Section where the rock samples were collected.

Discussion

Taking the overall data given by the 55 sedimentary rock samples from the Turpan Basin into account, the inference can be made that the isotopic record can be viewed as three separate signals: two in response to tectonic influences sandwiched between a period where climate dominates.

Possible influences on the isotopic record including detrital effects, diagenesis, and climate, can alter oxygen and carbon values. Due to the interaction of calcite with meteoric waters at high temperatures, diagenesis can result in exceptionally low oxygen isotope values (Dickson and Coleman, 1980). Detrital processes can contaminate samples with carbonate from unknown origins.

The Late Cretaceous (90-65 Ma) $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ data track together suggesting that evaporation may have altered the isotope record during this time in a possible climate dominated signal. This climate dominated signal is consistent with the warm and highly arid climate of the Mesozoic (Takashima et al., 2006) along with high P_{CO_2} levels during this time (Ekart et al., 1999) causing the signature of atmospheric carbon to be significant in the record (Cerling, 1984). The Late Jurassic and Early Cretaceous (160-110 Ma) and Tertiary (<65 Ma) $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ data do not track together inferring a cause unrelated to climate. The opposing oxygen and carbon signals during the Late Jurassic and Early Cretaceous periods could be the result of

the tectonic Jurassic inception of the Turpan Basin described in models supported by stratigraphic and paleocurrent data (Hendrix et al., 1992; Grenne et al., 2001; Greene et al., 2005). The Tertiary data also exhibits a similar divergent oxygen and carbon trend. Tertiary samples present in this study are from a conglomerate giving a greater chance that their values were increased by detrital marine carbonate. However, this change to a more high energy sedimentary environment suggests that this is when uplift was rapidly occurring, coinciding with India's collision into Eurasia (Tapponnier et al., 2001). These results are consistent with a two stage uplift scenario for the Bogda Shan beginning with the formation of the Turpan Basin in the Jurassic and ending with a second uplift event during the early Tertiary.

The goal of this research was to define paleoelevations and paleoclimates using stable isotopes. However, uncertainties exist. The Tibetan Plateau exhibits some of the most extreme atmospheric circulation patterns and tectonic arrangements on Earth. It is thought that a combination of climate effects and tectonic uplift has resulted in the Bogda Shan's intricate isotopic record. This research is being continued and future work will help to better understand the complex history of the Bogda Shan.

Acknowledgements

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The Effects of Massachusetts' Decriminalization of Marijuana Law on Use Patterns

KERRIANN SPERANZA



Kerriann is a junior majoring in Criminal Justice. Her research was made possible by the Adrian Tinsley

Summer Research Grant program during the summer of 2010 under the guidance of Dr. Dina Perrone. She presented her research at the American Society of Criminology Conference in San Francisco, CA in November 2010. Kerriann plans to pursue a graduate education in Criminology.

The practice of smoking marijuana was imported to the United States from Mexico in the early 1900s. Fear around the use of marijuana provoked sixteen states to pass laws prohibiting the use of marijuana by 1930 (Becker, 1963). It was not until 1937 that the United States Congress passed the Marihuana Tax Act to stamp out use of the drug after the Bureau of Narcotics presented to the public in a series of propaganda films and news articles the perceived dangers of marijuana use – including violence (Becker, 1963). Since that law, the United States government has attempted to create a marijuana-free America.

Based on utilitarian and deterrence theories, the US implemented laws starting in the 1970s with harsh punishments to deter the use, possession and sale of marijuana. The 1970 Comprehensive Drug Abuse Prevention and Control Act affirmed the illegal status of marijuana, in which marijuana was (and remains) categorized as Schedule I drug, with high abuse for potential and no medical uses. The 1984 Federal Sentencing Reform Act established the United States Sentencing Commission, which created harsh mandatory sentencing guidelines. The Anti-Drug Abuse Act of 1988 reestablished the death penalty for major traffickers. These resulting new laws caused a massive rise in the arrests, incarceration rates, and sentences of marijuana users, traffickers, and dealers. However, these harsh drug laws have not seemed to deter use.

Marijuana is the third most popular recreational drug (behind only alcohol and tobacco). In 2008, 40.4% of Americans over the age of 18 have tried marijuana in their lifetime, and 1.2% aged 12 or older have used marijuana for the first time within the past 12 months (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009). In 2008, an estimated 6.1% of those aged 12 or older used marijuana in the past month (SAMHSA, 2009)

While the federal government continues its efforts to eradicate marijuana use, by keeping marijuana a Schedule I drug (United States Drug Enforcement Administration [DEA], 2008), certain states have taken a different approach to marijuana. Twelve states have decriminalized marijuana including; Alaska, California, Colorado, Maine, Minnesota, Mississippi, Nebraska, Nevada, New York, North Carolina, Ohio, and Oregon. It is estimated that more

than 30 percent of the U.S. population lives under some form of marijuana decriminalization. Massachusetts joined these states in 2008 when 60% of voters passed the law that replaces the criminal penalties for possession of one ounce or less of marijuana with a new system of civil penalties. These civil offenses are not included in the state's criminal record information system.

In Massachusetts, offender's aged 18 or older are subject to forfeiture of the marijuana plus a civil penalty of \$100. The money received from the new civil penalties is given directly to the city or town where the offense occurred. Possession of more than one ounce is punishable by up to six months in jail and a fine of up to \$500. For first time offenders, the court sentences the offender to probation, and upon successful completion of the probation period, the offender's record is sealed (United States Department of Justice, 2008).

There are many proponents and opponents to this newly acquired law. Proponents argue that decriminalization ends the creation of a permanent record and removes barriers to housing and employment. Moreover, police can focus on serious crimes, rather than continuing to arrest 7,500 people annually for marijuana possession, which would save almost \$30 million a year in arrest costs (Miron, 2008).

Opponents claim that decriminalization is an endorsement of substance abuse and dangerous criminal activity, and sends the wrong message to young people. They claim that decriminalization emboldens and enables drug dealers, and poses a threat to public health and safety (Miron, 2008). They further assert that marijuana is a gateway drug; thus, with decriminalization, people will be more likely to use marijuana and progress to harder drugs. Opponents also note that the federal government still considers marijuana a harmful, illegal substance (DEA, 2008). This research project assesses if these concerns have been realized.

By interviewing 20 users about their usage patterns before and after Massachusetts' Decriminalization Law went into effect, this project investigates if marijuana use increased and if the users progressed to more "harmful" drugs. As other studies evaluating decriminalization laws more generally and marijuana decriminalization specifically have found (e.g., Erickson, 1993; MacCoun & Reuter, 2001), this study concludes that marijuana use has not increased and users have not progressed to more "harmful" drugs. The decriminalization law has not affected their use patterns.

METHODOLOGY

Qualitative methods were employed with semi-structured interviews that lasted between twenty to sixty minutes. The interview protocol was designed to obtain information regarding the following research question: How has marijuana use changed since the decriminalization law was implemented? Prior to the commencement of the interview, each participant signed an informed consent form and received \$15 worth of Hempz® products for his/her time. The participants were interviewed face-to-face in a manner to elicit a conversation, and the interviews were digitally recorded.

Sampling

To gather participants, the snowball sampling technique was used. This technique was employed because marijuana is an illegal drug and the users of illegal drugs are apart of a "hidden" population. Like many drug researchers (e.g., Alder, 1993, Perrone, 2009; Williams, 1989), my life experience has supplied me with an entrance into the lives of marijuana users.

Numerous individuals became key informants who were my main source of information, and began the snowball chain. Some of these key informants provided a pool of marijuana users whom I asked to participate in my research. I had nine key informants who provided on average at least two other individuals whom I interviewed.

This sampling method was not as successful as I had previously hoped, or as successful as it has been in other studies (e.g., Alder, 1993; Perrone, 2009; Williams, 1989). All of my initial informants gave me names of willing participants, but the chain has stopped at them, meaning those links did not give me any more names. Even though marijuana is decriminalized in Massachusetts, most of the people I contacted for an interview feared repercussions if they discussed their marijuana use. For example,

I contacted Interviewee A and B on July 6, 2010 to set up a meeting. They agreed to a meeting for July 14, 2010. Upon arriving, Interviewee A started having hesitations about being recorded during the interview. I explained to her I did not have to use the digital recorder but she still seemed reluctant. She explained she was not comfortable exposing her drug use for fear of future repercussions. I did not interview interviewee A but still completed an interview with interviewee B (Field note, 7/14/2010)

The Sample

The sample size was 20 participants with the average age of 28.4 years with a range from 18-60 years (see Table 1). The majority of the participants were male (60%), most identified

Table 1: Sample

Name	Age (Yrs)	Gender	Race	Sexual Orientation	Income	Education
Adam	26	Male	Caucasian	Heterosexual	Meat Cutter	HS Diploma
Alex	24	Male	Caucasian	Heterosexual	Short-Order Cook	HS Diploma
Amanda	20	Female	Caucasian	Heterosexual	Waitress	In College
Andrew	24	Male	Caucasian	Heterosexual	No Income	HS Diploma
Anna	22	Female	Caucasian	Heterosexual	Unemployment	HS Diploma
Brian	18	Male	Caucasian	Heterosexual	Retail Food	HS Diploma
Christopher	21	Male	Caucasian	Heterosexual	Cable Sales Rep.	In College
Cocoa	33	Female	Caucasian	Heterosexual	Factory Worker	BS Degree
Donald	60	Male	Caucasian	Heterosexual	Disability	G.E.D.
Frank	45	Male	Caucasian	Heterosexual	Engineer	4th Year College
Jojo	42	Female	Caucasian	Heterosexual	No Income	HS Diploma
Keith	37	Male	Caucasian	Heterosexual	Cust. Svc. Rep.	Some College
Kristian	20	Female	Mexican/German/Korean	Heterosexual	Unemployment	HS Diploma
Lori	49	Female	Caucasian	Heterosexual	Self- Employed Farmer	3rd Year College
Mike	20	Male	El Salvadorian	Heterosexual	Mechanic	In College
Olivia	20	Female	African American	Heterosexual	Retail Apparel	In College
Paul	21	Male	Caucasian	Heterosexual	Unemployment	HS Diploma
Sean	28	Male	Caucasian	Heterosexual	Self Employed Electrician	HS Diploma
Shannon	20	Female	Caucasian	Heterosexual	Waitress	In College
Stephen	18	Male	Russian	Heterosexual	No Income	HS Diploma
Avg. Age						
Median	28.4					

as Caucasian (80%) and all identified as heterosexual. Twenty-five percent were in college while 55% only completed a high school diploma. Most were employed either full or part time, and 15% had no income.

The sample was comprised of both former and current users of marijuana. Most have been using marijuana for about 10 years (see Table 2), and current users consumed marijuana, on average, 2-6 times a day with smoking out of bowls and joints being the preferred method. The majority of the participants were poly-drug users in which they consumed a variety of substances from alcohol and prescription drugs to hallucinogens. Still, most (80%) had never been arrested for a drug related offense.

Limitations

This study has some limitations. The key informants displayed a greater openness and were less guarded during their interviews

than those who were obtained via the snowball chain. The interviewees from whom I gathered informants were more apprehensive or restrained in their responses. To address this, my mentor suggested attending the interviews. However, participants did not want a third party present at the interview. When I mentioned bringing my mentor along, many indicated they would decline participation. They simply did not feel comfortable discussing their marijuana use with an additional person. This could have limited some of my interview data.

Although my grant application was accepted with gift cards as incentives and payment for participation, I was later notified that this would not be supported. After selecting Hempz® products for my incentives, it was a bit harder to gain participants because some individuals decided they did not need the products, and thus, declined the invitation to participate.

Table 2: Sample Drug Use History

Name	Onset	First Used Drug	Other Drugs Used
Adam	11	Marijuana	Alcohol, cocaine, LSD, mushrooms, nicotine, percocet, vicodin,
Alex	13	Tobacco & Ritalin	Alcohol cocaine ecstasy, flexeril, ketamine, LSD, marijuana, mescaline, mushrooms, oxycotin, PCP, percocet, salvia, xanax, valium
Amanda	16	Alcohol	Marijuana
Andrew	13	Alcohol	Ecstasy, marijuana, nicotine
Anna	14	Alcohol	Adderall, marijuana, nicotine, salvia
Brian	14	Oxycotin & Ketamine	Adderall, alcohol, ecstasy, ketamine, marijuana, mushrooms, nicotine, percocet, vicodin,
Christopher	14	Marijuana	Adderall, alcohol, cocaine, ecstasy, LSD, mushroom, nicotine, oxycotin, salvia, vicodin
Cocoa	17	Alcohol	Alcohol, cocaine, LSD, nicotine
Donald	21	Amphetamines	Alcohol, barbiturates, cocaine, marijuana, nicotine
Frank	19	Alcohol	Alcohol, cocaine, crystal methamphetamine, marijuana, mescaline
Jojo	14	Marijuana	Alcohol. amyl/butyl nitrite, cocaine, LSD, mushrooms, nicotine, oxycotin, oxycodone, percocet, vicodin suboxone,
Keith	13	Alcohol	Alcohol, cocaine, LSD, marijuana, mescaline
Kristian	17	Alcohol	Cocaine, ecstasy, marijuana, mushrooms, xanax, klonopin, percocet, ritalin, opium, LSD, salvia,
Lori	17	Alcohol	Cocaine, marijuana, mushrooms, ketamine, PCP,
Mike	12	Marijuana	Alcohol, mushrooms
Olivia	18	Alcohol	Marijuana, salvia
Paul	16	Percocets	Adderall, alcohol, cocaine, ecstasy, marijuana, mushrooms, salvia
Sean	14	Alcohol	Ecstasy, LSD, marijuana, mushrooms, percocet, vicodin, oxycotin
Shannon	17	Alcohol	Adderall, marijuana, mushrooms, percocet, vicodin, xanax
Stephen	11	Marijuana	Alcohol

UTILITARIANISM AND DETERRENCE THEORIES

The principle foundation of both the US criminal and sentencing laws under the criminal justice system is utilitarian theory. Utilitarian theorists Bentham (1781/1988) and Beccaria (1764/1983) claim that individuals seek to engage in behaviors that bring them the most pleasure with the least pain. Based on that principle, legislators enact laws that clearly define what is unlawful, and prescribe punishments (pain) for law violations sufficient enough to offset the gain (pleasure) from crime to deter criminal behavior.

Thus, to deter the crimes, the punishment must be tailored to be just severe enough to offset the gain or pleasure the crime would provide. Punishment that is too severe is unjust, and

punishment that is not severe enough will not deter. The punishment then must “fit the crime.” To Bentham (1781/1988) and Beccaria (1764/1983), fitting the punishment to the crime meant more than making the punishment proportional to the harm caused by society. Rather, the basis behind this argument is that the amount of gain or pleasure derived from committing a particular crime is approximately the same for everyone (Akers & Sellers, 2009). Therefore, making the punishment fit the crime stands in contrast to the punishment fitting the individual. Akers and Sellers (2009) state, “the law should strictly apply the penalty called for a particular crime, and the penalty should not vary by the characteristics or circumstances of the offender” (p.18). This argument also assumes that the more serious or harmful the crime, the more the individual stands to gain from it; therefore, the more serious the crime,

the more severe the penalty should be to deter it (Akers & Sellers, 2009).

Despite the pervasiveness of criminal legislation based on deterrence, Bentham (1781/1988) argues that certain behaviors cannot be deterred. He describes these behaviors as “cases unmeet for punishment” (p. 170). He explains that in the “following cases punishment ought not to be inflicted:” when punishment is groundless, inefficacious, unprofitable, and needless (p.171). Bentham (1781/1988) clarifies that this occurs “where the penal provision, though it were conveyed to a man’s notice, could produce no effect to him, with respect to the preventing him from engaging in any act of the sort in question” (p. 173). For these behaviors, even when the law is established and made known to the person, the punishment will not prevent individuals from engaging in the behavior (e.g., drug use). This could be interpreted to mean that Bentham only included violent or property crimes to be deterred in a society rather than non-violent, victimless crimes (e.g., drug use).

Marijuana and Deterrence

Given the US government’s extensive punitive efforts to deter marijuana use, researchers have evaluated the effectiveness of marijuana criminalization on usage patterns. Research has also compared patterns of marijuana use in jurisdictions with very different policy responses (i.e., criminalization and decriminalization) to address marijuana use (MacCoun & Reuter, 2001), while others have examined trends in use over time in a particular jurisdiction where the policy response to marijuana was altered (MacCoun & Reuter, 2001). The results of these studies suggest that the enforcement of marijuana laws generates little impact on rates of marijuana consumption.

For example, a number of studies measuring the general deterrent effect of the law in preventing marijuana use demonstrated repeatedly to have little effect on use rates (e.g., Erickson, 1993). Actually, compared to 1970, when the US had more lenient laws on marijuana, the onset of marijuana use was higher (about 16 yrs.) than it is currently [13-14 yrs. (Lloyd, 2003)]. Also, past month marijuana use in the US for individuals aged 12 or older has remained stable over the past five years at about 5-7% (SAMHSA, 2009). Furthermore, when marijuana usage patterns in the US are compared to other countries that have more lenient marijuana policies criminalization does not seem to have an effect.

For example, the rates of illegal drug use are much higher among US teenagers than their European counterparts, despite the fact that drug law enforcement is far more vigorous in the US (Beckett and Herbert, 2004). According to researchers

Beckett and Herbert (2004), “in 1999, 41% of 10th graders in the United States had tried marijuana versus 17% of European teenagers; 23% of the students in the United States had used other illicit drug versus 6% of Europeans” (p. 48).

When assessing the effects of decriminalization on usage patterns, other studies show that the de-penalization of marijuana possession is not associated with increased marijuana use. There are negligible differences in the rates of the United States, Australia, and the Netherlands (Mosher & Akins, 2007). In fact, rates of marijuana use are in most cases higher in the US than in marijuana de-penalized nations (Dilanian, 2006).

The findings from this study corroborate that research. The Federal and Massachusetts criminalization of marijuana laws did not deter onset of use. The average age of onset of marijuana use in this study was 15.05 years. Additionally, since the decriminalization law went into effect, 90% of the participants’ marijuana use has not changed. The following quotes exemplify this:

Researcher: Has your use changed since the decriminalization law went into effect?

Adam: Not at all, I haven’t gone without smoking even when I’ve been sick for at least 6 or 7 years.

Researcher: Has your use changed since the decriminalization law went into effect?

Jojo: No, no I’ve pretty much stayed the same, 3 a day [joints] for 15 years.

Researcher: So has your use changed since the law went into effect?

Anna: No, I mean I’ve been smoking for so many years; it has always been just the same.

Two participants indicated a slight increase in their use, but this was not attributed to the law. Rather, personal factors (i.e., financial status) contributed to increasing their use. This is evident with the following quote:

Researcher: Um, so has your use changed since the law went into effect, have you used it more in the past year than previously?

Mike: Um, my use is probably the same amount maybe a little more but not much.

Researcher: Do you think the law affected that?

Mike: No, definitely not; I just have more money this year than last.

PROGRESSION TO HARDER DRUGS

Marijuana, alcohol, and nicotine are presumed to be gateway drugs leading users to try harder drugs. The goals of criminalization of marijuana are not only to deter marijuana use, but also to prevent the use of harder drugs (DEA, 2008). Regardless if criminalization of marijuana deters marijuana use, proponents of marijuana criminalization claim that such laws reduce the use of harder drugs because marijuana is a gateway drug (Lessem, Hopfer, Haberstick, Timberlake, Ehringer, Smolen, & Hewitt, 2006). They argue that the use of gateway drugs, specifically marijuana, causes youths to have an increased risk of progressing to other, more serious drugs (Lessem et al., 2006). Critics of the gateway theory argue that individuals predisposed to use hard drugs would likely do so regardless of whether they use marijuana first—marijuana just happens to be the most available so it comes first (Lessem et al., 2006).

This research indicates that 90% of the marijuana users in the study used other drugs in addition to marijuana (see Table 2). Of that 90%, 20% used marijuana prior to other drugs, including alcohol, and 50% used alcohol prior to marijuana. Importantly, 90% of those who used harder drugs, used these those drugs when marijuana was criminalized. Only 10% (2 participants) used harder drugs (e.g., prescription drugs, ecstasy and psilocybin mushrooms) after marijuana was decriminalized. However, both of these participants also used harder drugs prior to marijuana decriminalization.

Two of the participants never moved on to harder drugs as the following quotes show:

Researcher: So have you tried other drugs?

Stephen: No, I don't try other drugs. I stick with drinking and my weed.

Researcher: So have you tried other drugs?

Amanda: Not really...nope, and I never will.

According to this study, marijuana decriminalization did not lead users to try harder drugs. All of those who used harder drugs used those drugs when the marijuana criminalization law was in effect.

