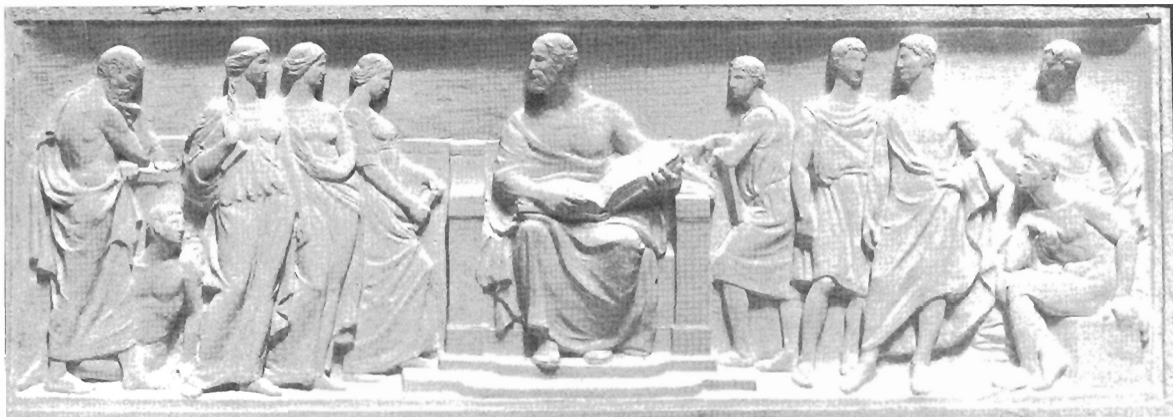


THE COLLEGE OF NEW JERSEY



JOURNAL OF STUDENT SCHOLARSHIP

VOLUME II
APRIL 1999

THE COLLEGE OF NEW JERSEY

Journal of Student Scholarship

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The College of New Jersey Journal of Student Scholarship is funded by the Office of Academic Affairs. Currently, it is published once yearly at the end of the spring semester.

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A Message from the President of The College of New Jersey

This second volume of The College of New Jersey Journal of Student Scholarship is a tangible manifestation of our commitment to a learning environment that values intellectual integrity and engagement. The individual productions by students collected herein are the result of a collaborative experience: in the classroom, the laboratory, the studio, the library, and in the creation of the learning environment itself. We challenge our students and faculty to discuss with one another and learn from one another. No longer do we confine our acknowledgement of excellent teaching or learning to the lecture hall or classroom; rather we recognize that the best that happens in the intellectual life of students permeates their lives on campus. We also acknowledge that the relationship between faculty and student is reciprocal and multi-dimensional. The productions that you will read in this journal are the result of the commitment of our faculty to developing skills and knowledge bases that will prepare students to be the leaders of their professions and their communities in the twenty-first century.

The foundation for TCNJ's special environment is a teacher-scholar model for the faculty. Excelling as both teacher and scholar, the teacher-scholar recognizes that teaching informs scholarship and scholarship informs teaching. Such a notion of scholarship for this professoriate prevents the isolation of the undergraduate from the excitement of her or his faculty member's scholarly or creative life. By assuming a mentoring relationship with undergraduates, the faculty member both molds the student as a young scholar or artist and also refines the appreciation of his or her own production as thinker or creator.

As a community we take great pride in our individual scholars (faculty and students alike) and their papers presented herein, but we take even greater pride in the environment that nurtured their production and that will promise continued creativity and intellectual excitement in the years ahead.

*R. Barbara Gitenstein
President*

A Message from the Editor

Volume II of The College of New Jersey Journal of Student Scholarship is characterized by the breadth and diversity of the student scholarship it includes. Twelve student authors present their work in ten different disciplines. This is testimony that throughout The College, students are engaged as mature learners, actively seeking to develop and expand their own expertise. In many cases these students are discovering new information to add to the knowledge base in their own disciplines. It is my hope that the TCNJ Journal of Student Scholarship will grow and develop along with our students and continue to be a showcase for their work in the years to come.

It is always a difficult job for editorial staff to make choices about what to include, and what not to include, in a volume. In the case of this journal, the choices were especially hard, because all of the work submitted was of very high quality. Unfortunately, there are always some student-authors who will be disappointed because their submitted work was not included. I hope that these students will remember that our decision in no way diminishes the importance of their work—in all cases submissions were sponsored by faculty members who believed the work was of very high quality. I congratulate those students and I encourage them to continue to pursue their very worthwhile scholarly endeavors.

I want to thank the faculty reviewers who graciously took the time during winter break to carefully review student submissions. Their work was invaluable. I also want to commend the student authors for their professionalism, their willingness to work with me on short deadlines, and their always-gracious responses to my suggestions for changes. I would also like to thank the editorial team, Helma de Vries and Bill DeMerit for the many hours of time and thought that they each devoted to this volume.

I continue to receive many helpful suggestions about the process of publishing this journal from faculty and students alike. I know that the current deadline (early January) has been difficult for some students. This deadline is in place to ensure that the journal will be published in April before students graduate or leave campus for the summer. In order to meet the needs of students who find a January deadline difficult, we are instituting a second deadline in early June. Manuscripts submitted in June and January will be considered for publication the following April. In the future we hope to publish two issues for each yearly volume so that all student authors will get to see their work in print before they graduate.

This year I began working with a student editor, Helma de Vries, who has been a very valuable member of the editorial team. This position will be available again for Academic Year 1999–2000, and can carry academic credit as an internship or independent study. I encourage students who are interested to contact me for more information.

I offer my heartfelt congratulations to all students at The College of New Jersey who are pursuing scholarly and creative projects and I encourage them to consider this journal as an outlet for their work.

*MaryAnn Baenninger
Editor, TCNJ Journal of Student Scholarship*

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Multifunds: Overpriced Diversity?

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ABSTRACT

This decade has witnessed the resurgence of an investment vehicle that originated in the 1960s: multifunds (a.k.a. funds of funds). Instead of investing in stocks or bonds, these funds invest in other mutual funds. Multifunds offer investors the ability to diversify their portfolios without having to buy positions in numerous investment vehicles. Their popularity has skyrocketed because they offer indecisive investors the convenience of not having to pick and choose their own mix of funds. According to the investment information firm Morningstar, Inc., there are presently forty-six multifunds being offered to the investing public, of which only six have been in existence for at least ten years.

INTRODUCTION

Multifunds had quite an inauspicious beginning because of an entrepreneur named Bernie Cornfeld. In 1956, he founded a small company, Investors' Overseas Services (IOS); it quickly grew into an international conglomerate. The company specialized in selling mutual fund investment programs to United States citizens living overseas. "Starting from point zero, Bernie amassed a personal fortune of more than \$100 million that came out of a corporate combination that counted more than 1,000,000 customers in 126 countries, staffed by nearly 20,000 employees and salesmen" (Cantor 8). His billion-dollar mutual fund operation was the first to offer multifunds to the investing public. Unfortunately, by the early

1970s the investment company began to fall apart due to poor management and fraudulent activities. When the company folded, so did the existing multifunds.

Most present-day multifunds invest in mutual funds outside of their own families. For example, American Pension Growth Fund invests in mutual funds such as T. Rowe Price Equity Fund and Putnam Voyager Fund but not in other funds offered by American Pension. Investors wanting to buy positions in multifunds that invest outside their own families must be willing to pay two layers of expenses. The first layer is a compilation of fees charged by each individual mutual fund that is held in the multifund's portfolio. The second layer is the fee assessed by the manager of the multifund for overseeing the portfolio.

A few alternatives are available to investors who want to own shares of multifunds without paying two layers of expenses. A small number of multifunds invest only in mutual funds within their own families, thereby eliminating the second layer of expense. For example, Vanguard Star Fund has positions in Vanguard Windsor II Fund and Vanguard Explorer Fund, as well as seven other Vanguard funds. Shareholders pay only the fees assessed by the underlying mutual funds,

Author's Note: This paper was submitted in partial fulfillment of the requirements of BFIN 495-Senior Thesis in Finance. Dr. Herbert B. Mayo is a professor of finance. A 1998 graduate of The College of New Jersey, Timothy J. Lepore majored in finance and is currently a commercial credit analyst at Summit Bank in South Brunswick, New Jersey.

as if they had invested in these funds directly. Many individuals question whether multifunds that invest outside their own families are worth the additional costs. If multifunds do not outperform the market, it may be better for investors to buy shares of mutual funds that seek to duplicate the composition of a market index, such as the Standard & Poor's 500 stock index. This would allow investors to diversify their portfolios while only paying one layer of expense.

In order to examine the performance of multifunds in comparison to the S & P 500 stock index, three- and five-year annualized returns were obtained from Value Line, Inc., and then compared to the returns on the S & P 500 stock index. Table 1 presents a list of multifunds, their three- and five-year annualized returns and beta coefficients, and the returns on the S & P 500 stock index.

Table 1. Average Annual Return and Risk

Listed Alphabetically	3 Year Return*	5 Year Return**	3 Year Beta*	5 Year Beta**
American Pension Capital Income	28.95	19.28	0.61	0.67
American Pension Growth	12.84	10.66	0.77	0.82
Flex-Muirfield Fund	16.80	12.23	0.80	0.69
FundManager Growth With Income	24.46	17.20	0.85	0.83
FundManager Portfolios Growth	24.99	17.40	0.87	0.86
Merriman Asset Allocation	8.95	8.49	0.49	0.45
Merriman Capital Appreciation	11.23	7.68	0.66	0.60
Merriman Flexible Bond	9.30	7.90	0.46	0.44
Merriman Growth & Income	15.26	9.68	0.60	0.53
New Century Capital	22.87	16.50	0.79	0.81
Righttime	11.11	8.43	0.46	0.40
T. Rowe Price Spectrum Growth	22.63	18.06	0.77	0.79
T. Rowe Price Spectrum Income	13.08	9.95	0.79	0.80
S & P 500 Stock Index	31.29	21.03	1.0	1.0
Vanguard STAR	21.97	15.32	0.59	0.62

* For the three years ended December 31, 1997.

** For the five years ended December 31, 1997.

Source: Value Line.

The S & P 500 stock index outperformed all fourteen of these multifunds on an absolute basis. American Pension Capital Income Fund had the best returns of the multifunds but underperformed the market by 2.34% and 1.75% annually over three years and five years. The worst performer, Merriman Flexible Bond Fund, earned only 8.95% annually over three years and 8.49% annually over five years.

Although the absolute performance of these multifunds was poor, their level of risk

has not been considered. To determine the relative performance of these multifunds in comparison to the S & P 500 stock index, their returns have to be calculated on a risk-adjusted basis. The Treynor index, which measures a portfolio's risk-adjusted performance by standardizing its return in excess of a risk-free rate by the portfolio's systematic risk, is a means to rank risk-adjusted performance. The index is calculated by subtracting the risk-free rate from the multifund's realized return and then dividing the result by the multifund's beta coefficient. For example, if multifund X has a return of 13% when the risk-free rate is 6%, and the portfolio's beta coefficient is 1.2, the Treynor index is 0.0583. If, during the same time period, multifund Y has a return of 11% and a beta coefficient of 0.7, the Treynor index is 0.0714. Although multifund X outperformed multifund Y on an absolute basis, the index indicates that multifund Y outperformed multifund X on a risk-adjusted basis. To evaluate how multifund X and Y performed in comparison to the market, the Treynor index can be computed for the market by subtracting the risk-free rate from the market return, and dividing the result by the market's beta coefficient, which is always 1.0.

The Treynor index was computed for these fourteen multifunds using their three- and five-year annualized returns and beta coefficients. The Treynor index was also computed for the market using the annualized returns of the S & P 500 stock index over the same time period. The risk-free rates used in the equations were the three- and five-year annualized returns offered by United States Treasury Bills. According to Ibbotson Associates, the three-year risk-free rate was 5.36%, and the five-year risk-free rate was 4.57%.

The Treynor index rankings for these multifunds (Table 2) indicate that almost all were outperformed by the S & P 500 stock index. After adjusting for risk, only one multifund outperformed the S & P 500 stock index over a three-year time period (American Pension Capital Income Fund),

and only two multifunds outperformed the S & P 500 stock index over a five-year time period (American Pension Capital Income Fund and T. Rowe Price Spectrum Growth Fund). Not only did many of these multifunds underperform the market, most did not come close to it. For example, the five-year Treynor index ranking for the Merriman Capital Appreciation Fund was only 0.0871 as opposed to the Treynor index ranking of 0.1734 for the market.

Table 2.

Listed Alphabetically	3 year	5 year
American Pension Capital Income	0.3867	0.2196
American Pension Growth	0.0971	0.0743
Flex-Muirfield Fund	0.1430	0.1110
FundManager Growth With Income	0.2247	0.1522
FundManager Portfolios Growth	0.2256	0.1492
Merriman Asset Allocation	0.0733	0.0871
Merriman Capital Appreciation	0.0889	0.0518
Merriman Flexible Bond	0.0857	0.0757
Merriman Growth & Income	0.1650	0.0964
New Century Capital	0.2216	0.1473
Righttime	0.1250	0.0965
T. Rowe Price Spectrum Growth	0.2243	0.1708
T. Rowe Price Spectrum Income	0.0977	0.0673
S & P 500 Stock Index	0.2593	0.1646
Vanguard STAR	0.2815	0.1734

The results of the Treynor index rankings provided conclusive evidence that these multifunds did not maximize their returns given their level of risk. The S & P 500 stock index outperformed almost every multifund on both an absolute and a risk-adjusted basis. Although these multifunds offered investors a prepackaged diversified portfolio, their three and five year annualized returns did not justify their high costs. The two layers of expenses charged by most of these multifunds eroded their returns and caused many of them to underperform the market. Based on the historical returns of these multifunds, investors should buy shares of mutual funds that seek to duplicate the composition of the market. By investing in a market index fund, investors would avoid having to select their own mix of funds, while increasing their chances of earning higher returns.

REFERENCES

Bell, Allison. "Funds of Funds Organizers See Growth By 2000." *National Underwriter*. Life & Health/Financial Services Edition. V. 101. 17 Mar. 1997. 12.

- Brandstrader, J. R. "Funds of Funds: One Size Fits All." *Barron's*. V. 75. 10 Apr. 1995. F18-F19.
- Cantor, Bert. *The Bernie Cornfeld Story*. New York: Lyle Stuart, Inc., 1970.
- Fabozzi, Frank J. *Investment Management*. New York: Prentice Hall, Inc., 1995. 626-644.
- Fredman, Albert J. and Russ Wiles. *How Mutual Funds Work*. Second Edition. New York Institute of Finance. New York: Prentice Hall, Inc., 1998. 148-161.
- Ibbotson Associates. *Stocks, Bonds, Bills, and Inflation (S&BBI) 1998 Yearbook*. Chicago. 1998.
- Laderman, Jeffrey M. "A Bunch of Funds Rolled into One." *Business Week*. 29 Sept. 1997. 57.
- Martin, Josh. "Keep Your Distance." *Euromoney*. Apr. 1996. 17.
- Mayo, Herbert B. *Investments: An Introduction*. Fifth Edition. New York: The Dryden Press, 1997. 846-848.
- McGough, Robert. "Funds of Funds Are Multiplying Quickly but Bring Along a Lackluster History Containing Some Memorable Disasters." *Wall Street Journal*. 5 Apr. 1995. R9.
- Naese, Susan. "New Approaches Aid Small Endowments: Open Doors to Alternative Investments." *Pensions & Investments*. V. 25. 7 Jul. 1997. 58.
- Raw, Charles. "Do You Sincerely Want to Be Rich?" *The Full Story of Bernie Cornfeld and IOS*. V. xii. Viking Press, 1971.
- Stark, Ellen. "Funds That Serve You Everything on One Plate." *Money*. V. 24. Dec. 1995. 54-55.
- Treynor, Jack. "How to Rate Management of Investment Funds." *Harvard Business Review*. Jan.-Feb. 1965. 63-75.
- Yee, David. "The Ghost of Bernie Cornfeld." *Financial World*. V. 164. 25 Apr. 1995. 71-74.

Otitis Media with Effusion in Young Children and its Effects on Language Development and Learning

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ABSTRACT

Otitis media (commonly referred to as "ear infection") is a ubiquitous and often recurring childhood disease. The author reviews the evidence that early otitis media is causal in the development of linguistic and cognitive impairments later in childhood.

INTRODUCTION

Otitis media (OM) is one of the most common childhood diseases aside from the common cold, with estimates that fifty to seventy-five percent of children have at least one episode in the first year of life (Roberts, 1997). Many infants suffer from multiple episodes of acute otitis media; some spend months with effusions in one or both ears (Teele et al., 1990). Although the severe pyogenic complications of untreated otitis are now rarely seen, many cases do not resolve promptly with antibiotic therapy. Middle ear effusion often persists after an initial episode with resultant recurrent otitis or chronic otitis media with effusion (Wright et al., 1988). Approximately one-third of children enrolled in speech and language therapy have a history of recurrent middle ear disease (Friel-Patti, 1990).

Otitis media is an inflammation of the middle ear, and can include the eustachian tube and mastoid process, that can occur in one or both ears. Two common forms of otitis media are acute otitis media (AOM) and serous otitis media or otitis media with effusion (OME). When AOM is present, the middle ear is infected and symptoms such as fever, congestion, and pain may be present. The eardrum

may appear red and bulging, with puslike fluid visible behind the eardrum. It has a sudden onset and usually is of short duration (Medley, Roberts, & Zeisel, 1995; Watt, Roberts, & Zeisel, 1993).

OME is the presence of noninfectious, watery or mucous-like fluid (effusion) in the middle ear. It has no acute signs or symptoms but may present subtle symptoms such as inattention or a hearing loss for as long as the fluid is present. This fluid may be a remnant of an episode of AOM, or it may develop following an upper respiratory infection, such as a cold. The reason OME is a concern is that the fluid may last for weeks or months (Medley et al., 1995; Watt et al., 1993).

OME is not itself contagious, but it can be contracted from germs, bacteria, and viruses, which are easily spread in early childhood settings. OME can result when any of these agents spread up the eustachian tube from the mouth and nose into the middle ear. The eustachian tube, which usually functions to aerate the middle ear and allow fluid to drain into the nose and throat, may then swell, closing off the drainage pathway and trapping fluid (effusion) in the middle ear. OME can also remain after AOM resolves. A child may go back and forth between AOM

Author's Note: This paper was submitted in partial fulfillment of the requirements for SPAU 532-Physiological Aspects of Hearing Pathologies, supervised by Dr. William O. Jones, a professor of language and communication sciences. Chana B. Lerner, a graduate student in the Department of Language and Communications Sciences, is majoring in audiology.

and OME indefinitely until the effusion can drain (Medley et al., 1995).

When a child has AOM, a ten-day course of antibiotics is usually prescribed. In most cases, antibiotics clear up the acute symptoms, such as fever and earache, within two to three days (Medley et al., 1995; Watt et al., 1993). Antibiotics selected for the treatment of AOM should be active against the common middle ear bacterial pathogens: pneumococcus, *H. influenzae*, *B. catarrhalis*, and group A streptococcus (Giebink & Daly, 1990). A longer course of antibiotics may be prescribed if the child has frequent infections.

For children with persistent OME, medical management is somewhat controversial and can include antibiotics, tympanostomy tubes, or watchful waiting until the effusion resolves without any medical intervention. Tympanostomy tubes involve surgical insertion under general anesthesia of a tube or grommet through the tympanic membrane between the outer and middle ear to help drain the fluid and allow for ventilation of the middle ear space. Tympanostomy tubes typically allow hearing levels to return to a normal range. They usually stay in place for 6 to 12 months (Medley et al., 1995).

Moreover, adjunctive therapies such as decongestant, antihistamine, steroidal and nonsteroidal anti-inflammatory, and topical drugs (ear drops) in addition to myringotomy and adenoidectomy have been advocated by some in treating acute and recurrent OM (Giebink & Daly, 1990).

A variety of child-related factors appear to play a role in OM. These include age, with a higher incidence in younger children (birth to age 6); age at onset of first infection, with early age (before age one) increasing risk for repeated infections and OME; family history of OM and gender, with males having a somewhat higher incidence. In addition, race may play a role, with Native Americans, Eskimos, and Latinos at higher risk for OM than Caucasians, who are at higher risk than African Americans. Certain congenital anomalies also increase the incidence of OM

because these syndromes involve malformations of the skull that affect the middle ear. These include Down syndrome, cleft lip or cleft palate, Turner syndrome, Alpert syndrome, Williams syndrome, fragile X syndrome, fetal alcohol syndrome, some other craniofacial syndromes, and autism.

