



McNair Research Journal

THE UNIVERSITY OF TEXAS AT ARLINGTON

Summer 2006 • Volume 10



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Message from the Provost



In 1986, the U.S. Department of Education established the McNair Scholars Program in honor of Ronald McNair who died in a space shuttle explosion that year. Dr. McNair's life was one that constantly cleared obstacles and was dedicated to fulfilling his dreams. An African-American who grew up in a poor community in the South, Dr. McNair earned a Ph.D. in laser physics and became a NASA astronaut. The McNair Scholars Program was created to encourage students from similar backgrounds to pursue graduate studies, engage in research, and develop scholarly skills by working with a faculty mentor.

In 1986, the U.S. Department of Education established the McNair Scholars Program in honor of Ronald McNair who died in a space shuttle explosion that year. Dr. McNair's life was one that constantly cleared obstacles and was dedicated to fulfilling his dreams. An African-American who grew up in a poor community in the South, Dr. McNair earned a Ph.D. in laser physics and became a NASA astronaut. The McNair Scholars Program was created to encourage students from similar backgrounds to pursue graduate studies, engage in research, and develop scholarly skills by working with a faculty mentor.

Students who participate in the McNair Scholars Program at The University of Texas at Arlington receive a stipend to fund a summer research project and are paired with a faculty member who supervises their research and serves as their mentor. Once the research is complete, the students present their findings at the annual McNair Research Presentations.

On behalf of The University of Texas at Arlington, I want to congratulate each of the McNair Scholars and their faculty mentors. The research published in this journal is a reflection of their hard work, dedication, and their willingness to dream. The skills they have acquired will serve them well as they pursue their graduate education and other endeavors throughout life. More importantly, their research exemplifies the core mission of institutions of higher education, and makes all of us at The University of Texas at Arlington proud.

A handwritten signature in black ink, appearing to read 'Dana Dunn'.

Dr. Dana Dunn
Provost and Vice President for Academic Affairs

Notes from the Director



It is with pride that I congratulate the research interns in the McNair Scholars Program at The University of Texas at Arlington on the successful completion of their eleven-week Summer 2006 research projects. The research summaries in this journal are evidence of the level of effort these scholars devoted to researching, developing, writing and presenting their findings. They are to be commended for their dedication in pursuing and reporting new information in their respective fields.

Equally deserving of recognition and appreciation are the outstanding faculty mentors who gave of their time, talent and expertise in guiding and directing the research process, and the numerous professional staff members throughout campus who conducted beneficial seminars and workshops. Additional appreciation is extended to President James D. Spaniolo, Provost & Vice President for Academic Affairs Dana Dunn, Vice President for Research Ronald L. Elsenbaumer, and Dean of the Graduate School Philip Cohen for their ongoing assistance and support.

Congratulations, McNair research interns, on your achievements this summer. Best wishes on your continued academic success!

A handwritten signature in black ink that reads "Kathryn Head". The signature is written in a cursive, flowing style.

Kathryn Head

Director of SOAR/McNair Scholars Program

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The McNair Scholars Program



Dr. Ronald E. McNair/Scholar, Scientist, Astronaut, 1950-1986

The history of the McNair Scholars Program at UT Arlington commenced in 1990 when the U.S. Department of Education funded a grant proposal to bring it to campus. The goal of this program (and of the many McNair programs nationwide) was to assist disadvantaged undergraduates—either first-generation/low-income and/or underrepresented (African American,

Hispanic, Native American) students—to prepare for future graduate study culminating in the Ph.D. and a life of research and teaching. Since its inception on campus, the McNair program has encouraged and assisted over two hundred students in various majors with their preparation for graduate study.

Currently the McNair Scholars Program at UT Arlington works with a minimum of twenty-five students (sophomores through seniors) each academic year, providing seminars and classes on a wide range of topics relating to graduate school, offering a spring institute to heighten Scholars' understanding of the culture of research, and, subsequently, affording them the opportunity to engage in one summer of research with a faculty mentor prior to graduation. The program also enables Scholars to present their research at McNair (and other) undergraduate or professional conferences, provides guidance with the graduate school application process, and funds graduate school visits.

The McNair Scholars Program at UT Arlington enjoys strong, campus-wide support and greatly benefits from the expertise and enthusiasm of its faculty and staff. An expression of this institution's commitment to McNair Scholars was the creation of the UT Arlington McNair Graduate Assistance Package (M-GAP) in spring 2002, offering a fellowship/assistantship combination in a wide range of disciplines.



Restoring Central Park: Neglect, Deterioration, and Rejuvenation from the 1960s to the 1990s

SAMUEL ODAMAH

Mentor: Gary Robinette, M.L.A. (School of Architecture)

INTRODUCTION

Central Park was the first public park in the world that was built to serve people from every segment of society. It brought together a vast number of people of every age, income, class, and ethnicity. In the 1960s and 1970s, financial and social crisis in New York City contributed to the neglect and dramatic deterioration of Central Park. Many park advocates sought solutions to reverse the decline of Central Park, and in 1980 civic-minded citizens working closely with the city developed ideas to renovate and rejuvenate it.

The study of Central Park is important because many American cities are facing the same problems. Understanding what happened in Central Park, how it occurred and how the problems were approached, serves as an effective model for other cities. This study examines the problems that caused the decline of Central Park in the 1960s to 1980s, and the accomplishments of the public-private partnership formed between the Central Park Conservancy and the New York City Parks and Recreation Department beginning in the 1980s.

LITERATURE REVIEW

This study used three primary sources from the Central Park Conservancy. The first primary document consisted of *Central Park and the Conservancy: A Brief History of the Conservancy's Partnership with City of New York, and a Management Overview*. The second document, *Rebuilding Central Park for the 1980s and Beyond: An Outline for a Restoration Plan*, was a master plan for

restoration. The third document was the Conservancy's annual report from various years.

The most helpful secondary sources were *The Park and the People: A History of Central Park and Rebuilding Central Park: A Management and Restoration Plan*, as well as numerous articles and periodicals. In the *Park and the People*, Roy Rosenzweig and Elizabeth Blackmar tell the dramatic story of the creation of Central Park. The authors clearly present the park's history providing the reasons for the park's deterioration in the 1950s and 1960s, the financial crisis in the 1970s, and the park's restoration in the 1980s by the Central Park Conservancy.

METHODOLOGY

The methodology consisted of two parts: research in primary and secondary documents and an on-site visit. For this study, an extensive literature search was performed reviewing books, scholarly articles, journals, newspapers and reports that were relevant to the research matter. Prior to visiting New York City, I made telephone calls and sent e-mails to establish contacts for the site visit. Furthermore, the opportunity to explore Manhattan for five days allowed me to wander through most of Central Park's 843 acres. Visiting the Parks and Recreation Office at the Arsenal in Central Park provided me with helpful information from the Central Park Conservancy's annual reports. Finally, a discussion with a police official at the Central Park Precinct provided insightful facts on matters of security in Central Park.

RESULTS AND DISCUSSION

The crises of Central Park were financial, physical (deterioration) and social in nature. As funding decreased, crime increased; police officers no longer dealt with minor crimes such as not obeying park regulations, theft, and muggings. Crime plagued Central Park throughout its history. This deteriorating image of Central Park conveyed a negative impression of the America's most famous public space. And many New Yorkers were not pleased with the message being conveyed about their park.

When people's attitude towards the park changed things began to turn around for the better to preserve the historic park. The Central Park Conservancy put together plans to restore the park over time and discourage crime in the park. The goal was to restore Central Park, push out crime and attract people back to the area. With Elizabeth Rogers Barlow, the first Central Park Administrator, fund-raising efforts to rescue the park achieved success, see Figure 1. Since 1980, the Conservancy has raised \$300 million dollars and has restored about 80 percent of the park and contributed to a 91 percent reduction in crime (Central Park Conservancy, 1981). Removing crime from Central Park was not the only fac-

tor that improved it. In addition, increased community involvement and the redesign of Central Park attracted people and greatly reduced crime in the park.

The Conservancy also worked to connect the surrounding community with Central Park. For example, nineteen of twenty-two playgrounds were placed on the edges of the park. Essentially the playgrounds cemented the surrounding neighborhoods to Central Park. This unique connection creates the feeling of small neighborhood parks within one large park. Entrances into the park are located near playgrounds, so parents do not have to enter the park.