Policy Implications and Discussion

The opponents' fears of the marijuana decriminalization law have not been met. Marijuana use did not increase for the majority (90%) of the participants in this study since the passing of the law in 2009. Furthermore, the majority (90%) of the users did not try harder drugs as a result of the decriminalization law. This study lends support to the proponents' of marijuana

decriminalization claim that marijuana may fit in Bentham's (1781/1988) cases unmet for punishment. Decriminalization did not increase use. This may call into question the use of harsh punishments for deterrence from drug offenses. Regardless if marijuana is criminalized or decriminalized, users will continue to use it. This is clearly seen in the national trends of marijuana use; as of 2008, 40.4% of Americans have tried marijuana in their lifetime (SAMHSA, 2008), even though marijuana has been and remains a Schedule I drug.

Given the ineffectiveness of criminalization, the dearth of effects of decriminalization on use patterns, and the potential harms of incarceration if marijuana remains a Schedule I drug, it is clear that marijuana should be legalized. Seventy five percent of the users in this study agree. This is evident with the following quotes:

Kristian: It might as well be legal, I mean, I know so many people you wouldn't even think smoke weed, and I just think you might as well make it legal because everybody is going to do it anyways.

Sean: Best policy, um yeah, I'd love to see it legal... I think that there's too many people that get in trouble for it that shouldn't.

Lori: It [legalization] would give the public and police a lot more time to not be dealing with it. I wish they would though, do like alcohol, make it twenty-one and up only.

Furthermore, 100% agreed their use would not change if marijuana were legalized. This is evident in the following quotes:

Researcher: So, how would your use change if it became legal?

Jojo: It wouldn't really. I would just smoke it more in the open, and I don't care that anyone knows I smoke now as it is, so it wouldn't really make much difference.

Researcher: Do you think it would stay the same?

Lori: Oh, I'm sure it would pretty much stay the same.

Researcher: Would your use change if it became legal?

Kristian: Um, I think it would be nice to sit outside and smoke openly and not be worried, you know? But, my use would be the same

The United States drug policy relies on criminalizing certain substances with the goal of preventing use. This study shows that even when substances are criminalized, it does not prevent use. The harsh penalties the US has enacted for drug use has not had any effect on prevention, rather it has increased incarceration and arrest rates for petty drug use. In the global world, the US does not rank high on effective drug policies (i.e., to reduce use). Rather, those countries that have changed their policies to more health-based, harm reduction initiatives have shown to be more effective in reducing illicit drug use and harmful drug behaviors.

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Coursework

THE UNDERGRADUATE REVIEW
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The sections on Coursework include submissions that were originally produced as work for a course, but mentored under the revised review process.

An Enlightened Woman: Judith Sargent Murray and the Call to Equality

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Mary is an English major with a Secondary Education concentration. This essay was completed

as coursework in Dr. Ann Brunjes's Early American Literature class. Mary appreciates Dr. Brunjes's guidance and is grateful to her for introducing her to the works of Judith Sargent Murray. Mary plans on teaching English following graduation.

The political and social upheaval of 18th century America is well documented in the writings of many great thinkers of that time. As the Age of Enlightenment stirred debate in many quarters, causing men like Thomas Jefferson to ponder the merits of equality among men, so too did it inspire women to question their own status in an emerging American culture. A little-known writer named Judith Sargent Murray emerged as an early contributor to the discussions of the role women in a changing society. The Sargent family's openness to the study of a progressive faith, Universalism, and rejection of status quo Calvinism influenced the notion of equality upon which Judith developed her personal philosophy in regard to education, marriage and the role of women in American society. Judith Sargent Murray's well reasoned and impassioned Revolutionary Era arguments for marital equality, acknowledgement of the female intellect and access to educational opportunity for women in both "On the Equality of the Sexes" and *The Gleaner* reflect an early feminist philosophy rooted in her embrace of liberal Universalist theology as well as her resentment at being deprived an education. Judith Sargent Murray's willingness to question gender constructs in her writings, both private and public, reflect the ideals of the Enlightenment and reveal her uniquely American perspective on gender inequity based upon both her personal life experiences and her vision for the emerging American society.

Although the input of women was neither sought nor particularly valued in the struggle to define post-Revolution America, Judith Sargent Murray considered herself a patriot and did not shy away from speaking her mind. In one of her decidedly political essays from *The Gleaner*, published in *Massachusetts Magazine* in 1792, Murray wrote:

The genius of liberty, invigorated in this younger world, hath arrayed itself for battle-it hath gone forth-it hath originated opposition-its banners have been displayed-it hath enlisted its worthies-the struggle hath been arduous, but the event hath crowned us with success... independence claps her wings-peace is restored-governments are formed... We are free, sovereign and independent states, and yet to the federal head we are amenable.

Murray felt that her opinions were valuable and viewed her ability to spread her political message as her patriotic duty. She, like many writers of the era,

was devoted to expressing, “The symbolic meaning of America and the social message of how to live and succeed in American society-how to be an American” (Elliot 23A). Murray’s hopes for the changing American culture included a strong central government which would endeavor to direct the social message of equality to reflect changing the role of women in society. Murray was fortunate to grow up in relative privilege, and was exposed to political issues and philosophies more so than many women of her era; therefore her positions on matters of equality were the result of spirited debate and study. Hurd-Smith notes that, “Murray’s mature sentiments about gender roles were a product of her particular experiences and of the transatlantic literary and philosophical tradition that characterized the Age of Enlightenment” (Hurd-Smith17). Murray considered the rights of women to be crucial to establishing an American society worthy of a reasoned people, and, having developed this opinion rationally through her own study and experiences, embodies the spirit of the Enlightenment in this regard.

As the spirit of reason swept across America in the lead up to the Revolution, surging political discourse led to a closer examination of religious doctrine in some quarters. The new, more liberal religious philosophy of Universalism began to gain acceptance in New England among many who questioned the harsh orthodoxy of Puritanism. The Sargent family, finding themselves attracted to the egalitarian nature of Universalism and its message that salvation was available to all, reached out to the liberal theology’s founder John Murray who accepted their invitation to preach (Hurd Smith 22). Although the Sargent family held a position of great esteem within their Puritan community, they questioned Calvinist theology’s premise of God’s “grace” rendering eternal salvation available to a select, predetermined few. They were further troubled by laws requiring financial support of the community’s Puritan meetinghouse as a civic duty for all, regardless of religious affiliation. Feeling they could no longer abide supporting a system with which they had lost faith, the Sargent family found themselves breaking all ties with First Parish Church. Biographer Shiela Skemp underscores the significance of the family conversion in *Judith Sargent Murray: A Brief Biography with Documents*, “They were abandoning their past, rejecting a tradition that had accorded them a privileged place in the community and separating themselves from the intricate network of social and spiritual relationships that shaped their world” (20). The Sargent family’s decision to risk their social status and reputation in pursuit of a faith more in keeping with their values speaks to the premium placed on intellectual curiosity in the Sargent household. This bold move was reflective of their liberal nature and the values they imparted to a young Judith, the same values which led her to question society’s views about women in religious and civic life.

Judith Sargent Murray relied heavily on the Universalist notion of equality in forming her ideas on the extension of equality to women. In arguing that women possess equal intellect to men, Murray’s “On the Equality of the Sexes” admonishes men against the assumption of superiority by offering a theological perspective that: “Our souls are by nature equal to yours; the same breath of God animates, enlivens, and invigorates us; and that we are not fallen lower than yourselves” (729). Murray points out that while men and women were not equals in their corporal existence, no such distinction exists on a spiritual plane. Even the most dogmatic tenets of Calvinism did not argue that men were more inclined to salvation than women. Murray’s thesis follows that if God thought women could be entrusted with salvation, surely they could be trusted with intelligence. Skemp supports this argument in writing that, “Murray’s view of women’s intellectual equality was a logical development of her religious and philosophical beliefs” (111). Murray recognizes the inherent conflict that society, Puritans in particular, had established in requiring women to study the word of God, while discouraging them from the study of the words of men. Universalism, unlike Calvinism, did not require critical examination of personal behavior and religious texts to determine moral failings. Rather, Murray found her new faith to be a source of encouragement to explore greater questions about spirituality and whether the constraints placed on women were implicit divine directives or, rather, the misinterpretations of men. Universalism aligned well with Murray’s liberal views of American society precisely because it was not a religion which confined her to rigid self-examination based on harsh dogmatic teachings of Calvinism, but encouraged her to embrace her own capacity to think and reason.

In Part II of “On the Equality of the Sexes,” Murray draws inspiration from her own liberal interpretation of the Bible to criticize the premise of male superiority, “I am aware that there are many passages in the sacred oracles which seem to give the advantage to the other sex, but I consider all these as wholly metaphorical” (730). She goes on to enumerate the weaknesses of revered men in Biblical tales: “Thus David was a man after God’s own heart, yet see him enervated by his licentious passions...Listen to the curses which Job bestoweth upon the day of his nativity and tell me where is his perfection” (730). Murray then concludes that, “the superiority of man, as exhibited in scripture, being also emblematical, all arguments deduced from thence of course fall to the ground” (730). Murray’s bold stand in questioning the accepted interpretation of a scriptural basis for the presumption of male superiority is followed by her appeal to apply reason. If these men are the standard by which men derive their sense of superiority, Murray argues that no such superiority is evident. Skemp notes of Murray, “As a religious dissenter, she had learned to question

traditional authority in matters of conscience” (69), and thus felt no loyalty to accept the long held patriarchal interpretations of Biblical lore.

While Murray’s public writing is notable for its examination of scriptural content to advance her theory of female equality, a private correspondence to a friend which was later appended to her essay “On the Equality of the Sexes” reveals the extent of her boldness in challenging any Biblical basis for the inferiority of women. Murray presents an analysis of the Story of Creation which serves as an indictment of the flawed nature of men represented by Adam while depicting Eve as an example of women’s intellectual curiosity. Regarding the Biblical Fall from Grace, Murray posits that Eve acted out of inquisitiveness: “A laudable ambition fired her soul and a thirst for knowledge impelled the predilection so fatal in its consequences” (732). She further argues that it required the powerful forces of Satan to deceive Eve into Original Sin because she would not be easily swayed, but that Adam required no such manipulation or deception to participate in their downfall:

Thus it should seem that all the arts of the grand deceiver (since means adequate to the purpose are, I conceive, invariably pursued) were requisite to mislead our general mother, while the father of mankind forfeited his own, and relinquished the happiness of posterity, merely in compliance with the blandishments of a female.(732-733)

Murray theorizes that Eve’s fall resulted from her “desire of adorning her mind” (732) while Adam simply gave in to his physical arousal at the sight of Eve’s naked body state. This suggests that not only does Murray see women as the intellectual equals of men but hints at the possibility of a greater intelligence. Murray’s analysis would have been troublesome, even scandalous, at the First Parish Church where she had previously worshipped; however, because of the Sargent family’s long held liberal theological views, Murray had no qualms about questioning interpretations of religious texts which she could not reconcile with her own views concerning gender equality.

The Sargent family’s liberal social positions extended beyond their religious life and into the realm of education, although they fell far short of providing the true equality of opportunity which a young Judith Sargent Murray longed for in her studies. Murray’s parents, recognizing the intellectual curiosity and potential of their daughter, arranged to have her privately tutored, but never fully committed to providing their daughter with the education she felt she deserved. Skemp notes that when her knowledge and abilities surpassed the scope of her

tutoring, “She begged her parents to allow her to sit in on Winslow’s lessons. She especially wanted to learn Latin, the mark of any genteely educated man” (Skemp 13). Despite their liberal philosophy, her parents saw no practical application for a young woman, even one of Murray’s exceeding intelligence, to have a Classical education, although they did allow and encourage her independent study from their extensive personal library and permitted Winslow to tutor her on his own breaks from Harvard. Murray did not blame her parents for halting her formal education; rather, she blamed the larger society for denying formal educational opportunity to women, and focused her writing on the injustice to women in such policies.

Murray’s ire over the restrictions placed on her education is evident throughout her essay “On the Equality of the Sexes” where she pointedly asks of the perceived differences in men’s and women’s acumen: “Yet it may be questioned, from what doth this superiority, in thus discriminating faculty of the soul proceed. May we not trace its source in the difference of education, and continued advantage?” (727). She cites the disparity between the sexes by echoing the situation in her own home: “As their years increase, the sister must be wholly domesticated, while the brother is led by the hand through all the flowery paths of science” (728). Rather than stew in her own resentment, Murray pours her efforts into extolling the virtues of education not only for herself, but for all women. In her essay “Women’s Attributes as Breadwinners” from *The Gleaner*, Murray writes that “To neglect polishing a gem, or obstinately to refuse bringing into action a treasure in our possession, when we might thus accumulate a handsome interest, is surely egregiously absurd, and the height of folly” (Hurd-Smith 146). Murray sees herself and all women denied a proper education as unpolished gems. The imagery of the gem is especially powerful as a metaphor, not only because of the obvious connection to women’s perceived vanity and affinity toward jewelry, but because the gem itself represents the essence of how women may be seen as beautiful adornments to be admired without much thought given to their substance. Murray’s arguments in both “On the Equality of the Sexes” and *The Gleaner* urge that women be valued for their intellect and that they be permitted to increase their value through education.

Murray, while certainly on the forefront of American feminist theory in her writings on the female intellect, was not alone in debating the Enlightenment era concept of intelligence. She is notable for being a more radical voice than her contemporaries in standing against those beliefs, “Within the conventions of European philosophies of mind that set the initial terms of U.S. conceptions, (that) women’s intelligence occupied a lower order than men’s” (Olwell 37). Not content to accept this European philosophy, Murray’s “On the Equality of the Sexes”

explores the question of whether there exists any difference in male and female intellect which cannot be accounted for by means other than lack of opportunity. Murray reasons, "May not the intellectual powers be ranged under their four heads—imagination, reason, memory and judgment?" (727). She then buttresses her argument with a series of witty observations detailing the stereotypical manner in which women are viewed to utilize the power of imagination, including fashion as well as more manipulative pursuits. Of women's imaginations, she notes, "Another instance of our creative powers is our talent for slander. How ingenious are we at inventive scandal?" (727). Murray's tongue in cheek approach humorously demonstrates that women have clearly equaled or surpassed men in mastery of these areas of intellect. She goes on to propose that by allowing women the ability to direct these intellectual powers in more worthy pursuits, no gender distinction would exist (728). These sentiments would later be echoed by Hannah Mather Crocker who would cite the theory that "Reform of female education would eventually eliminate any appearance of systematic, innate differences in the intellectual capacities and interests of the sexes" (Hunt-Botting/Houser 270). While Crocker, the granddaughter of Cotton Mather, had herself come from a family which valued education, her beliefs exemplified the emerging concept of "Republican Motherhood" which put forth, "The idea that women should exemplify, teach, and guard the spirit of the republic within the family," (Kritzer 150). Murray's regard for women's intellect and the prospects of their education reflected her progressive beliefs that the usefulness of women's education was not limited to the domestic realm.

While the emerging "Republican Motherhood" movement dictated a decidedly more conservative approach to the ties between marriage and education, Judith Sargent Murray's philosophy and life experiences again led her to advocate a progressive stance toward women's education and employment in her writing. Although women's employment opportunities were restricted to the domestic arena, Murray joined other progressive women of her time in suggesting that were women able to obtain the same level of education which had long been afforded men, it would follow that they be granted the same access to employment as well (Nash 31). Given the unhappiness and occasional poverty she endured in her marriage to Stevens, Murray resolved that women's education should be seen as a means to improve not only the situation of married women, but of widows and the unmarried. Murray addresses this notion in her *Gleaner* essay "Women's Attributes as Breadwinners", writing, "The chance of a matrimonial coadjutor is no more than a probable contingency; and if they were early accustomed to regard this *uncertain* event with suitable *indifference*, they would make elections with that deliberation" (Murray 146). Murray realized that just as women were entitled to both

educational opportunity and equality within marriage, so too were they entitled to their own pursuits should they choose not to marry. While the "Republican Motherhood" agenda stressed education for the betterment of family life, the liberal minded Murray realized, "An even more compelling reason for women to be self-supporting was their desire for self-determination" (Nash 31). Murray viewed access to education as a means of improving women's lives, not merely for the sake of self-improvement, but because it opened up a world of economic possibilities to unmarried women or those who found themselves widowed without any financial resources as she had following the death of her first husband.

Murray's belief in the need for society to embrace true equality for the benefit of marriage and family life was an extension of her faith and personal philosophy. In "On the Equality of the Sexes," Murray writes, "Females would become discreet, their judgments would be invigorated, and their partners for life being circumspcctly chosen, [and] an unhappy Hymen would then be as rare as is now the reverse" (728). This essay, written following Murray's unhappy first marriage to John Stevens, reflects not only her hopes for improving the institution itself, but speaks to her dissatisfaction with her own prior marriage. In the essay, Murray relies upon her own interpretation of her faith to determine that women not be bound to suffer in silence as subordinates within their marriages, asking:

Is it reasonable that a candidate for immortality, for the joys of heaven, an intelligent being, who is to spend an eternity in contemplating the works of the Deity, should at present be so degraded as to be allowed no other ideas than those which are suggested by the mechanism of a pudding, or the sewing the seams of a garment? (729)

Skemp writes, "She could not imagine that God thought wives should embrace false doctrine simply for the sake of marital peace" (Skemp 69). Murray would later find the opportunity to be treated as an equal partner upon her second marriage to her longtime friend Rev. John Murray, one of the founders of Universalism. Working together to spread the message of Universalism, their partnership represented the sort of union theorized in Murray's essay: a modern marriage based on love and mutual respect reinforced through their shared faith.

As a period of great societal change fueled the public discourse on the future of America and her people, Judith Sargent Murray bravely spoke out in the hope that her voice would help steer the discussion toward gender equality. Although true equality would not soon follow, Murray's fearless commitment to progress and granting women equality in social standing,

marriage and educational opportunity represents the spirit of independent thought and reason so valued during the Enlightenment. In both "On the Equality of the Sexes" and *The Gleaner*, Murray's message of equality is consistent with these values and reflect her the influence of her family's rejection of Calvinist restrictions in favor of Universalism's liberal theology. Judith Sargent Murray's progressive views in support of women's intellect and equality permeate her writings and reveal her to be an inspirational voice of early American feminism and a product of the Enlightenment in America.

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God Bless America, Land of The Consumer: Fitzgerald's Critique of the American Dream

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Kimberly is a senior studying English and Secondary Education. This paper was kindly mentored by

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In James Truslow Adams' book, *The Epic of America*, he defines the American dream as "that dream of a land in which life should be better and richer and fuller for everyone, with opportunity for each according to ability or achievement" (404). In the middle of the roaring 1920's, author F. Scott Fitzgerald published *The Great Gatsby*, examining the fight for the American dream in the lives of his characters in New York. Fitzgerald illustrates for the reader a picture of Gatsby's struggle to obtain the approval and acceptance of high society and to earn the same status. Jay Gatsby travels the journey to achieve the American dream, but his dream is corrupted and outside forces prevent him from ever fully attaining it. Adams' definition continues: "It is not a dream of motor cars and high wages merely, but a dream of social order in which each man and each woman shall be able to attain the fullest stature of which they are innately capable, and be recognized by others for what they are, regardless of the fortuitous circumstances of birth or position" (404). This definition corresponds to what could be considered the inception of the American dream--"Life, Liberty, and the pursuit of Happiness"-- which were dubbed unalienable rights in the Declaration of Independence (US 1776). Fitzgerald sets Jimmy Gatz out on the right path toward the American dream, but it is distorted by the influence of society's focus on materialism. Gatsby's materialistic way of life, however, does not win the approval and acceptance of the New York elite, or the heart of his beloved Daisy. Fitzgerald criticizes American society for depriving Gatsby of his American dream because of the country's growing obsession with consumer culture and misunderstanding of the American dream as a culmination of wealth.

F. Scott Fitzgerald paints a picture of the class-consciousness of America throughout the plot. He sets his story in New York, but makes clear distinctions about the economic classes of people that inhabit the area. Situated on an island off New York, East Egg and West Egg are towns that are home to a range of classes. East Egg is reserved for the elite members of the upper class born into old money. Fitzgerald describes the island through Nick Carraway's eyes: "Across the courtesy bay the white palaces of fashionable East Egg glittered along the water" (5). The people that come from East Egg exude high class. Nick identifies the party guests from East Egg as Yale graduates, doctors, and people with "flipped up" noses (61-62). West Egg on the other hand, is for the imposters of sorts. West Egg is "the less fashionable of the two," as Nick puts it. The 'new money' rich live on West Egg, including Nick Carraway and Jay Gatsby. West Egg is the up and coming area for the

self made millionaires and those trying to look like them. The people living in West Egg that attend Gatsby's parties include Irish people, Jewish people making money in the movies, and gamblers (62-63). Fitzgerald's sets of descriptions of the two places are very different from one another, establishing that the desirable area is East Egg based merely on the people alone.