Factors external to the child can also increase the incidence of OME, including attendance in group childcare programs and seasonal variation, with more prevalence in the winter and spring. Other risk factors are upper respiratory infections and colds; bottle feeding, particularly in a reclining position; exposure to secondhand smoke, poor hygiene, or a crowded household; and HIV infection (Medley et al., 1995; Watt et al., 1993).

In addition to the discomfort experienced by those suffering from the disease, data suggest that mild-moderate, fluctuating conductive hearing loss is a frequent accompaniment to OM, although the extent of loss varies across children (Roberts, 1997). The hearing loss is caused by fluid in the middle ear pressing against the eardrum, hindering its movement and reducing or dampening the way sound is heard (Medley et al., 1995). The fluid restricts the vibration of the ossicles, which affects how well sound travels (Watt et al., 1993).

Recurrent periods of partial auditory deprivation in early childhood occur at the critical time language and other skills are acquired. Speech-language pathologists and audiologists have focused on OM because of a hypothesized linkage between persistent or frequent OM during early childhood and later language difficulties (Roberts, Burchinal, Davis, Collier, & Henderson, 1991). The fluctuating nature of these conductive hearing losses has led some investigators to suggest that the impact upon language development may be even greater in children with otitis media than in those with a stable hearing loss (Wallace, McCarton, et al., 1988). Many studies performed to address these concerns have come to conflicting conclusions.

Two general positions on the relationship predominate. The No Effects position holds that speech and language should not be significantly affected by OM because the hearing loss is only mild to moderate and the transient nature of the loss allows for periods of normal hearing in which children can “catch up” (Roberts, 1997). The minimal reduction in either the quantity or quality of auditory stimulation need not interrupt the acquisition of language, because the infant can actively search out alternative sources of information (Friel-Patti & Finitzo, 1990).

The Effects position holds that speech and language should be significantly affected by OM, particularly when OM occurs early. In contrast to the preschool child whose established knowledge of language is available to compensate for the 10–40 dB loss associated with OM, similar losses in infants 6–18 months old may have an amplified effect (Roberts, 1997). Infants and young children need high-quality auditory input during language acquisition. A mild hearing loss may be more than a mild impairment when experienced by an infant or young child (Friel-Patti, 1990).

Friel-Patti (1990) notes that infants as a group have a greater reduction in auditory capability during episodes of OME and that they do not respond to sound until it is presented at higher intensity levels than are required by older children with OME. The conductive hearing loss associated with OM overlays the developmental requirement for greater stimulus intensity before the infant can either respond to or discriminate speech. Even if a child can discriminate speech sounds in a test condition, it cannot be concluded that the hearing loss is irrelevant to comprehension of language. The implication is that, if a person has to concentrate hard to perceive a degraded signal, the capacity for deeper language processing is reduced. The conductive hearing loss may well not be severe enough to affect the perception of language, but it may nonetheless impair comprehension.

A child learns language by listening to the stream of speech sounds in the environment, attaching meanings to these sounds, and then abstracting the rules of language (Roberts, Sanyal, et al., 1986). The child who experiences changes in hearing sensitivity can receive a partial or inconsistent auditory signal and thus miss or confuse important auditory information. A child with repeated episodes of OM with varying degrees of hearing loss could then experience changes in the input to the database upon which language develops (Roberts, 1997). Early transient hearing loss may present the child with a signal that is unstable and difficult to process, hampering the fundamental acquisitions occurring in the crucial period preceding 18 months old. Moreover, the effects of these early delays may persist into the early school years (Roberts, 1997).

Long before children begin to speak, they are able to make fine phonetic discriminations to distinguish the speech sounds of the language around them. During early language acquisition, the child learns the sound system as well as how to form such things as plurals and past tense. This requires hearing the difference between words such as “plays” and “place” or “help” and “helped.” An inconsistent auditory signal resulting from fluctuating hearing loss may make the stream of speech difficult to segment and may impede the child’s ability to form such linguistic categories (Friel-Patti, 1990).

When a young child has a hearing loss, he or she may have difficulty discriminating sounds (pig and big may sound the same), learning grammar (cat and cats may sound the same), and hearing intonation (cookie? and cookie may sound the same). Thus, if the hearing loss persists, a child may have difficulty picking up new words and figuring out the rules for using language. A child’s language may be delayed if OME persists over a period of time (Watt et al., 1993).

Several studies have found a relationship between an early history of OM and later problems in language development. For

instance, Teele et al. (1990) studied 207 children from birth to age seven years. They found that estimated time spent with OME during the first three years of life was significantly associated with lower scores on tests of cognitive ability, speech and language, school performance, verbal and IQ scores, mathematics and reading, articulation, and use of morphologic markers at age 7 years. Since there is so much development occurring in infancy, any impediment to reception or interpretation of auditory stimuli might have an adverse effect. Softer speech sounds and voiceless consonants may be missed or confused when hearing loss is as little as 10-20 dB. Time spent with OME after age 3 years was not a significant predictor of scores on any of the tests administered.

Friel-Patti & Finitzo (1990) also found a relationship between hearing and language. Hearing from 6-12 months is significantly related to language, beginning with receptive language at 12 months. At 18 and 24 months, both receptive and expressive language are significantly related to average hearing from 6-18 months. Better language is associated with better average hearing levels. These findings suggest that the relationship between OME and language is mediated by hearing.

Groenen, Crul, Maassen, & van Bon (1996) found long-term difficulties with categorization in 9-year-old children with early OME, suggesting poorer phonetic processing. Further, discrimination results demonstrate that children with early OME also have poorer sensitivity to voicing cues than children without OME. Children with OME appear to need more redundancy of auditory information. Disturbances in lower-level perception may have diverse effects on higher-order language learning processes. They suggest that these disturbances in lower-level perception processes form the basis for higher-order linguistic problems in some children and thereby mediate between OME and the diversity of outcome in language learning.

Roberts (1997) had similar findings when studying 14-16 month-old infants with a history of OM. He found that even mild hearing loss occurring periodically over time may have a measurable adverse effect on categorical responding by infants. Even small disruptions of hearing have amplified effects early in development. Moreover, these effects on categorical responding appeared to persist over a lengthy period after normal hearing was restored. Although additional time with normal hearing may eventually result in "catching up," this may not occur quickly or flexibly enough to avoid consequential effects on important language behaviors.

Results of infant studies indicate that there is a relationship between bilateral episodes of otitis media during the first year of life and expressive language development. Impairments in language expression may be evident as early as one year of age in children with OM. However, no significant impairments were detected for receptive language abilities. It is not just a specific degree of hearing loss that leads to language impairment. Rather, the presence or recurrence of OME may be considered a condition sufficient to cause language dysfunction. Given these findings, it may be useful to screen infants experiencing frequent episodes of OM because there appears to be a relationship with the emergence of language. Further, it may be appropriate to consider early language stimulation programs for infants who are prone to recurrent middle ear disease (Wallace, Gravel, McCarton, & Ruben, 1988; Wallace, McCarton, et al., 1988).

To explain the lack of receptive language impairment, Wallace, McCarton, et al. (1988) add that only as the child matures do receptive strategies rely more heavily on verbal features than on prosodic features. Phonemic distinctions that signal differences between words are more subtle than suprasegmental aspects of speech and may indeed be compromised by middle ear effusion. However, it is not until after one year that assessment scales can accurately examine such receptive

abilities. It seems possible that comparisons will be more interpretable when the children are older and can be assessed with measures of receptive language that have more items involving semantic and syntactic knowledge.

The results of preschool testing performed by Gravel & Wallace (1992) demonstrate a relationship between a history of early recurrent OM and performance on a competitive listening task. Children who had numerous episodes of OM in the first year of life performed more poorly when listening to sentence material in the presence of background competition than did children who were considered otitis negative during the same period. Thus, early recurrent OM appears to affect children's higher level auditory abilities (selective auditory attention and discrimination of speech in noise) at later ages, even when peripheral sensitivity and middle ear function are normal. This could subsequently lead to verbally-based learning disorders. No significant differences were detected on cognitive or language measures as a function of early OM. The task of speech-in-competition is similar to the situation in classroom environments in which children must attend to a primary message and ignore a competing (potentially distracting) phrase. This suggests that auditory attention is affected deleteriously by an early history of recurrent OM.

Paden, Novak, & Beiter (1987) recognized that the restoration of a more adequate level of hearing, as a consequence of relief from middle ear effusion, contributes importantly to normal phonologic development. In addition, younger ages of first diagnosis of OME were generally associated with lower phonologic adequacy, whereas younger ages of remission were associated with higher phonologic adequacy scores.

A study of late talkers with a history of OM before age 3 shows a greater risk for prolonged difficulties with articulation (Paul, Lynn, & Lohr-Flanders, 1993). However, no differences in expressive language outcomes at age 4 years could be attributed to history

of OM. Inconsistent auditory input due to fluctuating hearing losses that accompany OM may negatively affect the child's ability to establish underlying features for consonants in early syllable production. Delays in the stabilization of these features would delay the acquisition of other features that normally build upon the earlier ones. These cascading delays may result in chronic articulation deficits. Expressive language, on the other hand, which receives inputs from many mental systems and can take advantage of cognitive, social, and linguistic development, may be more buffered from long-term effects. Pragmatic strategies may help the child to make sense of and produce connected discourse, whereas accurate articulation may rely more fully on a stable auditory image of the target production. Thus, the child may be able to compensate for early deficits in auditory input when acquiring sentence production skills in ways that are not available in the area of phonological production (Paul et al., 1993).

For children developing language normally, Paul et al. (1993) found no evidence of increased risk for speech or expressive language delay that can be attributed to chronic OM during the first three years of life. This suggests that decisions about treatment for OM in young children with normally developing language should be made on the basis of general health considerations and not as a necessity for preventing language delay.

Lonigan, Fischel, Whitehurst, Arnold, & Valdez-Menchaca (1992) also found that children with persistent OM from 18-24 months had significantly poorer articulation than children with fewer episodes of OM. However, they report that if any expressive delay occurs, the child will begin to talk when the disease subsides.

Findings from Roberts, Burchinal, et al. (1991) suggest that a history of early OME does not have a major negative impact on the language performance from 4.5-6 years in children from low-middle socioeconomic status families. Similarly, a study by Roberts,

Sanyal, et al. (1986) found no evidence of associations between measures of early childhood OM and verbal or academic functioning. Results of Wright et al. (1988) are in excellent agreement as well. They found recurrent OM induced a temporary decrease in hearing sensitivity demonstrable at 2 years of age, which appeared to resolve as the children matured and which was not associated with delay in language acquisition.

The findings which fail to support the hypothesis that early OME is related to later language performance are inconsistent with many previous studies. Despite the number of similar findings, there is not universal agreement as to the sequelae of OM. This lack of consensus is due in part to the flaws inherent in the research designs of many investigations, such as studying a nonrepresentative population, using a retrospective design, or failing to control for confounding variables (Teele et al., 1990; Wallace, McCarton, et al., 1988). Many studies have relied upon parents' retrospective reports of children's experience with OM. Given the potential sources of error in these reports, their reliability and validity is questionable. Other studies have used language measures of questionable psychometric properties and applicability, making it difficult to interpret studies. Finally, many studies have had extremely restricted sample sizes and resultant statistical power problems (Lonigan et al., 1992).

In explanation for the failure to identify relationships between OM and cognitive or academic outcome measures, one must be aware that standardized tests of intelligence and academic achievement may not be sensitive to the patterns of developmental differences that accompany prolonged early OME. Children with OME may have had difficulty with domains of verbal functioning which were not tested adequately by the standardized tests used here (Roberts, Sanyal, et al., 1986).

Possibly, there are common underlying factors predisposing children to both OM and lowered scores on tests administered. It might also be that a child who is frequently

ill might be treated differently by a parent. Such differences could equally well account for later problems of intellectual ability, speech, or language. Despite these reservations about a causal relationship between OM and development, it is reasonable to conclude that any intervention that would prevent recurrent ear disease might help prevent later disability (Teele et al., 1990).

Even though it is not clear yet whether children who experience persistent OME in early childhood will show developmental consequences, it is necessary to provide an optimal health and educational environment for all children experiencing OME. Although OME is only one of many factors influencing children's language and learning, its possible consequences warrant attention and early intervention. Educators can play a significant role in addressing issues related to OME. They can a) promote healthy practices in the classroom to reduce possible episodes of OME; b) identify signs of OME and hearing loss and suggest referrals where appropriate; c) address the effects of OME in the classroom; d) provide an environment that facilitates hearing; and e) maintain an environment that encourages language learning (Medley et al., 1993).

The effect of the sequelae on language development is a very important question. If it were proven that recurrent OM leads to hearing loss, which in turn leads to language delay and learning disability, the gravity of childhood OM would be greatly magnified (Wright et al., 1988). Whether one believes that early OME is catastrophic for the development of communicative competence or that the resilience of the child eventually triumphs, the need for methodologically done research in this area is accepted by both sides (Friel-Patti & Finitzo, 1990).

REFERENCES

- Friel-Patti, S. (1990). Otitis media with effusion and the development of language: A review of the evidence. *Topics in Language Disorders*, 11, 11-22.
- Friel-Patti, S., & Finitzo, T. (1990). Language learning in a prospective study of otitis media with effusion in the first two years of life. *Journal of Speech and Hearing Research*, 33, 188-194.
- Giebink, G.S., & Daly, K. (1990). Epidemiology and management of otitis media in children. *Topics in Language Disorders*, 11, 1-10.
- Gravel, J.S., & Wallace, I.F. (1992). Listening and language at four years of age: Effects of early otitis media. *Journal of Speech and Hearing Research*, 35, 588-595.
- Groenen, P., Crul, T., Maassen, B., & van Bon, W. (1996). Perception of voicing cues by children with early otitis media with and without language impairment. *Journal of Speech and Hearing Research*, 39, 43-54.
- Lonigan, C.J., Fischel, J.E., Whitehurst, G.J., Arnold, D.S., & Valdez-Menchaca, M.C. (1992). The role of otitis media in the development of expressive language disorder. *Developmental Psychology*, 28, 430-440.
- Medley, L.P., Roberts, J.E., & Zeisel, S.A. (1995). At-risk children and otitis media with effusion: Management issues for the early childhood special educator. *Topics in Early Childhood Special Education*, 15, 44-64.
- Paden, E.P., Novak, M.A., & Beiter, A.L. (1987). Predictors of phonologic inadequacy in young children prone to otitis media. *Journal of Speech and Hearing Disorders*, 52, 232-242.
- Paul, R., Lynn, T.F., & Lohr-Flanders, M. (1993). History of middle ear involvement and speech/language development in late talkers. *Journal of Speech and Hearing Research*, 36, 1055-1062.
- Roberts, J.E., Burchinal, M.R., Davis, B.P., Collier, A.M., & Henderson, F.W. (1991). Otitis media in early childhood and later language. *Journal of Speech and Hearing Research*, 34, 1158-1168.
- Roberts, J.E., Sanyal, M.A., Burchinal, M.R., Collier, A.M., Ramey, C.T., & Henderson, F.W. (1986). Otitis media in early childhood and its relationship to later verbal and academic performance. *Pediatrics*, 78, 423-429.
- Roberts, K. (1997). A preliminary account of the effect of otitis media on 15-month olds' categorization and some implications for early learning. *Journal of Speech, Language, and Hearing Research*, 40, 508-518.
- Teele, D.W., Klein, J.O., Chase, C., Menyuk, P., Rosner, B.A., and the Greater Boston Otitis Media Study Group. (1990). Otitis media in infancy and intellectual ability, school achievement, speech, and language at age seven years. *The Journal of Infectious Diseases*, 162, 685-694.
- Wallace, I.F., Gravel, J.S., McCarton, C.M., & Ruben, R.J. (1988). Otitis media and language development at one year of age. *Journal of Speech and Hearing Disorders*, 53, 245-251.
- Wallace, I.F., McCarton, C.M., Bernstein, R.S., Gravel, J.S., Stapells, D.R., & Ruben, R.J. (1988). Otitis media, auditory sensitivity, and language outcomes at one year. *Laryngoscope*, 98, 64-69.
- Watt, M.R., Roberts, J.E., & Zeisel, S.A. (1993). Ear infections in young children: The role of the early childhood educator. *Young Children*, 49, 65-71.
- Wright, P.F., Sell, S.H., McConnell, K.B., Sitton, A.B., Thompson, J., Vaughn, W.K., & Bess, F.H. (1988). Impact of recurrent otitis media on middle ear function, hearing, and language. *The Journal of Pediatrics*, 113, 581-586.

Two Tales of Adultery: The Politics of Perspective in D.H. Lawrence's *Lady Chatterly's Lover* and Jane Campion's *The Piano*

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ABSTRACT

This paper argues that Jane Campion's film, *The Piano*, is a feminist rewriting of D. H. Lawrence's controversial novel, *Lady Chatterly's Lover*. Both works are tales of extramarital female adultery. Lawrence's novel tells the tale of Connie Chatterly's affair with Oliver Mellors, the educated gamekeeper with a unique perspective on society and sex. Campion's film tells a similar story of a woman, Ada, who enters an adulterous relationship as rebellion against the confines of marriage. *The Piano*, however, is told from a perspective that identifies more with the female protagonist than the male. The result is the feminization of Lawrence's masculinist masterpiece.

INTRODUCTION

Coincidentally, the best known works of both the novelist D. H. Lawrence and the screenwriter Jane Campion focus on female adultery. *Lady Chatterly's Lover* is a tale of the sexual and social awakening of Connie, Lady Chatterly, through her extramarital relationship with her husband's gamekeeper, Oliver Mellors. As he guides Connie, Mellors gives voice to Lawrence's loathing for the state of industrialized mankind and his belief in the salvation that sex provides. *The Piano*, like *Lady Chatterly's Lover*, is a story of the sexual awakening of its female protagonist through her relationship to an extramarital lover, George Baines, who, like Mellors, occupies a subservient social role to her husband, the colonist Alisdair Stewart. However,

Lawrence's supposedly "progressive" view of sexuality is full of masculinist bias, while Campion's tale has a decidedly feminist skew. Considering the similarities between the two texts in light of the difference in gender perspective, I believe that Campion's *The Piano* is a feminist rewriting of D. H. Lawrence's controversial novel.

In *Lady Chatterly's Lover*, Connie is introduced as a once-lively Scottish woman whose spirit and vitality have been dampened by the years of a sterile marriage to an impotent, indolent cynic, Clifford, Lord Chatterly. Connie's opportunity to shake off her melancholy comes in the form of Oliver Mellors, her husband's gamekeeper, whom she meets during one of her many walks. Mellors is a unique individual. A man of education but not distinction, he was long ago discouraged, both by what the world had to offer and by previous sexual relationships. He retreated to the lowly post of gamekeeper at Wragby, the Chatterly estate. There, he hoped to find peace in celibacy and physical labor. Eventually his desire overtakes him, and he and Connie become lovers. While at first she is there only in body, she soon starts to crave not only physical and emotional contact with him, but also intellectual

Author's Note: This paper was submitted in partial fulfillment of the requirements of both WGST 310-Men and Masculinity: Literary Perspectives and WGST 499-Independent Study in Women's and Gender Studies. Dr. John Landreau is an assistant professor of modern languages. Janene Mecca is an English major.

contact. Connie becomes living proof of his main philosophy: “that the clue to all living and to all moving-on into new living lay in the vivid blood-relation between man and woman” (Spilka 177). She blossoms under his tutelage, learning to cast off the shackles of a society run by Clifford Chatterlys.

Ada, the heroine of *The Piano*, is Scottish, like Connie. She is mute by her own volition, has just married a stranger and is travelling to his home in New Zealand. She brings her piano, her only voice, and an illegitimate daughter, Flora, who is ten years old. Shortly after she arrives, her husband, Alisdair Stewart, trades her piano to a Maori-identified European, George Baines. She is hurt by the injustice but Ada, ever strong-willed, makes an arrangement with Baines to reclaim her piano. Under the pretense of piano lessons, she “earns” back her piano by allowing Baines to “do [sexual] things” while she plays. Ultimately, Baines gives back the piano and calls off the deal because, as he says, she does not care for him the way he cares for her. But after this break, she realizes just how strongly her feelings have grown toward him. Eventually, like Connie, she seeks to escape the control of her husband and her marriage.

The analysis begins with a comparison of the two husbands and a discussion of their ironic masculinities, followed by an in-depth look at the women’s lovers, Mellors and Baines. Subsequently, the main female characters, Connie and Ada, are considered in light of their conflicting subordination and resistance to male power and the desires that led them into adulterous affairs. Finally, I take a look into the political motivations within both works, including shared themes and the politics of perspective.