CONCLUSION AND FUTURE RESEARCH

Many people (the Conservancy, Parks and Recreation Department, police officials, private investors and citizens), working together in different ways to help revive a declining Central Park, provides a successful model for other parks facing the same issues. Further studies might continue to track crime rates in the park, create a database showing exactly what restoration has occurred, monitor how the park is used, examine the continuing gentrification of surrounding blocks, and study the recruitment of new leadership to park conservancy.

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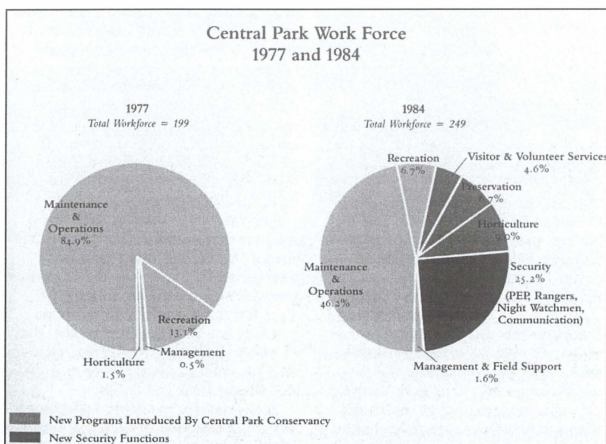


Figure 1. *Rebuilding Central Park for the 1980s and Beyond: An Outline for a Restoration Plan*. Central Park Conservancy. The New York City Department of Parks and Recreation and Central Park Conservancy, 1981.



Metaphysical Poetry: A History and a Legacy

CODI RENEE BLACKMON

Mentor: Dr. Thomas Ryan, Ph.D. (Department of English)

INTRODUCTION

This study focused on the Metaphysical Poets of the seventeenth century in England. John Donne is considered the first “metaphysical” poet, followed by later poets such as George Herbert, Henry Vaughan, Andrew Marvell, and Richard Crashaw, among others. Through their use of elaborate conceits and paradoxical images, these poets incorporate wit and humor into serious emotion and complex ideas. Dr. Samuel Johnson, who first identified the metaphysical style in *Life of Cowley* (1905), defines metaphysical wit as “a kind of *discordia concors*; a combination of dissimilar images, or discovery of occult resemblances in things apparently unlike” (Johnson 42). Conceits like those found in Donne’s “The Flea,” in which the act of making love is compared to a flea, illustrate the uniqueness of the metaphysical school of poets.

LITERATURE REVIEW

Poets like Donne, though not immensely popular during their lifetimes, were often praised by fellow poets and intellectuals for their wit and knowledge; however, towards the end of the seventeenth century, John Dryden, Alexander Pope, and Samuel Johnson disapproved of these poets for that same wit and knowledge and precipitated a negative reaction toward the metaphysical conceit. Nonetheless, the metaphysical poets began to come into favor again during the Romantic Period (1785-1830) when writers like Samuel Taylor Coleridge began to praise the metaphysical style.

During the twentieth century, T.S. Eliot, H.J.C. Grierson, and George Williamson worked to further explain metaphysical wit, and in the 1920s Arthur Nethercot published a series of philological articles on the reputation of the metaphysical poets throughout history. In her *Elizabethan and Metaphysical Imagery: Renaissance Poetic and Twentieth-Century Critics* (1947), Rosemond Tuve explores the influence of French humanist and philosopher Petrus Ramus (1515-1572) on the metaphysical style. Ramus challenged the scholastic traditions of medieval times with simplicity, precision, and clarity; thus the scientific trend in metaphysical poetry can be linked to Ramist logic because, according to Tuve, this philosophy promoted the scientific mind. A. O. Lovejoy’s *The Great Chain of Being* (1936), E. M. W. Tillyard’s *The Elizabethan World Picture* (1959), and Louis Martz’s *The Poetry of Meditation* (1962) contribute greatly to the study of metaphysical poetry by detailing the worldview that the writers of the seventeenth century inherited and how their beliefs influenced their writing.

Scholars have also revisited the criticism of poets like Dryden and Johnson. Robert Lathrop Sharp published *From Donne to Dryden: The Revolt against Metaphysical Poetry* (1940) in an attempt to analyze the changing attitudes of the late seventeenth and early eighteenth centuries. Collections such as Joan Bennett’s *Four Metaphysical Poets* (1934), Helen White’s *The Metaphysical*

Poets: A Study in Religious Experience (1936), and Helen Gardner's *Metaphysical Poets* (1960) attempt to make these poets accessible to twentieth-century readers.

The study of the metaphysical poets and their style continues into the twenty-first century. For example, David K. Anderson published his *Image and Ritual in the Devotional Poetry of John Donne, George Herbert and Henry Vaughan* in 2004.

METHODOLOGY

The literary research consisted entirely of textual analysis. The study examined the scholarly publications concerning the secular and religious works of the metaphysical poets, particularly Donne, Herbert, and Vaughn. The investigation also examined the texts that influenced their writing style, the historical and social context of the seventeenth century, and the decline and revival of the metaphysical style in later centuries.

RESULTS AND DISCUSSION

As early as the sixteenth century, William Shakespeare and Sir Philip Sydney employed intricate conceits and paradoxes in their poetry to convey the intensity of the speaker's emotions; however, the metaphysical poets were able to convey complex thoughts and feelings through scientific and intellectual language, rather than the romantic verse of the previous century. The criticism aimed against them only reflects the prevailing attitudes toward nature and art at the time. Many critics said their metaphors were too complex to be accessible or enjoyable to those who were not very well educated. However, the metaphysical poets should be lauded for their ability to search and find those unexpected and surprising metaphors labeled conceits. Though criticized by Dryden, Pope, and Johnson, both Dryden and Johnson were also able to recognize and praise the genius of poets like Donne. Similarly, though Pope and Dryden

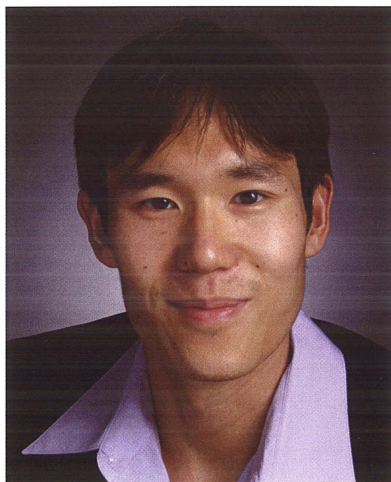
expressed contempt for the metaphysical style, they carried on the seventeenth century tradition in the influence which the metaphysical poets had on their writing. As Joseph Duncan demonstrates in his book, *The Revival of Metaphysical Poetry: The History of a Style, 1800 to the Present*, the renewal of interest in these poets, due greatly to T. S. Eliot's important essay, "The Metaphysical Poets" (1921), reached the level of a revival during the early to mid-twentieth century.

CONCLUSION

Though Donne and his contemporaries altered the face of both secular love and devotional poetry, they can also be said to be only the beginning of the metaphysical tradition. The metaphysical poets of the seventeenth century transformed the way in which the style was applied from then on, and the transformation and evolution of the style is the reason why these authors have regained prominence despite centuries of criticism. The decline and subsequent resurgence of this writing style is a testament to the legacy of metaphysical poetry. An abundance of recent scholarship proves that far from being over, the critical interest in these poets has not waned. The metaphysical poets have become an integral part of the English poetic tradition and are still being read four centuries after their time.

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A Country Within a Country: A Study of Korean and Vietnamese Baptist Churches in America

DANIEL CHUNG

Mentor: Robert Young, Ph.D., (Department of Sociology)

INTRODUCTION

According to the 2004 U.S. Census Asian-Americans make up only four percent of the total population, yet their numbers are rapidly increasing. Despite the growth of the Asian-American community, it appears to have been ignored by scholars. Asian-Americans being very recent immigrants appear to have utilized a variety of methods in adapting to life in America. Ethnic churches have provided services that have allowed immigrants to adjust to a new lifestyle. For example, the church provides a cultural umbrella that allows immigrants to feel at "home." Ethnic churches also provide other services as well. These services range from social activities to language courses that transfer the ancestral language to the second generation. However, in this study, I want to examine whether or not a sense of group alienation and marginality leads to a greater degree of cultural manifestation than in other ethnic churches.