The landscape proves to be another reason for West Egg's inferiority. The West Egg side of the island faces the city, with a desolate space in between the two. This "valley of ashes is bounded on one side by a small foul river, and, when the drawbridge is up to let barges through, the passengers on waiting trains can stare at the dismal scene for as long as a half an hour" (24). This area is next to West Egg, which has an effect on how people perceive West Egg to be less desirable than East Egg. Fitzgerald's description of the space between West Egg and New York is seemingly other-worldly:

This is a valley of ashes--a fantastic farm where ashes grow like wheat into ridges and hills and grotesque gardens; where ashes take the forms of houses and chimneys and rising smoke and, finally, with a transcendent effort, of men who move dimly and already crumbling through the powdery air. Occasionally a line of gray cars crawls along an invisible track, gives out a ghastly creak, and comes to rest, and immediately the ash-gray men swarm up with leaden spades and stir up an impenetrable cloud, which screens their obscure operations from your sight. (23)

Fitzgerald criticizes how the industry of the area has changed. The area may have once been the 'fantastic farm' that he writes about, but now it is ash that grows like the wheat once did and the garden is now grotesque. Fitzgerald is describing the decline of genuineness and authenticity in America, due to the harrowing effects of consumerism. This land was once thriving with life and now is dead and turned to ash. It has been consumed by consumerism. The farmers are now railroad workers, serving the transportation system of goods bought and sold in the area. The area was taken over by the budding consumerist culture and now there is nothing left. All of the temptations of the consumerist lifestyle, including houses and cars, have even burned and turned to ash. This world is not about people; consumerism is about the material things, not genuine human relationships. The people here are gray and lifeless, and have no spark to them. They merely walk through the motions of life. This scene is what Fitzgerald thinks will become of the country once it is destroyed by consumerism, like a look into the future. This novel is a cautionary tale for the people of America. The American dream is so easily corrupted by the temptations of a consumerist lifestyle. This

era was a period of change after World War I, and Fitzgerald is warning America about the direction the country could be heading in.

Fitzgerald's characters in *The Great Gatsby* live in this dynamic era and represent a range of economic classes attempting to adapt to it. The only true working class characters in the novel are the Wilsons. Fitzgerald uses them to illustrate both ends of the spectrum of the effects of consumerism on Americans. Myrtle complains about George by saying, "I married him because I thought he was a gentleman...I thought he knew something about breeding, but he wasn't fit to lick my shoe" (34). George lied about his economic status in order to impress her. Their marriage is not based on love or even truth; it is based on a lie about financial conditions. Myrtle laments the position she was conned into, "The only *crazy* I was was when I married him. I knew right away I made a mistake. He borrowed somebody's best suit to get married in, and never told me about it, and the man came after it one day when he was out... I gave it to him and then I lay down and cried to beat that band all afternoon" (35). Despite her working class status, Myrtle still dreams of living a privileged lifestyle like any other consumer. She thinks of herself so highly that even her husband is substandard. That greed and self-centeredness is another aspect of what Fitzgerald is warning America about. The more Americans focus on money and materials, the more they lose themselves in the process and become the gray and lifeless people Fitzgerald created to represent the future of consumerist America.

The Buchanans represent the elite upper-class from old money. They are rich, sophisticated, and very particular about the company they keep. Tom focuses on the separation of the races, as he attempts to quote "*The Rise of the Colored Empires*" by a man named Goddard (Fitzgerald 12); scholar Walter Benn Michaels points out that he mistakes this for Stoddard's *The Rising Tide of Color Against White World-Supremacy* (Michaels 23). Tom believes that white people need to protect the sanctity and exclusivity of the white race. Tom's ideas are not his own, but he is still commended for reading, as Daisy says in a possibly sarcastic and condescending manner, "Tom's getting very profound... He reads deep books with long words in them" (Fitzgerald 13). Ronald Berman, author of *The Great Gatsby and Modern Times*, claims that the Buchanans "connect entertainment with consumerism, and consumerism with the acquisition of character. Tom gets his ideas from books with long words in them, books that dissipate ideas under the impression that they are radiating them. In this narrative, ideas are bought and paid for" (5). I agree with Berman's argument because I believe that the characters are so enveloped in consumerism, that it is almost expected that even their basic

ideas about humanity are contaminated by it. Tom regurgitates another man's ideology and insists, "It's all scientific stuff; it's been proved" (Fitzgerald 13). Tom has no thoughts of his own in this situation; he relies on the thoughts of others that he paid for, whether it be in books with long words, newspapers, or paying a friend to do some digging into Gatsby's background. These characters, the Buchanans and the Wilsons, interact throughout the novel, but the class distinctions keep them from ever truly fitting together. Fitzgerald creates a picture of high society that looks beautiful from far away, but when examined further shows a much uglier side of high society and the way it warps the impression it exudes to the lower classes.

The desire to attain the status of high society, no matter how ugly it really is, is inherent in Jay Gatsby. Even at a young age, Jimmy Gatz had the same determination the reader sees in Jay Gatsby, before it was poisoned with consumerism. In being introduced to Mr. Gatz, the reader is also exposed to a side of Gatsby previously unknown. Even before Daisy's captivating influence, Jimmy Gatz was already a dreamer. His daily itinerary and list of "General Resolves" is reminiscent of that of Benjamin Franklin's *Autobiography*, as Walter Benn Michaels points out in his book, *Our America: Nativism, Modernism, and Pluralism* (26). Mr. Gatz says, "Jimmy was bound to get ahead. He always had some resolves like this or something. Did you notice what he's got about improving his mind? He was always great for that" (173). Before he met Daisy, Jimmy Gatz had a dream of becoming something better. Jimmy Gatz was on the right path towards achieving the American dream, by way of improving his mind and working hard. It was not until he met Daisy that his dream changed; Daisy became his dream.

It is when he meets Daisy that he is led astray. Fitzgerald describes their relationship in its beginnings, establishing that Gatsby "found her excitingly desirable" (148). She was desirable, like an object to be adored. He was also fascinated by her way of life from early on in the way that her house "amazed him - he had never been in such a beautiful house before. But what gave it an air of breathless intensity was that Daisy lived there - it was as casual a thing to her as his tent out at camp was to him" (148). From that very moment, Daisy's lifestyle distorted his once genuine quest for the American dream into one for a "grail" as Fitzgerald calls it (149). He knew from the beginning that he could never have her as Jimmy Gatz. Fitzgerald refers to her as a "grail" to symbolize that the quest to win Daisy, like the Holy Grail, will never end and will ultimately be fruitless. Gatsby knew from the very start of their courtship that "he had no real right to touch her hand" (149). We understand Gatsby to be a hardworking man, kept down by society's standards defining the upper class. Jay Gatsby represents a step somewhere in the middle, between the working class and the

rich from old money. Walter Benn Michaels argues that Gatsby lost his chance with Daisy because he lacked the necessary past and family to be an acceptable suitor for Daisy despite their love for each other (26). I agree because not only is success and status linked to money in the novel, but also to breeding and background as Michaels points out. For Gatsby, the concept of the American dream was forever altered because it could no longer be achieved through hard work and determination. After Daisy's first rejection of him, Gatsby's dream centered completely on winning her back and like Daisy as the "grail," the dream is unattainable.

The reader could perceive him to be of the upper class based on his immense riches, but as the plot progresses, the mystery surrounding him leads to talk amongst his partygoers questioning his past. He is of the 'new money' upper class with a barrier much more pronounced than one might think. Being from a lower economic class than the Buchanans has an effect on how he is perceived as a human being. To most at his parties, Gatsby was the seemingly absent host, providing the luxuries of the parties, but rarely partaking in the enjoyment. Gatsby walks around his own home surrounded by strangers. Consumerism has infected Gatsby through the luxury and extravagance he feels is necessary to fit in, and win Daisy.

In order to become the man Daisy wanted, Gatsby had to transform himself and compensate for his lack of breeding. His extravagant mansion and lavish parties are all for Daisy even though she is not a part of his new life. For Gatsby, consumerism is a crutch. It masks his emotional connection to attaining his American dream. To the naked eye, he looks like any other entrepreneur, gaining popularity by throwing parties. Underneath the facade is a broken man, kept down by society's standards. Even with his surrender and subjugation to consumerism, it is not enough to gain admittance into the club he so desperately wants to join. As hinted at by many of his party guests, Gatsby made his money through questionable business transactions. Because of his quiet and mysterious demeanor, the rumors fly about his allegiances and patronage. He could be a cousin to Kaiser Wilhelm (Fitzgerald 32), or a German spy in the war (Fitzgerald 44). Most notably are the accusations Tom Buchanan makes about Gatsby's finances after learning of the affair with Daisy. Tom claims Gatsby makes his money illegally, "I found out what your 'drug-stores' were." He turned to us and spoke rapidly. "He and Wolfsheim bought up a lot of side-street drug stores here and in Chicago and sold grain alcohol over the counter. That's one of his little stunts. I picked him for a bootlegger the first time I saw him, and I wasn't far wrong" (Fitzgerald 133). This development in the plot proves that not only is his identity fake and dishonest, but the way Gatsby makes his money is also tainted.

Despite his questionable activities, I think Fitzgerald meant for readers to feel sympathy for Gatsby. Gatsby had always been a man with a dream and people could see the genuineness in his eyes. Nick Carraway saw the goodness in him the first time the two met, describing his presence in great detail:

He smiled understandingly—much more than understandingly. It was one of those rare smiles with a quality of eternal reassurance in it, that you may come across four or five times in life. It faced—or seemed to face—the whole external world for an instant, and then concentrated on you with an irresistible prejudice in your favor. It understood you just as far as you wanted to be understood, believed in you as you would like to believe in yourself. (48)

This moment is one of the few times that someone sees through the extravagant façade that Gatsby hides under. He may have been a bootlegger, but I argue that Fitzgerald makes the statement that society forced Gatsby into bootlegging because the American dream is not accessible to those not born into money. He was a bootlegger, but he was still just Jimmy Gatz, following his dream to get the girl. Both the economy and society of the time period prevent people from attaining high society status through hard work, so Gatsby must turn to other resources.

Historian Bret E. Carroll claims that “the lavish lifestyle of the gangster (denoted by his expensive suits and jewelry) also came to embody both the promise and pitfalls surrounding the new paths to individual fulfillment offered by consumerism” (107). Carroll argues that consumerism was seen as a way to individual fulfillment in this time period, and that thought affected not only the well known gangsters, but also a much wider audience. Carroll continues:

For instance, in F. Scott Fitzgerald’s *The Great Gatsby* (1925), Jay Gatsby’s palatial home, fabulous parties, and expensive clothes epitomize the growth of a masculine style defined by hedonistic materialism. Gatsby’s gleaming car represents the emergence of the automobile as an archetypal symbol of the new union of consumerism with masculine independence, power and status. (107)

Carroll convincingly argues that Gatsby’s materialistic way of life is a sign of both the promise and pitfalls of consumerism. Gatsby’s material possessions are not earned honestly, but through illegal channels of commerce, yet they still give off the impression of his affluence. His riches appear to make him happy, because as a consumer, wealth brings happiness. In

the reality of Gatsby’s life, however, the riches only bring him down.

Gatsby’s car, a beautiful Rolls-Royce, is not merely a mode of transportation, but a symbol of himself. From the outside he is polished and a tad bit extravagant, but the layer under the surface is much darker. After the War, people wanted that kind of luxury, independence, and status. It was a status symbol for Gatsby. He does not own a modest Ford, but a ‘gorgeous car’ (Fitzgerald 63). The car is part of his façade of outer extravagance to hide inner insecurities. Fitzgerald chose to make the automobile, ‘the archetypal symbol’ as Carroll calls it, the messenger of death in his story. Nick Carraway remembers that “The ‘death car’ as the news papers called it, didn’t stop; it came out of the gathering darkness, wavered tragically for a moment and then disappeared around the next bend... Myrtle Wilson, her life violently extinguished, knelt in the road and mingled her thick dark blood with dust” (Fitzgerald 137). This is no accident; the automobile revolutionized American industry, coming “out of the gathering darkness” to bring new technology to the world. Its availability brought a little bit of luxury to the American people, promoting consumerism. The car is representative of Gatsby’s consumerist attitude toward status, and it ultimately ends up killing Myrtle. I believe that Fitzgerald is criticizing the road that consumerism will take America toward destruction. Gatsby’s tainted car, home, parties, and clothes represent the rise of consumerism in America and the great lengths people will travel to fit into the consumer culture no matter how dismal the journey.

Fitzgerald acknowledges the problem of obsession with consumerism not only among high society, but in the country as a whole. His representation of varied economic classes shows his understanding of mass culture and its effects across cultural boundaries. In this time period, consumerism was often associated with the idea of “mass culture.” Andreas Huyssen, author of “Mass Culture as Woman: Modernism’s Other,” argues that, “Warding something off, protecting against something out there seems indeed to be a basic gesture of the modernist aesthetic” (2). I agree with Huyssen’s claim that modernists are concerned with mass culture and are warding it off, but in terms of applying this idea to Fitzgerald and *The Great Gatsby*, I disagree with Huyssen on some points. I believe Fitzgerald is taking a stand against consumerism, but does so by way of creating a cautionary tale. He does not ward off consumerism or protect his characters from it. Fitzgerald faces consumerism head on and lets his characters be consumed by it. The Buchanans, Myrtle Wilson, and Gatsby are all brought down by the effects of this mass cultural phenomenon. Huyssen continues, “The nightmare of being devoured by mass culture through co-optation, commodification, and the wrong kind

of success is the constant fear of the modernist artist, who tries to stake out his territory by fortifying the boundaries between genuine art and inauthentic mass culture” (7). On the one hand, his argument can be validated by applying it to Fitzgerald in terms of addressing the fears of mass culture and in this case consumerism. On the other hand, Huyssen’s argument is flawed when applying it to Fitzgerald. Fitzgerald’s underlying purpose is to warn the reader of the negative effects of consumerist culture. He submits his characters to the disastrous consequences of consumerism but lets the reader decode the purpose for himself. Fitzgerald does preach against consumerism in subtle ways by proving to the reader what happens to someone consumed by mass culture and in this case consumerism. I interpret Huyssen’s argument to mean that many modernist authors protect their characters and the public from mass culture by warding it off. Fitzgerald’s approach is more critical than Huyssen’s argument would suggest.

Modernism as a historical, cultural, and literary movement helped to define the end of the nineteenth century and the start of the twentieth as a time of change. As a reaction against the Victorian era, modernism proclaimed the importance of individuality. In categorizing Fitzgerald as a modernist writer in the 1920’s, I argue that he takes a stance against the rising consumerist culture in America. In her article on modernism and consumer culture, literary critic Alissa Karl quotes Henry Ford in his book, *Moving Forward*. “Our buying class is our working class,” Ford claimed in 1930, “and our working class must also become our ‘leisure class’ if our immense production is to be balanced by consumption. Besides, it is only just and human and progressive and educational that people should use what they produce” (qtd. in Karl 83). Henry Ford is seen as the father of mass production in America, having revitalized American industry with his invention of the Model T automobile. His words were truly influential in this time period, and they describe the era that Fitzgerald was living and writing in. Ford’s words are representative of the changes taking place in the economic class systems in America; the working class is producing more and buying more along with the upper class. More consumption leads to more production and the cycle continues. After the focus on production during World War I, the 1920’s were celebratory by way of mass consumption. Karl states that consumption “isn’t simply good for business: it is a national moral imperative” (83). Spending money and stimulating the economy was a moral responsibility in addition to a national reality. Consumerism found a way to work itself into the American dream, fooling Americans into believing that to be an American was to be a consumer.

Fitzgerald purposefully blurs the boundaries between genuine art and mass culture by creating a genuinely artistic text about

the negative influence of consumerism. Fitzgerald criticizes the consumerist view on art when Four Eyes is speaking about the books in Gatsby’s library: “Absolutely real—have pages and everything. I thought they’d be a nice durable cardboard. Matter of fact, they’re absolutely real. Pages and— Here! Lemme show you ... It’s a bona-fide piece of printed matter. It fooled me” (45). Fitzgerald is criticizing how consumerism has tainted a person’s outlook on art. Four Eyes assumes that the books are fake and serve as décor in the mansion. Literature and art in general are bought and sold and are meant to be representative of wealth. Four Eyes later gawks over the “thoroughness” and “realism” of Gatsby’s library (46). He assumes that the library is a ruse meant to convince people of his wealth and status. He never entertains the thought that these books could be for art’s sake or for the sake of learning. Fitzgerald longs for the respect for literature and art that was a staple of the past. Fitzgerald describes Gatsby’s library as a “high Gothic library, paneled with carved English oak and probably transported from some ruin overseas” (45). Gatsby’s library is reminiscent of the libraries of ancient times like at Alexandria or in Rome during the Renaissance when art was truly revered and appreciated. This is the genuine art that Fitzgerald longs for. He writes this novel hoping it to be read and respected as a piece of genuine art, not left on a shelf to represent status like Four Eyes suggests the consumers of mass culture would do.

The Great Gatsby is not only a classic piece of modernist literature, but it is a picture of life affected by consumerism and the ways one can be destroyed by it. Jimmy Gatz wanted nothing more than to have the American dream as James Truslow Adams described it. He wanted to be respected and loved for the person he was, not the family and situation he was born into. The misunderstanding of the American dream as a culmination of wealth corrupts the pure and genuine quest for self improvement Jimmy Gatz follows as a path toward achieving the dream. Jimmy Gatz falls for Daisy and her lavish lifestyle, but Jay Gatsby dies alone, with only his property and riches with him. The hundreds of partygoers do not attend his funeral because those relationships were not based on human connection. The last time Nick sees Gatsby, he remembers the first time they met: “The lawn and drive has been crowded with the faces of those who guessed at his corruption – and he had stood on those steps, concealing his incorruptible dream, as he waved them good-by” (154). Fitzgerald’s statement is clearly ironic because his dream is so corrupted by the notion that the American dream is about money and status. In the end, Gatsby has only Nick and his father to mourn him, because the consumerism of American society preached the importance of wealth and possessions rather than the richness of human contact. Fitzgerald gives us a story about the journey of the American dream, and how it can be jeopardized by the very

people who want it. Adams' definition of the American dream is based on a utopian society, while Fitzgerald tells a much more realistic story in true modernist fashion, warning us of the all-consuming power of consumer culture.

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Mary Rowlandson: The Captive Voice

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The arrival of the Puritans in Massachusetts, the ensuing relationship they developed with the Native Americans and its deterioration over the following years are historical facts that are commonly known, but the reality that numerous women and children were kidnapped for ransom in the years referred to as “King Philip’s War” might surprise many Americans. In fact, on February 20, 1676, in the town of Lancaster, Massachusetts, along with several of her neighbors, Mary Rowlandson and her young daughter were violently ambushed, torn from their homes, and taken hostage by a multi-tribal band of Indians. She was ransomed and released in early May. Several years later she penned the details of her experience.

As a direct result of her captivity, she had the unique opportunity to speak publicly, through her writing, which was not commonly acceptable for women of her time. Because her female voice was powerfully limited by societal and religious expectations, and the trauma she experienced was so intense, it is imperative that the reader pay close attention to the details she chose to relate, and the way she represented her experience in her narrative, bearing in mind that even upon her return to society, she was still captive to the limitations of what a “good wife” was allowed to say. Rowlandson structures her account within the confines of her religion, and provides the reader lessons with regard to providence and virtue. At the same time, however, her writing reveals a societal structure within the native community which depicts her captors as much more than savages, as well as her own strength – both of which challenged the culture in which she lived.

In her world, women were not allowed to hold public office, preach to an assembly, or have authority over men. Had she not been taken hostage, she would probably have lived a very common life – raising her children, tending to the needs of her husband, and adhering to the doctrines of her faith. If she had anything to say about the role of women in her culture, she would have been silenced. In contrast to Anne Bradstreet, who was “the only North American woman author to have published before her” (Salisbury 6), she does not appear to have had aspirations to become an author. Her fame as a writer was based solely on the circumstances resulting from her capture.

It is impossible to evaluate her narrative without considering the powerful role the society in which she lived played in formulating her perspective.

She was a Puritan, she was of English descent, and she was a wife and mother. She also lived in a male dominated society in which women did not have the opportunity to challenge beliefs. When she documented her experience, she knew the expectations of thought and behavior all of these social roles entailed. In this context, it would be foolish to assume that her voice as an author was not limited when she presented her captivity as an historical account. It is probable that she, knowingly or unknowingly, adjusted her experience to please her general audience. In the introduction to *Authority and Female Authorship in Colonial America*, William Scheick writes that "...sites of logonomic conflict can be glimpsed in the unintentional, barely perceptible ruptures occasioned by an author's uneasy attempt to negotiate between orthodox and personal authority" (3).