Effeminate Male Power: The Husbands

Both husbands are in positions of power. Clifford is from a family of established money and power, even if important only in a small town in industrial England, and he is quite aware of his superiority. It is this same assurance that is seen in Stewart who, though adventurous enough to leave home

for a foreign frontier, goes about trying to buy land from the natives and create his little bit of Europe in New Zealand with many of the other settlers. In a sense, they are homebodies, comfortable with the familiar and accepted. And they both long for more power and control. Clifford controls the mines, “owning” the lives of the local laborers. Stewart, along with many of the other white settlers, asserts his “superior” race and Western culture over the presumably childish and vulgar Maori, the native people of New Zealand. He cannot fathom their concept of non-ownership of land, questioning whether it was theirs to begin with (but he never questions his “right” to relieve them of it because they don’t “use” it).

As Clifford’s character develops in *Lady Chatterly’s Lover*, we come to understand his dependency on industry for moral support, which is seen as an emasculating trait, leading to Connie’s ultimate rejection of him as a spouse (Spilka 181). Instead of being a “real man” by standing on his own two feet (impossible because of his physical and emotional handicaps), he relies on the quiet “support” of Connie and the mothering caresses of the submissive Mrs. Bolton. This physical handicap (paralysis below the waist, a war injury) is symbolic of his impotence both in the sexual sense and as a useful, functioning unit of society. Instead of trying to help the downtrodden, he prefers to profit from their misery and grow powerful from their weakness. He gets an ego boost from bossing the spineless slaves of industry. Indeed, he has “no moral feet to stand on” (Spilka 183). Connie discovers this lack of self-responsibility and stamina, and so seeks it out in Mellors, whose “moral strength” outshines Clifford, who is a sheep in wolf’s clothing, weak beneath his guise of power.

This same theme of “effeminate” behavior of the husband continues in *The Piano*, but it is diluted somewhat, leaving Stewart only insecure in his masculinity rather than emasculated like Clifford. When we first meet Alisdair Stewart, he is combing his hair

in an attempt to look presentable for his new wife, yet in the meantime he makes the hired Maori stop walking, completely ignoring them in his self-absorption. The first look at his house is characterized by charred remains of trees he burned back to make his private space and mark the land surrounding it. His obsession to gain more land shows him trying to buy the natives off with buttons and blankets, tactics of the most condescending and selfish form of imperialism. He tries to validate himself as a "masculine" man by buying as much land as possible, accumulating it as a status symbol. He also attempts to gain credibility by suppressing his wife as well as the native Maori, both of whom are supposedly inferior to his white, male superiority. "Stewart represents all that is foolhardy in racist patriarchy... [from] the land he tried to burn into submission [to] the woman he buys and tries to make love him" (Maio 1). This indirect, rather than direct, grasping of power is what unmans him. His brand of shy politeness is more associated with the other women of the story, Aunt Morag and Nessie, who are Stewart's main conversational companions.

These are modern, civilized men, dependent on society's moral infrastructure to take care of their problems. In the scene when he cannot handle his motor-chair, Clifford, "yellow with anger," calls out, "It's obvious I'm at everybody's mercy!" indicating this basic weakness (Lawrence 204). He places his life in the hands of a machine, and when it fails him he is at an utter loss of what to do. It is the same when he finally grasps that Connie is really leaving him, for he had depended on society to save him from this sort of fate, yet it failed him, again. The same applies to Stewart when he realizes that tried-and-true criteria cannot be relied upon to control the behavior of his wife. Neither marriage vows nor other people's opinions (such as the shocked stares of Aunt Morag and Nessie) nor Ada's own word (when she found a loophole to her promise not to see Baines) suffice. That both husbands trust society to keep their

wives in line is directly related to how they rely on capitalism and racist patriarchy to verify their masculinity. They measure their "maleness" by how many people they control and how much status (land and money) they can accumulate. But even though they are in the social position that is most associated with masculinity (powerful, upper class), Clifford and Stewart are ironically presented as non-masculine figures, striving for, yet lacking, the affirmation of their sexuality. Their wives sense this lack and seek it out in other men, thus contributing to the husbands' feelings of powerlessness—for they are then seen as even less masculine because they cannot control their women, the supposedly weaker sex.

Masculine Power as Otherness: The Lovers

The lovers in the two stories, Mellors and Baines, have cast off their obligations to society. They both retreat to the woods in an attempt at self-discovery outside the strictures of society. Mellors, sick of war, industry, and his past experiences with sexual relationships, tries to find peace in celibacy and common, physical labor. Baines retreats as well, but from what we are unsure. We know only that he is unwilling to associate with his fellow European settlers and recognizes the richness of the Maori culture. "Baines is capable ... of questioning male/Western superiority. Victorian mores are losing their grip on him as his Maori facial tattoos indicate (Maio 1)." He loves the wilderness of New Zealand and accepts the singularity of Ada's passionate spirit. But he is neither settler nor native, becoming, like Mellors, "the noble recluse who understands the laws of society and therefore sees no reason to spend his life obeying them" as Anthony Lane states (Lane 1). So both go back to nature where they are in touch with the reality of life and not the artificiality of convention. And they, with their married lovers, undergo rebirth through love in this setting, which seems to be outside the societal hierarchies produced by money and power.

In the case of the male characters in *Lady Chatterly's Lover*, masculinity is in the

forefront in terms of how well they sexually satisfy their partners. Clifford is immediately rejected as a satisfying partner, first because of his casual attitude toward sex and later because of his paralysis. In both circumstances, he makes it clear that it is of no consequence to him whether he and Connie have sex or not (Lawrence 9). Clifford is sexually remote, not enthusiastic about sex even for his own pleasure, much less Connie's. Mellors, on the other hand, takes a genuine interest in Connie's pleasure (although he defines her satisfaction in his terms), and throughout the course of their relationship, their mutual gratification becomes easier to achieve. However, his concern for Connie's orgasm seems more for his personal satisfaction than concern for her pleasure. It is obvious early in their relationship that he disregards her feelings, particularly in their first sexual encounter, when he takes advantage of an overly emotional Connie. Nonetheless, Mellors' potency and his ability to please his partner add to his masculinity.

A similar situation exists in *The Piano*, in which Ada's husband, Stewart, attempts to abuse her sexuality while her lover, Baines, understands her needs. Twice Stewart attempts to rape his wife, first when he finds out about her affair with the woodsman and later after he mutilates her finger. Before he finds out about her affair, he is quiet and reserved around her, meekly asking for a goodnight kiss (and being refused). But after he learns that she is indeed sexual, he immediately tries to take advantage of that sexuality, to mutilate it as he later does her finger. In contrast, Baines is concerned for Ada's comfort and enjoyment. Instead of simply requesting or demanding sexual favors for the piano, which would be more in keeping with the time period, he wants Ada to enjoy herself as well. When he first led Ada and Flora to the piano on the beach, Baines saw how the piano affected her, made her feel free and uninhibited, and realized its hold on her affections. This passion attracted him to her, perhaps recognizing in her a kindred

spirit, and so he wanted to share that passion, to be a part of it. Why else would he insist that she play her piano as he touched her arms and looked at her legs? He knows that one could not find a way to Ada's affections without accepting her relationship with the piano, and he knows that playing the piano gives her pleasure. He wants the pleasure to be mutual instead of a simple harassment. He also ends it when the arrangement has gone too far, progressing from fleeting touches to full intercourse, seeing that for her it was more of a molestation than an opportunity for romantic involvement. Thus, Baines is much more sympathetic to Ada's needs than her husband, just as Mellors is more aware of Connie's sexuality than Clifford.

The two male groups of husbands and lovers are very similar; at the same time they are each affected by the author's perspective on gender. The husbands are powerful, but effeminate, while the lovers are more "masculine," despite their inferior status as social outcasts. But that is where the associations end and the disparity begins. Lawrence does not renounce the issues of inequality that lurk behind the sex act, the ones that keep Connie the less important partner in the relationship and a secondary character of the book. He recognizes the need for mutuality in a relationship but fails to apply it. He continues to place Connie in the role of "student" or "novice," which is not only unrealistic but also misogynistic, enforcing the idea of woman's "naturally" submissive codependence. Campion, on the other hand, attributes more understanding, caring-yet-strong characteristics to Baines, creating a much more sympathetic hero. Lawrence's idea of masculinity implies the separation of sex and love, rejects the assertion of woman's will, and asserts the overall importance of men's dominance in social and sexual relations. Campion takes a subtler approach in *The Piano*, where Stewart so believes in prescribed social roles that he does not understand the psychological barriers keeping him from Ada. While Stewart waits patiently for Ada's sense of social responsibility to yield her

to him, Baines does not follow this formalized and repressed Victorian path. Stewart shows his nature as a repressed Victorian when he tries to rape his wife. He does not understand, as Baines does, the mutuality necessary to form a lasting bond. While this woodsman wants to share in Ada's passion, her husband abuses it, thus enforcing his dominant position in their relationship. Overall, the masculinities of the husbands and the lovers remain the focal point of the masculinist and feminist perspectives.

Subordination and Resistance: Lady Chatterly and Ada McGrath

Control is one of the biggest differences between the lives of the two female characters, particularly who is in control and who is being controlled in each relationship. Of course, there are many complicated associations involved in each love triangle, and an even stranger one exists in the hearts of these women. Connie is in love with the idea of becoming a mother, and Ada has a personal relationship with her piano.

These women are both involved in unsatisfying marriages. Clifford became a stranger to Connie as their marriage progressed. Whatever notions of love existed in their courtship slowly died away through the passage of years, embittering her to his shallow intellect and lofty musings on society. In his presence, she feels hollow and wasted, mostly because she is completely in control of her husband. His passivity and his emotional and physical impotence weigh on Connie, making his dependence on her a burden that has grown too difficult to bear. Even Clifford's newfound "power" from the mines is not real to her, and she begins to seek out a man whom she does not need to control. Ada's husband is a stranger to her, and because he knows nothing about her (and does not attempt to learn), he leaves her no control over her life. But because Ada is a character accustomed to a determined grasp on her life, she arranges to regain a part of her old life and create a new one in New Zealand. Throughout the story, Stewart fights to exert some control over his

wife, only to become another passive instrument of Ada's will. This is perhaps best demonstrated by the reversal of their sexual "roles." Stewart puts Ada under house arrest, unable to trust her in light of her affair with Baines. In doing this Stewart hopes to reinforce his dominant position in the household and in their sexual relationship (she can have sex with only him). Instead of becoming his captured sex slave, Ada instead enslaves Stewart, asserting her dominance.

Both women take a lover to achieve a different balance of control in their lives. Connie's dry married life makes her yearn for a child, and an opportunity arises in the form of the gamekeeper, Oliver Mellors. She is tired of assuming responsibility for herself as well as others: Clifford is a burden, just as she is a burden to herself. And, indeed, as soon as Mellors comes into her life, he begins making decisions for her. The first time they have sex, she merely acquiesces and does not act on her own behalf, being "in a sort of sleep, in a sort of dream" (Lawrence 123). It is also in that first time that she starts giving herself up to him, letting go of her hold on herself and becoming a part of him:

She knew, if she gave herself to the man, it was real. But if she kept herself for herself, it was nothing. And at last, she could bear the burden of herself no more. She was to be had for the taking. To be had for the taking.
(Lawrence 124)

At this point, Connie surrenders herself to Mellors, first in body and later in mind, revealing that she has gotten past her initial confusion concerning the man, or at least has learned to ignore it. The explicit characterization of Connie "to be had for the taking" is only one of Lawrence's overtly male chauvinistic statements concerning women; most of his other opinions about women are expressed through Mellors' moralizing. Connie even admits that her lover treats her more like a sex object than a person: "It really wasn't personal. She was only really a female to him." But strangely enough Connie, a "liberated woman," seems to appreciate this a lot more than one might

assume. She goes on thinking “men were very kind to the person she was, but rather cruel to the female, despising her or ignoring her altogether and he [Mellors] took no notice of Constance or of Lady Chatterly; he just softly stroked her loins or her breasts” (Lawrence 129). Later Mellors states that women without “natural” sexuality are “lesbians” (natural sexuality as the ability to achieve orgasm almost exclusively through sexual intercourse) (Lawrence 219). Connie’s positive female identification in the novel is connected to the fact that she can “come off” during sex with Mellors. Lawrence’s masculinist bias is evident in other ways as well. For example, Connie tries to mold herself in the image of her lover, aspiring to some kind of superiority that he has and she can only dream of. She adopts his theory that society is run by emasculated toads like Clifford and that mutually satisfying sex is the only antidote for this cynical world. In the end, Connie is only the codependent mother of Mellors child, perhaps freed from her inhibitions but never to be free of him.

In *The Piano*, Ada agrees to Baines’ arrangement to get her piano back. By regaining her voice, as well as keeping this secret from her husband, she hopes to shift the balance of power in her new marriage. It is this power struggle that leads Ada to reject her marriage, and she senses that a relationship of equality can be created with George Baines. It’s not by accident, though, that he first becomes attracted to her while she is at her piano—it is obviously her favorite place. He understands her connection with the piano, how it is a part of her, and so he includes that in his “courting” of her. Ada eventually accepts his love because he understands the need for an equal partnership between man and woman, denying the institution of gender roles. Baines even becomes synonymous with the freedom the piano brings Ada. In a scene from the published screenplay that does not appear in the motion picture, Ada expresses her longing for him and her changing attitudes:

As she climbs out of the small valley surrounding BAINES’s hut, she stops and walks back to look down at BAINES and his hut, in the exact same manner that she once looked at her piano from the cliff top above the beach.... (Campion 77)

Just as the piano was once her means of expression, particularly of her freedom and individuality, Baines becomes her other means of expression. He does not speak for her, but he speaks with her. (This becomes a reality after they flee to Nelson, where Ada develops her speaking voice.)

Nature, Power, and Gender

According to Carol Jacobs, *Campion’s* tale “unmistakably confront[s] the contemporary issues of feminism, colonialism, and environmentalism ... speak[ing] eloquently as a protest against brutal and artificial hierarchies.” She says this work represents a challenge to “the tyrannies of colonial rule and its violence to the ecology” (Jacobs 758). If we consider imperialism, with its territorial expansion driven by greed for raw materials and commercial goods, as another form of the decaying industry presented in Lawrence’s novel, it becomes clear that these two works are related. Also, Connie’s supposed identification with an early women’s liberation movement and the unique personality of Ada as one who will not let herself be owned in a time of maddening possession lend both stories similar conflicts and gender issues. Lawrence not only speaks of these political issues (economy, environment, and sex) but also entwines them, making this the combined theme of his novel. It has already been mentioned that the forest surroundings in these stories are associated with those characters, such as Mellors and Baines, who cannot or do not wish to live in their respective societies. It is in such a place, whether the New Zealand bush or the edge of Sherwood Forest, that the connection of physical intimacy can be found. The life force exerts its will over the human animal, separating it from the unnatural, or civilized. Those characters who are comfortable in society and center their dreams of power in it are antagonists of natural living

and nature itself. The latter, of course, are the husbands, Clifford and Stewart. They both exhibit a sort of enmity towards nature, for it prevents them from immediately realizing their dreams of power and prosperity.

Trees, as both literal and symbolic barriers, are important features. In *Lady Chatterly's Lover*, "acre-by-acre the woods are chopped down," put to use first in the war effort and later cleared to make way for industry; in *The Piano*, the land is "wounded with charred, dead amputees of trees" from his attempts to burn back the woods to make way for his home. His land is marked with wooden posts inscribed with his initials, which Jacobs believes is the result of his desire to show fierce possession of the land (Jacobs 760). It is also important to understand the association between women and nature. The husbands seek to dominate both, and both are generally characterized as passive, lacking a will of their own with which to protect themselves. Therefore their success, or lack thereof, in controlling their environment mirrors the extent to which they control their homes. Clifford believes he is successful in both areas, while in actuality there is dissension at the mines and in his marriage; Stewart has great trouble maintaining any kind of control without the use of brute force (burning back the forest and mutilating his wife).

Trees are understood as sexual symbols in both works. For Lawrence, trees are phallic, male figures. This is perhaps best shown in a passage recording Connie's response to a young pine tree "which 'swayed against her with curious life, elastic and powerful, rising' erect and alive" (Squires 35). They also figure into Lawrence's analogy of the impotence of society, as if the cutting down of each tree was another spirited man fallen into the grips of industrialism. In *The Piano*, when Baines finds out about Ada's mutilation at the hands of Stewart, he takes out his aggression on a nearby tree. This aggressive sexuality (a masculine trait) comes into play, when he hits the tree as if it were the axe-wielder himself, as if a jealous possessiveness took hold of him. But perhaps a

better example is in the scene when Flora, Ada's daughter, participates in a game with the Maori children.

The children rub up and down against the tree trunks, kissing and hugging them. The game has an edge of promiscuity to it as they exchange trunks and hug one tree as a group... Unseen by the children, STEWART marches towards FLORA. He pulls her off the tree. STEWART: Never behave like that, never, nowhere. You're greatly shamed and you have shamed these trunks. (Campion 72)

This scene demonstrates the trees' symbolic nature, as people, as passion, and it shows the Victorian attitude toward sexuality—that it should be kept secret and enforced by shame. (It is worthy to note that Lawrence rebels against this view of sex as dirty and sinful and makes it a point to root out Connie's shame, which is the final step toward sexual consciousness.) This idea is mocked in the following scene, when Stewart has Flora scrub those trees with soap and water, as if they were dirty beings needed to be made clean. Ada must traverse the bush, these trees, to get to Baines' lessons. Even after the arrangement is ended, she finds herself drawn to thoughts of him: "*Her head stiffly, irresistibly, lifts and turns in the direction of BAINES's hut. She peers deep into the bush as if attempting to penetrate [it]*" (Campion 80). Trees are alternately her obstacles and her facilitators, for she must get past them to get to her lover, but they hide her as well, providing good cover for a love affair. It is this setting of passion, which may be why Stewart attempts to violate her there—it implies something almost animalistic. This is an echo of the outdoor lovemaking of Connie and Mellors, when they are considered closer to nature than at any other time. It is only people like Stewart and Clifford, who are without sufficient sexual outlet, who can see this romantic setting as something that can be owned and turned into profit and are therefore bent on tearing it down. Thus, the husbands are as much to blame for their crimes against nature as the adulterous couples are to blame for their crimes against

society. "True enough, when Connie leaves [Clifford], she sins against bourgeois morality—but Clifford sins against organic life. The two moral systems clash," argues Mark Spilka, creating one of the main conflicts in these stories (Spilka 197).

The conflict of organic life versus bourgeois morality is represented again by the native peoples of each setting, each representing the human manifestation of organic life. The working class citizens of Tevershall are considered to be the natives of the area, and are therefore assumed to have a more profound relationship with the earth. Mellors strives to characterize himself as a "natural" man, one unassociated with the lofty morality of aristocratic society. He even seeks out his position of gamekeeper, hoping to purify himself through physical labor—as if it would make him closer to the earth and closer to what he considers "pure living." He also, at times, slips into the regional dialect, rejecting even the speech that marks him as an educated person (rather than one that must earn a living through physical labor). Similarly, the presence of the Maori in *The Piano* also makes a powerful statement against imperialism and its cousin, racism. According to Anthony S. Wohl, "both Victorian science and popular literature assigned similar characteristics to... Blacks [and native cultures] and members of the lower classes. Both were seen as: ... childlike, having no religion but only superstition, [having] no notions of property, [being] excessively sexual..." These prejudices came out of the fear Victorians had of their sexuality or "the animal within." They suppressed these tendencies in themselves and tried to control it in the "primitive" people they encountered to show "how advanced and civilized [they] are" (Wohl). This suppression is shown by Stewart's lapses into animalistic behavior, first when he chases Ada through the forest trying to rape her and second when his jealous rage leads him to cut off her finger. This is a perversion of the natural passion exhibited by the lovers who accept

the wilder, unexplainable side of their nature and exhibit it in a healthier way. Stewart is then so ashamed of his actions that he wants Baines and Ada to leave so there is nothing to remind him of his primal lapse.