LITERATURE REVIEW

According to Herberg, Irish Catholic immigrants preferred to build their own churches than to attend a non-Irish church. Asian immigrants appear to behave in a similar manner (Herberg 1955:23). Korean-American churches in the United States numbered 75 in 1970; however, this number increased to 2000 ten years later. According to scholars, immigrant churches are more than just places of worship. Immigrant churches are in

many ways a reflection of the home culture. According to Zhao, Vietnamese Catholicism has been so substantially influenced by the indigenous culture that it is referred to as "Confucianized" Catholicism (Zhou, Bankston and Kim 2002:37). The Korean-American churches appear to be heavily Confucianized as well. For example, Confucian ideology of male superiority is manifested in Korean immigrant churches and they tend to be more heavily male-dominated than churches of other ethnic groups. According to Kim's sample of elders of varying ethnic groups, 90 percent of the Korean elders, 57 percent of Caucasian, and 39 percent of African-American elders were males. Asian immigrant churches also provide language courses to second-generation youth. This function is performed to transmit the parental culture to their offspring.

METHODOLOGY

I conducted my fieldwork in a Korean and a Vietnamese Baptist church located in a suburban city in Texas. The Korean church, which is ten years older, celebrated its twenty-fifth anniversary during the period of my observation. Qualitative data were obtained through participant observation and from interview sessions with the pastors and the assistant pastors at the observed churches. Over a period of approximately three months, I recorded the activities and the rituals that took place during the worship services and other church-sponsored events. I conducted

interviews and follow-up discussions with the ministers of each church in order to obtain information on (1) non-religious events that take place at or under the auspices of the church (e.g. community service), and (2) church-sponsored activities designed to assist congregants' adaptation to American culture.

RESULTS AND DISCUSSION

It appears that the Korean church seemed less concerned to promote Korean culture. Rather, the Korean church was more inclined to promote "Biblical" culture than its Vietnamese counterpart. This lack of cultural manifestations appears to be influenced by the large percentage of non-Korean Americans that attend the church. In the future I will need to find a predominately Korean-American church to control for the race factor. The Korean church also appeared less concerned with providing services that transmit Korean culture to second-generation youth. During my time at the Korean church it did not offer a Korean language course. However, the Korean church did offer more worship services than the Vietnamese church. For example, the Korean church performed more worship services throughout the week than the Vietnamese church. The Korean church had a Wednesday night service and a Sunday evening service. The Vietnamese church only performed one service, which was the general Sunday morning service.

CONCLUSION AND FUTURE RESEARCH

It appears that the lack of Korean culture that was manifested in the church is partially due to its dual ethnic congregation. Possibly, if the Korean church put too much emphasis on Korean culture, the non-Korean members would feel disconnected from the church. The Vietnamese church with its homogeneous congregation could freely promote Vietnamese culture without having

to consider the consequences in doing so. Participation in fellowship activities and the amount of social activities offered by the church did appear to be affected by the size of the ethnic population in a city. For example, the Korean population at the time of the study was culturally marginal when compared to the Vietnamese population in this city. As a result, the Korean church possibly offered more socially orientated activities in order to alleviate this sense of alienation. However, more research needs to be performed to make sure that these conclusions are valid. In the future the race and income variables should be controlled in order for the conclusions to be more compelling.

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Massacre on the Western Front: A Study of British Strategy and Tactics during World War I

JUSTIN JONES

Mentor: Stanley Palmer, Ph.D. (Department of History)

INTRODUCTION

World War I was the British Empire's greatest tragedy in its military history. The loss of 723,000 lives was twice that of what Britain would lose in World War II. Flawed strategy and faulty tactics produced a death toll unnecessarily high throughout the entire war but especially between the years 1914 and 1917.

LITERATURE REVIEW

War plans dominated the military establishments of all European powers up until the outbreak of the First World War. The war plans of these powers were characterized by rigidity and inflexibility with little thought for the dynamic forces often at play on the battlefield. Many of these war plans – and the strategies and tactics developed from them – failed to take into account the changing technology of war: weapons such as the machine gun, advances in communications, and the new technology of aircraft.

Niall Ferguson's *The Pity of War* (1999) provides a controversial reassessment of the war, while John Keegan's acclaimed military history, *The First World War* (1998), examines each country's strategies and tactics. In order to understand the horrendous loss of life suffered by the British Empire during World War I, my study looks at one nation only: Britain's strategy and tactics throughout the conflict. From the very beginning of the war one can

observe many of the flaws in planning battles, and this shortcoming would continue throughout the end of 1917 and would result in two of the greatest tragedies in British military history: The Somme and Passchendaele.

METHODOLOGY

In order to understand what the British plans and strategies throughout the war were, I had to consult the works of several historians other than Ferguson and Keegan. From this base of accumulated knowledge, I was able to direct my own research into areas of British strategy and tactics that seem to have had the most impact on what caused the greatest loss of life. To that end, I consulted several accounts of battles, war diaries, and dispatches and memorandums written by the commanding generals of various campaigns throughout the war.

I also limited my research to the years 1914 through 1917, as these were the years that saw the most loss of life. I was determined to understand why it was that so many lives were lost during this time period when two of the bloodiest campaigns fought by the British on the Western Front took place: the Somme and Third Ypres (or Passchendaele). While the year 1918 was no less important, the British at this time were reacting to the Germans rather than acting on their own initiative, so I decided that 1918 was beyond the scope of my study.

RESULTS AND DISCUSSION

I found that the British strategy was rigid and inflexible and that these two limitations persisted throughout the entire period that my study examines. Rigidity took the form of not allowing for any alteration in a planned campaign even if circumstances rendered the original plan obsolete. Inflexibility was found in the areas of planning that did not take into account any plans that the Germans might have had. While it would have been impossible for the various commanders to anticipate exactly what the Germans were planning, allowances for eventualities should have been made.

However, as ill planned as many of the strategies were, there might have been a chance that they could have been executed successfully if the tactics themselves were not flawed. British commanders did not, or would not, understand the changes in the technology of war. Many of the tactics harkened back to the nineteenth century: marching in close formations, not utilizing cover on the battlefield, and antiquated forms of communications. Since these older tactics failed to take into account the destructive effects of newer weapons such as the machine gun, or even the automatic rifle, many more men were lost than was necessary.

CONCLUSION

From 1914 to 1917, the British Empire's involvement in World War I produced a massacre of its men. Two of the worst and most infamous military tragedies were the Battles of the Somme in 1916 and Passchendaele in 1917. Though England's politicians understood the grim fate of many of the men they sent to the Western Front, generals and other senior officers resisted understanding the changing dynamics of modern warfare. Britain would "win" the war but at a terrible cost in human lives lost.

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Framing of Heterosexual and Non-heterosexual Men in Newspaper Stories about Homicides

RICHARD-MICHAEL MANUEL

Mentor: S. Camille Broadway, Ph.D. (Department of Communication)

INTRODUCTION

When people die, they cease to be able to tell their stories and the job of publicly describing their lives and deaths falls to journalists. Journalists work as a team to report the facts, selecting what they think is of greatest interest and importance. Journalists therefore can exclude and include certain details; some angles are highlighted while others are downplayed—but to what extent can these exclusions and inclusions be inherently negative?

Contentious political and social debate regarding homosexuality, specifically on such issues as anti-sodomy laws and gay marriage, has appeared on the front pages of newspapers around the country (Gates, 2004). Research has shown that heterosexuals have a negative view of homosexuals (LaMar & Kite, 1998). Given the politically charged debates regarding sexuality and social pressures on news coverage, this study set out to examine if newspapers covered heterosexuals and homosexuals differently when the story was not about “gay-centric” issues like marriage, sodomy, sexually transmitted diseases, or the “don’t ask, don’t tell” military policy. This study examined the stories of male victims of homicide, to find what differences and similarities exist between coverage of homosexual and heterosexual victims.

LITERATURE REVIEW

Sexuality in the Media. Because of data collection issues and lingering stigma, an absolutely accurate number of U.S. lesbian, gay, bisexual and transgender citizens is not known. Using 2000 U.S. Census Bureau data, Smith and Gates (2001) reported that same-sex unmarried partners live in 99.3% of U.S. counties and account for 601,209 households. Only ten years earlier, those numbers were 52% and 145,130, respectively. Poor data collection in 1990 is blamed in part for the difference in findings, but Smith and Gates (2001) concluded that the 2000 data still missed key populations by not identifying single gays and lesbians, and thus underreported the total gay and lesbian population (at more than 10 million in the United States).