Mary Rowlandson was a member of a culture which maintained a strong sense of superiority over the Native Americans. In his book *The Invasion Within: The Contest of Cultures in Colonial North America*, James Axtell explains that while the natives were initially respectful of the colonists, their opinion changed, "When it became clear, however, that the strangers were disagreeably boastful of their prowess and sought to compromise the autonomy of the natives in nearly every sphere of life..." (19)

At the outset of her narrative this contempt is evident in the terms she uses to describe her captors such as "murtherous wretches" (68), "bloody Heathen" (69) and "ravenous Beasts" (70). But further on in her work, the awkwardness that William Scheick notes is evident throughout Rowlandson's detailed description of her time with the Indians. As she recalls the moment when she starts to weep, after having maintained her composure since her capture, she does not describe the natives as responding harshly to her, but rather with compassion. In fact she explains, "There one of them asked me, why I wept, I could hardly tell what to say: Yet I answered, they would kill me: No, said he, none will hurt you" (82). In the same passage she notes, "Then came one of them and gave me two spoonfulls of Meal to comfort me, and another gave me half a pint of Pease; which was more worth than many Bushels at another time" (82).

After reading of this connection between captive and captor, the reader naturally anticipates that she will go on to explain how this kindness impacted her perception of the natives, but that is not what happens. Instead, she writes that she met King Philip and abruptly changes the subject to decry her former use of tobacco. One gets the impression that this was an uncomfortable moment for her to relate. It is quite plausible that she felt guilty that she had experienced a somewhat

emotionally close encounter with the people she was supposed to hate. Still, she could have made the choice to leave out that rather sentimental moment, since it is in such stark contrast to her prior descriptions of the "Heathen(s)." However, by quickly changing the subject she actually stresses the significance of the encounter more than if she merely said that she appreciated their kindness. Her discomfort is palpable, not so much with the compassion of the Indians, but rather, the *relating* of the tale.

Captivity is complex. The expectation is that the person held captive should detest their aggressor consistently throughout their confinement. The unique situation that is living with one's enemy provides fertile ground for confusion. Even though Rowlandson had plenty to say about the evils of her captors, and certainly she had experienced extreme horrors throughout her ordeal, she depicts several times when the humanity of her kidnappers was what allowed her to survive. Although she could have ignored these in her narrative, she chose to include them. This "gray" thinking was not reflective of the black and white teachings of the Puritans. In his book, *American Puritanism and the Defense of Mourning*, Mitchell Robert Breitwieser points out that this shift in Rowlandson's style is a progressive change. He states, "But *as she goes along* with the writing, and despite her best intentions, things get loose or come forward that do not reduce entirely to exemplary status without residue, things that therefore adumbrate or signal the vitality of a distinctly non-Puritan view of her experience" (8). She may have stopped short, at times, but her message was not always what she was supposed to say by convention. Planned or not, the effect of this change in writing style revealed perceptions that she would surely have known were unacceptable to voice outright.

In her lifetime, she had experienced the manner in which authorities dealt with women, and what was tolerated with regards to their restricted communication. It is interesting that her mother, Joan White, had been allowed by the church to speak about her conversion, which was very rare. Neal Salisbury describes two very different responses by the church to women speaking publicly. He states:

In publicly relating her conversion experience, White acted in a capacity permitted few New England women in the 1640s. Since 1637, when New England's magistrates and ministers had banished a radical Puritan named Anne Hutchinson, along with her followers, most churches had ceased allowing women to speak publicly in any capacity. Hutchinson had boldly challenged the authority of New England ministers by claiming that all but two of them adhered to a "covenant of works." (9)

It is important to note the fact that while Rowlandson's mother was *allowed* by the church to speak, Anne Hutchinson was not. As a woman who actually spoke not only of her own accord, but confrontationally, she was banished by the community. Since she experienced a three month separation from her loved ones, it is highly unlikely that Rowlandson would have had the desire to write anything in her memoir which might have been construed as contrary to authority. Banishment is forcible removal from a society from within, while kidnapping is aggressive removal from without. In the end, however, they both result in absolute separation from a support system, and the destruction of relationships which have been built over a number of years. It must have been a daunting task for her to compose her narrative while, at the same time, being aware of the consequences should she overstep any boundaries of convention.

Within the realm of societal power over a woman and her behavior, the concept of purity is dominant. A woman who is taken captive may be forced into an unwanted role sexually with any of the men who become her captors. Rowlandson deliberately addresses this topic and does not avoid answering the questions that she certainly knew her readers would be asking. She wrote:

O the wonderfull power of God that I have seen, and the experience that I have had: I have been in the midst of those roaring Lyons, and Salvage Bears, that feared neither God, nor Man, nor the Devil, by night and day, alone and in company: sleeping all sorts together, and yet not one of them ever offered me the least abuse of unchastity to me, in word or action. Though some are ready to say, I speak it for my own credit; But I speak it in the presence of God, and to His glory. (107)

It is clear that her narrative was scrutinized by the public in many ways. In fact, she was accused of taking credit for not having been molested, rather than giving God the glory. She explicitly states that she was never approached in a sexual manner, even stressing how *improbable* it was that she wasn't. When reading this passage, it appears that she feels the need to protect her own reputation. One might wonder how she could have addressed the matter had she actually been raped. It is uncertain in what manner the Puritan population would have responded to the wife of a minister who had been intimate, by choice or not, with a man they considered to be a heathen, as well as not her husband. In a society which perceived that God brings about punishment according to behavior, would she have been depicted as a victim or as a sinful woman who brought on her own defilement? Even if she was acknowledged

as a victim, it would have been difficult to have this type of information assimilated publicly. In the above passage, she points out that she was blamed for taking credit for not being raped; one cannot help but wonder how much more she would have been subjected to judgment if she had.

The fact that a woman was able to survive such harsh conditions, without a man protecting her, challenged the cultural belief that women were weak. While it is true that she gives God the glory for bringing her through the overall ordeal, she also relates her own specific skills which contributed to her survival. One of the most important examples of this involves the recognition of her knitting talent by her captors. In fact, it was this ability that gained her a certain amount of respect within the native society, as well as allowing her to bargain for food which was imperative for her to live long enough to be ransomed and returned to her husband. When she speaks of her talent, she does not seem to feel the need to stress that it was from God. In addition to making a shirt for King Philip's boy (83) she explains, "There was a *Squaw* who spake to me to make a shirt for her *Sannup*, for which she gave me a piece of Bear. Another asked me to knit a pair of Stockins, for which she gave me a quart of Pease" (83). She used her business savvy, possibly gained in the context of captivity, to survive. Her ability to barter, even as she was in an incredibly stressful situation, is evidence of *her own* strength of character. The fact that she sprinkles throughout her narrative the many times the natives specifically requested that she provide them with knitted items shows that she is aware of the fact that her own skills were valuable. That is not to say that she didn't recognize that all talent comes from God; but it seems she was proud of her ability to trade her skills for food. The act of taking any personal credit was crossing the line with regard to Puritan pressure to minimize self and always give God credit for any accomplishment. She doesn't say, "God allowed me to knit" or "my God-given talent." But she also doesn't say, "Since I am an extremely talented woman, I was able to survive." She is careful to simply present the details of the interaction.

And, indeed, she was judged by the public for taking credit, rather than giving God the glory, for circumstances which she obviously had no control over. She did not choose to be taken by the Indians and she did not remain a captive as a result of her own desire. Salisbury notes that, "Although it was never expressed directly, there may also have been resentment over Rowlandson being elevated publicly above the other captives, especially near the end when she was the focus of English efforts at redemption and was in fact the first to be removed" (43). If the mere fact that she was *redeemed from her captivity* was enough to provoke envy, it follows that she would have incited jealousy if she appeared to "brag" in any way. Within her community the possibility of offending public opinion was

lurking behind every statement. As we have seen, she did stretch these boundaries with her accounts of the Indians' kindness, as well as her survival skills, but she did so very cautiously.

There was a specific motivation for publishing her account, which was to promote the Puritan belief that God actively punishes and restores believers. Salisbury focuses on this intent in his introduction when he writes:

There is substantial evidence indicating that Increase Mather played a central role in getting the manuscript published. Mather and the Rowlandsons were old acquaintances, and Mather had gone to the Massachusetts Bay Council just a week after the Lancaster attack with Joseph's request for assistance in securing his family's release. As part of his long project to demonstrate the role of divine providence in shaping human lives and events, Mather had begun as early as 1670 collecting evidence to support his thesis. (44)

With this in mind, it was imperative that her text support, and not introduce questions about, faith with regard to God's divine providence. Her account would not have been published had she written about any unresolved struggles in her faith. She could depict herself as suffering, but she could not, by convention, leave room for any wonder in the reader's mind with regard to the purpose and resolution of her capture. What was written needed to stress God's will and prove God's power. No matter what she had actually experienced, the way it was presented was required to fit within this structure. Even if she had not published her narrative, her belief system restricted her from questioning her experience as she wrote, because to do so would have been to undermine her faith and, according to her account, that faith is what saw her through her ordeal.

What is implied here is not that she did not truly believe that God was in control. The problem lies in the fact that there was no room for her to voice any of her inner struggles or questions, or to challenge any conventions she had accepted before her capture in a direct fashion. She did have a voice, but it was bound to and held captive by convention. It must have been quite difficult for her to fully piece together all of her encounters - the intense emotional suffering she endured as she watched her daughter die over the course of nine days, the memories of seeing the violent deaths of friends and family members, the transition of going from the position of being the respected wife of the minister to being a servant who slept on the ground, as well as wondering if she would ever be returned to her former life. Beyond that was the knowledge that her former life didn't actually exist anymore.

Structuring these gut wrenching emotions into a narrative that frankly states "It is not my tongue, or pen can express the sorrows of my heart, and bitterness of my spirit, that I had this departure: but God was with me, in a wonderful manner, carrying me along, and bearing up my spirit, that it did not quite fail" (73) and after describing her dying child as constantly moaning and saying over and over, "I shall dy, I shall dy" (73) ending her paragraph with "But the Lord renewed my strength still, and carried me along, that I might see more of his Power; yea, so much that I could never have thought of, had I not experienced it" (73) fit convention. She could not have said that she felt that God had deserted her, that these circumstances were unfair, or that she had lost her faith. There is no way to know if she had any of these thoughts or feelings. But the question must be asked, "If she did have any of these struggles, would she have felt that she could have included them in her narrative?" That is highly doubtful.

The extreme transition to another culture, spiritually as well as physically, certainly opened the door to a broader point of view in contrast to the limited world she had lived within her entire life. In her book *Captivity and Sentiment: Cultural Exchange in American Literature*, Michelle Burnham writes.

This Puritan Englishwoman's extended habitation within the radically alien culture of her Indian captors necessarily makes her narrative a history of transculturation and of a subjectivity under revision. Such conflict and its effect on the texture of Rowlandson's account has become, for recent readers, the most fascinating aspect of her text... (14).

The texture of her account does change throughout. She begins by dramatically relating the violence of her capture and her "...narrative ends with a tone of calm and a noticeable absence of descriptive detail" (Burnham 11). But even in the beginning, it should be noted that she cannot write about her dying daughter without distancing herself from her - and this is certainly a confirmation of the Puritan attitudes toward mourning in which Rowlandson has been raised. She calls her "babe" and "it" in the same paragraph (74-75). One word shows the intense love of her motherly bond, and the other sounds as if she is talking about a thing. She is clearly conflicted, and probably just trying to survive the overwhelming and profound emotions she was forced to experience, the living nightmare of watching her own child die slowly, with no way to save her. But she was also part of a culture with a unique view of mourning. As Breitweiser writes.

In the seventeenth century, Anglo-American Protestantism was not yet sufficiently genteel to oppose emotional intensities per se, so its injunctions against grieving have to have more to do with grief's content, its intrinsic thought, than with its amplitude. Unfortunately, Puritan writing is for the most part practical and militant, rather than theoretical and multisided, so no Puritan text I know of explains the origin of the hostility to mourning or registers mourning as other than a force haunting the periphery of thought, though there are many texts that express or deploy the hostility. (21)

Breitweiser argues, then, that Rowlandson is reflecting a kind of intrinsic Puritan hostility toward mourning. She was not allowed to address her grief directly in her narrative without accepting it, as well, as part of the overall plan of God's judgment. She could not express anger, depression, or any resentment she may have felt about the death of her child, because her voice, as a Puritan woman, was restrained. While it is true that other aspects of Rowlandson's narrative reflect what Burnham describes as "a history of trans-culturation and of a subjectivity under revision" (14), the root of her conflicted response was firmly grounded in Puritan norms.

Toward the end of her narrative, Rowlandson does reveal how this traumatic experience has changed her peace. She says, "I can remember the time, when I used to sleep quietly without workings in my thoughts, whole nights together, but now it is other ways with me. When all are fast about me, and no eye open, but his who ever waketh, my thoughts are upon things past..." (111). Of course, she quickly explains that while even though so much bad has happened, it is all good in the end because it is God's work. She may have revealed more of her inner struggle than she intended, though, when she wrote, "And I hope I can say, in some measure, As David did, It is good for me that I have been afflicted" (112). She was *supposed to say* she could, for certain. Even though her voice was captive to religious and cultural expectations, her written words both respectfully and gently challenged the boundaries.

Freedom of speech is relative. With that freedom are implied conditions for every author. If one is challenging public norms, there is always the possibility of confrontation. Within that arena, the author will either choose to fight for a purpose or concept, or surrender to popular belief.

Given the emotionally and physically overwhelming nature of her captivity, Rowlandson was faced with the immediate need to adjust to, and live within, a society with some very different cultural behaviors than she was used to. The dynamics of her captivity forced her to adapt in a way that the majority of people never have to face. For her to then have to *justify how she responded* was yet another captivity – that of public opinion. It seems she was consistently in the position of trying to satisfy people in order to thrive. Interestingly, within her narrative she was able to provide some small glimpses into a culture that was detested. She may not have realized that though her words supported the tenets of her religious beliefs, as well as the colonial perception of superiority, she also revealed, both by what she did and did not say, that she may have had opinions and experiences that did not conform to the rules.

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The Adam Walsh Act: Juveniles and Sex Offender Registration and Notification

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Kallee is a junior majoring in criminal justice and philosophy. This paper was written during the fall

of 2010, in a directed study led by her mentor, Dr. Richard G. Wright. She reveres Dr. Wright's constant commitment to the success of his students, and is truly grateful for his time and continuing support. Kallee plans on applying to graduate schools in the fall.

Increased public concerns of juvenile sex offenders fueled the passage of the Adam Walsh Child Protection and Safety Act in 2006. The media coverage of these adolescents and public perception were influential in the enactment of this policy. Public fear is aroused by isolated incidents of deviance or crime. Media accounts highlight extreme cases, instead of more common incidents of sexual assaults (Harris & Lurigio, 2010). The fear culminates in the forming of groups of experts and concerned citizens that demand reform. Legislators cite media and views of their constituents as their primary sources of information about sex offenses and offenders (Sample & Kadleck, 2008). The justifications for the enactment of the Adam Walsh Act were based on public perceptions, not facts.

In 1994, the Jacob Wetterling Crimes Against Children Sex Offender Registration Act was signed into law. The purpose of the Wetterling Act was to provide law enforcement officials with better tools to keep the public safe from sexual predators. With the passage of this law, all states were required to implement sex offender registries, but were not required to provide community notification (Enniss, 2008). In 1996, an amendment to the Wetterling Act, known as "Megan's Law," made it mandatory for states to release "relevant information" to the community (Enniss, 2008). States still had discretion in determining what information could be released to communities.

The Adam Walsh Act of 2006 set out to standardize registration and community notification. The Adam Walsh Act expanded the definition of sexual offenses originally defined in the Wetterling Act, and also increased the scope of individuals affected by registration requirements of the Wetterling Act and Megan's Laws (Enniss, 2008). Differing from the Wetterling Act, the Adam Walsh Act required states to include juvenile sex offenders in their registries (Wright, 2008).

The Adam Walsh Act outlined a variety of expectations in the management of sex offenders both at the state and federal levels. The Adam Walsh Act created a tiered classification system with minimum registration periods for sex offenders (Wright, 2008). In addition, the Adam Walsh Act created a more standardized nationwide registration process, which now includes certain juvenile sex offenders (The Center for Sex Offender Management, 2007). The intended purpose of this legislation was to enhance public safety

through increasing accountability and implementation of stricter regulations for sex offenders.

In response to the Adam Walsh Act, states can either not comply, substantially comply, or challenge the constitutionality of the Act to make changes (Enniss, 2008). Failure to comply will result in losing 10 percent of the state's allocated Byrne Grant money, which states generally use to support law enforcement and enforce drug laws (Justice Policy Institute, 2008). In every state, first-year implementation of Title I of the Adam Walsh Act, the Sex Offender Registration and Notification Act, would cost more than losing 10 percent of this funding (Justice Policy Institute, 2008).

In Massachusetts, implementation of sex offender registries and notification requirements of the Adam Walsh Act would cost over \$10 million, whereas 10 percent of the Byrne Grant money allotted to Massachusetts in 2006 was estimated at \$435,320 (Justice Policy Institute, 2008). Compliance with the Sex Offender Registration and Notification Act requires training and funding for new personnel, software including creation and maintenance, legislative costs related to adopting and making state law, court and administrative costs, and law enforcement costs (Justice Policy Institute, 2008). In addition to the loss of funding, if a state does not comply with the Adam Walsh Act, then the state may be seen as too lenient or unconcerned with the safety of its residents. There is also the fear that the state that does not comply with the Adam Walsh Act will attract sex offenders who want to avoid strict registration laws (Enniss, 2008).

Some states had already developed complex classification processes before the passage of the Adam Walsh Act. For example, in Massachusetts, sex offenders went through a classification hearing to determine their level of risk. Assessment of risk is determined by taking into account factors such as the criminal history of the offender, history of substance abuse, educational and familial history, and response to sex offender treatment (Wright, 2008). The classification system of the Adam Walsh Act is based solely on the offender's conviction and the age of the victim, disregarding any additional risk factors (Harris, Lobanov-Rostovsky, & Levenson, 2010).

Tier III sex offenders have been charged with either aggravated sexual assault, abusive sexual conduct, nonparental kidnapping, or assault committed after the offender is registered as Tier II. Individuals classified as Tier III are required to register for the rest of their lives. Tier III sex offenders can include first-time juvenile sex offenders. Requiring juveniles to register for life is contradictory to research, which shows that juvenile sex offenders are less likely to commit another sexual offense

within five years of their first offense (Jones, 2008).

Tier II sex offenders have been charged with either sex trafficking, coercion and enticement of a minor for sexual purposes, transporting for sexual purposes, abusive sexual contact, child porn, use of a minor in a sexual performance, or solicitation for child prostitution. Individuals classified as Tier II are required to register for a minimum of 25 years. Tier I sex offenders have been charged with all other sex offenses not included in Tiers I or II, and are required to register for a minimum of 15 years (Wright, 2008).

The classification guidelines of the Adam Walsh Act were designed to place the greatest restrictions on those who sexually offend against children. The Office of Juvenile Justice and Delinquency Prevention (2009) observed that the majority of juvenile sex offenders victimize their peers or somewhat younger children. The report also found that offenses against young children actually decline across offender age, as offenders move from early to middle adolescence (Finkelhor, Ormrod, & Chaffin, 2009).

The Adam Walsh Act standardized the National Sex Offender Registry (NSOR), which allows law enforcement and the public to more effectively track convicted sex offenders, including juveniles 14 and older who engage in genital, anal, or oral-genital contact with children younger than 12 (Jones, 2007). States must make information on Tier III juveniles publicly accessible, and must e-mail notifications within three days to a wide range of agencies and all citizens requesting such notifications (Harris & Lobanov-Rostovsky, 2010). The registry includes the offender's home, school, and work addresses (Lobanov-Rostovsky, 2010). This part of the law has been criticized due to its potential conflict with state laws, which shield juvenile records, thus making them private (Wright, 2008).

In most states, juvenile records are sealed from the public. The juvenile justice system was originally created to provide juveniles with protection, discipline, and guidance for rehabilitation. The intention of the juvenile court was to act as a guardian in the absence or breakdown of parental care (Lobanov-Rostovsky, 2010). The juvenile justice system has focused on balancing community safety with the rehabilitative needs and potential of youthful offenders (Letourneau et al., 2009).

International laws also recognize the special protection needs of children. Article 16 of the Convention on the Rights of the Child states, "No child shall be subjected to arbitrary or unlawful interference with his or her privacy, family, home or correspondence, nor to unlawful attacks on his or her honor and reputation. The child has the right to the protection of the

law against such interference or attacks” (as cited in Human Rights Watch, 2007). The reasoning behind shielding records is that rehabilitation involves reintegration into the community. Under the Adam Walsh Act, confidentiality of juvenile records is eliminated (Lobanov-Rostovsky, 2010).