Both the Maori and the people of Tevershall are changed by the presence of capitalist powers. The workers of Tevershall present a pathetic picture of industrialized humanity, painting a clear picture of the ills of a greedy society. "The people were as haggard, shapeless, and dreary as the countryside... There was something in their deep-mouthed slurring of the dialect, and the thresh-thresh of their hob-nailed pit-boots as they trailed home in gangs on the asphalt from work, that was terrible" (Lawrence 11). They are warped and deadened by the onslaught of industrialism, and, as Mellors thinks, they are no longer men but the shells of men. But these shadows exist only in the background of *Lady Chatterly's Lover*, while the Maori are consistently shown throughout *The Piano*, and the audience gets a good idea of what their lives are like. It is not by accident that we see the Maori dressed in a mixture of native and European clothing, while their bodies are marked with traditional tattoos. This is the most visible suppression of the natives and is probably the first stage of their conversion to Western ways. Many of them are already addicted to tobacco and a good number of them show up for the recital at the mission house, which we can assume means that some are being (or may eventually be) converted to Christianity. While the Maori can be seen as Western-corrupted "guardians of the earth," they can never be taken too seriously. Most of the time, they parody the Westerners, and they refuse to convert to these ways even as they copy them. In scene 16, when Ada first meets Stewart and his entourage on the beach, we quickly learn what the Maori think of Stewart's stuffy Victorian ways as they parody his conversation with Ada. "The utter absurdity of Stewart's formal clothes is underscored by the figures of two similarly behatted Maoris, one of whom tilts his head in exact unison with each movement of the officious,

questioning white man" (Jacobs 761). While the Maori can still afford a sense of humor about their neighbors, the workers of Tevershall have been so mechanized that they no longer have the spirit to respond to the world around them. The natives of both worlds are destined to die (in either body or spirit) by the diseases that the struggle for power and money has brought upon them. This is one of Lawrence's chief arguments against capitalist industrialism and underscores Champion's statement about the ills of colonialist hegemony.

Gender Scripts and Gender Unscripted
Lawrence's masculinist view casts Connie as wife, hostess, and helpmate to Clifford. Not surprisingly, she longs for a child, which she eventually gets, though in an unorthodox way. But outside of her role as Lady Chatterly, Connie is the submissive codependent of Mellors, somewhat out of character for this supposedly liberated woman. While Lawrence attributes a fair amount of sexual experience to Connie, she displays many virginal characteristics for one so wise. Not only was she sexually active before her marriage, she was also experienced in extramarital relations, having had a casual affair with the young playwright Michaelis. Yet, with all her experience, when she is with Mellors, she is presented as an innocent—one unaware of the pleasure potential, one who must be taught. Connie is an instant novice, infinitely less knowledgeable than the man even though they had had almost the same number of previous partners. In fact, her experiences had probably been more enjoyable than his, considering his frustration in that area. In any case, she is painted as a born-again virgin—in awe of his powerful masculinity, afraid of and yet tempted by the phallus:

"So proud!" she murmured, uneasy. "And so lordly! Now I know why men are so overbearing!... A bit terrifying! But he's lovely really! And he comes to me!" She caught her lower lip between her teeth, in fear and excitement. (Lawrence 226)

In this scenario, she acts as if she'd never seen a penis before. Perhaps Lawrence takes the "awakening" or "reawakening" of Connie's phallic consciousness a little too far. It is for this awe-inspiring phallus that she eventually becomes his codependent sex object. "Connie now submits to Mellors because of the warmth between them... though there is no real question as to who must give direction and meaning to the marriage." (Spilka 193). This is ultimately what he set out to do—not just to awaken her sexual consciousness, but make her *his* sexual woman.

The theme of male domination of women does not repeat in Ada's relationship with Baines in the same way. According to Jacobs, Ada doesn't "act out the litany of clichés attached to a certain feminism" (Jacobs 761), for she is neither an exemplary housekeeper nor a very attentive mother. She is, from the start, not as likely to fall into the old dominance-submission problems we see in *Lady Chatterly's Lover*. Baines reacts quite differently from Mellors. Not only does he accept Ada's strange love and individuality, he wants it, encourages it to grow, unafraid of her power. He does not try to mold her in his image. He has many typical "masculine" qualities; being a man who works outdoors, he is aggressive, and a non-conformist. But in spite of it all, he is not absurdly macho. Instead of seeing in Ada one who can be easily dominated, he sees a person strong like himself—the strong, silent type. Through the circumstances of their arrangement, he reawakens her sexuality (acknowledging its existence before he came along), and when it is returned to him, he accepts her passion as equal to his. This is not the knowledgeable man teaching the inexperienced woman—it is mutual.

There is a different contortion in Ada's relationship with her husband. When he puts her under house arrest, away from Baines in the midst of her awakened sexuality, she acts out her needs on Stewart—making him lie inert while she touches him. He submits himself to her caresses, gasping at

the prospect of a consummation she never allows. Not only is this a change from the expected man-as-aggressor, but it also displays reversed teacher-student roles. We know little of Stewart's sexual history, but considering the time period, there may not have been much to tell. It is quite possible that he is sexually inexperienced. But in any case, even today, this odd type of role-playing is out of place. It shocked audiences even in the sex-soaked 1990s, and would leave almost any man bewildered, especially in the tightly-wrapped Victorian era. Ada turns the tables on Stewart, objectifying him. She acts out her sexual frustrations on him, not only using him as the only adult male body nearby, but also giving him a taste of his own medicine. He had considered himself the owner of her piano, and so traded it without discretion, but her sexuality is her own to keep or share at will. When he tries to rape her, he violently misuses her sexual nature, thinking it is his to be had for the taking, and so in return, she misuses his, conveniently turning the tables on prescribed sex roles. Stewart, an already frustrated individual, resents this denial of what he considers his marital right. He is not given a chance to assert himself and finds himself submitting to the one who he believes he should rule. This impotent frustration builds within Stewart, leading to his final violence.

The treatment of women in light of power relations is another difference between the two works: Lawrence proclaims that willful women are dangerous and, perhaps, not really women. Lawrence's characterization of Connie comes straight from the heart of patriarchy. Despite his attempts to create a situation in which sexual awakening empowers a woman, Lawrence creates a situation in which a woman repeats the destructive cycle created by gendered hegemony, reasserting male superiority. Connie changes her views and adopts those of her lover, becomes a sex object, regards the phallus with virginal awe and reverence, and considers motherhood her ultimate goal and the key to her happiness. The only difference between

this situation and the situation that leads to the hysterical madness in "The Yellow Wallpaper" (Charlotte Perkins Gilman, 1892) is that Connie seems to like this arrangement. Ada does not share Connie's passivity, but allows her will, however unattractive to men, to rule. In the end, Ada wins her right to love and to live however she pleases. Lawrence would condemn her willfulness, just as he condemns it in Mellors' wife, Bertha Cloutts, and all other women. Mellors says of Bertha:

She sort of kept her will ready against me, always, always: her ghastly female will: her freedom! A woman's ghastly freedom that ends in the most beastly bullying! Oh, she always kept her freedom against me, like a vitriol in my face. (Lawrence 303)

Here Lawrence acknowledges a "link between female will and the difficulty of achieving manhood" (Squires 27). Mellors thinks his wife tried to bully the masculinity out of him by flaunting her freedom, her ability to do without him: "when a woman gets absolutely possessed by her own will, ... then it's fearful, and she should be shot at last" (Lawrence 304). (Perhaps Stewart agreed with this idea, and it prompted him to "clip Ada's wing".) Here Mellors perceives female power paranoically, as if he will be mentally castrated if women no longer rely on men. In Mellors' world, if every woman received a proper phallic education, like Connie, there would be no bullying because everyone would be complete—(ful)filled—and stable, like men. Just as the trees are cleared by men without sufficient sexual outlet, the assertion of will is done by women without the proper phallic consciousness, a taming, if you will. (This excludes men like Clifford, who are metaphorically castrated and bully just the same as a power-hungry woman.)

Unlike Connie, Campion's character Ada is the embodiment of passionate will. In Ada's case, "will... is like a passion outside the realm of tame self-interest and self-knowledge" (Jacobs 771). It is an unusually strong ruling force, controlling Ada so much that she cannot speak by the sheer force of will, without her conscious assertion of it.

It is represented as almost childish, as if, when younger, she had a temper tantrum and simply refused to speak, and it stuck. But it is hardly favorable to categorize Ada (and woman's will) as childish. To say so degrades her and any kind of feminist statement this film attempts to make. Rather, we can explain her strange muteness through her association with the piano. We learn that Ada started playing the piano when she was about five- or six-years old, which is the same time she first refused to speak. Unconsciously, she knew she had found a better instrument of expression than her voice, and from then on she chose to make it her only voice. The viewer is then drawn in, wondering if this is the first time she is empowered by her will, and where her will could take her from there. No matter how bizarre we think the consequences of this will be, it nonetheless continues to surprise.

One of the first to experience her will is her new husband. It is for her piano, her favored means of expression, that she asserts herself, yet is repeatedly ignored. One assumes he expected a docile mute, one easily controlled "like a pet," as Aunt Morag puts it. Instead he gets just the opposite, "a woman in command," and according to Anthony Lane, "it throws him into revolt" (Lane 2). Their relationship begins as an immediate power struggle, with Stewart seeking to assert quickly his patriarchal dominance. He learned that his superiority over his family goes hand in hand with his masculine identity, making it important to his self-esteem. His trouble dominating the native, the supposedly uncultured, childish savages, throws his troubles at home into sharp relief, so that his struggles for dominance over Ada echo his colonialist desire to own part of the world. So when he says, angrily, "We cannot go on like this," he speaks not only of ruling the home from within, but also ruling outside of it—ruling the land he buys with buttons and blankets, guns, and—a piano. He cannot understand the strength of will that exists in these things he should so easily control, like his wife, the Maori, and

even the forest. But because Ada is so willful, the bargain begins.

The bargain/love affair is what many critics and feminists have problems with, even though it demonstrates the ultimate lengths to which Ada's strong will can go. It is impossible to deny that Baines takes the place of the piano in Ada's affection, but does this refute *The Piano's* supposedly feminist perspective? Not necessarily, though it does make it harder to recognize. Her final rejection of the piano, throwing it overboard and attaching herself to it, is an acknowledgment of the part of her she is leaving behind in order to enter this new life with Baines. Essentially, she is casting off all the years of her life attached to the piano—a part of her she wants to (and must) sacrifice for Baines' love. But another part of her wants to physically experience this sacrifice, to put her body through a separation from life that is similar to the separation of her heart from the piano. Despite her suicidal intentions, her will, or life spirit, won't let her die, and it is this that keeps her from becoming either another codependent woman or a useless martyr to a feminist ideal. "She literally snatches her life back from the depths (of female despair) and applies her will to finding a voice" (Maio 1-84)—both a speaking voice and a "voice" of feminism, proof that she does not have to die in order to protest the patriarchy.

In both *Lady Chatterly's Lover* and *The Piano* we find themes of struggles against ruthless capitalism, environmental damage, racism, and certain forms of patriarchal oppression. D.H. Lawrence's masculinist bias dominates his novel, while Jane Campion subverts this perspective in her feminist version of the story, *The Piano*. The titles of the two works are emblematic of their opposing perspectives. In *Lady Chatterly's Lover*, Mellors simply fills the gap in Connie's life, and he, as the object of her desire, is therefore also the subject of the book. The title is not "Lady Chatterly Takes a Lover," but "*Lady Chatterly's Lover*." It seems that Connie is but an instrument to get to the

gamekeeper. After all, he is the one who vocalizes all the important ideas—Lawrence's ideas. He becomes invaluable to Connie: she depends on him and relies on him for moral support until she is but a function of him and his ideology. In *The Piano*, the lead female's object of desire is also the title of the film. The piano itself is quite possibly the most influential "character" in the movie, for it embodies Ada's willpower and is her chief means of expression. Female, not male, desire is highlighted in the title. Ultimately, Campion makes a feminist story in *The Piano* out of *Lady Chatterly's Lover*, by empowering the female protagonist, putting her desire, her will, and her voice, not those of her male counterparts, in the foreground.

REFERENCES

- Campion, Jane. *The Piano*. New York: Hyperion, 1993.
- Jacobs, Carol. "Playing Jane Campion's 'Piano': Politically." *MLN* v. 109 (1994): 757-785.
- Lane, Anthony. "Sheet Music." *New Yorker* (11/29/93): 148-151.
- Lawrence, D. H. *Lady Chatterly's Lover: Complete Unexpurgated 1928 Edition*. New York: Bantam Books, 1968.
- Maio, Kathi. "The Key to 'The Piano.'" *Ms. v.4* (1994): 84.
- Spilka, Mark. *The Love Ethic of D.H. Lawrence*. Bloomington (IN): Indiana University Press, 1955.
- Squires, Michael. *The Creation of Lady Chatterly's Lover*. Baltimore: John Hopkins University Press, 1983.
- Wohl, Anthony. "Race and Class Overview: Parallels in Racism and Class Prejudice." *The Victorian Web*. Online. <http://www.stg.brown.edu/projects/hypertext/landow/victorian/race/rcov.html>

The Significance of Japanese-American Internment Literature

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ABSTRACT

The author argues that the impact of the internment of Japanese Americans during World War II can be best understood, not through conventional history books, but rather through the words of the people who were themselves interned.

"The evacuation, which started at Bainbridge Island on March 29, proceeded, area by area, to include the entire extent of the three West Coast states, the territory of Alaska, and the southern half of Arizona."
—*The Decision to Relocate the Japanese Americans*

*"Still, even barracks have ears:
so-and-so shot and killed;
so-and-so shot and lived;
infants, elders, dying of heat;
epidemics, with so little care."*
—*Lawson Fusao Imada*

"We went because the government ordered us to... They had all heard stories of Japanese homes being attacked, of beatings in the streets of California towns. They were as frightened of the Caucasians as the Caucasians were of us."
—*Jeanne Wakatsuki Houston*

These excerpts describe the internment of all persons of Japanese descent living in the western United States during World War II. The words of these authors remind us of events as horrible as the Holocaust and as recent as the genocide in Bosnia. The Japanese internment is a part of American history too soon forgotten because of the silence surrounding it. The silence on the part of the United States government is because of shame; the silence of the survivors is to mask the deep sense of pain and betrayal.

Which of the three quotes is more effective? The first is from a history book; the latter two are from works of literature written by Japanese Americans who lived through the experience of internment. I believe that the lived experience of oppression is an extremely effective tool in educating and informing people about history. For example, I know that I am more interested in hearing my grandparents tell the stories of their lives during World War II than reading dry facts about the same events in a textbook.

With that said, there is still some factual background information necessary in order to understand the context in which the imprisonment of 120,000 Japanese Americans occurred.

"He arrived on a small cargo boat and landed in San Francisco just three months after the great earthquake to find the tower of the ferry building still askew and Market Street piled high with ash."
—*Yoshiko Uchida*

Thus Yoshiko Uchida describes his father's first impression of the United States when he first arrived in 1906 at the age of twenty-two (Uchida, 5). There was a great influx of Japanese into the United States beginning in the 1880s. Many of them were enticed by the legends of riches awaiting them in Hawaii. They crossed the Pacific as sojourners, with the intent of returning to Japan a few

Author's Note: This paper was submitted in partial fulfillment of the requirements of HONR 270-Honors Human Rights, taught by Dr. Morton Winston, a professor of philosophy and religion. Katherine S. Munning is an English major.

years later as wealthy men. Even though these myths proved untrue, the majority of Japanese remained in the United States. Instead of riches, these men were met with relentless manual labor. Americans viewed Japanese as a replacement for the Chinese, whose low-wage labor resulted in thousands of miles of railroads in the west.

The Japanese endured American racism as something to be expected, but they would not tolerate racism when it came to workers' rights. They formed "blood unions" and demanded higher pay and fair treatment in a strike in Oahu in 1909. America was not happy about this, and the growth of the Japanese population in the United States gave rise to vicious racism.

"In Boyle Heights the teacher felt cold and distant. I was confused by all the moving and was having trouble with the classwork, but she would never help me out... This was the first time I had felt outright hostility from a Caucasian." —Jeanne Wakatsuki Houston

Resident-alien Japanese, called Issei, and their American children, called Nisei, were widely discriminated against in the United States. Immigration laws denied all resident aliens the opportunity to become citizens, no matter how long they lived in the U.S. Legislation like the Alien Land Act and Teddy Roosevelt's Gentleman's Agreement severely limited the opportunities of Issei, making it illegal for them to own land. Roosevelt's Gentleman's Agreement of 1908 served to prevent future immigration of Japanese.

In daily life, "the Japanese were routinely refused service in barbershops, grocery stores, hotels, and restaurants. Often they were segregated from whites (Cao, 95)." Although Teddy Roosevelt outlawed the segregation of Japanese students from white students, the discrimination continued. Anti-Japanese demonstrations were popular, discouraging them from settling in certain neighborhoods.

"In the first few months of the Pacific war, America was on the run. Tolerance had turned to distrust and irrational fear. The hundred-year-old tradition of anti-Orientalism on the west coast soon resurfaced, more vicious than ever." —Jeanne Wakatsuki Houston

In 1940, America's Japanese community was concentrated into "Little Tokyos" contained within many west coast cities like San Francisco. Many Japanese Americans worked as farmers, either as tenants on a white man's land or on land legally owned by their children, who could own land because they were American citizens. Others worked as shopkeepers, managers, and at every other imaginable occupation inside the self-sufficient Japanese-American communities.

There existed numerous Japanese-American organizations. One of the most prominent of these was the Japanese American Citizens League (JACL), an extremely patriotic national organization founded in 1930 by "an educated and acculturated Nisei group to promote the collective interests of the Nisei in America (Cao, 101)." U.S. citizenship was a requirement for membership, and members of the JACL were encouraged to assimilate into American society as a means to overcome discrimination. When the time came for evacuation of all Japanese persons in the western United States,

The Japanese American Citizens League accepted the conclusion that 'the evacuation' of all Japanese, U.S. citizens and aliens alike, from the West Coast was 'a military necessity' and cooperated with the program. It even discouraged legal challenges, arguing that cooperating with 'the evacuation' was a way for Japanese Americans to demonstrate their loyalty and to contribute to the war effort. (Oishi, 149)

*"We were given forty-eight hours to clear out."
—Jeanne Wakatsuki Houston*

After the bombing of Pearl Harbor on December 7, 1941, Americans were frantic. The government decided that it could count on the loyalty of neither its Japanese aliens nor its Japanese-American citizens. On March 2, 1942, General DeWitt announced Executive Order 9066, one in a series of humiliating and, more importantly, unconstitutional actions taken against Japanese Americans. Although Order 9066 applied to all potential enemies of the state, strangely, most people of German and Italian descent were not affected by these operations.

As a result of Executive Order 9066, Washington, Oregon, California, and Arizona were declared "Military Areas." All Japanese were evacuated from "Category A Zones," and their movement was restricted in "Category B Zones." Other infringements on the constitutional rights of Japanese Americans included arrest without a warrant, extended imprisonment, confiscation of property, and extended imprisonment without trial, to name a few. This does not include the countless injuries endured by those imprisoned in the concentration camps. Those who experienced internment tell that story best.

*"Assembly,
Concentration,
Detention,
Evacuation,
Internment,
Relocation, —
Among others."
— Lawson Fusao Imada*

In April 1942, signs began appearing on telephone poles ordering the evacuation of all Japanese Americans, including people with as little as one-sixteenth Japanese blood. *And Justice for All* is an oral history of internment compiled by John Tateishi. The book contains interviews with thirty-one survivors, detailing their experiences of evacuation from their homes and of life in the camps.

Most people who were alive in 1941 have some recollection of their reaction to the bombing of Pearl Harbor. However, it's much different to hear it from a Japanese American perspective. Many were afraid to leave their homes, and feared even more when family members and neighbors were suddenly arrested. Most Japanese-Americans wanted desperately to demonstrate their loyalty and contribute to the war effort, but were hampered by curfews and travel restrictions. Mary Tsukamoto, who opened a JACL office in her hometown of Florin in order to best protect her community, relates the story of Ida Onga, a pregnant woman whose husband was arrested by the FBI. Fighting her fierce

pride, Onga was forced to accept welfare for the first time in her life. She was unable to visit the doctor in Sacramento, which was nine miles away, because of the travel restrictions which allowed Japanese Americans to travel only within a five mile radius of their homes (Tateishi, 8).

Conversely, one of the most notable aspects of the experiences described was the surprising amount of support the white community gave to their Japanese neighbors during the evacuation. Mary Tsukamoto describes the protest of a small group of white landowners to the Alien Land Act: "They tried to go to protest, but they weren't given an opportunity to speak in favor of the Japanese... They were very disappointed that they weren't given a chance to be heard and tried to get it in the papers. But, of course, with McClatchy and Hearst, they just didn't have a chance (Tateishi, 6)."