Framing. Frames have their origin in cognitive psychology (Entman, 1993). They are the general anecdotes, quotes, metaphors, and words choices used to describe a person, place, or event (Hallahan, 1999). Entman’s analysis of frames found that “understanding of frames helps illuminate many empirical and normative controversies, most importantly because the concept of framing directs our attention to the details of just how a communicated text exerts its power” (p. 55-56, 1993). Studying

frames can help show what and why certain issues are important in society as well as help understand when the terms that characterize these issues started being used by the media.

METHODOLOGY

This quantitative content analysis examined coverage of the homicides of white males, ages 17 to 35, in six newspapers, located in four regions: the West, Midwest, Northeast, and Southeast. The publications examined were *The Boston Globe*, *The Commercial Appeal*, *The Milwaukee Journal Sentinel*, *Pittsburgh Post-Gazette*, *The San Francisco Chronicle*, and *St. Petersburg Times*. Each newspaper was chosen for its circulation and density of gay and lesbian couples in the communities that make up their coverage areas. The research was designed to determine the similarities and differences in coverage and framing of heterosexual and non-heterosexual male homicide victims. The variable sexuality was compared to measures of word choices, phrases, and anecdotes used for victims. The study examined articles from June 1, 1996 to May 31, 2006.

RESULTS

The study supported that newspaper articles generally characterized victims in a neutral way, regardless of sexual orientation. References to drugs and gangs were somewhat higher for heterosexual victims, while allusions to sexual activity and bars were more often found in gay and bisexual victims. These findings supported previous research, concluding that gay men were sometimes viewed negatively along sexual lines.

CONCLUSION AND FUTURE RESEARCH

Several alternate studies can be performed to expand upon this research. Examining other age groups, ethnicities, lesbians, or bisexual samples are a few of the ways. Furthermore, transgendered and transvestite victims might provide interesting results. Finding differences and similarities in articles where victims who are males becoming females, as compared to females becoming males, are treated is also of use. However, within the existing study, an examination of the opinion pieces might show greater differences. Although not used in the study, examples from the *San Francisco Chronicle* were noted as being alarmist and hostile towards gay and lesbian deaths. One editorial seemed to insist that all deaths of gay men must be treated as homicides, no matter the circumstances of the crime. Yet, an *Arkansas Democrat Gazette* editorial scoffed at coverage of Gianni Versace's death and the nationwide manhunt for a cross-country killer, even after reports had emerged that his murderer might be hunting wealthy gay men. Charting changes regarding differences and similarities over a broader span of time could also reveal interesting data.

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Women and Violence: Re-Envisioning History in Three Plays

NATALIE MOTT

Mentor: Laurin Porter, Ph.D. (Department of English)

INTRODUCTION AND LITERATURE REVIEW

Murder is committed in this country every day, to and by both men and women; however, people tend to take a special interest in women who kill. Evidence for this can be seen in the media frenzy that surrounds stories of women like Andrea Yeats who kill their children or women who murder their husbands. According to Jennifer Jones in her book *Medea's Daughters*, these women who kill are "disruptive and dangerous women who threaten the institutions of marriage, motherhood, and filial duty, [and whose] cases received far more press than comparable murder trails in which men killed their wives, mistresses, or daughters" (xiii). Due to the patriarchal structure of society, different standards and consequences exist for the two sexes. Jones writes that "until very recently women's experiences and perspectives were not incorporated in legal practice. Their stories have been told by men to men, and they have been judged according to the standards set by other 'reasonable men'" (xv). Because of the contradictory standards for women and men, it is an important area to study.

Drama is one literary genre that can be used to both recreate a murder and to explain it. Since the women's rights movement of the 1960s, many women activists and playwrights have come to the forefront to reexamine gender constructs, particularly within the boundaries of feminist theory, by giving a woman's perspective on patriarchal society. Jones writes that "cultural historians

have long noted that the retelling or reenacting of crime stories reinforces existing power relations and maintains the status quo" (xiii). Because drama is related to the culture from which it comes, it speaks powerfully to an audience. Three playwrights who have taken historical cases of women who were convicted of murder and given them a feminist perspective are Susan Glaspell with her play *Trifles*, Sophie Treadwell with *Machinal* and Wendy Kessleman with *My Sister in This House*. All three of these playwrights take actual stories of murders committed by women and offer explanations beyond what the male-dominated newspaper articles and trial transcripts offer. Through the retelling of the lives of these women and encouraging the audience to identify with the women in the play, the playwrights show their lives in a more sympathetic light and give them a voice where they had none before, essentially re-envisioning history.

METHODOLOGY

This research is based on three historical murders committed by women and compared to three specific plays written by female playwrights, which retell the women's stories through a feminist perspective. For both *Trifles* and *Machinal* actual trial transcripts and newspaper articles were used to illustrate the patriarchal society in which the women were tried and convicted. For all three plays, various sources of criticism were used and supplemented with numerous texts on feminist theory.

RESULTS AND DISCUSSION

Interestingly, the times in which each of the previous three plays were written seemed to determine how well they were received and to what extent the playwrights were able to express their feelings about patriarchy. *Trifles*, which was written in the early 1900s, is today a well-known play taught in many classrooms. However, Glaspell, overshadowed by other playwrights of her time, such as Eugene O'Neill, was not recognized as a great playwright until later in the century. *Machinal*, on the other hand, was written in the Roaring Twenties, a time when women were just beginning to be liberated. It was very well received in its time and had an impact on the feminist movement. *My Sister in this House*, written in the 1980s, is, like *Trifles* and *Machinal*, both a feminist play and based on a real murder case. However, unlike the other two plays, *My Sister in This House* explores the nature of sexuality and class boundaries and is not extremely well known. There is very little scholarship available on the play, and it is not a play that is commonly taught in the classroom. Perhaps this is because the play was written in the wake of the women's movement of the 1970s when women were more established in the workplace and as individuals. Whatever the reason, evidence seems to suggest that the play's reception is correlated with the time in which it was written. Like the Andrea Yeats case, which involves a woman who was convicted of murdering her five children in 2002 and whose case was recently overturned, time seems to determine how society perceives women who kill.

CONCLUSION

Feminist theater allows for a new understanding of women's lives. Marta Morales writes that "the [feminist] movement has influenced all the new currents of thought that perceive women as subjects in all areas of study and has made invaluable contributions by turning a spotlight on women play-wrights, actors, and producers, both on- and off-stage" (2001). This is indeed true; giving women a voice on stage and behind the scenes, where they had none before gives a voice to all women everywhere by reconstructing, at least within the context of the play, society's view of women. Sue-Ellen Case writes that "the feminist in theatre can create the laboratory in which the single most effective mode of repression – gender – can be exposed, dismantled and removed" (qtd. Austin 5). Playwrights like Glaspell, Treadwell, and Kesselman question the gender roles as structured by a patriarchal society and reveal that there might be more to women who commit acts of violence than the media portrays, allowing the women in their plays to break free of the patriarchal machine of society.

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E-Learning Isolation and Its Effects on Course Satisfaction and Employee Performance

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INTRODUCTION

Learning via CD-ROMs, multimedia presentations, virtual classrooms, digital collaboration, and other instructional content delivered through a broad range of electronic technology (ASTD & NGA, 2001; DeRouin, Fritzsche, & Salas, 2005; Ruiz, Mintzer, & Leipzig, 2006) became possible after the advent of computers and the World Wide Web. Known as e-learning or electronic learning today, this method of instruction has diffused extensively into the corporate workplace. Although the adoption rate of e-learning is increasing among businesses, an adoption gap is occurring as several barriers delay its diffusion.

This study stems from Dr. Victoria Perez Cereijo, Dr. Chris Myers, and Amigos Library Services' (ALS) research project. ALS provides technology and training services to library workers from public school, university, and corporate libraries in the southwestern United States. The purpose of this research study is to determine if the isolation that library employees might experience as students taking ALS live online courses is based on technological and/or course design factors. Subsequently, this study seeks to ascertain whether isolation, a frequently reported e-learning barrier, affects their performance and satisfaction with e-learning. Results from this study could assist organizations adopting e-learning programs in the future in reducing these factors to improve the effectiveness of e-learning.