The Adam Walsh Act signifies a departure from traditional policy separating juveniles from adults. Youthful perpetration of sexual violence is now equated with adult sexual predation (Letourneau et al., 2010). Registration policies were originally created to address recidivism risks of violent adult sex offenders. The inclusion of juveniles in sex offender registries and community notification suggests that juvenile sex offenders are the same as adult sex offenders, or that juvenile sex offenders are somehow more dangerous than other juvenile nonsexual offenders.

Expanding these policies to include juvenile sex offenders disregards the developmental and motivational differences between juvenile and adult offenders, and the fact that juveniles are less likely to reoffend sexually (Letourneau, Bandyopadhyay, Armstrong, & Sinha, 2009). Juvenile sex offenders differ from adult sex offenders in that juveniles tend to act impulsively in exploring their sexuality, while it is often the case that adult sex offenders methodically entice their victims (Enniss, 2008). Research has documented clear differences in neurological, cognitive, and social development of juveniles compared to adults, which limits their culpability and capacity as criminal defendants (Letourneau et al., 2009). Since juveniles are different from adults, they should be treated as such.

A recent South Dakota Supreme Court decision (2008 SD 108) upheld due process and equal protection challenges to juvenile registration, indicating that adolescent sexual offenders could not be subject to the same registration requirements as adults (as cited in Lobanov-Rostovsky, 2010). Research has shown that juveniles who are waived to adult court are more likely to serve the minimum correctional sentence, are less likely to receive treatment, and are more likely to recidivate (Lobanov-Rostovsky, 2010).

The belief that juvenile sex offenders are somehow more potentially dangerous than their nonsexual offending peers is not grounded in evidence. In 2007, Caldwell conducted a study comparing the recidivism rates of sexual and nonsexual juvenile delinquents. The results were that 7% of adjudicated juvenile sex offenders had a subsequent sex offense. However, the study also found that 6% of the adjudicated nonsexual delinquents had a subsequent sex offense (as cited in Chaffin, 2008).

In a review of the literature, Wijk et al. (2006) found that juvenile sex offenders are more likely to display internalizing problems and problems with peer relationships than are nonsexual offenders. They also found that juvenile sex offenders are less able than nonsexual offenders to establish and maintain emotional relationships (Wijk et al., 2006). Inability to create and maintain positive self-interest and relationships will result in anti-social behaviors and emotions. The negative effects of applying sex offender registration and notification laws to juveniles can aggravate deviant behaviors. Labeling a juvenile as a sex offender can create a negative impact on peer relationships, social isolation, and a sense of identity (CSOM, 2007).

It is often the case that juvenile sex offenders are ostracized by their peers and neighbors, kicked out of extracurricular activities, or physically threatened by classmates (Jones, 2007). Research has shown that stigmatization, peer rejection, and isolation from families and communities increases the risk of future criminal behavior (Lobanov-Rostovsky, 2010). For juveniles, the stigma attached to the label of sex offender hinders their transition to law-abiding adulthood by creating limitations on academic opportunities, employment, and civic engagement (Harris, Lobanov-Rostovsky, & Levenson, 2010). Another negative consequence of the Adam Walsh Act is that parents may be deterred from reporting inappropriate sexual conduct between siblings due to the fear of the consequences of registration (Enniss, 2008). Along with parents, registration and notification laws may impact juvenile justice decision makers. Letourneau et al. (2009) found that 75-92 percent of judges indicated concerns about placing juveniles on public registries.

As states and the federal government set mandatory minimum sentences, judges lose discretion in deciding the best punishment and treatment for offenders. In a response to the federally mandated requirements of the Adam Walsh Act, juvenile justice decision makers might alter their behaviors to reassert their discretion in registration decisions.

Letourneau et al.’s study found that in response to South Carolina’s lifetime registry policy, prosecutors also altered their decision-making procedures in ways that seemed to protect many juveniles. As a result, the prosecution of felony-level sex offense charges decreased more than 40 percent. These findings suggest that applying a lifetime, charge-based registration policy undermines the primary aims of registration policies like increased police and community surveillance of sex offenders (Letourneau et al., 2009).

Although extending the sex offender registration and notification laws to juveniles has resulted in unintended negative effects, these policies were initially put into practice with positive intentions. Intended positive effects include reduced first-time and subsequent commission of sex crimes (Letourneau et al., 2010).

The objectives of sex offender registration are enhanced public safety and deterrence. Sex offender registries can improve public safety by facilitating the investigation of sex crimes. Registries increase visibility and scrutiny of sex offenders by making their information available to the public. However, using registration as means for monitoring sex offenders supports the erroneous belief that sex offenders will inevitably reoffend. One empirical example of this fallacy comes from Wisconsin. A birth cohort study discovered that 8.5% of males with juvenile sexual offense charges recidivated sexually as adults, while 6.2% of males with any nonsexual offense charge offended sexually as adults (Lobanov-Rostovsky, 2010).

In addition to targeting known sex offenders, registries seek to deter the individuals who have not yet committed a sexual offense, or who have gone undetected, and do not want to be placed in the registry (CSOM, 2007). In this case of general deterrence, the fear of consequences increases compliance with laws. For deterrence to be effective, sanctions must be for behaviors that are generally accepted as reprehensible or immoral.

The developmental stages between adult perpetrators and child victims are clearly distinct, whereas the developmental stages of juvenile offenders and their victims often overlap (Letourneau et al., 2010). As such, the culpability of juvenile sex offenders should come into consideration in sex offender policy. Juveniles cannot fully understand the long-term consequences of their actions for themselves and their victims. In addition, compared to adults, juveniles are influenced more by external factors such as school failure, associations with delinquent peers, and insufficient parental supervision and monitoring (Letourneau et al., 2010). If juveniles do not believe certain sexual acts are criminal, then it is less likely that they will be deterred.

The effectiveness of applying sex offender registration and notification laws to juveniles as a means of deterrence has been a topic of concern since the passage of the Adam Walsh Act in 2006. Letourneau, Bandyopadhyay, Armstrong, and Sinha (2010) conducted a study examining the registration and notification laws in South Carolina. They found that sex offender notification laws had no deterrent effect on juveniles. This included both would-be offenders and known offenders. Thus, community safety was not enhanced by reducing sexual or

nonsexual recidivism rates. Since registration and notification requirements have shown no significant enhancement to public safety, it seems then that these requirements serve as a form of retribution (Letourneau et al., 2010).

The registration and community notification component of the Adam Walsh Act is also retroactive. This means that all individuals previously adjudicated with a sexual offense will be required to register as a sex offender if they come back into the criminal justice system as a result of a criminal charge that is sexual or nonsexual (Lobanov-Rostovsky, 2010). Registered juvenile sex offenders face restrictions in housing, employment, and education opportunities, along with the shame attached to the label of “sex offender” (Enniss, 2008). The consequences of the retroactive application of sex offender registration and notification laws seem to have a punitive connotation. If registration and notification were meant to be punishment-orientated, then retroactive application would violate the juveniles’ due process rights (Lobanov-Rostovsky, 2010). In the 2003 case of *Smith v. Doe*, the United States Supreme Court ruled that registration and notification processes are concerned with public safety and as such are viewed as regulation, not punishment (Lobanov-Rostovsky, 2010). If the retroactive application of registration and notification was considered a punishment, then this would be a violation of ex post facto laws (Lester, 2008).

Smith, Goggin, and Gandreau conducted a meta-analysis of research studies from 1958-2002, focusing on the effects of sanctions on recidivism. They determined that punitive approaches in the absence of rehabilitation do not reduce recidivism (as cited in Lobanov-Rostovsky, 2010). This finding supports the position that the retroactive nature of the Adam Walsh Act may in fact increase an adolescent’s likelihood of reoffending.

The retroactive application of sex offender registration and community notification greatly widens the scope of those that have to register, especially considering that juvenile sex offenders who are rearrested later are more likely to have committed a nonsexual offense than a sexual offense (Lobanov-Rostovsky, 2010). In a study of 11,219 juvenile sex offenders over a mean of 59.4 months, Caldwell (2009) found that the sexual recidivism rate was 7.08 percent, while the general recidivism rate was 43.4 percent.

The public fears that juvenile sex offenders are extremely likely to reoffend. However, research has shown that rates of recidivism are between 4-20 percent for juvenile sex offenders (Lobanov-Rostovsky, 2010). The truth is that juvenile sex offender recidivism rates are much lower than most believe.

Americans today tend to believe that there is an epidemic of juvenile sexual offending, when, in fact, the overall rate of child sexual abuse in the United States has declined over the past 25 years (Lobanov-Rostovsky, 2010). The decrease in child sexual abuse cases has not been attributed to sex offender registry laws. Finkelhor and Jones reported that the period of decrease in physical and sexual abuse was marked by improved economic conditions, increased law enforcement and child protection efforts, more aggressive prosecution and incarceration policies, growing public awareness, and the dissemination of new treatment options for family and mental health issues. The passage and implementation of community notification laws mostly occurred after rates of child sexual abuse started to decline (Finkelhor & Jones, 2006).

In conclusion, it seems that the only accurate way success of the Adam Walsh Act can be measured is in addressing the public's demand for action. In evaluating the evidence, registration and notification policies give the public a false sense of security. The registration and notification components of the Adam Walsh Act have failed to meet their objectives of enhancing public safety and deterring future commission of sex crimes. In addition, including juveniles in sex offender registries undermines the rehabilitative goals of the juvenile justice system. Laws that were originally made for adults should not be applied to juveniles. Because juveniles are different from adults, they should be treated as such.

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The Invasive Asian Shore Crab, a Dominant Species on Southeastern Massachusetts Beaches: A Cause for Concern

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The non-native Asian shore is becoming a dominant species in southeastern Massachusetts beaches. A study was conducted to test whether environmental conditions across beaches in southeastern Massachusetts had an effect on the crab species inhabiting those areas. Although this was the main focus, it was found that the invasive Asian shore crab has had an ecological impact on the native crab populations. Six southeastern Massachusetts beaches (Scituate Beach, Plymouth Beach, Mass Trust Estuary, Ellisville Harbor, Gooseberry Island, and Sandwich Marsh) were visited and crab species were counted in measured sites, generally two sites per beach. Crab species found were the Asian shore crab (*Hemigrapsus sanguineus*), green crab (*Carcinus maenas*), Acadian hermit crab (*Pagurus acadianis*), long-clawed hermit crab (*Pagurus longicarpus*), white-fingered mud crab (*Rhithropanopeus harrisi*), black-fingered mud crab (*Eurypanopeus depressus*), and lady crab (*Ovalipes ocellatus*). After all data were collected, percentages of each crab species in each site were determined, as well as diversity. The majority of the crabs were the invasive Asian shore crab, making up 78.3% of the total caught. There was not any trend in crab species abundance with beaches of similar environmental factors including temperature, salinity, dissolved oxygen, tides, and type of habitat. However, it was apparent that the Asian shore crab has become a dominate species in southeastern Massachusetts. If the Asian shore crab continues to dominate beaches and cause declines in populations of other species, they might cause the local extinction of those species.

Introduction

Invasive species are organisms that have been accidentally or purposefully introduced to an area outside that of their origin. Exotic species can come from another continent, another part of the country, or just from another watershed (NISIC, 2011). Organisms evolve with other species that moderate their population growth. When an organism is taken out of its original environment and placed in another environment without regulation, an exponential increase in the invasive species can displace indigenous species, causing dramatic ecological shifts (Mooney, 2001).

The green crab (*Carcinus maenas*), though not a native species, was once common in the rocky intertidal habitats of southern New England and has recently declined in abundance coincident with the invasion of the Asian shore crab (Lohrer, 2002). Over a four-year period in the late 1990s there was a significant decline (from 2 crabs per meter squared to less than 0.001 crabs per meter squared) in green crab density and a sharp increase (from

3 crabs per meter squared to greater than 80 crabs per meter squared) in Asian shore crab density at three sites in southern New England (Lohrer, 2002). There were many more Asian shore crabs than green crabs found at each site. The Asian shore crab and the green crab, interact aggressively with one another in competition over food and shelter. Research shows that the Asian shore crab, once introduced into the area, became a stronger competitor than the green crab, that had been introduced to the region earlier (Nelson, 2005).

Zonation is the division of an ecosystem into distinctive zones that provide different niches (habitats). Zonation is more gradual on muddy and sandy shores, whereas along the rocky intertidal zone the competition between species for food is much greater (Peterson, 1991). Factors such as sediment size and elevation contribute to zonation because different sediment types are suitable for different species. The most noteworthy contrast in community organization between rocky and soft shores lies in the importance of interspecific competition. Environmental factors, such as stresses from exposure, desiccation, and temperature change, can determine where species are found within an intertidal zone. If able to withstand these stresses, those species can avoid being forced to local extinction. The high intertidal barnacles *Balanus* and *Chthamalus* are a good example of this. At lower tide heights, *Balanus* out competes *Chthamalus*, whereas at higher tide heights, *Balanus* is unable to survive. Therefore, *Balanus*' low tide height limit is established by *Chthamalus* and its high tide limit is determined by the tide line. Likewise, *Chthamalus* has a low tide height limit set by competition with *Balanus* and a high tide height limit established by the tide line (Connell, 1961).

This study focused on species abundance and diversity of crabs at six beaches in southeastern Massachusetts. Crab species found at the six beaches were analyzed with factors such as the amount of human activity, terrain conditions and site size to determine if these conditions have an effect on the amount and type of crab in that area. Environmental factors are expected to be similar at each of the beaches visited. As a result, it is hypothesized that there will be one dominant species of crab at all of the six beaches.

Materials and Methods

The study was conducted on Wednesday afternoons between 1:00 and 3:00 pm over a six-week period, with one beach sampled per week. The following beaches were traveled to and studied from September 15, 2010 to October 20, 2010: Scituate Beach (sites 1 and 2), Plymouth Beach (sites 3 and 4), Mass Trust Estuary (sites 5 and 6), Ellisville Harbor (site 7), Gooseberry Island (sites 8 and 9), and Sandwich Marsh (sites

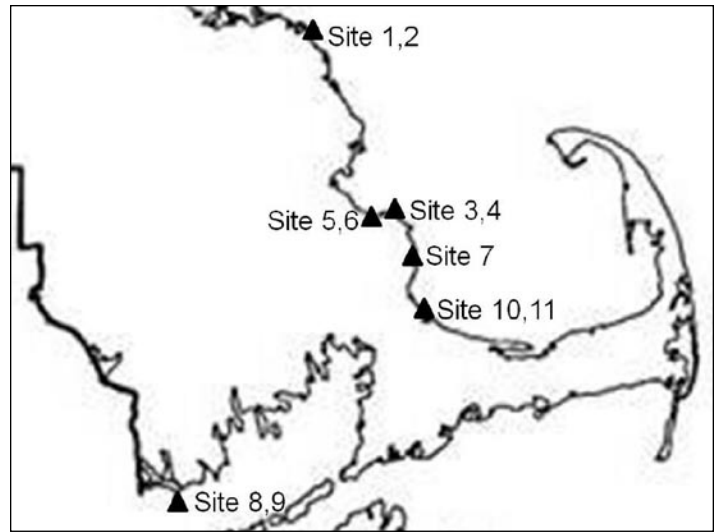


Figure 1: Sites visited across Southern Massachusetts. The field study was done to see if there is a correlation between crab species and environment type. At each site, the date, location, sea activity, tide, weather conditions, air and water temperature, salinity, DO, and air pressure were measured. Crabs were then searched for, collected, and identified in the marked area and then released. Sites 1 and 2 were visited on 9/15/10 at Scituate Beach. Sites 3 and 4 were visited on 9/22/10 at Plymouth Long Beach. Sites 5 and 6 were visited on 9/29/10 at Massachusetts Trust Estuary. Site 7 was visited on 10/6/10 at Ellisville State Harbor. Sites 8 and 9 were visited on 10/13/10 at Gooseberry Island. Sites 10 and 11 were visited on 10/20/10 at Sandwich Beach.

10 and 11) (Figure 1). Two sites with different habitat types from each beach were studied, with the exception of Ellisville Harbor. It should be noted that all sites were along or near the shore within 0.5 m of water depth.

Scituate Beach site 1 was on top of large rocks, away from the shore; site 2 was located to the right of site one, on rocks in direct contact with open-ocean. Site 3 at Plymouth Beach was located near rough ocean water and on large rocks with pools beneath them; site 4 was on the other side, with calmer water, was less rocky, and there was grass and mud. Site 5 in Mass Trust Estuary had a mixture of fresh and salt water, site 6 had small rocks and was in direct contact with rough open-ocean water. There was only one site for Ellisville Harbor, site 7; it was located near open-ocean with medium sized rocks. Site 8 at Gooseberry Island was located near open-ocean with lots of seashells and rocks; site 9 was located on the other side with choppy water and larger rocks. Finally, site 10 in Sandwich Marsh was located on the edges of the salt marsh, where it was grassy and muddy; site 11 was located on rocks near the open-ocean with tidal pools.

Table 1: Table of Environmental Factors for Each of The Sites Visited.

Site #	Area (m ²)	DO %	Salinity (PPT)	Environmental Factors							
				Landscape	Beach	Date	Tide	Wind	Air Temp. (°C)	H2O Temp. (°C)	GPS
1	196	106.1	32	Open shore	Scituate	9/15/2010	Waxing	NM	18	16.7	41°11'21.14" N 70°43'05.00" W
2	140	106.1	32	Rocks and tidal pools							
3	343	103.1	30	Large rocks	Plymouth	9/22/2010	Waning	NE 12MPH	28.6	18.8	41°56'49.43" N 70°37'40.12" W
4	147	103.1	30	Grassy beach							
5	540	121.5	22	Estuary	Mass Trust	9/29/2010	Waxing	W 8MPH	23	24	41°56'26.93" N 70°32'05.56" W
6	257.25	114.5	28	Open shore							
7	122.5	95.7	35	Rocky beach	Ellisville	10/6/2010	Waning	NE 14MPH	NM	16.1	41°53'38.43" N 70°32'09.42" W
8	367.5	106.3	33	Rocks and pebbles	Gooseberry Island	10/13/2010	Waxing	NM	22	17.5	41°35'42.14" N 70°27'57.78" W
9	367.5	106.3	33	Larger rocks							
10	176.4	99.2	29.5	Marsh	Sandwich Marsh	10/20/2010	Waning	NM	18	14.3	41°45'50.89" N 70°29'05.14" W
11	264.6	101.6	30	Open shore							

NM – not measured at site

First, the date, location, sea activity, tide, and general weather were recorded (Table 1). Also, general observations were made at each site, including presence of dead organisms/shells on shore, presence of people/houses in the area, sediment type (rocky vs. sandy), and other physical parameters, including air and water temperature (°C), salinity (PPT), and dissolved oxygen (mg/L). Two different readings were taken for salinity and dissolved oxygen for the Mass Trust sites and for the Sandwich Marsh sites because the two sites were so different from each other. Researchers searched for crabs in the measured sites, and individuals were placed into buckets to be identified. The crabs were then identified based on the field guide, *Atlantic Seashore: A Field Guide to Sponges, Jellyfish, Sea Urchins, and More*, and were then released (Gosner, 1978).

Results

Out of the 714 total crabs found, 559 (78.3%) were the Asian shore crab (*Hemigrapsus sanguineus*). 7 out of the 11 sites

were inhabited by this species. Of these 7 sites, the average percentage of Asian shore crabs found was 83.7%. Sites that had higher percentages of Asian shore crabs also had higher Simpson's diversity index, meaning less diversity. Sites 1, 4, and 11 had Simpson's diversity indexes above 0.9 and had Asian shore crab percentages above 90%. The most diverse site, site 5, had only 30% Asian shore crabs and a Simpson's diversity index of 0.302.

Six other crab species were observed during this study: the green crab (*Carcinus maenas*), Acadian hermit crab (*Pagurus acadianis*), long-clawed hermit crab (*Pagurus longicarpus*), white-fingered mud crab (*Rhithropanopeus harrisi*), black-fingered mud crab (*Eurypanopues depressus*), and lady crab (*Ovalipes ocellatus*). Out of all the other crab species found the Asian shore and the green crab are the only invasive crab species (Table 2). The green crab, however, made up only 2.24% of the total crabs found.