Emi Somekawa, a mother, wife, and RN at the time of her evacuation, felt bitterly towards her German neighbors, who remained unaffected by Executive Order 9066. "The day we left the house, this German lady came with a cake, and she said that if there was anything that they could do for us, to call. So twice they came out to the assembly center. I think they felt a little bit displaced too (Tateishi, 147)."

Somekawa gave birth to her second child in a reeking horse stall at the Portland Assembly Center. In September 1942, she and her family were shipped off to the camp at Tule Lake. During the long, difficult bus trip they ran out of milk. Desperate, Somekawa went to Safeway and tried to buy the milk, even though she did not have a ration token.

I went up to the cashier and I said, 'You know, I don't have a red token to buy this, but I need it for my baby... I have no other way of providing him milk.' Right then there was this lady right behind me, and she gave me the red token to pay for that milk. You know, right there in Burns, which is a real bad area, I think. There was a lot of discrimination and prejudice. But anyway, I was thrilled to death... (Tateishi, 148-9)

After being removed from their homes and forced to sell most of their property, the Japanese families were gathered into temporary assembly centers. In September 1942, most were moved to one of ten permanent concentration camps deep in the interior of the United States. The majority of the camps, such as Topaz and Manzanar, were in the desert, where the weather fluctuated between extreme heat and cold. Many internees were unaware of the harsh weather that awaited them. "Some old men left Los Angeles wearing Hawaiian shirts and Panama hats, with nothing available but sagebrush and tarpaper to stop the April winds pouring down off the back side of the Sierras (Houston, 25)."

Farewell to Manzanar, an autobiographical account by Jeanne Wakatsuki Houston and co-authored by her husband James D. Houston, recounts an eight-year-old girl's innocent bewilderment as her own country betrays her and her family. She describes her father's sudden arrest and his increasingly violent alcoholism after he joined the family at Manzanar, but she particularly focuses on her mother's silent courage throughout the whole ordeal. During evacuation, Wakatsuki's mama is forced to sell her most prized china ("blue and white porcelain, almost translucent"). Rather than accept the dealer's insulting price of fifteen dollars for the whole set, "she reached into the red velvet case, took out a dinner plate and hurled it at the floor right in front of his feet. The man leaped back shouting, "Hey! Don't do that! Those are valuable dishes!" In this manner Wakatsuki's mother destroyed her most valuable possessions, "just quivering and glaring at the retreating dealer, with tears streaming down her cheeks (Houston, 12-13)." It is with this wry humor tinged with sadness that Wakatsuki recalls the experience of internment.

Although the internees endured unthinkable atrocities, such as living in horse stalls, Wakatsuki's narrative is not all negative. The overwhelming majority of Japanese Americans remained loyal to the U.S. and saw their detention as their contribution to

the war effort. They continued their lives as best they could within captivity.

These tender memories are not meant to efface the suffering of Japanese Americans during their internment. In *Legends From Camp*, the poet Lawson Fusao Imada clearly illustrates the misery of living in the camps. In just a few lines, Imada can communicate the frustration of betrayal by one's own country, as in "The Legend of Protest:" "The FBI swooped in early, taking our elders in the process—/for 'subversive' that and this./People ask: 'Why didn't you protest?/' Well you might say: 'They had *hostages*.' (Imada, 9)." Here the author implies that the U.S. government is a terrorist organization, or at least the enemy of his people, even though he makes it clear in other poems that his roots and his loyalties are in America. In a piece ironically titled "The Legend of the Great Escape," Imada shows what a threat his people really were to the U.S. during the war: "The people were passive:/ Even when a great train paused /in the Great Plains, even/ when the soldiers were eating, / they didn't try to escape (Imada, 12)."

While enduring internment, all internees were forced to complete a questionnaire intended to determine the loyalty of Japanese Americans. The two most memorable questions, numbers 27 and 28, were called the "loyalty questions." The first asked, "Are you willing to serve in the Armed Forces of the United States on combat duty, wherever ordered?" The second was "Will you swear unqualified allegiance to the United States of America and faithfully defend the United States from any or all attack by foreign or domestic forces, and forswear any form of allegiance to the Japanese emperor, to any other foreign government, power or organization (Cao, 117)?"

These questions, especially number 28, were understandably difficult for many Japanese to answer, especially considering the context in which they were expected to answer it. If the Issei, who had no hope of becoming U.S. citizens, renounced their loyalty to Japan by

answering "yes," they had no homeland; if they answered "no," they risked being deported and having to leave their families.

The Nisei, particularly male Nisei, were in a similarly difficult position. If they answered "yes," they would be forced to join the U.S. Armed Forces, leaving their families without a breadwinner or protection, as many of the patriarchs had been arrested and imprisoned by the FBI before evacuation began. Many Nisei were not willing to fight for a country that would imprison an entire race of its own citizens. However, if they answered "no" they not only faced the same risks as Issei, but implied former allegiance to the Japanese emperor.

Thus the camps were separated into "yes-yes boys" and "no-no boys," depending on how they answered the two loyalty questions. "During the first year of our internment, the burning issue in the camps was the question of loyalty... Our family, like many others, was split by the issue (Oishi, 145-6)." Gene Oishi, in his own story *In Search of Hiroshi*, describes the tension in the camps. Oishi's brother was a no-no boy, a Japanese nationalist who was arrested for flying the Japanese flag inside the camps. "One morning on the way to school one of my friends pointed to the top of a nearby butte. There unfurled and waving in the wind was the Hinomaru, the flag of Japan. We laughed. We wanted to believe that it was put there as a prank, but we were all uneasy (Oishi, 147)."

Oishi did not learn of his brother's involvement until the schoolteacher called him to her desk and told him and a classmate that she was "sorry" about the arrests of their family members. The young boy spends much of his time inquiring into the questions of loyalty and nationalism.

Over 6,000 Nisei and Kibei were recruited to fight in World War II in the segregated 442nd Regimental Combat Team "which, when joined by the Japanese-Hawaiian 100th Battalion, became the most highly-decorated military unit during World War II and the most highly decorated unit of comparable size

in United States military history (Tateishi, xxiv)." These young men left their parents, wives, and children in the camps and bravely fought for a country that refused to protect their constitutional rights. Unfortunately, the heartache did not end with the war.

The effects of evacuation on the Japanese-American community were enormous. After being released from the camps, former internees had to begin their lives all over again. Economic loss was an obvious and immediate problem. The Evacuation Claims Act of 1948 proposed to provide Japanese Americans with redress. The figure they arrived at was \$400 million (Daniels, 163). However, this number did not include agricultural losses, and could not possibly encompass the money lost in panic sales in the days after Pearl Harbor and the time period immediately preceding internment.

Of course, everything cannot be measured in dollars. The JACL booklet on redress notes: "Restitution does not put a price tag on freedom or justice. This issue is not to recover what cannot be recovered. The issue is to acknowledge the mistake by providing proper redress for the victims of injustice, and thereby make such injustices less likely to recur (Daniels, 167)." There has not been much conclusive research done on the psychological effects of internment, but some obvious detrimental effects were on the Japanese strong sense of pride and honor and a feeling of betrayal by one's own country. Racism and lack of leadership contributed to a period of intense fear, confusion, and anxiety, especially for Nisei, who were American citizens. Many survivors have repressed their internment experiences, which has resulted in a cultural silence surrounding this event in our nation's history.

It wasn't until 1980 that the United States Congress created the Commission on the Wartime Relocation and Internment of Civilians (CWRIC). Over a period of eighteen months, the committee heard over 750 witnesses, mostly former internees and conducted an exhaustive investigation of all the information available to them (Daniels, 194).

The subsequent report of their nationwide hearings, called *Personal Justice Denied* helped to create a "communal climate of opinion highly favorable to redress (Daniels, 189)." The report states outright that "the exclusion and detention of Japanese Americans were not determined by military conditions but were the result of 'race prejudice, war hysteria and a failure of political leadership (Daniels, 194).'"

Bills were introduced in 1985 to carry out the commission's recommendations to compensate individual internment survivors with \$20,000 apiece. This was certainly a victory for Japanese Americans, although the JACL Redress Committee asked for \$25,000 for each survivor or heir, reminding Americans of the similarities between the German concentration camps and the American ones: "Both were imprisoned in barbed wire compounds with armed guards. Both were prisoners of their own country. Both were there without criminal charges, and were completely innocent of any wrongdoing. Both were there for only one reason—ancestry (Daniels, 188)."

"Papa never said more than three or four sentences about his nine months at Fort Lincoln. Few men who spent time there will talk about it more than that. Not because of the physical hardships... It was the charge of disloyalty. For a man raised in Japan, there was no greater disgrace."

—Jeanne Wakatsuki Houston

One of the reasons internment literature is so important is because of the silence that surrounds this blot on our nation's history. Like the Holocaust, internment is a painful experience many would rather forget. For years, the only information available about the internment was the racist journalism and government reports quoting "stern military necessity" for evacuation of an entire race. Japanese-American children were not told the story of internment by their parents.

The silence has just begun to be broken within the past decade with the growing acceptance and popularity of internment literature. These writings are not simply

emotional outpourings that provoke sympathy in readers. This is the lived experience of oppression within the United States. These are valuable insights into humanity: how one group of people can oppress another and how a group can adapt to the most dehumanizing living conditions.

Our society has come to recognize the value of studying history in order to enlighten us and prevent past mistakes. The next step is to recognize historical literature as an intrinsic part of that history. Not only does Japanese-American internment literature enrich our culture, but it also a key to understanding their culture. The true experience of internment will not be found only in history books, documents, and artifacts. The lived experience of oppression in our United States is leaping out of the page and clamoring for acknowledgement.

REFERENCES

- Cao, Lan and Himilce Novas. *Everything You Need to Know About Asian-American History*. New York: Penguin Books, 1996.
- Daniels, Roger. *The Decision to Relocate the Japanese Americans*. Malabar, FL: Robert E. Krieger Publishing Co, Inc., 1990.
- Daniels, Roger, Sandra C. Taylor, and Harry H.L. Kitano, eds. *Japanese Americans: From Relocation to Redress*. Salt Lake City: University of Utah Press, 1986.
- Girdner, Audrie and Anne Loftis. *The Great Betrayal: The Evacuation of the Japanese-Americans During World War II*. Toronto: The Macmillan Company, 1969.
- Hong, Maria, ed. *Growing Up Asian American*. New York: William Morrow and Co., Inc., 1993. An anthology of Asian-American literature.
- Houston, Jeanne Wakatsuki and James D. Houston. *Farewell to Manzanar*. Boston: Houghton Mifflin Company, 1973.
- Imada, Lawson Fusao. *Legends from Camp: Poems by Lawson Fusao Inada*. Minneapolis: Coffee House Press, 1993.
- Tateishi, John. *And Justice for All: An Oral History of the Japanese American Detention Camps*. New York: Random House, 1984.

The Great Fight: The Search for an Identity as a Woman Artist in Four Latin American Works

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ABSTRACT

This paper examines the role of women artists as protagonists in four Latin American works. The struggle of the woman to forge an identity as both a woman and an artist is described as a dual process that is often self-conflicting. Women artists are often required to choose between their desire to be a woman and their desire to be an artist. In these four works, it becomes evident that the struggle for an identity as both a woman as well as an artist is often a powerful one, requiring both strength and dedication.

INTRODUCTION

Throughout the twentieth century, and particularly in the Modernist movement, numerous literary works cast the artist in the central role of the protagonist. Indeed, the *künstlerroman* examines the protagonist's search for an identity as an artist. As the artist-protagonist struggles to find a place in society, he or she fights for a place in a space that can both accommodate and fuel creative energies. Many times the struggle includes a break from conventional aspects of life, which stifle artistic creation. In searching for an identity, the artist must often work within societal norms to find an accommodating place at the same time that he or she must reject them in order to fully express the creative energies that define him or her as an artist.

One of the most famous novels of the artist-protagonist search, which has had a great impact on the Modernist movement and the literary world in general, is *A Portrait of the*

Artist as a Young Man by James Joyce. Stephen Dedalus, the artist-protagonist, is portrayed as an isolated rebel who "defiantly abandons country, church, friends, and family in an effort to attain the god-like purity and freedom he felt was the artist's right" (Lemon 1). In order to create, the artist has to break away from the society, which neither esteems his work nor comprehends his world.

Artists often express disdain towards the ordinary world, where people go to work, fall in love, raise families, and create communities (Lemon 2). According to the philosopher Nietzsche, "the enemy of the artist is the rule follower, he is the hollow man, the man in the three-piece suit. He is evil because he cherishes the conditions that keep the artist enchained. He attempts to block the creator's work" (Lemon 2). Therefore, the common man neither accepts the artist nor supports his work. Because of this, "each artist must see himself tragically alone, a magnificent soul tormented by a society that refuses not only reverence and awe but sometimes even food and shelter" (Lemon 2). This break from society engenders both the external and internal struggles of the artist in forging an identity within and separate from the world at large. Thus the artist is in continual conflict: "an internal division [develops]

Author's Note: This paper was completed in partial fulfillment of the requirements for SPAN 242-Introduction to Literature in Spanish II, under the supervision of Dr. Deborah Compte, associate professor of modern languages. Jennifer Scholz is a Spanish and elementary education major.

between his sensual self, which hungers for life and his spirited self which aspires to art" (Huf 3).

Curiously, the intense struggle to define oneself as an artist, as portrayed in the *künstlerroman*, was historically male dominated. Even though there are many novels with a male artist-protagonist, there are remarkably few with a female artist-protagonist. According to the critic Huf, "It is difficult to recall a single serious literary work by a woman, which celebrates her struggle to become an artist" (Huf 2). It is impossible to find a heroine with the same ambition as Stephen Dedalus.

The absence of the female artist-protagonist seems to arise from the doubly conflicted world in which she resides. Not only must she wrestle with the struggle to find an identity as an artist, but she must also overcome all of the other societal obstacles with which women have had to fight merely to establish an identity as a human being. The absence of the woman artist in literature is derived from her traditional position in society, which has been both peripheral and marginal. The role of the male artist has been one of creation and expression of that which he perceives to be true. Woman artists, on the other hand, "have had a hard time finding an identity in this tradition. She is an outsider to the male-dominated realm of official art" (Littleton 44). A female artist fights a double battle, that of woman and artist, in attempting to gain recognition in a society that "degenerates the serious artistry of women" (Stewart 179). Often, women have reservations about creating because of the prejudices of a society that does not support their art simply because it has been created by women.

The female *künstlerroman* that do exist tend to differ greatly from those of male *künstlerroman*. According to Huf, novels with artist-protagonists express basic characteristics. The differences are derived from the woman's position in society. As a woman, she has to fight against the stereotypes of her sexuality before she can attempt to fight for a position in society as an artist. Because of

the dual struggle, her personality traits differ greatly from those of male protagonists. The female artist-protagonist often finds herself forced to choose between being a woman *or* being an artist. If she chooses the role of the artist, she must abandon her position as a woman in order to define her identity as an artist, thus negating part of herself.

When women are represented as artists, they differ greatly from their male counterparts. Men, like Stephen Dedalus, are "sensitive, dreamy, passive, bookish, and misunderstood" (Huf 3). Often they are passive and have feminine characteristics. In contrast, women artists express masculine characteristics; they have spirit and are bold (Huf 4). The woman artist needs more energy because she not only has to fight against the traditional enemy of Nietzsche, which is society in general, but she also has to fight against male artists and those who oppress her as a woman, not only as an artist. Because of her fight, she "typically acquires the reputation of trouble maker. She is said to be selfish and unfeminine" (Huf 10).

The Latin American woman artist's struggle to forge her dual identity is particularly acute in confronting a social milieu dominated by *machismo*, which offers her few, if any, outlets for female expression. The woman is subdued by a male-dominated culture, and the woman artist doubly so. In the short story "Tosca," by Isabel Allende, the protagonist, Maurizia, is a strong woman who continually confronts the obstacles imposed by a patriarchal society in order to realize her ambitions as an artist. She first rebels against her father with her decision to be a singer rather than the more acceptable venue as a pianist. She later rebels against her husband when, in pursuing her desire to establish herself as a singer, she feels compelled to leave her husband and son, thus rejecting her prescribed societal role. Similarly, the poetic voice in the poem "El cisne," by Delmira Agustini, pertains to a strong woman who adopts a similar stance as an artist. She declares "doy miedo" (Agustini 60), "I inspire fear." The female

artist-protagonist is well aware of the transgressive nature of her art which upsets the status quo, inspiring fear rather than admiration.

While the protagonist of the novel *Querido Diego, te abraza Quiela*, is not as strong as the women of the previously mentioned works, she does in fact express an idea of force and rebellion with the actions of her past. When she was a student at The Academy of Fine Arts in Russia, she was expelled for participating in a student protest. Additionally, her parents treated her as they would treat a male; she says “tuve que prepararme, ejercer y saber trabajar” [I had to prepare myself, to practice, and to familiarize myself with work] (Poniatowska 66). It is her independence and her ability to work, traditional masculine qualities, that bring her happiness and fulfillment. She says, for example, “El lograr mi independencia económica ha sido una de las fuentes de mayor satisfacción y me enorgullece haber sido una de las mujeres avanzadas de mi tiempo” [Achieving my economic independence was one of my most satisfying accomplishments and I prided myself with being one of the most advanced women of my era] (Poniatowska 66). Her past, therefore, reflects various masculine aspects of her character, the very characteristics that distinguish her in the academy and in her early career. Not one of these women is weak; they all possess the talent, determination, and independence of thought to succeed. Yet their respective societies offer little place or support for a woman of talent.

The traditional feminine stereotypes “encourage women to sacrifice themselves for others, not to demand sacrifice from others. Women are caught in a double bind, in trying to fulfill the selfless role of the heroine and the self-expressive role as the artist (Stewart 44). Because of their traditional responsibilities, women artists often experience guilt. The writer Anaïs Nin, for example, says “I feel guilty writing poems when I should be cooking” (Huf 149). The woman artist is often forced to choose between her gender and her profession. As the writer

Judy Chicago notes, many times critics tell her “You know Judy, you have to decide whether you’re going to be a woman or an artist” (Huf 6).

The problem of the woman artist comes from the traditional definitions of artist and woman. She cannot be a woman and an artist at the same time, because to accept one role is to reject the other. Artistic identity contradicts the sexual identity of women. Society has a concept of art as being solely intellectual. However, the role of women has been “pro-creative, other-directed, and nourishing and therefore antithetical to the role of the artist” (Stewart 14). In order to be an artist, a woman has to “reject the image of woman as passive, weak, selfless and unthinking or accept her unwomanliness if she actively seeks experience, knowledge and pleasure” (Stewart 15). Therefore, many works with female artist-protagonists represent this conflict between life and art and between women and artists.

In “Tosca,” for example, Maurizia as a woman who has been controlled by the men in her life. Her father “sat her down at the piano when she was five years old” and then, “he enrolled her in classes with a severe teacher” as a way of repressing her desires to be an artist (Allende 111). Additionally, when she marries Ezio Longo, he falls in love with her “with the same dedication that had made it possible for him to strew the capital with his buildings” (Allende 112). As a result, Maurizia tries to escape from the oppression of her father and her husband in order to realize her self. Her actions are a parody of the traditional role of a woman in a patriarchal society (Koene 99).

In *Querido Diego, te abraza Quiela*, the principle conflict revolves around Quiela’s ability to be mother and wife and artist at the same time. When she is an artist, she has time for nothing else. She says, for example, “Me impuse un horario que sólo tú podrías considerar aceptable, de ocho a doce y media del día, de una y media a cinco en la tarde, y todavía de ocho a diez de la noche. Nueve

horas de pintura al día ¿te imaginas tú lo que es eso?" [I adapted myself to a work schedule that only you would consider acceptable. I worked from eight A.M. until noon, from one P.M. until five and then again, from eight o'clock until ten o'clock at night. Nine hours of painting each day, can you imagine how much work that is?] (Poniatowska 34). She continues, reflecting upon the all-consuming nature of her work, "Cada minuto perdido era un minuto menos para la pintura" [each minute lost was one less minute to paint] (Poniatowska 36).