LITERATURE REVIEW

When the innovation of electronic learning has low relative advantage, compatibility, observability, trialability, and high complexity (Rogers, 2003), businesses might perceive it as less effective than traditional methods of learning. This perception can occur when electronic learning programs are more expensive than alternative programs, corporate leaders de-emphasize its importance, and employees resist e-learning due to negative personal experiences or frequent reports of negative experiences (Kurchner-Hawkins, 2003; Vaughan & MacVicar, 2004; Waight & Stewart, 2005). For instance, while some people learn best in isolation, most prefer learning environments that involve physical or face-to-face contact with other individuals (McInerney & Roberts, 2004; Richardson & Hansen, 2002). Because isolation is a barrier that cannot be completely eliminated in electronic learning environments (McInerney & Roberts, 2004), businesses and employees might be resistant to adopting e-learning programs.

According to Robert S. Weiss (1973), feelings of isolation, or loneliness, result from two distinct situations. First, the loneliness of emotional isolation results from the lack of an attached relationship and produces a sense of utter aloneness, anxiety, and constant focusing on potential solutions to problems (Weiss, 1973). Second, the loneliness of social isolation develops in the absence of social

integration, or participation with other individuals. This type of isolation engenders boredom, aimlessness, and marginality (Weiss, 1973).

The negative effects of isolation become visible during e-learning courses when technological and course design factors interfere with employees' abilities to process and retain knowledge, and to engage in meaningful social relationships. For instance, learners that feel isolated during e-learning courses are more likely to associate their negative experiences with other courses and other employees (Kurchner-Hawkins, 2003), fail to remember and, therefore, apply learned information (Richardson & Hansen, 2002), and become dissatisfied with the course.

METHODOLOGY

The population consisted of 227 library employees who voluntarily completed ALS courses and submitted a 32-item ALS course evaluation survey online from September 2002 to February 2006. A two-level research model was developed to answer the research questions guiding this study. Regression analysis and bivariate correlations performed on the survey results assessed the first-level relationship between technological/course design factors and attachment/social integration and the second-level relationship between attachment/social integration and employee performance/satisfaction.

RESULTS AND DISCUSSION

Some technological and course design factors may "contribute to" attachment and social integration, which ultimately leads to emotional and social isolation, respectively. Additionally, some of the variables contributing

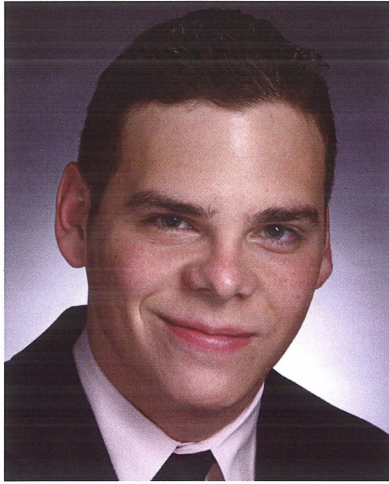
to isolation via attachment and social integration may "affect" employees' performance and satisfaction with e-learning courses. Moreover, because relationships between some of the variables in the proposed research model were not found to be statistically significant, re-assessment and retesting of the model is warranted in future studies.

CONCLUSION AND FUTURE RESEARCH

The results from the proposed model suggest that relationships do exist between isolation, course satisfaction, and employee performance. However, ALS and corporations utilizing e-learning for corporate training would benefit from pursuing further study with this model to improve employee development and company productivity in the long run.

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Gay-Rights Laws in the United States and the Factors That Lead to Their Enactment

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INTRODUCTION

Gay rights is a new and highly salient topic that has only emerged during the last few decades. The United States is currently immersed in an intense debate on the topic, with groups on all sides of the issue fighting for what they feel are the right policy choices in government. Given how new and unexplored gay-rights policy research is, there is much yet to be learned. There has never been a better time to study gay rights than now, as there are new developments always arising that social scientists can attempt to identify and understand.

The basis for this study, then, is to better understand the current state of gay-rights policies within the American states. This study focuses on state-level gay-rights policies and seeks to categorize the states and their policies based on the choices that each state has made when it comes to this policy area. A number of studies have been done that attempt to analyze single aspects of gay rights or to categorize states based on their permissiveness, but this study goes further and investigates why different states make different policy choices in regard to gay rights.

First, the states are classified based on their permissiveness on gay rights. This will be done using three measures that each represents a different policy aspect within gay rights. A composite measure, which is most commonly found in related literature, has been created to get a better understanding of a state's general policy liberalism in gay rights. This study is set apart from oth-

ers because it utilizes two other measures that capture different aspects of gay-rights policies. These measures include a civil-rights measure and a family measure. These measures will then be compared against a host of other characteristics to examine which are most influential in the policy-making process.

LITERATURE REVIEW

This policy area is a new and rapidly changing development in political science research. Decisions are constantly being made by state legislatures and courts nationwide that change the state of gay rights throughout the nation. Because this is such a relatively new topic, the research in this policy area is quite limited. Some social scientists have examined gay rights from an individualistic standpoint. That is, they have examined what causes people to choose the policy positions that they have. One such study by Loftus (2001) focuses on the changing attitudes toward gay rights. This study finds that people do make a distinction between the morality of homosexuality and the civil liberties of homosexuals. Herek's (2002) study examines the gender gap that is prevalent in a number of political science topics. That study finds that women are more accepting of gay rights than men.

Other research has examined the policy process itself, such as Soule's (2004) study that looks at factors that influence state gay-marriage bans. Her study finds that

ideology, interest groups and political opportunity structure are most influential. Other studies have examined single aspects of gay rights or related policy areas, but few have looked at the policy area as a whole. Research such as Berry et al. (1998) illustrates the importance of ideology in policy decisions. Nice (1994) examined why states chose to deregulate intimate behavior. He found that ideology and religion variables were the strongest deciders in these decisions. Rimmerman et al. (2000) examines gay rights as a social movement and investigates issues such as opposition groups, relationship bans and military concerns.

METHODOLOGY

In this study three dependent variables are created and used to accurately classify the states in regard to their policy choices. Each measure captures a different dynamic of gay rights. The composite measure provides an overall picture, while the civil-rights measure provides a context for the less controversial aspects, such as safe-school policies. The family measure examines the most controversial aspects such as gay marriage. These variables are then compared to a host of independent variables, including potential interest organization, citizen and state ideologies, Democratic Party strength, legislative professionalism, policy innovativeness and inter-party competition.

The correlations are computed to see which of these variables has the strongest relationship with the dependent variables.

RESULTS AND DISCUSSION

After comparing the dependent variables and the independent variables, some interesting results are found. This study finds that interest organization and ideology

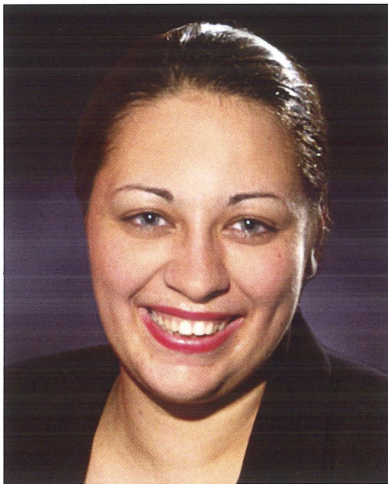
are the most influential characteristics in this realm of policy. Systematic variables, like innovation and professionalism, play a small part but are not nearly as strong as the ideology variables and interest groups variables. Interestingly, the party variables have very weak influences on policy decisions. This confirms the basic idea that legislators are most concerned with reelection. Gay rights are not an overwhelmingly popular notion, and regardless of the party affiliation, few politicians are going to be willing to support policy choices that large percentages of voters are uneasy about.

CONCLUSION AND FUTURE RESEARCH

This study was successful in providing an accurate portrait of gay rights in the states. Clear results were produced that show definite trends and findings in the field. Some of the findings confirm earlier notions put forth by previous researchers, while other challenge these notions and offer insights into new thoughts about this particular policy area. There is still much research that can be done on this subject and, as policy decisions continue to unfold and as the debate rages on, even more possibilities will materialize for investigating these issues.