Table of Crab Counts and Totals for all Six Beaches

Site Number	Asian Shore	Green	Long-clawed	Arcadian	Rock	Lady	White-fingered	Black-fingered	Total # of crab species	Total # of Crabs
1	30	0	1	0	0	0	0	0	2	31
2	0	2	86	14	1	0	0	0	4	103
3	11	1	0	0	2	0	0	0	3	13
4	107	0	0	0	1	0	0	0	2	108
5	13	0	11	18	0	1	1	0	5	44
6	5	0	0	0	0	0	1	0	2	5
7	342	0	0	0	0	0	0	0	1	342
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0
10	0	12	0	0	0	0	0	2	2	14
11	51	1	0	0	0	0	0	0	2	52
Total:	559	16	98	32	4	1	2	2		714
% Total	78.3%	2.24%	13.7%	4.48%	0.560%	0.140%	0.280%	0.280%		100%

Table 2: Crab species and abundance found at six Southeastern Massachusetts beaches from September 2010 to October 2010.

Ellisville Harbor had the largest crab count with 342 crabs (Figure 2). No living crabs were found at either site at Gooseberry Island. Sites that had high percentages of Asian shore crabs (above 90%) had higher Simpson's diversity indexes, and sites with no Asian shore crabs had lower Simpson diversity indexes (less than 0.740). The Simpson's index of diversity is used to measure how diverse a population is. The closer the Simpson's diversity value to 1 that the site has, the less diversity that site has. The lower the value, the more diverse is at the site. So sites with fewer percentages of Asian shore crabs had higher diversity (Table 3).

All environmental factors previously mentioned were recorded. Most beaches had large to medium sized rocks and had rough open water. The water temperature was the warmest at site 5 (24°C), but most of the other sites had water temperatures between 14.3-18.8°C. Most sites also had a salinity reading between 28-33 PPT, though site 5 had a lower salinity at 22 PPT.

Discussion

The hypothesis that common environmental factors in beach environments will yield the same crab species has been rejected based on the data collected during this study. Most beaches had approximately the same salinity, dissolved oxygen, and water temperature, but not all sites had the same number of

species or amount of crabs. Sites with higher dissolved oxygen and warmer water temperature had higher diversity, but most sites had a Simpson's diversity index of more than 0.6 (meaning they were less diverse). Based on these results, it cannot be concluded that similar environmental factors will yield the same crab species at different sites.

Though the hypothesis of this research was rejected, there was one important finding. The Asian shore crab is known to be an aggressive invasive species and findings from this study have shown that 559 out of 714 (78.3%) crabs captured at six different southeastern Massachusetts beaches were Asian shore crab. In an 8 year study recording the population of crab species in the Long Island Sound Estuary, the Asian shore crab population had spiked and was most likely a contributing factor in a decline of about 90% of the green crab and mud crab populations (Main, 2007). The Asian shore crab is such a strong competitor because its diet consists of invertebrates and seaweed, its broad temperature and salinity tolerance, and can produce several large broods per year (up to 60,000 eggs over a 3 year lifespan) (Main, 2007).

Taking this into consideration with the results from this study, the expanding Asian shore crab populations in southeastern Massachusetts may be a factor in the small populations of other crab species. Since the Asian shore crab is such a strong invasive

Crab Population Percentages for Each Site Visited

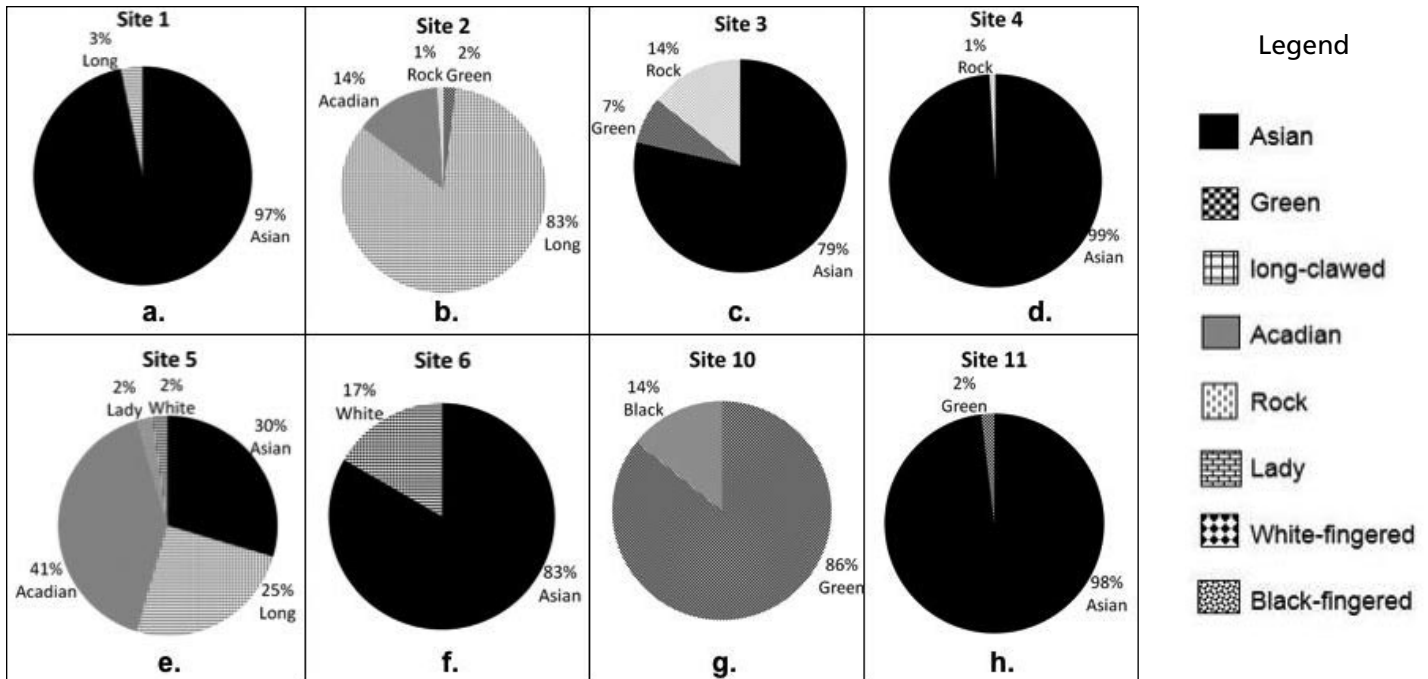


Figure 2a-h: Different crab population percentages for each site visited. Ellisville State Harbor and Massachusetts Trust Estuary were excluded because at Ellisville State Harbor all crabs counted were the same species, Asian shore crab, and at Gooseberry Island no crabs were counted.

The Dominance of Individuals Among Species (Simpson's Index of Diversity)

Site Number	Simpson's Index	Rank
1	0.935	6
2	0.713	4
3	0.615	2
4	0.981	8
5	0.302	1
6	0.667	3
7	1.000	9
8	NC	NC
9	NC	NC
10	0.736	5
11	0.962	7

Table 3: Simpson's index of diversity for each site of each of the six beaches. Gooseberry Island is excluded because no crab species were found during the time research was conducted. The higher the index value is to 1, the less diversity is shown in that sample. The lower the number, the higher the diversity in that sample. Sites are ranked from most diverse (1) to least diverse (9).

competitor with a large habitat range and diet, they would be able to thrive in many different areas and compete with different types of crab species for shelter and food. Eventually, the Asian shore crab might become the most dominate species in all of the southeastern Massachusetts beaches and bring other crab species into local extinction.

All six beaches not only had different crab species but also had different population sizes. Scituate Beach (sites 1 and 2) had two different sites that were very close together and had similar conditions. Site 2 was directly in contact with the open-ocean which can deliver more nutrients to that area than to site 1, located on rocks away from the surf. This means that site 2 would be more suitable for organisms to live because of the constant delivery of new nutrients. Their Simpson's index of diversity were 0.935 (site 1) and 0.713 (site 2), which further suggests that site 1 has lower diversity than site 2 and that site 2 is a better habitat for organisms to survive in.

For Plymouth Beach, the two sites (sites 3 and 4) were very different. Site 3 was rocky and was against the open-ocean. Site 4 was grassy and calm. The crabs in site 3 were found under rocks and in pools, that would provide shelter from predation. Though more crabs were found in site 4, the diversity was higher at site 3, supported by the Simpson's index of diversity

of 0.615 (site 3) and 0.981 (site 4). Since site 4 was open and had few places for organisms to hide from predation, less species inhabited that area.

For the Mass Trust sites (sites 5 and 6) were two completely different habitats. Site 5 was an estuary during mid to high tide. There was high species diversity, as seen by the Simpson index of 0.302. Five crab species were found, the most out of any of the other sites. Site 6, on the other hand, had two crab species and only a total of six crabs. Since site 5 had the lowest salinity and highest dissolved oxygen of all the sites, this could be a contributing factor of its high diversity. Oxygen is supplied to the estuary water through photosynthesis of the sea-grass, making it an ideal habitat for not only crabs but a large number of other aerobic organisms. A mixture of both salt and fresh water could provide different habitats for different crab species. The water was also much warmer than all the other sites, and warmer water yields a greater biological capacity.

Site 7 at Ellisville Harbor had the largest count for Asian shore crabs of all the sites with a diversity index of 1.000. There was no diversity at the site since only Asian shore crabs were collected. The salinity at site 7 was the highest out of all the sites, but the Asian shore crab is known for its tolerance of salinity ranges (Ahl, 1999). This might account for the large numbers found at this site. The Asian shore crab is an aggressive invasive species that might have become so dominant in that area that few other species of crabs can be supported there (Main, 2007). Since only one species was found in a large abundance, it might be concluded that Ellisville is a stressed environment.

No living crabs were found at Gooseberry Island (sites 8 and 9). Both sites were rocky, but each was located on a different side of the island. Numerous sea shells were found along the beach at site one. There were only small rocks, and none seemed to retain any moisture. On these sites, as well, there were numerous starfish found, both dead and alive. The Northern sea star (*Asterias vulgaris*) is found in shallow water and preys on the mussel (*Mytilus edulis*) and other organisms that are similar to that size (Gaymer, 2001). Starfish are voracious eaters who can eat entire shellfish beds or coral reefs (Kraynak, 2009). Since the green crab and Asian shore generally prey on the same organisms (mussels, clams, snails) the abundance of starfish could be causing the lack of crabs in that area because there are not enough food sources (Bourdeau, 2003). It is also important to note that large crab claws and shells did wash up on shore, suggesting that larger crabs are deeper in the water. However, using established protocols, no sampling could be taken from deeper water.

The last area visited was Sandwich Marsh (sites 10 and 11). Site 10 was along the edge of the marsh. The salinity was a little lower than most other sites visited. Green crabs were collected as were two black-fingered mud crabs. While researchers were collecting data, a fisherman was collecting traps from in the marsh water and pulled out hundreds of green crabs. So even though 12 green crabs were found on shore, there were plenty more in the water. Site 11, near open ocean, had a higher amount of Asian shore crabs and only one green crab. Both sites had low diversity, and richness. It seems that the closer to the open ocean, the more Asian shore crabs are present. This could be a serious problem for the green crab; they might be limited to only the marsh because large numbers of the invasive Asian shore crabs are already inhabiting the areas that the green crab would occupy. When green crabs were first introduced to North America, they faced little competition for space under rocks in the mid to high intertidal zone since no native species were using that space. After the introduction of the Asian shore crab, competition for those areas increased. Interactions of aggressive crabs, such as the Asian shore crab, can greatly affect habitat usage and distribution of the green crab (Grosholz, 2009).

The introduction of non-native species can have ramifications that can impact indigenous species. Invasive species introduced to new environments can efficiently displace or can even cause the local extinction of native species. It is important to regulate the introduction of non-native species into new environments and to be aware of the possible consequences.

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Thesis

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Impact of Pathways to College Level Mathematics on Success in Mathematics and Retention

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Paraskevi "Vivi" Liousas is a senior with a double major in Elementary Education and

Mathematics and a minor in Art. This paper is an abridged version of her honors thesis developed under the guidance of Dr. Uma Shama with the wonderful assistance of BSU's Office of Institutional Research and Assessment. Vivi was motivated to do research in the area of math education because of her passion for teaching mathematics. She is committed to excellence in teaching and is eager to join the profession after graduating.

The importance of mathematics knowledge in this country has far surpassed merely the ability to handle one's money. The National Math and Science Initiative, Inc. (NMSI) was created in the United States to address the issue of deficiencies in mathematics and science in education, which affect the United States on an economic and global level, as explained in the NMSI brochure:

The U.S. has had a proud history of inventions and innovations since colonial times, but the future of our intellectual capital is now at risk. America's size, natural resources and historical role as a superpower are no longer enough to ensure its economic future. In today's global economy, the U.S. is losing many of its previous competitive advantages. Upgrading the knowledge and skills of our workforce is critical. U.S. students must have the relevant knowledge of science, technology, engineering and math to become a more competitive workforce.

-NMSI Brochure.

According to the *Trends in International Mathematics and Science Study*, which analyzed forty-one nations across the globe, the United States greatly lags behind in mathematics on the international scale (Hagedorn et.al. 1999). In an effort to stay competitive, the United States has created educational standards to measure academic success. These have been enforced on every level from the nation, to the state, to the institution. On the national level, President George W. Bush began the *No Child Left Behind Act of 2001* that took action to have all children be proficient in basic mathematics and reading by 2014. President Barack Obama has replaced this with the *Elementary and Secondary Education Act* which will take action to have students "college- and career-ready" by 2020. It includes new, rigorous standards for knowledge in mathematics. On the state level, Massachusetts has developed the *Massachusetts Comprehensive Assessment System* (commonly referred to as MCAS) to test learning of mathematics and language arts in K-12 schooling.

Strengthening mathematics programs on the K-12 level is closely aligned with carrying out the mission of NMSI, because early struggles in mathematics affect higher education. Many times, students are discouraged from pursuing their desired major because of the necessary mathematics requirements

(Conley 2005; Arem 2003). When students do not aspire for these mathematics-based majors, jobs in mathematics and science are not filled, thus creating the national economic issue described by NMSI.

At Bridgewater State College, educational standards have been created within the general education requirements in the Core Curriculum. All students must take two quantitative reasoning courses, of which one must be a foundations for mathematical reasoning course. In addition, many majors require more advanced mathematics courses than those which fulfill the Core Curriculum.

The Toolbox Revisited: Paths to Degree Completion from High School Through College, a detailed publication of the U.S. Department of Education, studies what aspects of formal education contribute to completing a bachelor's degree by a student's mid-twenties. This essay speaks of the importance of credit momentum during the first year of college in predicting the attainment of a college degree. *The Toolbox Revisited* defines credit momentum as the rate to which a student attains credit towards a college degree. Earning twenty degree credits within the first year at a four-year institution was found to be significantly related to retention and degree completion. Students who are in remedial mathematics classes or failing college-level mathematics (CLM) have low credit momentum. Therefore, they are at a greater risk of not earning a degree (Adelman et.al. 2006; Hagedorn et.al. 1999).

In many cases, students simply have not completed a rigorous enough mathematics program in high school to prepare them for college (Conley 2005). A large number of high school graduates are unable to begin CLM. This leads to colleges struggling to deliver appropriate remedial courses to compensate for the gap in mathematics knowledge (Hagedorn et.al. 1999). Currently, students in Massachusetts public schools are required to successfully complete three years of mathematics (Massachusetts DOE). This leaves many students taking their college's mathematics placement test without having seen mathematics in over a year. As a result, students cannot place immediately into their desired mathematics course and must take a prerequisite course or the non-credit bearing remedial mathematics course. Therefore, *The Toolbox Revisited* recommends that each student has at least 3.75 years of mathematics, with the highest level as Calculus, Precalculus, or Trigonometry, to yield a sturdy mathematics student prepared for higher education (Adelman et. al. 2006).

At Bridgewater State College (BSC), placement tests are completed during the First Year Orientation in the summer before beginning to attend. If students' Elementary Algebra

placement test scores do not meet the standard required to take CLM, they are placed into a non-credit remedial mathematics (RM) course called Freshman Skills. This remedial mathematics course must be passed before continuing on to CLM (Source: AAC).

The purpose of RM is to build sufficient mathematics knowledge to be successful in CLM. By placing underprepared students in remedial mathematics, student failure is reduced in introductory mathematics courses (Conley 2005). According to a study by Peter Bahr, students at community colleges who take a remedial mathematics course demonstrated comparable outcomes to those who did not, indicating that the remediation was "highly effective in resolving skill deficiencies" (Bahr 2008). However, there also have been findings which show the opposite, claiming that remediation is ineffective, with the remedial courses themselves even having high failure rates (Hagedorn et.al. 1999).

For the purpose of this study, the courses in which a student can be placed through passing the Elementary Algebra placement test are considered Basic CLM. They are *Precalculus*, *Selected Topics in Mathematics (Topics)*, *Principles of Mathematics I* and *Principles of Mathematics II (Principles)*, and *Elementary Statistics (Statistics)*. The courses in this study which require passing the College Level Mathematics placement test will be referred to as Calculus. They are: *Elements of Calculus I (Calculus I)*, *Applied Calculus for Business (Applied Calculus)*, and *Calculus I*. The various Calculus courses are typically taken by students whose majors require it.

Bridgewater State College offers two types of *Precalculus* sections. The first type is the traditional section which is in the format of typical college courses. The second type is called *Targeted*, which is a supported section that includes mandatory weekly meetings with a mathematics coach to go over homework and answer questions. *Targeted Precalculus* is taken by students who need to continue onto Calculus and who are either coming from RM or who scored just below the placement test cutoff to place into a traditional *Precalculus* section. The purpose of this support is to help bring these students' mathematics knowledge up to the knowledge of the students regular *Precalculus* counterparts. *Targeted* sections were first offered at Bridgewater State College in Fall 2007.

Given previous research and the nature of courses at Bridgewater State College, this study will explore the following research questions:

1. What is the impact of Remedial Mathematics pathways versus direct placement pathways to first Basic College Level Mathematics on students' success in that course?

2. What is the impact of Remedial Mathematics pathways versus direct placement pathways to first Basic College Level Mathematics on students' retention at Bridgewater State College?
3. What is the impact of students' success in first College Level Mathematics on retention at Bridgewater State College?
4. What is the impact of pathways to Calculus on success in Calculus? More specifically,
 - a. What is the impact of Precalculus-to-Calculus versus direct placement pathways on success in Calculus?
 - b. What is the impact of Targeted Precalculus versus regular Precalculus pathways on success in Calculus?

Methodology

The population for this study are the cohorts of first-time, full-time students entering BSC in Fall 2006, Fall 2007, and Fall 2008 who took one of the eight specified mathematics courses by Spring 2009. Consequently, any students entering in the Spring semesters are not considered in this study. In addition, transfer students are not considered in this research. The Office of Institutional Research created a data file for this study in spreadsheet format on SPSS (Statistics Programming for the Social Sciences).

The first task was to narrow the sample by keeping those who had one of the eight courses by Spring 2009 and had a CLM grade. The final sample sizes for this research were 1102 for 2006, 1357 for 2007, and 1150 for 2008. The next task was to create variables that could be compared to answer the research questions. Some of the variables included *First CLM Course*, *Retention*, and *Success in First CLM Course*. For the variable of *Success*, a grade of C- or above was considered "successful" and a grade of D+ or below was considered "unsuccessful."

Thirdly, chi-squared tests were run to explore all of the research questions. Chi-square is a test which determines whether a distribution of frequencies could happen that way by chance. It determines if one variable is dependent or independent of another. When this test is run, a resulting p-value determines the likelihood of the results happening by chance. If the p-value is less than 0.05 (5%), those results are considered unlikely to happen by chance. Therefore, one may conclude that the variables cross-tabulated are indeed dependent on each other. Question 1 cross-tabulated *RM* and *Success in First CLM*. Question 2 cross-tabulated *RM* and *Retention*. Question 3 cross-tabulated *Success* and *Retention*. Question 4a cross-tabulated *Precalculus* and *Success in Calculus*. Question 4b cross-tabulated *Section of Precalculus* and *Success in Calculus*. Questions 4a and 4b narrowed the sample to only those students who had taken Calculus and had the grade on record.

RESULTS

Question 1: Remedial Mathematics vs. Direct Placement on Success in Basic CLM

Not all courses had significant differences in success based on remedial status. The *Principles* result showed significance, along with the *Precalculus* result. For the purpose of this research, the students who are directly placed into CLM without taking RM first will be referred to as "directly-placed students," while those who needed to take RM before their CLM course will be referred to as "RM students." In the 2006 sample, the percentages of directly-placed students who are successful versus RM students who are successful are 96.8% and 80.6% for *Principles*, and 79.2% and 44.9% for *Precalculus*, respectively. These percentages were difference enough that the p-values were less than 0.05, therefore making the results significant. The *Topics* result is not significant, with percentages of 83.9% and 81.8% respectively. While the *Statistics* result is not significant, the percentages of 69% and 46% are both very low and showed observable differences. In general, it appears that directly-placed students in *Principles* and *Precalculus* are more likely to be successful than RM students.