However, with the development of her relationship with Diego, she loses her desire to create. "Se apropia de nuevos papeles, los de esposa y madre, que dominan en su relación con Diego y restringen su propia actividad artística" [She appropriates, adopts new roles, those of wife and mother, which dominate in her relationship with Diego and restrict her own artistic ability] (Aronson 5). When she lived with Diego, she attended to his needs, sacrificing, in the process, her own needs. "Quiela cumplía esencialmente la función de esposa, sujeta a los deseos y a la actividad de su compañero" [Quiela essentially fulfilled the role of wife, subject to the desires and activity of her partner] (Torralbo 63). This is evident when she describes her desire to have "una Angelina que cuidara de [ella] y [le] rogara interrumpir tan sólo un momento para comer un poco, y continu[ó] hasta la noche convulsivamente" [an Angelina that would care for her and that she would only have to interrupt her work for a short moment to eat something, and could continue compulsively working into the night] (Poniatowska 22). She also says that "hace ya muchos años que no pinto" [It has been many years since I've painted] (Poniatowska 24). Her traditional roles then, as lover and mother, impede her ability to be an artist. In fact they function inversely; the stronger her feelings for Diego and her son, the less she is able to paint and harness her creative energies.

Similarly, there is a conflict in the poetic voice of "El cisne" between her desire to be a

woman and an artist. Beupied notes that in much of Agustini's work, "aparece una tensión entre un tú y la voz poética. La figura del tú vencedor representa los valores patriarcales contra los que la voz lírica lucha y es derrotada en su proceso de auto afirmación como mujer poeta" [There appears a tension between a 'you' and the poetic voice. The figure of the triumphant 'you' represents the patriarchal values against which the lyrical voice fights and is defeated in the process of self affirmation as a woman poet] (132). Additionally, the poem explores "las dificultades que encuentra el yo lírico a la hora de asumir identidad como mujer poeta. A pesar de la explícita rebelión contra los valores de su época por parte de la hablante, éstos llegan a contaminar su auto identificación" [the difficulties that the lyric 'I' encounters when she assumes her identity as a woman poet. In spite of the speaker's explicit rebellion against the values of her age, they come to contaminate her self-identification] (133). The poem is therefore an exploration of the personal conflict of the poet as both a poet and a woman.

In the poem, the poetic voice describes a swan, which represents poetry. The swan is also a possible reference to Ruben Darío's poem with the same title, where the poetic voice says, "Oh cisne/Bajo tus blancas alas la nueva poesía," [Oh swan/beneath your white wings the new poetry] (Rosenbaum 124). The swan of Ruben Darío "es la nueva poesía, es enigma de la creación artística" [is the new poetry; it is the enigma of artistic creation] (Gonzalez 62). The relationship between the poetic voice and Agustini's swan therefore represents the same relationship that is established between Agustini and her identity as a woman.

The poem begins with a reference to the act of writing. The poetic voice says, for example, "Pupila azul de mi parque/es el sensitivo espejo/de un lago claro, muy claro.../tan claro que a veces creo/que en su cristalina página/se imprime mi pensamiento" [The blue pupil of my park/is the sensitive mirror/of a clear lake,

very clear.../so clear that at times I think/ that on its crystalline page/my thought is inscribed] (Agustini 1-6). The clear lake is both the page, which the poet uses to write or inscribe her thoughts, as well as a mirror that reflects her art as well as the self-referential nature of the creative act. "Este lago/página es también el espejo cuya pupila azul devuelve la mirada" [This lake/page is also the mirror whose blue pupil returns her gaze] (Beaupied 135).

The poetic voice also speaks of a "pico en fuego" (Agustini 12) and "el rojo pico quemante" (Agustini 42) which represent a pen. This fire, therefore, reflects the desire of the poetic voice to write. Similarly, the red represents ink. As a woman artist, she puts "su pico en [sus] manos" (Agustini 22) in order to write and express herself as a poet. The striking use of red underscores as well the theme of passion and desire. Rosenbaum notes, "'El cisne' is one of the most erotic poems ever written. She [the poetic voice] puts her soul, her spirit, her destiny into her lover's hands" (86). For example, the poetic voice says, "Yo parezco ofrecerle/todo el vaso de mi cuerpo" [I seem to offer you (him)/the entire vessel of my body] (Agustini 35-36). Therefore, if the swan represents a poem, when she puts her soul in it, she is also putting her soul in reality, as well as in her work. The desires of the poem are, therefore, highly self-referential and allude not only to sexual desire, but also to the more profound desire of the poet to be an artist, and thereby achieve fulfillment.

Closely linked to the nearly palpable desire to express herself artistically is an equally strong need to flee the structures that bind her. In the female *künstlerroman*, one may speak of a rite of passage in which "the heroine walks out on the hero and is today, more than ever, an escape artist" (Huf 163). In order to create, many women have to think solely of themselves. For the woman artist, "wedlock is a padlock, a marriage license, a death warrant" (Huf 156). Women who choose the role of artist over that of woman have to abandon the traditional roles

of women, thereby denying the features which presumably define them as women.

This abandonment is evident in "Tosca." In order to be an artist, Maurizia has to relinquish her maternal situation. She feels compelled to abandon her role as a mother because the two roles are contradictory. In a society bound by gendered roles, one simply cannot accommodate the other. Maurizia's growth as an artist depends in fact on rejecting society's prescribed roles. This climactic moment brings with it a full confrontation with her surrounding reality. This confrontation "is the final phase of her development as an artist" (de Carvalho 64). In this moment of confrontation, Maurizia "hesitated for an infinite moment on the borderline between reality and dream, then stepped back" (Allende 123). She decides to abandon totally the prosaic reality of her surrounding world and live instead in her dream world of art, which she herself has created.

According to the critic Keone, there is irony in the story because Maurizia's caprice, her desire to become a singer, "llega a ser una obsesión que destruirá su capacidad de encontrar una felicidad verdadera" [becomes an obsession that will destroy her capacity to find true happiness] (100). He believes that she cannot be happy if she is not part of a reality where she fulfills the roles of wife and mother. He fails to see, however, that she cannot be happy without her art, nor can she be both artist and mother. She consciously chooses to leave her husband and son, because she knows that they exist in another reality, the reality of a patriarchal society where a woman artist cannot exist. Maurizia, as a woman artist, cannot claim an identity in the reality of her husband and son.

For Maurizia, her art, and her decision to be an artist instead of a wife and mother, is not a resignation where she cannot be a part of their world, but rather an affirmation of another reality. For her, the art "becomes a means of confronting a complex reality of dealing with it, and finally overcoming or transcending it" (de Carvalho 66). It is "the

most dramatic moment of the long theater of her life" (Allende 122). Therefore, when Maurizia decides that she will no longer be a part of their reality, she begins to "bridge the gap to another level of reality," (de Carvalho 67) a reality which she herself constructs in order to claim an identity as an artist.

In *Querido Diego, te abraza Quiela*, Quiela does not make a conscious decision to abandon her roles as mother and wife in order to be an artist, but instead loses these roles. Because of this, she faces a different struggle, one not of rejection of the gender specific roles of mother and wife, but of acceptance of the loss of these roles. In her first letters to Diego, she never speaks of her own art, but instead, focuses on her self-sacrificing love for him and the loss of her son. She writes that now "tengo todo el tiempo del mundo para planear y llevar a cabo una buena obra pero en estos días me he removido en mi cama torturada por el recuerdo de la muerte de mi hijo y la ausencia de Diego" [I have all the time in the world to plan and carry out a good work of art but in these days I have tossed in bed tortured by the memory of the death of my son and the absence of Diego] (Poniatowska 25).

In order to return to her position as an artist, she has to transcend the loss of her former roles and come to accept her new situation. "La mujer dulce y débil de las primeras cartas se rebela contra el papel de persona sumisa y maternal" [The sweet and weak woman of the first letters rebels against the role of a submissive and maternal person] (Torralbo 65). She begins to show an enlightened understanding of her true situation, in which she finally perceives the negation of her former roles through Diego's abandonment. For example, she says, "Tampoco quiero ser maternal... Diego sólo es un hombre que no escribe porque no me quiere y me ha olvidado por completo" [Nor do I want to be maternal... Diego is only a man who doesn't write because he doesn't love me and has completely forgotten about me] (Poniatowska 42).

As she slowly relinquishes her former roles, she also acquires a new strength and begins to

question Diego. She writes "¿Ya no me quieres, Diego? Me gustaría que me lo dijeras con toda franqueza. Has tenido suficiente tiempo para reflexionar y tomar una decisión... Ahora es tiempo de que lo hagas" [Don't you love me any longer, Diego? I'd like you to tell me with all candor. You've had enough time to reflect and make a decision. It's now time for you to do it] (Poniatowska 42). Therefore, she emerges as a less submissive figure, and begins to distance herself from her role as Diego's wife. With this displacement, she returns to her role as an artist. For example, she says that "Primero hice naturalezas muertas... después y sin pensarlo dos veces, me puse a pintar paisajes urbanos y sin más pasé a hacer cabezas y caritas de niños que son, a mi juicio, las mejores logradas" [First I drew still-lives... then, and without thinking twice, I started to paint urban scenes and soon after I began to draw heads and faces of children, which are in my opinion, the most successful] (Poniatowska 50). As Quiela returns to her art once again, she begins to achieve confidence in her artistic ability.

In a similar manner, the poetic voice of Agustini's poem abandons the world of repression. In "Nocturno," the poetic voice has been converted into a swan. "Yo soy el cisne errante de los sangrientos rastros/ voy manchando los lagos y remontando el vuelo" [I am the errant swan of the bloody countenances/I proceed staining lakes and rising up in flight] (Agustini 7-8). Here, she has become the poem; in order to survive as a poet and woman, she has to abandon the world and its oppression. The leitmotif of escape is often a constant feature of the female *künstlerroman*, where "images of flight appear indicating that the woman artist conceives her escape from prison" (Stewart 14).

Allende, Agustini, and Poniatowska's works reflect characteristics that are quite similar to those of other works where women artists are protagonists. They recognize the oppression of patriarchal societies, which offer no place for women as artists, and also recognize that only by transcending the traditional gender-

rooted strictures can they fully pursue their artistic goals. While conforming in large measure to the patterns of female *künstlerroman*, they nonetheless also include certain defining features which distinguish them.

With "Tosca," for example, Allende adds the element of fantasy, where the artist has to create her own imaginary reality if she wants to survive as a woman artist. Maurizia's other reality, like many of Allende's artist-protagonists, is that which separates Maurizia from other women in literature. She uses her art in order to create another world. This world is the only place where she can achieve happiness and fulfillment. Maurizia "learns to fantasize, to use her own private world as an escape, a space into which she has the power to create and control her own reality," (de Carvalho 61). She forges her own reality, where she herself is the star and where Leonardo Gómez is "el héroe de su propio melodrama," (Allende 680). Through her imaginative faculties, Leonardo and the town of Agua Santa become mere players in a fantasy world where she is respected as an artist and as a romantic heroine in the opera of her life. "The couple lived in Agua Santa, many years, well respected by the citizenry, who pointed to them as exemplars of perfect love" (Allende 120). And after Leonardo dies, "with the same infinite passion with which she had created for herself an image of the romantic heroine, in her widowhood, she constructed the legend of her despair," (Allende 120).

Likewise, in "El cisne," Agustini digresses from the standard patterns of the traditional *künstlerroman*. In the poem, the poetic voice makes a clear connection between the process of creating art and the process of giving birth. For the poetic voice, poetry is another way to create. This is evident in the use of the color red, which symbolizes blood. It is principally the allusion to blood that "representa la pérdida de la virginidad y el parto. En ambos casos, podemos reconstruir la idea de un rito de pasaje, en este caso, el pasaje de la poeta consagrada como tal," [represents the loss of virginity and giving birth. In both cases we

can reconstruct the idea of a rite of passage, in this case, the passage of the poet consecrated as such] (Beaupied 137). In the same way, "es el parto de la poeta que nace cuando la sangre/tinta inscribe al cisne/poema," [it is the delivery of the poet who is born when the blood/ink inscribes the swan/poem] (Beaupied 138).

The birthing process leads quite naturally to the theme of maternity in the poem, which becomes evident when the poetic voice says, "Hunde al pico en mi regazo" [Bury the beak in my lap] (Agustini 53). Additionally, she gives water to the swan, which is a means of nurturing and supporting its life. She says, "Agua le doy en mis manos/y él parece beber fuego" [I give it water in my hands/and he (the swan) seems to drink fire] (Agustini 33-34). The references to birth represent the birth of the poetic voice as a poet. "Este cisne es, entonces, el poema que se va creando y en cuya gestación la hablante se observa darse a luz a sí misma como poeta," [This swan is, then, the poem that is being created and in whose gestation the speaker watches herself giving birth to herself as a poet] (Beaupied 136).

There is a similar conflation of the birthing process and artistic creation in *Querido Diego, te abraza Quiela*. "Para Quiela, la pintura es importante sobre todo por la yuxtaposición contra otro proceso creativo: la maternidad. A lo largo de la novela hay una interrelación constante entre ambas. Su estado anímico, su tristeza ante la muerte de Dieguito, se refleja en su arte" [For Quiela, painting is important above all because of the juxtaposition to another creative process: maternity. Throughout the entire novel, there is a constant interrelation between both. Her anemic state, her sadness from the death of Dieguito, is reflected in her art] (Aronson 12). Originally, when she saw a child in the street, "lo veía ya como el trazo sobre el papel...yo no veía al niño, veía sus líneas, su contorno" [I saw him as an outline on paper...I didn't see the child, I saw his lines, his contour] (Poniatowska 38). With the birth and death

of her son however, everything changed. "Veo con tristeza a los niños que cruzan la calle para ir a la escuela. No son dibujos, son niños de carne y hueso" [I sadly see the children who cross the street on the way to school. They are not drawings, they are children of flesh and bone] (Poniatowska 39). Her art and artistic vision are directly related to the very physical reality of a child, that she as a mother knows so intimately.

According to Aronson, "La maternidad se entrelaza con el arte de la pintura y su interdependencia es obvia" [Maternity is interwoven with the art of painting and their interdependence is obvious] (12). With the loss of her child came the loss of her ability to create. She writes, for example, "No sólo he perdido a mi hijo, he perdido también mi posibilidad creadora; ya no sé pintar, ya no quiero pintar" [I have not only lost my son, I've also lost my creative possibilities; I no longer know how to paint, I no longer want to paint] (Poniatowska 39). Quiela associates artistic creation with physical creation, and with the death of her son, her artistic desire and ability also die. When she once again starts to paint, it is with the memory of her child, as if her painting were both a continuation of him and a transference of that vitality into artistic form. She writes "Es mi hijo el que se me viene a la yerma de los dedos" [It is my son who comes to my fingertips] (Poniatowska 50).

These particular aspects of the literary works previously examined, with a woman artist as a protagonist, also manifest themselves in the short story "La muñeca menor," by Rosario Ferré. The representation of a displaced maternity through artistic creation is evident in the aunt, who makes dolls for her nieces. The artistic abilities she displays in fashioning ever more refined dolls paradoxically reflect the absence of her own children and her freedom to channel her creative energies in other areas. "Unable to marry, the aunt fulfills her reproductive role by producing dolls that duplicate the growth of her nieces," (Rivera 96). The aunt makes dolls in order to fulfill her need to create. Like the

poetic voice in "El cisne," for the aunt, the process of creating her art is akin to the process of giving birth.

Ferré also employs the technique of magical realism in order to produce a world with another reality, like that of Allende's *Maurizia*. In this reality, the women are able to achieve power and revenge, through the creation of dolls. For example, the young doctor wants his wife to behave like a doll, and "La obligaba todos los días a sentarse en el balcón, para que los que pasaban por la calle supiesen que él se había casado en sociedad," [He obliged her to sit on the balcony every day, so that the people who passed by on the street would know that he had married into society] (Ferré 14). In the end, she gives the doctor exactly what he wants and becomes a doll. "Él notó que su pecho no se movía... y por las cuencas vacías de los ojos comenzaron a salir las antenas furibundas de las chágaras" [He noted that her chest did not move...but that the furious antennae of the insects protruded out of her vacant eye sockets] (Ferré 15). When the youngest niece lies almost comatose in her bed, ironically fulfilling her husband's desire for a completely passive, yet socially desirable partner, the furious antennae portend an active form of rebellion.

Through the dolls, the women of the story are able to create a world of magical realism where they use their art in order to achieve power. In the story, "passive behavior is a weapon of subversion: the revolutionary response to silencing is to use the silence as a weapon" (Rivera 96). The niece uses her silence, like a doll, in order to achieve a more profound effect. Through the story, Ferré "recognizes the limitations of finding an authentic voice both as a woman and as an artist" (Rivera 101). These women, through the art of creating dolls, "use their mute and passive behavior as weapons against those who impose such silence and traditional roles on them" (Rivera 100). Thus, their art empowers them in a way not permitted by the colonial patriarchal society in which they live. The magical doll of the youngest niece takes on a life of her own, which the

niece could not, in actively confronting the spiritual death imposed by her husband.

Through her search for an identity as an artist, the struggle of the woman has been more difficult and more problematic than that of the man. She has had to recognize that she lives in a world that depreciates her value as an artist as much as a woman. Her society does not accept her role as an artist because it contradicts her traditional role as a woman. Through the literary works of Allende, Agustini, Poniatowska, and Ferré, it is evident that the female artist fights a very different battle than the male artist in order to affirm herself and find her role as a creator. Her art, in fact, becomes her weapon, emboldened with images of maternity representing the creative process. She often imaginatively creates an alternate reality, one in which she stands strong and where she has respect and power as an artist. While reflecting the concerns of the *künstlerroman* these works go beyond the mere search for an artistic identity in that they are doubly laden with the problematics of gender. As the protagonist struggles to affirm her identity as an artist, she must also come to grips with the meaning of her identity as a woman and transcend the stereotypical gendered roles which impede her creative development. These works offer a rich examination of both the struggles and empowerment of the female artist.

WORKS CITED

- Agustini, Delmira. "El cisne" y "Nocturno." *Poesías completas*. Madrid: Ediciones Cátedra, 1993.
- Allende, Isabel. "Tosca." *The Stories of Eva Luna*. New York: Macmillan, 1989.
- Aronson, Stacey. "La textura del estilo: *Querido Diego, te abraza Quiela; Eva Luna: Crónica de una muerte anunciada*." *Chasqui*: 4-14.
- Beaupied, Aída. "Otra lectura de 'El cisne' de Delmira Agustini." *Letras Femeninas* 22 (1996): 130-142.
- Ferré, Rosario. "La muñeca menor." *Papeles de Pandora*. Mexico: Joaquín Mortiz, 1976.
- González, Patricia Elena and Eliana Ortega. *La sartén por el mango*. Puerto Rico: Ediciones Huracán, 1984.
- Huf, Linda. *A Portrait of the Artist as a Young Woman*. New York: Frederick Unger Publishing, 1983.
- Koene, Jacoba. "Entre la realidad y el sueño: la parodia como arma de subversión en 'Tosca' de Isabel Allende." *Los discursos de la cultura hoy*. (1994): 99-102.
- Lemon, Lee T. *Portraits of the Artist in Contemporary Fiction*. Lincoln: University of Nebraska, 1985.
- Littleton, Jacob. "Mrs. Dalloway: Portrait of the Artist as a Middle-Aged Woman." *Twentieth Century Literature* 41 (1995): 36-48.
- Poniatowska, Elena. *Querido Diego, te abraza Quiela*. Madrid: Alianza Editorial, 1987.
- Rivera, Carmen S. "Porcelain Face/Rotten Flesh: the Doll in *Papeles de Pandora*." *Chasqui* 23 (1994): 95-101.
- Rosenbaum, Sidonia Carmen. *Modern Women Poets of Spanish America*. Connecticut: Greenwood Press, 1945.
- Stewart, Grace. *A New Mythos: The Novel of the Artist as Heroine 1877-1977*. Vermont: Eden Press, 1979.
- Torralbo, Carmen. "Querido Diego te abraza Quiela." *Notas y Estudios Filológicos* 7 (1992): 60-69.

Auditioning Beauty: Towards a Theory of Audiobooks

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ABSTRACT

The modern world has stripped away many of the joys of reading print books. Mass production has robbed books of their craftsmanship; impatient readers accustomed to television have learned to skim books for their content, leaving the richer layers untouched. Will audiobooks, with their gentle cadences, entertaining voices, and deliberate renderings, return the pleasures of the text to the reader? This exploration of the aesthetics, history, economics, and production of this new literary technology proposes audiobooks as a form intrinsically different from print books that can nonetheless restore to modern audiences the beauty of literature.