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An Analysis of the Impact of the Performing Arts on At-Risk Youth

ROBIN WILLIS

Mentor: Dennis Maher, Ph.D. (Department of Theatre Arts)

INTRODUCTION

Youth today face a multitude of problems, including but not limited to, teen pregnancy, gang recruitment and assaults, substance abuse, suicide, truancy, and poor classroom performance. In addition, poverty and parental substance abuse put children and teenagers at greater risk of becoming school dropouts, substance abusers, young parents, or criminals. Statistics in Dallas relating to poverty, crime, substance abuse, pregnancies, and jail time among young people have been steadily on the rise, significantly more than in other areas of the nation. What do these statistics mean? They suggest that essential elements within the current art education approach in Dallas are either not being utilized efficiently or at all (Brown 17-19)

LITERATURE REVIEW

Improvement is without a doubt crucial. The Texarkana Regional Arts and Humanities Council describes cognitive research regarding arts education of the last twenty-five years as the "educational equivalent of the polio vaccine which, inconceivably, has been left sitting on the shelf! It's time to take it off!" (1-4).

The advantages attained from a performing arts education are difficult to ignore, as it has an immense influence on the developmental growth of a child. Additionally, young people who take part in the arts for at least three hours, three days a week are four times more inclined to

receive academic and writing awards and participate in academic seminars. Arts education also produces a measurable result for youth at risk by discouraging felonious conduct and truancy, while at the same time encouraging academic success for those involved in an after-school or summer performing arts program (Farnum and Schaffer 20-26).

So what should be done? Sam Halperin and Nancy Martin, the authors of "Whatever It Takes: How Twelve Communities Are Reconnecting Out-of-School Youth," suggest that an expansion of programs geared towards assisting at-risk youth, coupled with proven methods for alternative education within school districts, will help substantially [163-167].

METHODOLOGY

The objective of this study was to identify measures to improve teaching techniques among performing arts programs assisting at-risk youth in Dallas. This study analyzes such programs in Dallas through observations and interviews among leading performing arts agencies for at-risk youth. Recent studies, articles, books, and reports on crime levels among at-risk youth, as well as an examination of the performing arts relating to at-risk youth, were used to determine which advocacy methods are most effective, as well as which implementation approaches are most successful.

RESULTS AND DISCUSSION

Findings show that successful programs provide assistance by collaborating among instructors, administrative staff, artists, social service agencies and social workers. These programs also provide for staffs trained in both curriculum and teaching techniques specific to at-risk youth.

Peer education and opportunities to serve the community through public performances are vital to developing confidence among students. Additionally, frequent evaluations are particularly important to the ongoing success of programs. "Process Evaluations" allow agencies to study how assistance is provided and applied, supplying opportunity for ongoing assessment and improvement (Atienza and Renz 19-23).

CONCLUSION AND FUTURE RESEARCH

As research develops new ways to improve performing arts programs for at-risk youth, the results among such programs will likely continue to be positive. As young people face seemingly insurmountable obstacles, performing arts programs provide a chance for self-reflection and self-expression. By providing children and adolescents with these essential elements, youth have the chance to explore questions about the course and direction of their lives.

It is incredibly important to understand that children depend on adults to help guide them in the right directions. In a speech to the National Governors' Association, VH1 President John Sykes concluded with this very relevant statement from a Cincinnati school superintendent regarding the need to provide performing arts programs: "Children don't control where they live and they can't vote. It's up to us." (quoted in Morrison and Sykes 3)

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An Analysis of Waves with Applications to Music

KRISTIN KATHLEEN CREECH

Mentor: Mostafa Ghandehari, Ph.D. (Department of Civil and Environmental Engineering)

INTRODUCTION

Most individuals have personally experienced waves. Waves occur frequently in nature. Consider a trip to the beach. One enjoys the breeze and watches the ocean water flow to the shore as people in the water float up and down; these are waves in the ocean. Many people listen to their car radios while they drive to work; these radio programs are broadcast using radio waves. Sometimes people reheat leftovers from dinner for lunch the next day using a microwave; microwaves are also waves. Earthquakes occur often, which send seismic waves through the earth. The ability to hear people speaking, music, or any noise is made possible by the sound waves that transmit the sound through the air.

Consider a stringed instrument, such as a violin, a cello, a guitar, a sitar, a harp, or any other stringed instrument that suspends strings at two fixed end points. These instruments produce sounds by causing the strings to vibrate. On each of these instruments, the strings are tightly suspended to both ends of the instrument. Whenever a string is strained in this manner, it is referred to as taut. When playing the violin, one may pluck the strings to produce a sound. Plucking the string sets it in motion and it begins vibrating. There are mathematical equations that describe the motion of this occurrence.

BACKGROUND

Imagine that you are holding a stretched string with one end attached to the wall. You quickly begin moving your hand up and down. This sends wave pulses moving down the string. The wave pulses are moving in the direction of the string, perpendicular to the direction of the traveling wave. These types of waves are termed transverse waves, and they occur whenever the string of a violin, or other stringed instrument, is plucked.

Whenever a string is plucked, the motion of the string interacts with the air and the air particles vibrate in the same direction of the wave propagation to form sound waves. These types of waves, in which the particles move parallel to the traveling wave, are termed longitudinal waves.

METHODOLOGY

To understand the mathematics that governs the behavior of waves, it is necessary that relevant background material be reviewed, including several techniques in ordinary differential equations and also in partial differential equations. Some techniques included the method to solve a second-order, linear, constant-coefficient, ordinary differential equation with complex conjugate roots of the auxiliary polynomial, and the technique of separation of variables.

When solving a partial differential equation, such as the wave equation, it is also necessary to have boundary conditions and initial conditions. The boundary conditions arise from the assumption that the two end points are fixed, so we have $u(0, t) = 0$ and $u(l, t) = 0$ for time, t , domain of $t \geq 0$, where the length of the string is l and they must be applied to the solution.

RESULTS AND DISCUSSION

Using Newton's Second Law of Motion, the derivation of the wave equation in one dimension for a taut string with two fixed endpoints was demonstrated. Where $u(x, t)$ is the vertical displacement of the string at the point x and the time t , $c^2 \frac{\partial^2}{\partial x^2} u(x, t) = \frac{\partial^2}{\partial t^2} u(x, t)$ is the second-order, partial differential equation, known as the wave equation, where c is some constant real number.

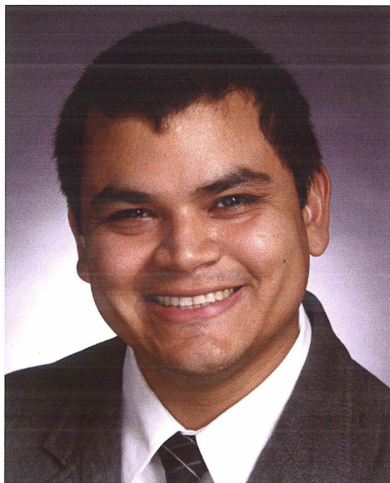
Using the technique of separation of variables, it is possible to separate $u(x, t)$ into one function of position only and one function of time only, so that $u(x, t) = X(x)T(t)$. Now, solving for $X(x)$ and $T(t)$ separately, it is possible to obtain the solutions using techniques in ordinary differential equations. Solving and then applying the boundary conditions, we find that $X(x) = B \sin\left(\frac{n\pi}{l}x\right)$ and, $T(t) = C \cos\left(\frac{cn\pi}{l}t\right) + D \sin\left(\frac{cn\pi}{l}t\right)$, where B , C , and D are any real constant numbers. Thus, we have that $u(x, t) = B \sin\left(\frac{n\pi}{l}x\right) \left[C \cos\left(\frac{cn\pi}{l}t\right) + D \sin\left(\frac{cn\pi}{l}t\right) \right]$ since $u(x, t) = X(x)T(t)$.

CONCLUSION

By deriving the wave equation, we now have an understanding of how the equation arises. By solving the wave equation, we now know the general form for any displacement function for a taut string with two fixed endpoints, such as a violin string.

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The Effect of Coffee on Cognitive Function and Rational and Irrational Responses

PATRICK A. RAMIREZ

Mentor: Daniel Levine, Ph.D. (Department of Psychology)

INTRODUCTION AND BACKGROUND

One of the most widely consumed stimulants in the world is caffeine. It is estimated that about half of this country drinks coffee everyday (Chou, 1994). In the past decade, coffee has been found to have many benefits. Reduction in aging, uses for Parkinson's disease, and reduction in risk of cancers are documented benefits (Kirchheimer, 2004). Caffeine is known to increase vigilance, reasoning, and logic, as well as arousal (Martin, Laing, Martin & Mitchell, 2005). This study attempts to determine if caffeine affects an individual's emotional decisions.