The 2007 sample yielded different results from the 2006 sample. The *Precalculus* result remains consistently significant with percentages for directly placed students and RM students at 78% and 61%. Also, the result of *Topics* is significant, with percentages of 90% and 78% respectively. The result of *Principles* is not significant here, but still yielded similar percentages of 95% and 88%. The *Statistics* result is again not significant, but resulted in interesting percentages. Here, the directly-placed students are successful only 64.6% of the time, while the RM students are successful 87.5% of the time. This finding is noteworthy because it is the first time RM students are more successful than directly-placed students.

The 2008 the results appear more similar to the 2007 sample than to the 2006 sample. Again, the result for *Precalculus* is significant, with dramatically different percentages for the success rate of directly-placed students and RM students of 86.3% and 50%. The result of *Topics* is again significant, with percentages of 88.6% and 78.3% respectively. The result of *Principles* is not significant, with nearly exact percentages for directly-placed students and RM students of 94.0% and 94.2%. Nor is the *Statistics* result statistically significant, though the percentages are observably different at 88.2% and 66.7%. This is in part due to the low counts in the groups.

Question 2: Remedial Mathematics vs. Direct Placement on Retention

Evaluating the 2006 sample on retention of students into their second year, there is no significant difference between the RM and directly-placed students. However, all courses did demonstrate RM students having a higher percentage of retention than the directly-placed students.

Looking at the 2006 sample and retention of students into their third year, again there are no significant results. However, the *Principles* group flipped its trend from the previous year. Now, the directly-placed students had the better retention rate (83.2%) than the RM students' rate (71.0%). In the rest of the courses, RM students continued to have greater retention.

Analyzing the 2006 sample's retention of students into their fourth year, again the chi-square test shows no significant results. The difference in percentages appears to be decreasing, with the results of *Precalculus* and *Topics* coincidentally having the same percentage for both the directly placed students (61.2%) and the RM students (72.3%). The *Principles* result did remain consistent with the directly-placed students having higher retention than the RM students.

The 2007 sample's retention of students into their second year presented some statistically significant results. For the results of *Topics*, the students who did take RM are more likely to be retained (93.1%) than the directly-placed students (79.5%). Also, the *Statistics* result is the only one where the directly-placed students had a better retention rate. The results of *Principles* and *Precalculus* showed the opposite with RM students having the better retention rate. When combining all the courses, the results are statistically significant, with RM students more likely to be retained.

For the 2007 sample's retention into their third year, statistically significant results are found again only for *Topics* and the entire sample. The results for *Topics* showed 83.8% retention for the RM students and 72.2% retention for the directly-placed students. Just like 2007 and retention into their second year, this test showed *Principles* and *Precalculus* RM students with better retention. Conversely, the results of *Statistics* showed directly-placed students with better retention.

For the 2008 sample's retention into their second year, there are no statistically significant results. However, every course yielded percentages where the RM students had better retention than the directly-placed students. This differs from the 2006 and 2007 samples, which had some courses showing the opposite.

Question 3: Successful vs. Unsuccessful in CLM on Retention

Looking at the relationship between success in CLM and retention, there is significance in several courses. For the purpose of this research, those students who are successful in their first CLM will be referred to as "successful students," and those who are not successful will be referred to as "unsuccessful students." The 2006 sample's retention of students into their second semester showed significant results for *Precalculus*, *Topics*, *Calculus I*, and all the courses combined. Successful students had significantly greater retention over unsuccessful students. *Precalculus'* successful students are 96.0% retained, while its unsuccessful students are only 81.3% retained. For *Topics*, successful students are 98.6% retained, while unsuccessful students are 81.4% retained. For *Calculus I*, successful students are 96.7% retained, while unsuccessful students are 69.2% retained. For those courses that are not significant, the successful students still demonstrated greater retention than the unsuccessful students.

For the 2006 sample's retention of students into their second year, there is statistical significance in the results of *Precalculus*, *Topics*, *Statistics*, and *Calculus I*. In *Precalculus*, successful students are retained 79.0% of the time, while unsuccessful students are retained 67.5% of the time. In *Topics*, successful students are retained 87.2% of the time, while unsuccessful students are retained 70.0% of the time. In *Statistics*, successful students are retained 100% of the time, while unsuccessful students are retained 70.0% of the time. In *Calculus I*, successful students are retained 96.7% of the time, while unsuccessful students are retained 69.2% of the time. In addition, all courses combined had successful students significantly more likely to be retained.

For the 2006 sample's retention into their third year, *Topics*, *Statistics*, and *Calculus I* are the only significant courses. In *Topics*, 80.6% of the successful students are retained, while only 58.6% of the unsuccessful students are retained. In *Statistics*, 97.1% of the successful students are retained, while only 70.0% of the unsuccessful students are retained. In *Calculus I*, 83.6% of the successful students are retained, while only 38.5% of the unsuccessful students are retained. However, it is interesting that *Precalculus* had nearly identical retention rates for successful and unsuccessful students, when just one year before, the rates are different enough to be considered significant. *Applied Calculus* is the only course which did not demonstrate successful students with the higher retention rate over unsuccessful students.

Finally, for the 2006 sample's retention into their fourth year, there is less significance. *Topics*, *Calculus I*, and all the courses

combined are the only ones with a statistically significant difference in retention. *Topics* had the retention of successful students at 75.9% and unsuccessful students at 54.3%, while *Calculus I* is 80.3% and 38.5%, respectively. All the courses again remained with successful students having better retention rates than unsuccessful students.

For the 2007 sample and retention of students into their second semester, *Precalculus*, *Topics*, *Calculus I*, and all courses combined are statistically significant with successful students retaining better than unsuccessful students. For *Precalculus*, the percentages are 96.5% and 88.5%, respectively, for *Topics* they are 97.4% and 82.1%, and for *Calculus I* they are 100% and 81.8%. For each course, successful students had higher percentages of retention than unsuccessful students.

For the 2007 sample and retention of students into their second year, *Precalculus*, *Topics*, and *Statistics*, along with all courses combined, showed significance. *Precalculus* is significant with successful students being retained 85.7% of the time and unsuccessful students being retained 70.8% of the time. For *Topics*, the retention rates for successful and unsuccessful students are 86.5% and 73.1%, respectively.

Finally for the 2007 sample's retention into their third year the same courses came out to be significant. *Precalculus*'s successful students are retained 75.3% of the time, while unsuccessful students are retained 62.5% of the time. *Topics*'s successful students are retained 79.1% of the time, while unsuccessful students are retained 61.5% of the time. *Statistics*'s successful students are retained 91.1% of the time, while unsuccessful students are retained 57.9% of the time. Again, *Principles*, while not significant, still had successful students with a slightly higher percentage of retention.

For the 2008 sample and retention of students into their second semester, all the courses except for *Elements of Calculus* and *Applied Calculus* showed statistical significance with successful students more likely to be retained than unsuccessful students. *Principles* students had retention rates of 98.7% and 80.0%, respectively. *Precalculus* students had retention rates of 97.1% and 73.8% respectively. *Topics* students had retention rates of 97.2% and 89.8%, and *Statistics* students had retention rates of 97.2% and 71.4% respectively. *Calculus I* students had retention rates of 97.9% and 73.3% respectively.

For the 2008 sample and retention of students into their second year, only *Precalculus* and *Statistics* are statistically significant. For *Precalculus*, successful students are 87.0% retained, and unsuccessful students are 64.6% retained. For *Statistics*, successful students are 85.1% retained, and unsuccessful students are 50.0% retained. For *Calculus I*, successful students

are 93.6% retained, and unsuccessful students are 66.7% retained.

Question 4a: Precalculus vs. Direct Placement to Calculus on Success in Calculus

Overall for the 2006 sample, students who are directly placed into Calculus are more likely to be successful in Calculus over students who took *Precalculus* first. For the purpose of this research, those students who place directly into Calculus will be referred to as "directly-placed Calculus students" and those students who went through *Precalculus* first will be referred to as "Precalculus-to-Calculus students." For *Elements of Calculus*, directly-placed Calculus students are 88.1% successful, while Precalculus-to-Calculus students are only 59.3% successful. For *Calculus I*, directly-placed Calculus students are 82.4% successful while Precalculus-to-Calculus students are 65.8% successful. *Applied Calculus* did not have any directly-placed students, so no comparison test could be run.

For the 2007 sample, the results of all three calculus courses demonstrated statistical significance. For *Elements of Calculus*, directly-placed Calculus students are 88.9% successful, while Precalculus-to-Calculus students are only 61.5% successful. For *Applied Calculus*, directly-placed Calculus students are 93.8% successful, while Precalculus-to-Calculus students are only 76.1% successful. For *Calculus I*, directly-placed Calculus students are 81.4% successful, while Precalculus-to-Calculus students are only 60.5% successful.

For the 2008 sample, interestingly none of the courses showed statistical significance, differing very much from the 2006 and 2007 samples. Also, *Elements of Calculus* and *Applied Calculus* did have directly-placed Calculus students with higher success rates than Precalculus-to-Calculus students. *Calculus I* had nearly identical percentages, but the Precalculus-to-Calculus students had a slightly higher success rate than the directly-placed students, which is different from all the other trends for this test.

Question 4b: Targeted Precalculus vs. Regular Precalculus on Success in Calculus

Since Targeted sections were not offered until Fall 2007, the 2006 cohort is not able to be included in this question. For this research question, only those students who took *Precalculus* and then took *Calculus* are included. Students who took the regular *Precalculus* section before *Calculus* will be called "Regular *Precalculus* students" while those who took the Targeted *Precalculus* section will be called "Targeted *Precalculus* students."

In the 2007 sample, there is a significant difference in *Calculus* success between regular *Precalculus* and Targeted *Precalculus*

students in *Elements of Calculus* and *Calculus I*. For *Elements of Calculus*, Regular Precalculus students are more successful (74.1%), over Targeted Precalculus students (33.3%). Similarly, for *Calculus I*, Regular Precalculus students are more successful (76.0%) over Targeted Precalculus students (30.8%). *Applied Calculus*' results are not significant but interestingly have Targeted Precalculus students with greater success. For *Applied Calculus*, Targeted Precalculus students are 85.4% successful while Regular Precalculus students are less successful at 68.1%.

For the 2008 sample, there are interesting differences from the 2007 sample in Targeted and Success cross-tabulation. Here, no calculus courses had any significant difference between those students who took Regular Precalculus and Targeted Precalculus. For *Elements of Calculus* and *Applied Calculus*, the Regular Precalculus students had a higher percentage of success in Calculus over Targeted Precalculus students. However, for *Calculus I*, the opposite is true; Targeted Precalculus students had a higher percentage of success in Calculus over Regular Precalculus students.

DISCUSSION

Question 1: Remedial Mathematics vs. Direct Placement and Success in Basic CLM

Results from all three cohorts demonstrate that directly-placed students are significantly more likely to be successful in *Precalculus* than RM students. This result could be due to a gap between the knowledge necessary to pass RM and the knowledge necessary to succeed in *Precalculus*. *Precalculus* is a very in-depth subject which relies heavily on past mathematics knowledge, while subjects like *Statistics* and *Topics* do not rely on past knowledge as much. However, the results for *Topics* are found to have this same significant result for the 2007 and 2008 cohorts, and the results for *Principles* are found to have this significant result only for the 2006 cohort. Other possible reasons could be that the RM students have poor study skills, low confidence in their ability to do mathematics, and/or mathematics anxiety that lead to their lack of success in mathematics previously. These traits are unlikely to change without further intervention during college, therefore continuing their lack of success into college mathematics.

A recommendation for eliminating the significance difference in success between RM students and directly-placed students would be to provide greater support for all students in remedial mathematics. Currently, there are Targeted sections of remedial mathematics for students who need to continue on to Precalculus and eventually Calculus. However, since these students are most at risk, one recommendation is to develop a mentoring

program to help get past many of the psychological barriers that prevent a student from working to his/her full potential. This program would include coaching to gain confidence in mathematics and lessons on effective study habits.

Note that the results of *Statistics* show no significance for any of the cohort years. The small sample sizes in the course required the chi-square value to be adjusted to compensate for this, therefore limiting the strength of the data. For future research, larger samples of students in *Statistics* should be obtained to run the tests, perhaps by combining cohort years.

Question 2: Remedial Mathematics vs. Direct Placement on Retention

RM students consistently had a higher percentage of retention than directly-placed students. However, this difference is rarely found to be significant. The 2006 cohort is not significant in any course or any retention year. In the 2007 cohort, only results from *Topics* demonstrated RM students as significantly more likely to be retained than their directly-placed counterparts. This is the case for retention into their second year and third year. For the 2008 sample, results are similar with RM students also being more likely to be retained. For the 2008 sample's retention into the first year, this is shown in the results of *Topics* and *Precalculus*. One explanation for this interesting result is that those students who pass RM to get to a CLM course have already overcome a large hurdle at BSC, so they have greater persistence than students who did not have that first hurdle to overcome. Students without much persistence may desire to quit college or transfer to a less rigorous community college when obstacles do come up since they have not invested as much time or money into the system.

Non-retained students could also be transferring to more rigorous colleges or universities that specialize in an area. Therefore, those students who are better in mathematics and did not need to take RM could just be beginning their college education at BSC for the first year or two for the cheaper costs, then transferring over to a more expensive institution which has their desired major. For example, a student who desires to become a pharmacist could stay at BSC for the first two years to get the prerequisite general science courses completed, and then transfer to a pharmacy school to obtain his/her degree. This would also make the results appear that the directly-placed students are less likely to be retained at BSC.

An idea for further research would be to track where the non-retained students went after leaving BSC. Also, a sample of surveys matched to their mathematics course grades would be very informative. The survey could question students as to their reason for leaving BSC, whether they were continuing on with

college at a different location, and whether their remediation in mathematics contributed to their departure from BSC. Another interesting future follow up research question would be to take only those students who took RM, look at whether they pass or fail RM, and compare that to whether they are retained at the college.

Question 3: Successful vs. Unsuccessful in CLM on Retention

There is significance across all the cohort samples in nearly all the courses. In general, successful students are more likely to be retained. One possible explanation is that since these students are successful in mathematics, they are successful in other subjects also because they have qualities of time management, patience, and focused study habits. Therefore, they are supporting their long-term goals of graduating from college and having a career. If they are not doing well in mathematics, they are not moving towards their goals of graduating college and getting a job in their field. *Topics* is the only course which is significant across nearly all of the retention period years (2006 2nd semester, 2006 2nd year, 2006 3rd year, 2006 4th year, 2007 2nd semester, 2007 2nd year, 2007 3rd year, 2008 2nd semester).

Precalculus and *Calculus I* are significant in seven out of the nine retention periods. These students in general are in majors which require a large use of mathematics. When they did not do well in mathematics, a large step necessary to achieve their goal, they may have given up altogether and left BSC. In addition, those who are unsuccessful in *Precalculus* perhaps are more likely to give up since that is not their final difficult mathematics course, but a prerequisite on their way to *Calculus*. Perhaps these students figure that if they couldn't even make it past *Precalculus* successfully, they might as well give up their goal before they waste even more time and money.

Statistics shows significance in five out of the nine retention years (looking at 2006, 2007, and 2008 as a whole). Some of these students may be in the same situation as *Topics* students, where this mathematics is being taken because of the college's requirement and not due to their major. These students could be therefore profiled similarly and become easily dejected with college when they weren't successful in mathematics. However, *Statistics* consistently had small sample sizes, which made significance harder to come by. Again, a recommendation for a future study would be to attempt to broaden the sample size of *Statistics*.

Interestingly, *Principles* only shows a significant result for one out of the nine retention periods. This suggests that even if students majoring in education have a road block like lack of success in mathematics, they are going to be retained in

college in general. Another reason is since BSC is well known as a college for teaching that students have a greater desire to remain there.

Question 4a: Precalculus vs. Direct Placement on Success in Calculus

The results indicate that directly-placed *Calculus* students are more likely to succeed in *Calculus* than *Precalculus*-to-*Calculus* students. One possible reason for this is that students who need to take *Precalculus* in college have poorer mathematics skills than students who are exempt and able to go directly to *Calculus*. In fact, some of those students who needed to take *Precalculus* could have begun in RM previously, making them further behind in mathematics abilities than their directly-placed counterparts. Possible reasons for their poorer mathematics abilities could be poor study skills, low confidence in mathematics, and mathematics anxiety carried over from high school. Another reason could be that BSC's *Precalculus* course does not adequately prepare students for *Calculus*, since topics such as Trigonometry are not covered. Oddly, the 2008 sample came out with absolutely no significance for any of the *Calculus* courses nor all the courses combined. One possible explanation could be that the average SAT Mathematics scores of entering students are significantly higher, but this is not the case. Another explanation for this inconsistency could be changes in the *Precalculus* course objectives or faculty that better prepares *Precalculus* students for *Calculus*.

Question 4b: Targeted vs. Regular Precalculus on Success in Calculus

Only for *Elements of Calculus* and *Calculus I* in the 2007 sample is there significance for this test, with Regular *Precalculus* students being more likely to succeed in *Calculus* over Targeted *Precalculus* students. An explanation for this could be that the Regular *Precalculus* students are better prepared in mathematics to begin with to be able to place into the regular section of *Precalculus*. Therefore, they did better once they got to *Calculus* because of a stronger mathematics base. 2007 was also the first year Targeted sections were included at the college. By 2008, these sections could have been adjusted such that students were more successful, therefore not showing significant difference in success from the Regular *Precalculus* students.

Conclusion

This study has shown that Remedial Mathematics students are less likely to succeed in *Precalculus* than directly-placed students. This is shown for *Topics* and *Principles*, depending on the year. Also, successful students are more likely to be retained at BSC than unsuccessful students, especially in *Topics*, *Precalculus*, and *Calculus I*. Next, directly-placed *Calculus* students are more likely to succeed in *Calculus* over *Precalculus*-to-*Calculus*

students. Finally, for the Calculus courses of *Elements of Calculus* and *Calculus I*, Regular Precalculus students are more likely to succeed over Targeted Precalculus students.

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Bite Me: *Twilight* Stakes Feminism

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Lauren Rocha is a Bridgewater State University graduate who majored in English and

minored in Art History. This paper represents a portion of her honors thesis that she developed under the mentorship of Drs. John Kucich and Kathleen Vejvoda. The research for the thesis was funded by two ATP Semester Grants as well as a 2010 ATP Summer Grant. Lauren plans to present this work at the Popular Culture Association/American Culture Association Conference in April 2011.

In my Honors Thesis, *Things That Go Bump in the Night: Vampires and Feminism*, I develop a feminist critique of Stephenie Meyer's *Twilight* series (2005-2008). I use Bram Stoker's novel *Dracula* (1897), Sheridan LeFanu's novella *Carmilla* (1872), and Joss Whedon's television series *Buffy the Vampire Slayer* (1997-2003) in order to highlight *Twilight*'s domestication of female identity against these other vampire texts. I argue that throughout these vampire works there is a shift in the representation of vampires towards a more domesticated, or self-controlled, vampire that is seen in *Twilight*. This domesticity not only applies to vampires, however, as Meyer confines females, particularly Bella, to traditional female roles. In doing so, the series comes to represent an overwhelming backlash against the struggle of feminism. Rather than showing an empowered female as seen in *Buffy*, in *Twilight* the female is shown as a regressive figure akin to the Victorian ideal of womanhood, creating a backlash against this empowered feminist ideal. Bella comes to symbolize that backlash through her weakness and dependency on male characters to give her value. She illustrates female submission in a male dominated world: disempowering herself and symbolically disempowering women. The series does so by Bella not only viewing herself in a negative light, but through the depictions of the largely domesticated vampires. Whereas previous vampire works depicted vampires as threats and outsiders to society, *Twilight* depicts vampire characters as accepted in society, integrating their lives into mainstream society; as such, they highlight modern society's fascination with physical appearance and the ideal of female beauty.

In Stephenie Meyer's wildly popular *Twilight* series (2005-2008), Bella Swan and Edward Cullen are in love. The problem is that Bella is a human and Edward is a vampire who thirsts for her blood. Rather than giving into this hunger, Edward controls himself so that he and Bella can be together; in doing so, he represents a domesticated, or self-controlled, vampire. Domesticity does not only apply to vampires in the *Twilight* series; instead, Meyer confines females, particularly Bella, to traditional female roles. In doing so, the series represents an overwhelming backlash against the struggle of feminism. The change in vampire bodies throughout vampire texts marks a change in attitudes towards women's bodies, from the sexually repressed female of the Victorian era seen in *Dracula* and *Carmilla* to empowered, contemporary females shown in modern works such as *Buffy the Vampire Slayer*. Yet in *Twilight*, the female is not shown as empowered, but rather a regressive figure akin to the Victorian ideal of womanhood, creating a backlash against the empowered feminist ideal.