INTRODUCTION

Romantics have proclaimed the rise of the audiobook a return to the roots of literature, the end for which the failed printed word has always been striving, and the coming of the true descendent of the oral tradition. Such a declaration may inspire idealistic praise for the advance in literary technology, but to place audiobooks in this position is to severely limit and mistake their nature, and to ignore the milleniums old history of the written word. Audiobooks need not have historic roots for their coming to be pronounced a blessing for literature. There is a strong connection between the written and spoken word, in both ancient and modern manifestations. Innovation in either the spoken or written word necessarily impacts the other in significant ways. The nature of this connection, as

well as the experience of listening to an audiobook and even the reasons we value literature, must be considered in order to establish a place for audiobooks in the contemporary literary spectrum. An expanded discourse on the merits and limits of the new book format will make apparent, through the lens of this new development, just how powerful this form of communication called literature is.

Audiobooks, by virtue of their format as cassette recordings, cannot be classified as a resurgence of the storytelling from which literature grew. Storytelling as an art form has never lost the popularity it held in previous eras, and virtually everyone is familiar enough with the form to be able to distinguish between an animated speaker recounting a story to rapt listeners, and a plastic case with a magnetized strip of tape inside. Storytellers have special techniques that do not concern either authors of print books or readers hired to put those books into words. As Sven Birkerts points out, audiobook readers are not constrained to an audience as storytellers are, and have no need of the techniques, such as alliteration, repetition, formulaic stories, and mnemonic tags, that storytellers have historically employed to hold listeners' attention (87). Neither do they have the additional motivation and indicator of an audience to which they can react.

Author's Note: This paper was submitted in partial fulfillment of the requirements of ENGL 497-Senior Seminar: Literary Theory, supervised by Dr. Lee Harrod, a professor of English. Sarah Sundell is an English major.

Audiobooks are simply printed books made aural; they are given no unique characteristics of content or form that distinguish them from their visual original. Readers are not creators; whether they are interpreters or copiers, they are supposed to be true to the exact text as the print book's author has recorded it.

If listening to an audiobook is not the same as hearing stories around a campfire or curling up in a reading parent's lap, why do listeners so often compare it to these experiences? While the nature of an audiobook is distinct from storytelling, it is also different from that of printed books. Audiobooks fall in a historical continuum after the printed word, and they must be considered as products of the current technological and literary markets that are inseparable from their original printed form, but they also must be considered as an experience apart from reading.

Birkerts subtitled his *Harper's Magazine* article, which like this essay attempts to explicate the experience of listening to audiobooks, "The Metaphysics of Reading an Audio Book." Such an elusive title is required for the slippery considerations of the state of consciousness generated by any literary endeavor, but especially for one as new and untouched by criticism as audiobook listening. Rather than plunge into such difficult waters, I will first discuss a very unscientific experiment I conducted with Rudyard Kipling's *Plain Tales from the Hills* in print and audio format.

In order to evaluate the similarities and differences between print books and audiobooks, I read and listened to several stories from the collection. Some I read first and listened to afterward; others, I listened to and then read. Both experiences always felt like a rereading. I did not approach a new text, either in audio or print form, but one I had already digested and considered. This suggests that, at least with an author as conservative as Kipling, the differences between audio and print books are, to me, negligible. Moreover, my listening experience did not color my later reading as I expected. I did not hear the voice of Martin Jarvis, the tape's

reader, running through my head as I read the print book. I did discover that, unlike reading, it is necessary for me to do something as I listen to an audiobook. Listening while driving allowed me to concentrate on the story; while listening at home, focusing on the audiobook was very difficult.

The characteristics of audiobooks that demand that we listen to them while occupied also provide the most intense aspects of the listening experience. When we read a book, we are consumed with the material object; our eyes and our mental ears are concentrated on the page. Often we ignore outside sounds and have difficulty attending to something happening in the room while we are reading. Listening to an audiobook is entirely different. As Birkerts says, we attain "a vivid sense of doubleness, of standing poised on a wire between two different realities" (89). According to Wolfgang Iser, Georges Poulet proposes that the interaction of the reader with the author creates a strange consciousness that "thinks what it is not" (in Richter 967). Listening to an audiobook fosters the creation of a "mind conscious of itself and constituting itself in me as the subject of its own objects" (967), and yet there is the self apart, always standing back from the work, conscious of the world in which it listens to the cassette. This is a thrilling experience, a dance between two selves who can speak to each other and make connections between environment and text that are impossible when the mind is entirely captured by a printed page.

Part of this phenomenon is due to the passivity and the luxury of being read to, and part is actually attributable to our awkwardness with the medium. It has become second nature to us to hold a book open, to turn the page, to feel the weight of the book in our hands. When we are young, it is probably a great distraction to think about these things. Such demands made by the physical form of the text are comparable to the need to turn over a cassette and adjust volume and balance controls. The author does not plan the page

breaks in his work just as he or she cannot plan the pauses between tapes. Switching tapes hearkens back to multi-volume print works that require the reader to begin a whole new book in the middle of the work. The unplanned pauses differ from chapters, or a serially published piece, because they are unforeseen. They add to the reader's suspense, because nothing is completed before the tape stops. There is nothing that signals the reader that the tape is coming to an end. All these mechanical considerations, however alien they seem now, will, in time, become second nature, as the mechanics of print books are now. For now, they cause an interruption in the reader's submersion in the audiobook, breaking the second consciousness created by the interaction of listener, reader, and work.

The primary distinction between print books and audiobooks rests in the presence of an extra filter, the reader, through whom the story is sifted before it reaches the audience. James Phelan points out that authors use the levels on which their narratives operate for certain ends (in Richter 798). Imposing another dimension on the story changes its rhetorical strategy and potentially its meaning. For example, in *The Rhetoric of Fiction*, Wayne Booth suggests that the reader's response to a character is determined not only by the character's behaviors, morals, and personalities, but also by the distance at which the narrative technique places the reader (Richter 919). Audiobooks, narrated by a physical person rather than sitting on the page in symbolic letters, could disturb the distance created by the author and lessen or increase the reader's identification and sympathy with the characters. The addition of the reader-listener level of rhetoric has significant impact on audience response when viewed through the lens of literary criticism.

To consider this issue, it is necessary to draw distinctions between various styles of reading employed by audiobook readers. The most straightforward style, in which the reader imposes no vocal interpretations upon the text, is termed "unvoiced"; narration with

some characters given individual voices is called "semi-voiced"; and a completely fleshed-out reading, with all the characters identified by their own voices, is named "fully voiced" (Hoffman 41). Audiobook publishers exhibit deep concern with the issue of which style is best and most true to the original work, but Aron suggests that listeners do not distinguish that clearly between the types (212). Nevertheless, the style of narration can have a large impact on the final product absorbed by the reader.

In *Why Write?*, Jean-Paul Sartre warns against trying to "affect" readers, writing simply to elicit powerful emotions from a reader who has placed his or her self in a state of passivity to enjoy the freedom of subjectively appreciating the author's art (in Richter 624-634). His concerns were of a political and social nature, but they enter the realm of interpretation when they are applied to audiobooks. Readers using either the semi-voiced or full-voiced style, full of emotion and characterization, threaten to impose upon not only the reader's freedom and enjoyment but also the meaning of the text. To remain faithful to the original, the unvoiced style would seem more appropriate. However, Books-on-Tape is the only major publisher to use this type of narration (Hoffman 41).

Yet even these unvoiced recordings pose a problem for interpretation. Mikhail Bakhtin promotes a dialogical discourse that includes not only the author's voice but also conflicting voices to which the author must respond (Richter 528). While these voices are implicit in the text, a single-voiced reader could lead listeners to analyze the text as a monological discourse. While full-voiced recordings allow for expression of a multiplicity of perspectives, there is a danger that the reader might mold the characters such that those which were meant to be subversive elements opening the text dialogically are mocked or belittled by the reader's choice of voice. A careful listener would still hear the acknowledged presence of the other in the work, but a cursory

examination of the work would be colored by the reader's interpretation.

Stanley Fish counters such a concern with his assertion that each reader, including the reader who voices an audiobook, extracts several meanings from a given text. Not even each individual, let alone a group, could pin down a single interpretation for a work. Readers of audiobooks cannot offer their interpretation of the characters through voice without exposing these conflicting meanings they have brought away from their interaction with the text.

However, this does not solve the problem of an additional level of rhetoric that audiobooks add to the original text. Louise Rosenblatt claims that "an undistorted vision of the work of art requires a consciousness of one's preconceptions and prejudices" (qtd. in Richter 924). Unfortunately, an undistorted vision of an audiobook, then, would also require knowledge of the reader's preconceptions and prejudices. Norman Holland answers this notion by stating that the meaning of the text does not reside in the author's creation but in the reaction of the audience, which is determined by the audience's psychological make-up (Richter 925). Regardless of the interpretation the reader gives the work, the listener, in Holland's opinion, will always interpret it according to his or her own "identity theme."

It seems that the reader inevitably adds his or her own flavor to the audiobook. Duvall Hecht, cofounder and president of Books-on-Tape, argues in favor of his company's use of unvoiced narration, "When you read a passage about a man and woman making love, the words aren't printed in red, boldface type" (Annichiarico, "Books-on-Tape" 38), introducing an interesting parallel between the voice on an audiobook and an element of print books. While this is true, it is also true that even the font and size of type can have an effect on the way a book is read. Even the choice of the unvoiced style has an impact on the reader. For example, I am now listening to Daniel Defoe's *Moll Flanders*. Though the cover notes indicate that the book can be

read as a statement of Puritan beliefs, the reader gives the protagonist a smug pride in her early escapades that encourages me to cast Moll Flanders as an example of the way exceptional personalities resist societal bonds. As an important aspect of the audiobook, the reader's voice is inescapable. It will necessarily have an effect on the listener's interpretation of the book, whether it provides the listener with a monological rendering of the reader's thoughts on the book, distances the reader from the characters, imposes the reader's prejudices on the book without the listener's knowledge, or alters the text in one of the other ways literary critics have already exposed in regard to print books. If Terry Eagleton's model of material criticism (in Richter 1142) were updated for audiobooks, it would necessarily include the RI, reader ideology.

The niche audiobooks occupy is partly determined by who listens to them. A survey of subscribers to Books-on-Tape, the largest producer and distributor of unabridged audiobooks, reveals a surprisingly homogeneous profile (Aron). Just as the college educated, the middle aged, and the more affluent are overrepresented among recreational readers of fiction, so are they found in unusually high numbers among the Books-on-Tape subscriber population. More than seventy-five percent had attended college and a surprising forty-one percent had earned a postgraduate degree. The age range from 40-69 included seventy-five percent of the respondents. Those with a family income over \$51,000 made up eighty percent of those surveyed, and half of those individuals had a family income over \$100,000. While these figures may not represent the entire population of audiobook listeners accurately, they probably come close. Though these subscribers are obtaining their audiobooks through a rental service costing \$17.50 per book, they are also procuring books at the libraries and bookstores (Aron 208-209). There are doubtless listeners who only acquire audiobooks through free library services, and there is a population of blind

individuals who receive audiobooks for free through the Library for the Blind, but the above profile fits a large percentage of the audiobook listener population.

Another defining factor of the average audiobook listener is a voracious appetite for literature in all forms. While the National Endowment for the Arts estimates that fifty-six percent of American adults read one book of literary fiction per year, eighty-two percent of these listeners read four or more print books per year. Not only that, but almost a fourth of those surveyed read over twenty-five print books per year, in addition to periodicals, newspapers, textbooks, and scholarly journals. The majority of these listeners use audiobooks to combat the monotony of the daily commute. While eighty percent listen to audiobooks in the car, only seven percent listen to them during exercise, the next most popular occasion. Across the board, the respondents cited the ability to listen to audiobooks while performing other activities as the primary reason for listening to them (Aron 209-211).

It does not appear that many listeners have cut back on their reading of print books due to the advent of audiobooks. If anything, listening to books encourages reading (Aron 210-212). According to Philip Zuba, one man I interviewed, who frequently reads upwards of sixty books a year, "Listening accelerates, amplifies my desire to learn... it contributes to the whole focus of life on learning about the human spirit, not being confined to just your own life." He explained that he has read more books since he began listening to audiobooks in the car and that he has been more focused on literature as the center of his life by engaging in it more often. In general, audiobook listeners are intense readers who listen to books they would not have the time or inclination to read otherwise.

Another radically different group also uses audiobooks, but they would never appear in any survey of renters, buyers, or borrowers. These are the children in our schools who are increasingly exposed to audio and video ver-

sions of print books in order to encourage appreciation of literature. Barbara Baskin and Karen Harris, who view the goals of English education in secondary schools as "extending literacy and promoting the enjoyment of literature" (373), believe that audiobooks "have a legitimacy equal to that of printed works" (372). They support this view by proposing that "an authentic book is equivalent to its contents and not to its format" (372).

Were their contention true, it seems there would be no reason to continue employing print books in education at all; however, there are several problems with this understanding of the purpose of English education and the nature of print books that make such a suggestion ill-conceived. Using audiobooks as replacements for print books would probably encourage students to listen to more literature, but it is doubtful that it would encourage them to read more. Simply knowing that there is a more entertaining way to consume literature (similar to the greater ease of Cliffs Notes) could turn students away from the print versions. In addition, students who listen to books rather than read them miss important components of the reading experience. Though as Baskin and Harris point out, the students learn the pronunciations of difficult words (373), they do not learn what those words look like in print. Audiobooks might expand a student's oral vocabulary, but they can do nothing for his or her reading or writing vocabulary. Ignoring the form of the printed work and focusing only on the "identical messages" (372) sent by print and audio books rejects an entire aspect of English education. Students read to develop their skills in decoding a text as well as constructing their own essays and narratives. Without reading print books, they will have no opportunity to wrestle with the written word and no chance to study models for their own written communication. In modern and postmodern fiction, form has come to almost take precedence over content, and high school teachers must not dismiss this. Even *The Canterbury Tales*, a high school staple, has been mutilated by

audiobooks that ignore form. Recorded Books' version of the work "modernizes" Middle English pronunciation, thereby making it more "intelligible" (Baskin and Harris 374). Besides being more intelligible, though, it has also lost the aural qualities which make it so pleasurable to the ear, and which, if properly illuminated, open students up to Chaucer's mastery of his language.

Baskin and Harris do present several excellent ways to employ audiobooks as classroom supplements, rather than print book replacements, and Rose Reissman, a high school English teacher, offers several more. Audiobooks are often read by someone native to the country the book concerns, since hearing the reader's accent exposes students to the culture presented. While ease should not be a criterion for inclusion in an English curriculum, Baskin and Harris are correct to say that audiobooks make it easier for students to grasp syntactically complex writers like Wharton and Hawthorne. Hearing works read aloud also aids students in deciphering and appreciating works written in dialect (374).

However, Reissman's suggestions are the most exciting. Reissman does not suppose that audiobooks and print books are equivalent due to their matching content. Instead, she leads her students in an investigation of the differences between the forms. Using Ray Bradbury's print and modified audio versions of his short story "The Veldt," she illustrates the decisions one author made when confronted with the task of adapting a piece of print literature for a spoken word medium. Furthermore, the students make the same considerations for themselves by producing a version of the short story on cassette. In undertaking this project, Reissman's students make a "close analysis of the text and images" in the story, and "the scripts they prepared accurately incorporated themes, plot lines, and dialogue into the requisite audio format (76)." Rather than ignoring the form of the work, Reissman uses it to stimulate a study of the text that the students would otherwise have no motivation

to undertake. From my own experiences in creating director's notes for the staging of *Much Ado about Nothing*, I can attest that no investigation of literature is deeper than that required to present a work in an audio or visual format. Had Barkin's and Harris's hypothetical students undertaken the transfer of one of *The Canterbury Tales* to audiobook, with guidance concerning correct Middle English pronunciation, they would have appreciated the nature of Chaucer's language and "message" much more.

While audiobooks are effective tools at the elementary and secondary level, their appropriation by college students and scholars is unlikely. Though in my experiment with *Plain Tales from the Hills*, I was able to generate the same quality, quantity, and kind of critical ideas during listening and reading, I would have had difficulty exploring them using the audio format. It is difficult to rewind the tapes to specific points in the narrative, and it is impossible to make notes directly on the audiobook itself. Audiobooks present their own forms to analyze, and studying them as direct replacements for print books would not only be difficult due to the mechanisms involved in listening to cassettes, but it would also be imprecise. The audiobook industry offers fresh ground for critics and scholars, but the audiobooks must be considered on their merits, and not be used as alternatives to the text.

Though audiobooks will not usurp the honored position held by print on the page in academic circles, they undoubtedly have effects on the literary marketplace in general. As Terry Eagleton points out, the literary mode of production is a determinate structure in the creation of literature (in Richter 1144). The rise of audiobooks is bound to change not only the form in which literature is produced, but also how it is purchased, consumed, and valued. Unlike print books, audiobooks produced by many companies are never discontinued (Annichiarico, "Books on Tape" 40), making the format more desirable for those authors who want

their work to be perpetuated. Because of the exorbitant expense of many unabridged recordings, libraries will acquire renewed importance as lenders of audiobooks.

It can be argued that high commercial prices, coupled with the marketing methods of the distributors, will limit the audiobook audience to the affluent and educated. For example, Books-on-Tape has discovered that its best advertising source for rental customers is *The New Yorker* (39). Ad campaigns in such magazines now proliferate, and other advertising outlets, which might have expanded the company's subscriber profile, are ignored. Preston Hoffman proposes that "the key to a broad patron base" is "awareness of the availability of audiobooks" (43). Until library services are better publicized, the typical listeners to audiobooks will remain the professional and academic commuters.

While the growing number of audiobooks found in bookstores seems a threat to the print book industry, it will most likely have a positive effect on print book sales. Those surveyed by Aron did not cut back on their reading due to their listening, and Zuba claims that he buys more print books now that he has begun listening to audiobooks. Not only does his listening prompt him to read more, but he also buys a print copy of every book he listens to in audio version. A frequent audiobook renter, he puts more money into the print copies of audiobook titles than he does into renting the audiobooks themselves. As much as listeners enjoy audiobooks, a box of cassette tapes simply does not make a desirable addition to the family library.

One fear of the commercial aspects of audiobooks expressed by literary purists involves the celebrity status audiobook readers are beginning to enjoy. Walter Benjamin both celebrated and mourned film for the qualities inherent in a work created during the age of mechanical reproduction. On the one hand, reproduction of art means dissemination to a much wider and more diverse audience than the work formerly reached. This consideration is nearly irrelevant for audiobooks, because

they tend to reach a more limited audience than their originals, print books, do. In addition, print books have themselves lacked the authenticity Benjamin ascribes to originals, for they themselves are products of mechanical reproduction. However, Benjamin's concerns about the actor's role in film illuminates potential concerns about the reader's role in audiobooks. Benjamin lamented, "The cult of the movie star, fostered by the money of the film industry, preserves not the unique aura of the person but the 'spell of the personality,' the phony spell of a commodity" (in Richter 1115). Similarly, the trend for audiobook listeners to choose tapes based not on the title or the author but on the reader threatens to overshadow the work itself. Preston Hoffman presents this phenomenon almost as a given. For support, he cites audio-video librarian Karen Miller, who says, "Everyone that comes in asks for anything narrated by Frank Muller" (41), who Hoffman claims is "without a doubt" the most popular spontaneous reader. Describing the dominance of abridged audiobooks in the industry, Mark Annichiarico's first observation is that abridged audio publishers "boast the hottest authors and celebrity readers" ("Long Story Short" 32). In this case, not only are readers transformed into commodities, but so are authors. In Aron's survey, only twelve percent of listeners selected tapes based primarily on the reader, but a larger number expressed concern with the quality of the reading in general. The cult of personality has not yet overwhelmed the industry, but readers' celebrity power grows with each new tape, and readings by already famous film actors and well-known authors contribute to the threatening commercialism of audiobooks. Books-on-Tape remains a bastion of tradition, refusing the requests of celebrities such as Gregory Peck and Stacy Keach to read favorite works (Annichiarico, "Books on Tape" 39), but even the company that strives hardest to remain true to the original work has its own "best" readers (Hoffman 43).

Another fear posited by proponents of literature is a reduction in literacy due to

audiobooks. If those who currently read for entertainment value found it easier or more enjoyable to listen to audiobooks, the number of people reading would decrease, and perhaps even the level of reading skills. However, this seems unlikely, as audiobooks are not going to take over newspaper and magazine markets, and schools will not convert entirely to books in audio format. Besides, there is simply no evidence that listening to audiobooks reduces an individual's time spent reading. From a different perspective, it could be suggested that audiobooks will improve literacy, offering those with reading difficulties a format they can follow aurally while they read. However, Aron's survey revealed that a small number of people, only two percent of those surveyed, use such a technique. In a specific case, Braille is threatened by audiobooks, which are fast becoming the format of choice for patrons of the Library for the Blind. These patrons do not purchase or rent these books, but receive them free with a special device for decoding them. It is possible that audiobooks will reduce the level of familiarity with Braille for those who use it as their written language, but for the majority of the population, audiobooks should have little effect, either positive or negative, on literacy.