METHODOLOGY

The experiment uses 16 students and one staff member from the University of Texas at Arlington. The subjects abstained from caffeine for a 24-hour period, and ran on two cycles for the experiment. The first contained decaffeinated and the second caffeinated coffee. Subjects then participated in two versions of the Iowa Gambling Task (IGT). The IGT is a test that uses four decks of virtual cards with preset probability of rewards and punishments (Peters & Slovic, 2000, Bechara, Damasio, Damasio, & Anderson, 1994). The differences between the tasks are illustrated in Figures 1 and 2. The two versions of the IGT test alternated for both subjects and condition, to take into account any issue from the testing method.

RESULTS AND DISCUSSION

Multiple t-tests were calculated. The number of good decks versus bad decks selected was $t(31) 1.69, p > .05$. The difference was not significant. The number of good deck selections with caffeine versus the number of good with decaffeinate was $t(31) 1.69, p > .05$. Again the difference was not significant. The number of Bechara Deck A versus Deck B showed $t(16) 1.75, p < .003$. This was a significant difference. Peters Deck 1 versus Deck 4 showed $t(16) 1.75, p > .05$. This did not show a significant difference.

CONCLUSION AND FUTURE RESEARCH

Further investigation is needed to better understand the lack of variation within subjects. Problems that occurred stemmed primarily from the experiment not using a double-blind approach and the limited time-frame. Based on the study by Oei and Hartley it is possible that the inability to determine if a difference occurred from the within-subject design could be due to a slight placebo effect that has been noted. The experiment will continue into the coming academic year.

Figure 1. Probability of reward and punishment: Bechara Deck display schedule.

Deck A	+ \$100 and - \$1250	Every 10 draws loss occurs
Deck B	+ \$100 and - \$250	Every 2 draws loss occurs
Deck C	+ \$50 and - \$250	Every 10 draws loss occurs
Deck D	+ \$50 and - \$50	Every 2 draws loss occurs

Figure 2. Probability of reward and punishment: Peters Deck display.

Deck 1	- \$500 (24%)	\$ 0 (26%)	\$150 (25%)	\$250 (25%)
Deck 2	- \$500 (11%)	-\$50 (9%)	\$50 (42%)	\$150 (38%)
Deck 3	- \$50 (51%)	\$50 (25%)	\$150 (24%)	
Deck 4	- \$300 (29%)	- \$200 (24%)	\$100 (24%)	\$300 (23%)

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Effect of Phosphorous and Nitrogen on *Prymnesium Parvum* Uptake Rate

CAMILLE ROGERS

Mentor: James P. Grover, Ph.D. (Department of Biology)

INTRODUCTION

About 60 to 80 kinds of algae are considered “harmful”, meaning they have the capacity to produce toxic biochemicals, induce physical damage in other organisms, and/or create nutritional instability in an ecosystem (Smayda, 1997). *Prymnesium parvum*, commonly known as golden algae, causes a specific kind of Harmful Algae Bloom (HAB) and has been responsible for the high death rate of fish in Texas (TPWD, 2006).

It is generally believed that the growth rate of most algal species will be limited by the essential nutrient of lowest concentration, motivating study of how the dissolved nutrient concentration affects the nutrient uptake rate of golden algae (Smith, 1984). This study examined whether there is a relationship between the concentrations of two essential nutrients for *P. parvum*, nitrogen and phosphorus, and the respective uptake rate.

METHODOLOGY

P. parvum cultures were preconditioned in a medium with 1/20 the standard amount of phosphorous or nitrogen (Kester, 1967). After the completion of preconditioning (four or six weeks), the cultures were divided into aliquots, diluted, and pulsed with a range of concentrations of their respective limiting nutrient. Samples were drawn and filtered immediately, and at intervals for four hours, then analyzed for nutrient concentration.

The uptake rates for each initial nutrient concentration were analyzed in relation to the initial nutrient concentration. This relationship usually follows a Michaelis-Menten equation

$$V = V_{\max} S / (KS + S),$$

where V is the uptake rate, S is the nutrient concentration, V_{\max} is the maximal uptake rate, and K is the concentration at which uptake rate is half of the maximum (English et al, 2006).

RESULTS AND DISCUSSION

Phosphorus-limited cultures with six weeks of preconditioning, phosphorus-limited cultures with four weeks of preconditioning, and nitrogen-limited cultures with four weeks of preconditioning showed no uptake when pulsed with varying concentrations of their respective limiting nutrients.

Nitrogen-limited cultures with six weeks of preconditioning had some uptake when pulsed with nitrogen, the most significant being concentrations of 22.33 and 66.99 μM . When bulk nitrate uptake rate was plotted against initial nitrogen spiking concentration (Figure 1), the curve increased and tapered off, a pattern consistent with the Michaelis-Menten equation (English et al, 2006):

$$V = (14.03) S / (4.39 + S),$$

where 14.03 is the maximal uptake rate, and 4.39 is the concentration at which uptake rate is half of the maximum (English et al, 2006).

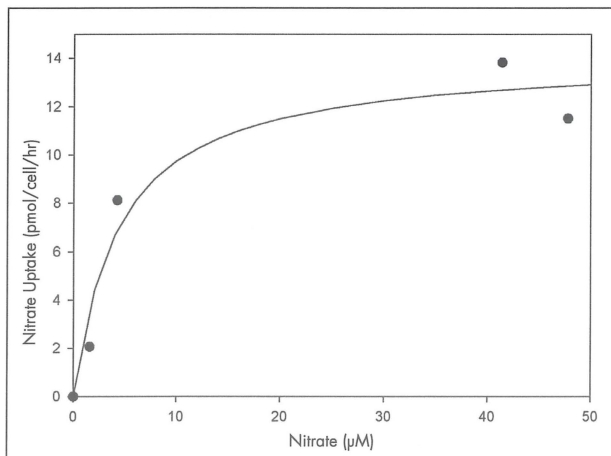


Figure 1. Nitrate uptake per cell vs. initial nitrogen spike concentration for 6-week preconditioned nitrogen-limited cultures

All four types of cultures had unexpectedly low cell counts when sampled two days before their testing and a large proportion of non-motile cells resembling the cysts described by Carter (1937). Microscopic examination revealed that P-limited cultures with four weeks of preconditioning had approximately half of the *P. parvum* cells still active and motile. The other three types of cultures all had predominately inactive and or non-motile cells, possibly in the process of forming cysts, and high amounts of cell debris and fragmentation. The cultures may have been sent into dormancy by excessively long preconditioning. We postulate that the preconditioning period should be capped at three weeks; it is suspected that this is the time when *P. parvum* cells reach optimum density and have the highest number of active cells.

N-limited *P. parvum* with six weeks of preconditioning displayed rapid nitrogen uptake only at the two high-

est pulse concentrations, which suggests that N-limited *P. parvum* cells need a higher range of nitrogen concentrations to induce uptake.

P-limited cells with four weeks of preconditioning had more cells than their six-week counterparts and about 50 percent of them were active and motile. While uptake rates were not obtained from this culture, it is likely that P-limited *P. parvum* with four weeks of preconditioning would experience some uptake from phosphorous pulsing.

Preconditioning methods used for other algal species were not sufficient for use in this experiment with *P. parvum*. This was demonstrated by cultures with predominantly inactive cells that, in two out of three experiments, experienced no uptake. N-limited cultures with six weeks of preconditioning experienced uptake that could be modeled by the Michaelis-Menten equation. Further experimentation using *P. parvum* with a shorter preconditioning period is needed to form a better understanding of the species.

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Targeted Drug Delivery to Vascular Smooth Muscle Cells Using Biodegradable Nanoparticles

DANYEL SPECHT

Mentor: Kytai Nguyen, Ph.D. (Department of Bioengineering)

INTRODUCTION AND BACKGROUND

Angioplasty is a common procedure used to dilate blocked arteries for treatment of patients with cardiovascular diseases. A problem with this procedure is that the endothelial cells lining the artery wall can be damaged, causing the underlying vascular smooth muscle cells (SMCs) to proliferate and migrate towards the injured vessel wall.^{1,2} SMC proliferation can lead to reoccurrence of the arterial blockage and restenosis, which is a re-narrowing of the artery. Various therapeutic agents such as antithrombotic agents and glucocorticoids have been used to reduce the high restenosis rates associated with angioplasty.^{3,4} Systemic delivery of these agents have typically failed to deliver sufficient therapeutic concentrations to the injured areas.^{3,4} Drug-eluting stents are another treatment being used to prevent in-stent restenosis.^{3,4} The advantage of drug-eluting stents is that only the localized area is targeted. However, in cases of arterial branching and bifurcations, stenting may not be possible.