Bella Swan, the main character of the *Twilight* series, symbolizes that backlash. Unlike *Buffy*, whose heroine is a strong, empowered female, the heroine in *Twilight* is weak and dependent on men to give her value. In *Buffy the Vampire Slayer*, Buffy demonstrates female autonomy in a male-dominated society, empowering not only herself but others. In *Twilight*, however, Bella illustrates female submission in a male dominated world; disempowering herself and symbolically disempowering women. The series does so by having Bella view herself in a negative light as well as through the largely domesticated nature of the vampires. Whereas previous vampire works depicted vampires as threats and outsiders to society, *Twilight* depicts vampire characters as accepted in society, integrating their lives into mainstream society; as such, they highlight modern society's fascination with physical appearance and the ideal of female beauty.

Bella, given her submissive nature, has been at the center of an argument about the role of feminism in today's society. As Bonnie Mann states in her essay, "When Bella falls in love, then, a girl in love is all she is. By page 139 she has concluded that her mundane life is a small price to pay for the gift of being with Edward, and by the second book she's willing to trade her soul for that privilege" (133). Bella sacrifices herself, "her mundane life" to be with Edward; in doing so, her actions embody Victorian values of female sacrifice for men. By being more focused on being with Edward, Bella is unable to focus on developing herself. Mann comments:

Other than her penchant for self-sacrifice and the capacity to attract the attention of boys, Bella isn't really anyone special. She has no identifiable interests or talents; she is incompetent in the face of almost every challenge. She is the locus of exaggerated stereotypically feminine incapacities and self-loathing. She has no sense of direction or balance. She is prone to get bruises and scrapes just in the process of moving from one place to another and doesn't even trust herself to explore a tide pool without falling in. When she needs something done, especially mechanical, she finds a boy to do it and watches him. (133)

Typically, men watch women, objectifying the female in viewing them as a solely sexual object. In *Twilight*, however, Bella takes on the gaze through her first person narrative where she constantly watches Edward. While this might appear empowering to have a female character assume the gaze, it is not. Mann cites feminist philosopher Simone de Beauvoir's argument about the masculine gaze, saying that "when the young girl internalizes and assumes the masculine gaze, de Beauvoir said, she takes up a perspective on herself as prey. As

in the fairy tales, she becomes 'an idol,' a 'fascinating treasure,' 'a marvelous fetish,' sought after by men" (136).

The *Twilight* series does have a fairy-tale like quality with Bella as a damsel-in-distress. Like a fairy-tale, Bella has a handsome prince to fantasize about. In particular, Bella is fascinated by Edward's physical appearance, which is similar to the other vampires in the series. The vampires' physical beauty is so stressed that it is the first characteristic the narrator Bella observes:

I stared because their faces, so different, so similar, were all devastatingly, inhumanly beautiful. They were faces you never expected to see except perhaps on the airbrushed pages of a fashion magazine. Or painted by an old master as the face of an angel. It was hard to decide who was the most beautiful – maybe the perfect blond girl, or the bronze-haired boy. (*Twilight* 19)

The comparison to "airbrushed pages of a fashion magazine" and a painted "face of an angel" elevates the vampire beauty to a humanly unachievable ideal Bella compares herself to. Just as the pictures in fashion magazines are airbrushed to eliminate any flaws, the vampires are perfect. That the vampires appear "so different" and yet also "so similar" implies that while each one has their own individual beauty, this creates a uniform beauty among the group.

The beautiful vampires are the products of the vampire transformation, where their imperfect human body is turned into a "perfect" vampire one. Instead of blood being the cause of the transformation, it is vampire venom which turns humans into vampires. When venom hits the bloodstream, it triggers the transformation process. Bella describes the venom as a "scalding pain" and a "fire" that does not stop (*Twilight* 454). The venom erases the human blemishes, flaws, and imperfections, so that the person is essentially born anew as a vampire. The skin, which is prone to aging and wrinkles, becomes frozen in time and sparkles in the sun "like thousands of tiny diamonds" are "embedded in the surface" (*Twilight* 260). Bella observes this in Edward, who she further states is "a perfect statue, carved in some unknown stone, smooth like marble, glittering like crystal" (*Twilight* 260). Edward's description as "a perfect statue" with skin "smooth like marble...perfect texture, satin smooth" is similar to a person that has undergone Botox, where their skin becomes smooth and frozen, like a statue (*Twilight* 260).

While Edward's vampire skin is beautiful because it is unnatural, Bella's attractiveness stems from her scent, heightening the desire for the taste of her blood. Edward tells Bella, "you are

exactly my brand of heroin,” emphasizing the allure her blood has for him (*Twilight* 268). Bella’s blood further contributes to the sensuality of the novels because her blood manifests itself as a scent, which in return brings Edward physically closer to Bella by arousing his senses. Bella often says how she can “feel his nose sliding along my jaw, inhaling,” to which Edward responds, “Just because I’m resisting the wine doesn’t mean I can’t appreciate the bouquet [...] You have a very floral smell, like lavender...or freesia...it’s mouthwatering” (*Twilight* 306). Edward’s explanation that he is “resisting the wine” not only means he is resisting the desire to drink her blood, but also to express his sexual desire. Edward tells Bella that “on the one hand, [there is] the hunger – the thirst – that, deplorable creature that I am, I feel for you...But...there are other hungers” (*Twilight* 277-78). Among the “other hungers” he is referring to is his sexual attraction to Bella. He resists giving into his sexual desire because to give in to his desire would mean a loss of “control of his need” (*Twilight* 282). He has such a need to be in control of himself that he and Bella have a “standard of careful non-contact,” where they are careful not to get too physically passionate (*Twilight* 283). This caution can be seen in their first kiss as Bella describes:

His cold, marble lips pressed very softly against mine. Blood boiled under my skin, burned in my lips. My breath came in a wild gasp. My fingers knotted in his hair, clutching him to me. My lips parted as I breathed in his heady scent.

Immediately I felt him turn to unresponsive stone beneath my lips. His hands gently, but with irresistible force, pushed my face back [...]

He laughed aloud. ‘I’m stronger than I thought. It’s nice to know.’

‘I wish I could say the same. I’m sorry.’ [...]

I kept my eyes on his, watched as the excitement in them faded and gentled. (*Twilight* 282-83)

Bella’s reference to her blood as it boils under her skin and burns in her lips, a vaginal symbol, alludes to her sexual desire. Bella’s use of “wild” conveys her passion as raw and untamed. Edward’s response, turning to “unresponsive stone,” cools Bella’s desire and defers the sexual moment. Bella notes this by saying that she “watched as the excitement [...] faded and gentled.” Edward and Bella’s sexual desire is restrained; for Edward, this restraint illustrates his self-control whereas for Bella, it represses her sexuality.

For Bella, it is difficult for her to understand why someone as “perfect” as Edward would love her. She tells Edward: “I’m absolutely ordinary – well, except for bad things like all the near-death experiences and being so clumsy that I’m almost disabled” (*Twilight* 210). Bella devalues herself, highlighting a physically negative attribute – clumsiness – as her only distinctive quality. Debra Gimlin explains the relationship between the physical body and the internal self in her book *Body Work*, stating that, “the body is fundamental to the self because it serves to indicate who an individual is internally, what habits the person has, and even what social value the person merits” (3). Unlike Buffy, Bella is internally “disabled”, needing romantic relationships to give her value. When Bella is not involved in a relationship, she loses self-value; as a result, Bella devalues her physical body by engaging in risky behavior. For instance, in *New Moon*, after Edward leaves her, Bella decides “to be as reckless as” she can “possibly manage in Forks” (147). She finds that as she engages in risky behaviors, she hears Edward’s voice warning and berating her. Although she is physically endangering herself, she is so amazed by the “sheer beauty” that she decides she can’t “allow [her] memory to lose it, no matter the price” (186). This price she is willing to pay is her own life, as her final risky act is jumping off of a cliff into the water below:

I knew that this was the stupidest, most reckless thing I had done yet. The thought made me smile. The pain was already easing, as if my body knew that Edward’s voice was just seconds away [...]

‘Don’t do this,’ he pleaded.

You wanted me to be human, I reminded him. *Well, watch me...you won’t stay with me any other way* [...]

I didn’t want to fight anymore. And it wasn’t the lightheadedness, or the cold, or the failure of my arms as the muscles gave out in exhaustion, that made me content to stay where I was. I was almost happy it was over. This was an easier death than others I’d faced. Oddly peaceful [...]

I saw *him*, and I had no will to fight...My subconscious had stored Edward away in flawless detail, saving him for this final moment. I could see his perfect face as if he were really there; the exact shade of his icy skin, the shape of his lips, the line of his jaw, the gold tinting in his furious eyes [...]

Why would I fight when I was so happy where I was? Even as my lungs burned for more air and my legs

cramped in the icy water, I was content. I'd forgotten what real happiness felt like. (357-361)

Bella values Edward, "his perfect face" and "flawless detail," so much that she is willing to literally die to be with him. The juxtaposition of "real happiness" with the description of her drowning suggests that for Bella, "real happiness" is masochism. Yet just as the Edward she sees here is not real, neither is her happiness; it is just a temporary relief from her emotional pain. According to Gimlin, "What women look like becomes symbolic of their characters – indeed, of their very selves" (4). After Edward leaves Bella feels "lifeless" inside; as a result, she intends to make her physical body "lifeless" as well (95). Bella believes that by endangering herself, she is proving her love for Edward by demonstrating the extremes she is willing to go to be with him and thus feel special. She tells him "*you won't stay with me any other way,*" meaning that she is so desperate to be with him, she is willing to kill herself even though he has left her.

Bella is desperate to be with Edward because he tells her she is special. Although Bella has a hard time believing she is anything but ordinary, Edward tells Bella, "you are the opposite of ordinary" and "you are my life now" (*Twilight* 314). Despite these reassurances from Edward, Bella still feels insecure about her value to Edward. Her insecurity stems from the fact that as a vampire, Edward will never grow old, but as a human, Bella will. Her anxiety about aging is expressed on her eighteenth birthday when she wakes up from a nightmare:

It had hit, it was even worse than I'd feared it would be. I could feel it – I was older. Every day I got older, but this way different, worse, quantifiable. I was eighteen.

And Edward never would be.

I was almost surprised that the face in the mirror hadn't changed. I stared at myself, looking for some sign of impending wrinkles in my ivory skin. The only creases were the ones on my forehead.

It was just a dream, I reminded myself again. Just a dream...but also my worst nightmare. (*New Moon* 7)

For an eighteen year old to have this fear of aging is ludicrous and troubling. Yet for Bella, who has the ideal vampire beauty to compare herself to, aging is a concern. While there are no "impending wrinkles" on her "ivory skin" now, she fears that soon she will resemble her appearance in the nightmare and

be "ancient, creased, and withered" (6). Her fear of looking "ancient, creased, and withered" reflects her deeper concerns that as she ages, her value will decrease because Edward will no longer love and desire her. The "impending wrinkles" on her skin she worries about not only symbolize a decline in beauty, but also a decline in value. That she will become "ancient" implies that she will be of no use to the eternal vampires who suggest a continuity of life. Eventually, she will be "withered" and have no aesthetic appeal. Naomi Wolf comments on the relationship between beauty and social value in her book *The Beauty Myth: How Images of Beauty Are Used Against Women*, saying that "without 'beauty'" women slide "into nothingness and disintegration;" similarly, Bella feels that "without 'beauty'" she too will descend into "nothingness and disintegration" because Edward will not be attracted to her (230). Bella understands that "to someone in the know" about the immortal vampires, growing old does not conform to the "devastatingly, inhumanly, beautiful" ideal the vampires embody (*Twilight* 19). She feels that staying human, aging, will endanger her future with Edward because Edward will not be attracted to her as her looks fade. As she says, "If I could be *sure* of the future I wanted, sure that I would get to spend forever with Edward, and Alice and the rest of the Cullens (preferably not as a wrinkled old lady)...then a year or two one direction or the other wouldn't matter to me so much. But Edward was dead set against any future that changed me. Any future that made me like him – that made me immortal, too" (*New Moon* 10). Being human and aging do not ensure a future; it ensures losing value in society as an old woman. Being a vampire means having a future and more importantly, value.

Bella's yearning to become a vampire implies a desire to be beautiful and have value. Her desire for the unnatural vampire beauty can be compared to women who choose cosmetic surgery not only to enhance their physical appearance, but also to enhance their lifestyles by increasing their self-value. Wolf states that "Women choose surgery when we are convinced we cannot be who we really are without it [...] Women's fears of loss of identity are legitimate. We 'choose' a little death over what is portrayed as an unlivable life, we 'choose' to die a bit in order to be born again" (258-59). Bella chooses to become a vampire because she cannot live without Edward just as women choose surgery because they feel they cannot be themselves without it. Bella chooses "a little death" so as to avoid "an unlivable life" without Edward. To live without Edward, just as to live without surgery, would mean a loss of identity for Bella. She reflects on this idea when Edward temporarily leaves her in *New Moon*, "It was depressing to realize that I wasn't the heroine anymore, that my story was over" (106). To not be a vampire would mean she would not truly have value.

Modern society's fascination with the ideal of female beauty is what Wolf terms the "Iron Maiden" (17). Wolf defines the Iron Maiden as "the modern hallucination in which women are trapped or trap themselves (that) is [...] rigid, cruel, and euphemistically painted. Contemporary culture directs attention to imagery of the Iron Maiden, while censoring real women's faces and bodies" (17). The Iron Maiden produces a beauty backlash that "is spread and reinforced by the cycles of self-hatred provoked in women by the advertisements, photo features, and beauty copy in the glossaries" of magazines (73). While Bella does not have magazines to compare herself to, she does have the vampire beauty which she compares to "the airbrushed pages of a fashion magazine" (*Twilight* 19). As a result, Bella has a self-hatred for her human body, which she views as so clumsy that it makes her "almost disabled" (*Twilight* 210).

Just as the Iron Maiden traps women in an ideal of perfect, inhuman beauty, so too does being a vampire trap women in a perfect, inhumanly beautiful body. While the vampire body is perfect, the body comes at a price: a lack of choice. As Rosalie tells Bella, "once it's done, it can't be undone" meaning that once Bella is turned into a vampire, she can never go back to being human (*Eclipse* 167). Rosalie emphasizes the importance of this to Bella in telling her own past as a human. While Bella thinks that becoming a vampire means a happy ending, Rosalie has a different view, saying that "if we had happy endings, we'd all be under gravestones now" (*Eclipse* 154). Being a vampire does not imply a happy ending to Rosalie, but rather, being human implies happiness. To be human is to have a choice in life whereas being a vampire means being entrapped in an eternal body and yet without eternal possibilities. Rosalie exclaims to Bella:

'You already have *everything*. You have a whole life ahead of you – everything I want. And you're going to just *throw it away*. Can't you see that I'd trade everything I have to be you? You have the choice that I didn't have, and you're choosing *wrong!*' (*Eclipse* 166)

Rosalie is trapped in the body of a vampire, the ideal beauty; as such, she is trapped in the vampire version of the Iron Maiden, an ideal of perfect beauty. "The real problem is our lack of choice," Wolf writes; similarly, the real problem with being a vampire is the lack of choice as well. While vampires have an eternity ahead of them, it is not a true life marked with experiences and aging; rather, it is a monotonous life that restricts individuals to limited roles: the high school student, the doctor, the housewife.

Rosalie is the most appropriate character to advise Bella regarding the seriousness of becoming a vampire. Rosalie is "the incarnation of pure beauty," the most beautiful Cullen (*Twilight* 304). Even as a human, Rosalie was blessed with a beautiful appearance. She explains: "I was thrilled to be me, to be Rosalie Hale. Pleased that men's eyes watched me everywhere I went, from the year I turned twelve. Delighted that my girlfriends sighed with envy when they touched my hair" (*Eclipse* 155). While beauty was important to Rosalie as a human, so too was something else. She explains: "I yearned for my own little baby. I wanted my own house and a husband who would kiss me when he got home from work" (*Eclipse* 156). While Meyer's emphasis on Rosalie as an example of the beauty myth and the male gaze might seem like a critique of misogynist practices, Meyer ultimately recedes into a conservative view of women's roles in Rosalie's desire for the traditional female roles of wife and mother.

Rosalie's vision never became real; instead, she was turned into a vampire. When she first sees her vampire reflection, she is relieved to see that she is still beautiful. Yet she soon realizes the serious ramifications of being a vampire:

'It took some time before I began to blame the beauty for what had happened to me – for me to see the curse of it. To wish that I had been...well, not ugly, but normal [...] So I could have been allowed to marry someone who loved *me*, and have pretty babies. That's what I'd really wanted, all along. It still doesn't seem like too much to have asked for.' (*Eclipse* 162)

Rosalie blames her being a vampire on beauty. Carlisle turned Rosalie into a vampire, saying that "It was too much waste. I couldn't leave her" (*Eclipse* 161). To let Rosalie die would have been a "waste" of beauty, of value. Rosalie feels vampire beauty is a "curse," a vampire version of the Iron Maiden; here, the Maiden traps Rosalie into a beautiful body, making her conform to a life she did not choose. She would trade everything to be Bella, to be "normal" instead of "the most beautiful thing (she's) ever seen" (*Eclipse* 162).

Rosalie's conversation with Bella, highlighting the severe implications of becoming a vampire and achieving the beauty ideal, serves as a warning in the novels that beauty comes with a steep price: a lack of choice. Rosalie's background highlights Wolf's main argument that society's message is "that a woman should live hungry, die young, and leave a pretty corpse" (231). Wolf says that the problem with cosmetics is "our lack of choice...the problem with cosmetics exists only when women feel invisible or inadequate without them" (231). This argument is illustrated in Rosalie's warning to Bella that the problem with

being a vampire is the lack of choice in lifestyle. While Rosalie's warning is important in stressing a feminist argument, Bella unfortunately feels that not being a vampire would make her feel the way women without cosmetics can feel: "invisible or inadequate" (231). Bella choosing to become a vampire reveals Meyer's feminist stance as hollow and conservative. Bella tells Edward that "it just seems logical...a man and woman have to be somewhat equal...as in, one of them can't always be swooping in and saving the other one. They have to save each other *equally* [...] I can't always be Lois Lane [...] I want to be Superman, too" (*Twilight* 474). Bella feels that staying human implies a type of inequality, or inadequacy, since she is powerless; she remains Lois Lane while Edward, with all his vampire powers, gets to be Superman.

Bella, however, does not end up as Superman in the end, but rather a domesticated female vampire in her role as wife and mother. She marries Edward and soon afterwards becomes pregnant with a half-human, half-vampire baby. Only after Bella gives birth to the baby, and thus solidifies her domestic role, does Edward turn her into a vampire. The birth scene is described with horror:

It was a blood-curdling shriek of agony. The horrifying sound cut off with a gurgle, and her eyes rolled back into her head. Her body twitched, arched in Rosalie's arms, and then Bella vomited a fountain of blood.

Bella's body, streaming with red, started to twitch, jerking around in Rosalie's arms like she was electrocuted. All the while, her face was blank – unconscious. It was the wild thrashing from inside the center of her body that moved her. As she convulsed, sharp snaps and cracks kept time with the spasms [...]

In the bright light, Bella's skin seemed more purple and black than it was white. Deep red was seeping beneath the skin over the huge, shuddering bulge of her stomach [...]

Her legs, which had been curled up in agony, now went limp, sprawling out in an unnatural way. (*Breaking Dawn* 347-351)

The description of Bella's thrashing body "streaming with red" is similar to the description of Lucy's body when she is staked by Arthur in *Dracula*. Both bodies highlight male dominance over females; here, Edward's choice to turn Bella into a vampire after she has suffered through this horrific scene emphasizes his control (here over her body). Bella is experiencing the "sharp snaps and cracks" as she fully transitions to her role as

mother, cementing her identity as domesticated female. As Jacob states, "She'd willingly sacrificed herself to be torn apart by that monster's young," (*Breaking Dawn* 356). Although the "monster" Jacob refers to is Edward, the larger monster at work is this backlash against feminism, where the "heroine" of the story is domesticated and oppressed as the male controls the female.

By making Bella a vampire Meyer not only immortalizes Bella, but symbolically immortalizes the backlash against feminism presented in the novels. Unlike *Buff* where females are shown as free and unchained, emphasizing feminism, *Twilight* creates a backlash against feminism, showing Bella as a chained, domesticated female. At the end of the series, Bella says, "And then we continued blissfully into this small but perfect piece of our forever" (*Breaking Dawn* 754). Her statement about her future with Edward is similar to the fairy-tale ending, of "then they lived happily ever after" as she can literally live forever with Edward. Meyer's fairy-tale like ending is not, however, a happy ending for females; instead, it is a throwback to Victorian ideals of female submission and domesticity. In 2010, this female ideal is beyond outdated – and yet one that will not die.

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