Many researchers are looking for a more effective method for local drug delivery to prevent the proliferation of SMCs. The objective of this research project was to develop biodegradable nanoparticles as a targeting drug delivery system. Nanoparticles loaded with therapeutic agents may be able to specifically deliver drugs to smooth muscle cells, thereby reducing the rate of cellular proliferation of this cell type.

METHODOLOGY

A biodegradable polymer, poly(D,L lactide-co-glycolide) (PLGA), was used to formulate nanoparticles (~100 nm) for the study. The PLGA nanoparticles were formulated using an evaporative emulsion technique consisting of a water-in-oil-in-water emulsion. Cellular uptake studies were performed using SMCs to determine the optimal time and concentration for the uptake of PLGA nanoparticles. Experiments were also conducted using a therapeutic agent, dexamethasone (DEX), to quantify the optimal amount of drug required for inhibiting SMC proliferation. DEX-loaded PLGA nanoparticles were then formulated to study the drug release kinetics and loading efficiency of the nanoparticles.

RESULTS AND DISCUSSION

Preliminary studies were completed to determine that the optical nanoparticle size is 100 nm. Results from the cellular uptake study indicated that the optimal time and dosage for nanoparticle uptake were 2 hours and 600 µg/ml, respectively. Confocal microscopy was used to evaluate cellular uptake and confirmed that the nanoparticles were localized within cellular membranes, Figure 1. The DEX dosage study found that 100 nM was the ideal concentration required for inhibiting SMCs proliferation without leading to excessive cell death.

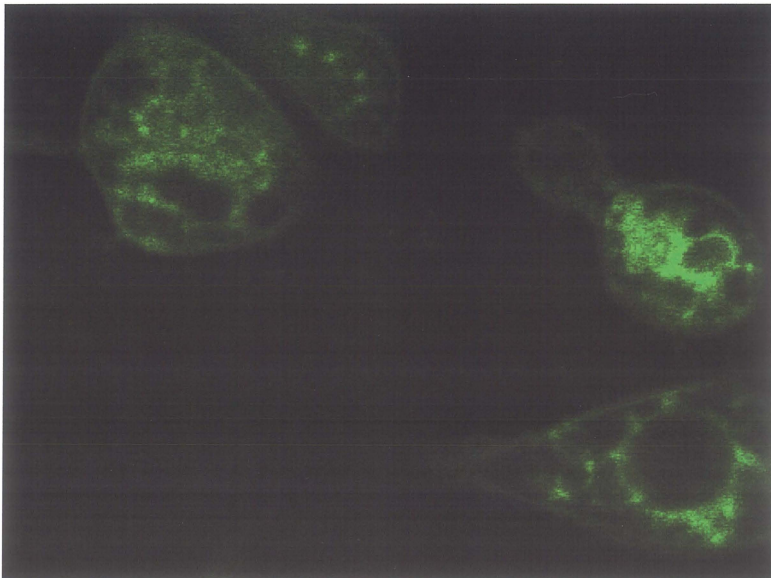


Figure 1. Images were taken using FITC filter, with a multi-track scanning option, at Ex(λ) 488 nm, Em(λ) 543 nm. Stacks were taken every 1 μ m and images were analyzed at the middle point.

CONCLUSION AND FUTURE RESEARCH

In summary, further testing needs to be performed in order to conclude the primary goal of this research. Future work on this project will include the development of biodegradable nanoparticles that can be targeted towards SMCs and provide specific delivery of therapeutic agents.

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Preparation and Characterization of Temperature-responsive Magnetic Nanoparticles Covalently Bonded with N-isopropylacrylamide Copolymer

MONET YOUSEF

Mentors: Hanli Liu, Ph.D. and Kytai Nguyen, Ph.D. (Department of Bioengineering)

INTRODUCTION AND BACKGROUND

Every year many people become victims of cancer, a disease that is characterized by uncontrolled cell division with the ability to invade other tissues. One of the cancer treatments is chemotherapy. However, a major limitation of this treatment is that it is unable to target the cancer cells, leading to destruction of both cancer cells and healthy tissues. Due to this reason the success rate of chemotherapy is very low.

The principle of this research is to develop temperature-sensitive magnetic nanoparticles in order to deliver drugs to cancer cells at a specific time within a therapeutic range. In order to achieve this goal, magnetic nanoparticle (core) will be embedded in the temperature-responsive polymer poly (N-isopropylacrylamide) (NIPA) as a shell to encapsulate anti-tumor drugs.

NIPA is a polymeric hydrogel that exists in two distinct phases, swollen and collapsed states [1-4]. NIPA gel also goes through rapid volume change above its phase transition temperature (32°C), a valuable feature in applications of magnetic drug delivery systems. In gel system, the drug is stored in the polymer and is released via switching external stimuli (temperature) on-off to control the drug amount encapsulated or released by the swelling or shrinking states [2].

METHODOLOGY AND RESULTS

For preliminary studies, NIPA nanoparticles were synthesized in aqueous micellar solution using SDS as surfactant and BIS as cross-linking agent. Using

a transmission electron microscope (TEM), the size of nanoparticles was determined to be approximately 100 ± 10 nm in diameter. The temperature responsive property of the synthesized NIPA was determined using UV-spectrophotometer. Results indicated that nanoparticles would shrink in size at 32°C. Next, in order to make a template for polymerization of NIPA on magnetic nanoparticles, magnetic nanoparticles were coated with a silane coupling agent. Size of silane-coated magnetic nanoparticles was approximately 20 ± 10 nm in diameter using TEM. These nanoparticles were further reacted with NIPA and acrylic acid to produce temperature-responsive magnetic nanoparticles, and TEM analysis showed the size of these nanoparticles as about 100 ± 10 nm in diameter (Figure 1).

DISCUSSION

Using instruments such as SEM-EDS, IR, NMR, TEM, SEM, and UV-VIS spectrophotometer, it was established that this method successfully yields the desired temperature-sensitive magnetic nanoparticles.

CONCLUSION AND FUTURE RESEARCH

Preliminary studies found that cells are able to intake nanoparticles with sizes below 500 nm, thus the size of these temperature-sensitive nanoparticles is appropriate for intracellular drug delivery. Future work will investigate the phase transition of NIPA copolymer coated magnetic nanoparticles and their drug delivery effects on cancer cells in vitro.

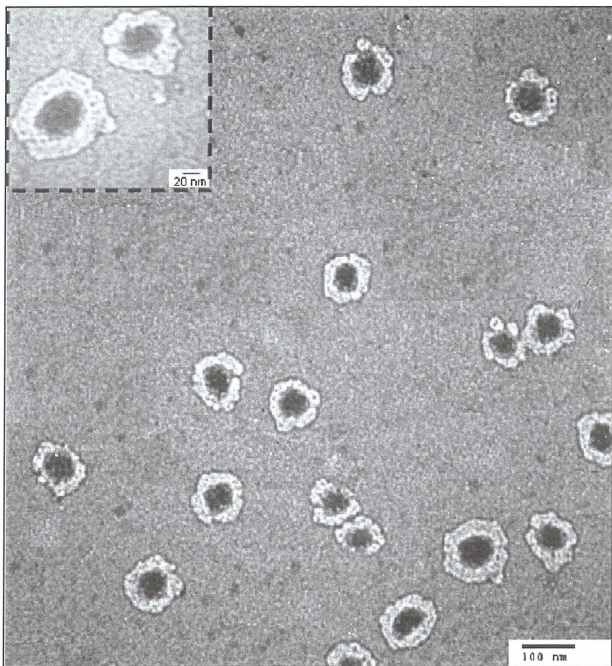


Figure 1. Transmission Electron Microscopy (TEM) of magnetic nanoparticles coated with silane, N-isopropylacrylamide, and acrylic acid. It indicates that nanoparticles are $100 \text{ nm} \pm 10 \text{ nm}$ in diameter

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