While scholars would like to think that the canon results solely from what is taught in universities, popular culture does play a large part in its formation. Therefore, audiobooks, an industry patronized by growing numbers of literate, well-educated adults, are likely to have an influence on the evolving canon. Though Books-on-Tape has always had the largest backlist of all the audiobook publishers, now at 4,500 titles, it could only boast approximately 2,500 titles of the 42,500 audiobooks listed in the 1991 edition of Bowker's *On Cassette* (Aron 208). It must be remembered that many of these audiobooks repeat titles, for different companies produce the same work read in different ways. In comparison, the 1998–1999 *Books-in-Print* lists over 1,528,600 active International Standard Book Numbers. While these numbers may

seem to detract from claims of audio's influence, what they really suggest are the limitations faced by audiobook buyers, renters, and borrowers. Zuba attests to the constraints he feels when browsing for audiobooks. The limited selection and the prevalence of bestseller fiction as opposed to literary fiction and the classics make selection difficult for those interested in "serious" literature. They must take what is offered, giving the audio industry power to mold its own canon. Because audio publishers carefully select works from the preexisting canon, listeners presume that the publishers choose the best works. However, economic concerns determine this canon, a fact that listeners do not always consider. Works that lend themselves to abridgment, those that have sold well, or those that are easy to license are more likely to make audiobook format than others. The power of this new canon will affect the larger canon, for the books published in audio format will reach a greater number of readers with greater expectations for the work. Works that are excluded from audiobook format, including long-time classics, may lose prestige and popularity in favor of those available in both print and audio versions. New works and works that have not historically been included in the canon, if perpetuated by audio, may gain in popularity and esteem and be admitted to the always evolving canon.

No discussion of audiobooks can ignore the issue of abridgment. Since the industry made its presence felt in the early eighties as an alternative to the lengthy, unabridged versions of print books then offered, the comparative merits of the two forms have been debated. Birkerts claims that "every mode has its snob hierarchies" (87), and there are librarians who refuse to purchase abridged audiobooks (Annichiarico, "Long Story Short" 96). This is an odd distinction, for many libraries possess abridged versions of longer printed books. While most in the field acknowledge that full-length versions are truer to the original, the form does have its proponents. While most advocate abridgments, by far the more

desirable form in retail markets, on economic grounds, there are those supporters who promote abridgments and condensed versions as alternative art forms, "performance art" as different from literature as movies are. While this second point must be considered elsewhere, the economic concerns can be dismissed. Brilliance Corporation has found a technique for producing cassettes with double the material, making inexpensive unabridged versions possible.

The strongest support for abridgment rests in the nature of the work to be abridged or condensed. The president and CEO of Dove Entertainment, a producer of both unabridged and abridged titles, explains, "some books lend themselves to abridgments. You're not going to lose the literary merits of Judith Krantz if you abridge her novels, for instance" (Annichiarico, "Long Story Short" 33). Abridgments, which allow only the author's words, and condensed works, which compress the work and leave only the story intact, are not only more appropriate for popular fiction, they are also more likely to be acceptable to the average reader than to literary purists who read classics and other "serious" literature. Other producers of abridgments argue that the format is legitimate since, whenever possible, the author of the print book approves or even writes the abridged audiobook. However, in many cases, the producers do not have that luxury, for the author is no longer living. In other cases, the author refuses to allow an abridgment at all, such as famously expansive writers Stephen King and Larry McMurtry. It seems that the question of abridgment, aside from the economic issues, is simpler than those in the industry make it: abridged audiobooks have the same merits and disadvantages as abridged books.

The most significant question raised by abridgments is not one of value, but of identification. When an author rewrites a book as an abridged version, it is commonly marketed as the same book, under the same title. However, particularly in cases when the

abridgment is done through condensing the material, rather than simply cutting the text, it seems more appropriate to label the product as a new work by the same author. As Baskin and Harris point out, "the author and print editor have presumably already eliminated extraneous elements" (374). Cutting the text for recording transforms it into another piece of art; it is no longer a recorded copy of the original.

Some authors, such as Ray Bradbury, purposely change their books for the audio format, consciously creating a new text. For example, Ernest Callenbach, author of *Ecotopia*, worked with Audio Renaissance in 1995 to produce *Ecotopia: An Audio Novel* in celebration of the novel's twentieth anniversary. The new work was created specifically for audio, and instead of the diary entries and newspaper articles contained in the print book, it features a tape-recorded journal and radio news stories ("Audio Renaissance" 90). Other audiobooks result directly from the author's plan and are not based upon an earlier print book at all. *May It Please the Court* is a collection of segments taken from twenty-three historic Supreme Court cases compiled with commentary by Peter Irons, the project's lead editor. The cassette recording can stand on its own, or can be used in conjunction with a book that features transcripts of the arguments and additional information not found on the cassette (Oder 28-29). There are many audiobooks which were not published in print first, and while I have found no evidence of a fiction work composed solely for audiobook that took advantage of the full possibilities of the format, such a concept is intriguing. Recording offers an outlet for experimentation with sound and tone in fiction that is not available in the printed form, in addition to new possibilities for listener interaction and multimedia presentations.

Baskin and Harris try to equate authentic books with their content rather than their format. This notion must be rejected to develop an adequate theory of audiobooks. As Preston Hoffman explains, "books on cassette

have evolved into a new art, distinct though not separate from the books that give them birth" (43). The work presented by a reader reading aloud, directing his or her work to a recording machine, is fundamentally different from the book created by an author and designer to be paged through, looked at, and held in the hands. The reader adds a new dimension to the work; an audiobook can never be called a copy of a print book. If this were so, the distinction between different versions of audiobooks would be no different than the difference between a Penguin Classic and a Modern Library edition. While these print books give the reader a different sense of the experience, the difference between audiobooks is much greater. The style the reader employs, and his or her accents, gender, and interpretation of the book alter the work so much that it becomes a new piece of art.

Despite these differences, audiobooks will probably never replace print books. While we love to be read to, like children curled up with our parents or medieval laborers entertained by minstrels, we also love the physical books we have long learned to live with in our homes. No reader can resist an aesthetically pleasing cover, a well-sewn binding, or thick, uneven pages. If this were not true, why would Knopf put money and effort into designing the beautiful books of contemporary poetry they produce? The book has always been an art form of its own, since the times of monks painstakingly illuminating religious works. McLuhan is ultimately vindicated by audiobooks, which reveal that to a great extent, if we change the medium, we change the message.

Though audiobooks must be distinguished from print books, the comparison offers important insights into the nature of literature. The experience of listening to an audiobook, it has been shown, is entirely different from reading a print book. However, those who listen to a book "count" it on their lists of books they have read, and my experiment shows that the work has been internalized in a very similar way. Why do we consent to

spend time with art that cannot be equated with the literature it represents? Because it is beautiful, and the vocal rendering of rhythmic phrases and word sounds pleases us aesthetically. We do not read, after all, to analyze the work or figure out something about its cultural context. We read to "partake of the fruits of another's imagination," as Birkerts characterized listening (87). When we read, we often skim the text without realizing it, ignoring the cadence and flow of the language. Audiobooks wake us up and remind us to attend to this aspect of the work's beauty, too long ignored. Those scholars who are now paying more attention to the question of beauty have undoubtedly been influenced, on some level, by the ascent of audiobooks.

Though we can't take notes on them, or use them to discover patterns of tropes, trace word usage, or uncover hidden structures of language, we continue to come back to audiobooks again and again. What we find there are our true reasons for loving literature: its capacity to present us with a whole new world and a renewed sense of the human spirit. We learn from this temporary existence in a different perspective, yes, but what we learn is an expansion of our abilities to find beauty elsewhere, a growth in our appreciation of broader definitions of the common human experience. No matter what form literature takes when we approach it, it never ceases to expand our vision, delight our senses, and leave us spellbound in its wake.

WORKS CITED

- "Audio Renaissance Moves into Fiction." *Publishers Weekly* 6 April 1995: 90.
- Annicchiarico, Mark. "Books on Tape*: Speaking Softly and Carrying a Big Backlist." *Library Journal* 15 November 1994: 38-40.
- . "To Make a Long Story Short: Abridged Audio at 10." *Library Journal* 15 November 1996: 32-34.
- Aron, Helen. "Bookworms Become Tapeworms: A Profile of Listeners to Books on Audiocassette." *Journal of Reading* 36.3 (November 1992): 208-212.
- Baskin, Barbara H., and Karen Harris. "Heard Any Good Books Lately?" *Journal of Reading* 38.5 (February 1995): 372-376.

- Birkerts, Sven. "Close Listening: The Metaphysics of Reading an Audio Book." *Harper's Magazine* January 1993: 86-89.
- Hoffman, Preston. "A Change of Voice: The Art of the Spoken Word." *Journal of Reading* 15 November 1991: 39-43.
- Kipling, Rudyard. *Plain Tales from the Hills*. 1888. Ed. Andrew Rutherford. Oxford: Oxford UP, 1987.
- . *Plain Tales from the Hills*. Read by Martin Jarvis. Cimino, TTDMC 401, 1994.
- Oder, Norman. "Supreme Court is Rich Mine for the New Press." *Publishers Weekly* 5 July 1993: 28-29.
- Reissman, Rose. "An English Teacher's Proposal: Teaching Literature Using Audiocassettes." *English Journal* January 1992: 75-76.
- Richter, David H., ed. *The Critical Tradition*. 2nd ed. Boston: Bedford Books, 1998.
- Zuba, Philip. Personal interview. 28 November 1998.

Media Alignment with Social Change, A Community Structure Approach: City Characteristics and Nationwide Newspaper Coverage of Physician-Assisted Suicide

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ABSTRACT

The debate over physician-assisted suicide continues to grow at a vigorous rate, yet few studies seek to explore this highly charged topic as a communication issue. Unlike other studies exploring the impact of media on society, this investigation examines the impact of society on media (The Community Structure Approach), specifically linking city characteristics to systematic content analysis of newspaper coverage of physician-assisted suicide. Specifically, this study maps the way newspapers from a national cross-section of cities across the United States differ in their coverage of physician-assisted suicide. A sample of the longest newspaper articles printed on the topic that were over one paragraph in length (up to twenty for each of fifteen newspapers) was drawn from a DIALOG newspaper database, collected from the four-year period of January 1, 1993 through January 1, 1997. The resulting 288 articles were then analyzed using both content and a variety of statistical analyses.

THE RIGHT TO DIE: A NATION DIVIDED

The debate over physician-assisted suicide continues to grow at a vigorous rate. It is a highly charged topic that cuts across personal, political, medical, and religious beliefs. Essentially, the issue boils down to whether terminally ill individuals have the right to choose the "when, where, and how" of their death. Many people consider the freedom to make this decision one of their basic human rights.

Others take the opinion that "It is impossible to justify voluntary euthanasia without slipping into barbarism (Snow, 1996, p. 4)." They contend that physician-assisted suicide is not the answer to any problem, and if proper end-of-life medical care existed, physician-assisted suicide would not be nearly as big an issue. Arthur Caplan (1996), director of the University of Pennsylvania Center for Bioethics, stated that "Urine-stained nursing homes are the best friend physician-assisted suicide practitioners and advocates have ever had." This view is evident throughout a large portion of the medical community, which while still predominantly against physician-assisted suicide, has recently turned to re-evaluating end-of-life care.

In the United States, courts have been unable to convict physicians who have aided in the death of their patients. In states such as Oregon, laws have even been passed allowing physician-assisted suicide in certain instances. High profile practitioners such as Michigan based pathologist Dr. Jack Kevorkian have waged battles against the press and the legal system, advocating the legalization of physician-assisted suicide. The religious community remains adamant that physician-assisted suicide is wrong, and

Author's Note: The research presented in this paper, coordinated by Dr. John Pollock, associate professor of communication studies, was conducted independently; it was not completed to fulfill the requirements of any specific course. Spiro Yulis is a communications studies major. The work that was completed is a part of Dr. Pollock's ongoing research program.

that doctors do not have the right to “play God (Stevens, 1996).”

The diversity of opinion surrounding the issue of physician-assisted suicide and its relative recency as an issue high on media agendas makes it a fascinating case study for the exploration of the evolution of reporting on a new and controversial public policy. In particular, a nationwide comparison of the way different major city papers report on physician-assisted suicide, along with comparisons of the way different city characteristics and demographics are linked to reporting variation, can help investigate a question that has been overlooked for too long. That question is the flip side of the traditional question: What is the impact of media on society? The reverse question is often ignored: What is the impact of society on media?

At a time when the restraining influence of public opinion has played a major role in preventing mass media from devouring President Clinton over the Lewinsky scandal, the power of society (or public opinion) to set boundaries or temper media reporting on social or political change has rarely been so clear. By evaluating existing literature on city characteristics or community structure and reporting on public issues, and by analyzing newspapers from a variety of cities around the United States as they cover physician-assisted suicide, this study will illuminate broad relationships between specific city characteristics and reporting on public issues. It is both a contention as well as a finding of this study that major city newspapers cover emerging public issues in a way that is systematic and aligned with the level or presence of certain sectors, groups, or institutions in each city. This approach is in contrast to one that reports controversial events in either a way that reflects a homogeneous “national agenda” on the one hand, or the highly individual viewpoints of each city’s journalists (editors or reporters) on the other.

Communications Literature Seldom Addresses Physician-Assisted Suicide
The debate over physician-assisted suicide is

one that cuts deeply into the ethical fiber of many portions of the American population. It is a topic that is extremely personal in nature, and in many cases not only comes down to individual beliefs but the relationship between patient and physician. The concept of legalizing assisted suicide within a formalized government dates back to 1935, when the British parliament rejected a proposal permitting voluntary euthanasia for seriously ill adults (Providence, 1997). The issue continued to develop over the following decades marked by such events as Dr. Herman Sander’s acquittal of killing a terminally ill cancer patient with an injection of air in 1950, the American Medical Association’s 1973 adoption of the *Patient’s Bill of Rights*, which includes the right to refuse treatment, Pope John Paul II’s 1980 public condemnation of mercy killing, and the state of Oregon’s voters approving a measure allowing doctors to prescribe lethal drugs to terminally ill patients who request them. Within the last ten years, the clash of opinions over physician-assisted suicide has expanded immensely due in some part to the media that have served as a catalyst to this debate.

Even a casual glance at the news coverage of this debate makes it apparent that a wide range of viewpoints must be considered. By examining the variations in news coverage of physician-assisted suicide across the United States, the broad differences in opinion and belief will become more apparent. The established medical community has openly opposed physician-assisted suicide for years, in contrast to the American public who continue to voice their “right to do as they please with their own bodies” (Gallup 1996).

It was alarming to note that there is a striking absence of information regarding physician-assisted suicide in the leading communications journals. A thorough search did not yield a single article on the topic of physician-assisted suicide. The same search was conducted on many communications literature computer databases and yielded the same results. The closest area of study that is dealt with in these journals

includes articles dealing with doctor-patient interaction and communication within the health care industry. The act of physician-assisted suicide is not an arbitrary decision, and in almost all cases involves prolonged discussion and planning (Lynn 1997). It is this interpersonal relationship between the doctor and the ailing patient that has not been addressed by communication professionals. The American Medical Association believes that it should be the role of doctors to improve proper end-of-life care, and to advocate and explain the benefits of this choice over physician-assisted suicide to their patients (Gianelli, 1996). In addition, many physicians support the statement that physician-assisted suicide "is likely to undermine the patient-physician relationship" (Bernat, 1997).

In the past few years, the topic of physician-assisted suicide has continued to gain public interest. The media have centered on the legal battles of Dr. Jack Kevorkian, the Michigan-based pathologist, and the passing of Oregon's "Right to Die" law. Aside from the communication literature, this topic has developed in magazines and many scholarly journals. Such sources as *The New Republic*, *The Humanist*, *The Economist*, and *National Review* have published many articles on the topic of physician-assisted suicide. At this point in time, previous to literature reviews done in prior studies on Kevorkian, many of these journals have started to analyze the topic beyond their own disciplinary frameworks (Pollock, Coughlin, Thomas & Connaughton, 1996). Many of these articles have begun to cross-relate the topic within many different fields. Despite the fact that a few articles have been one sided, most of the articles published in these media to date have presented both sides of the debate.

In addition to the mainstream scholarly literature, the religious and medical communities have begun to publish heavily on the topic. There are hundreds of articles in the medical databases alone, based on literature in *The New England Journal of Medicine*,

Journal of the American Medical Association, *Archives of Neurology*, and *Archives of Family Medicine*, to list some. The topics of these articles includes physician-assisted suicide, doctor-patient interaction, and end-of-life care. On the whole, the medical community is united and in agreement with the American Medical Association's "amicus brief" that was submitted to the U.S. Supreme Court. This brief clearly states opposition to the legalization of physician-assisted suicide, and further deems it "a profound danger for many ill persons with undiagnosed depression and inadequately treated pain, for whom assisted suicide rather than good palliative care could become the norm (AMA, 1996)." The religious community has also openly voiced their objection to the legalization of assisted suicide. In 1980 Pope John Paul II issued the Catholic church's "Declaration of Euthanasia," which prohibits mercy killing of any form. More recently numerous articles have been published in *Today's Christian Doctor* all of which consider assisted suicide to be "assembly line death (Stevens, 1996)." The religious literature that continues to be published on the topic maintains the argument that doctors have no divine right to aid in a person's suicide.

Public opinion toward physician-assisted suicide has remained favorable. In a recent Gallup organization poll, approximately sixty percent of Americans believe that a doctor should aid in the ending of a patient's life, if the patient and the family agree (Gallup 1996). It is this support from the public that has started to sway the direction of the literature in the medical community. Instead of previous literature that dealt with the moral obligations of a doctor to sustain life, new views include those that deal with proper end-of-life care and patient counseling. By studying similarities and differences in nationwide coverage of physician-assisted suicide, it is possible to isolate the major city characteristics associated with variations in the direction of reporting on this significant public issue.

A Community Structure Approach

With an issue based around a personal ethical decision, how do newspapers go about reporting on such a topic? The debate over physician-assisted suicide is one in which religious and health authorities openly oppose the viewpoint of the public. The continual development of this issue may be usefully examined utilizing the community structure perspective. This approach builds on the work of a variety of researchers and suggests that community or city characteristics (using data and demographics) have a great deal to do with reporting on critical events (e.g., physician-assisted suicide) that affect the nation (Pollock, Coughlin, Thomas & Connaughton, 1996). The community structure approach developed by Tichenor, Donohue, and Olien (1973, 1980), and elaborated by Pollock and others (1977, 1978, 1995, 1996, 1997, 1998), studies the connection between city structure characteristics in major U.S. cities and newspaper reporting on social change, focusing on critical events.

Demographics regarding physician-assisted suicide could differ significantly among different U.S. cities. Cities such as Pittsburgh, Miami, and Albany have large elderly populations, in contrast to cities like Charlotte, Los Angeles, or Houston. Such demographic differences merit study, especially in this example, where elderly Americans have proven to hold some of the strongest opinions regarding physician-assisted suicide (Pollock, Coughlin, Thomas & Connaughton, 1996). The community structure approach can help explore whether structural or geographic circumstances are linked to any significant variations in news coverage and possibly public opinion as well.

Hypotheses

After completing a review of the literature on physician-assisted suicide and examining previous research employing the community structure approach, multiple groups of hypotheses arise. There are nineteen hypotheses. They can be categorized in five clusters: media access, health issues, belief system, access to

privilege (or its opposite, marginality), and ethnic identity.

Access to Media

According to Tichenor, Olien and Donohue, the larger a city, the more likely it is to display a relatively wide range of viewpoints and group interests (1980). It is reasonable to assume that a nationwide sample of newspapers will follow suit, and that the greater the amount of newspaper circulation or number of cable television stations in a city, the more open to new perspectives on social change both those media and newspapers will be.

Other media such as the radio and Internet are believed to be the interactive vessels of news coverage. The Internet, with its e-mail and newsgroups, along with radio technology, which popularizes call-in shows, allow a city's citizens access to many viewpoints surrounding a topic. Due to the massive and rapid growth of the Internet on a daily basis, it is difficult to obtain accurate estimates of its usage. For this reason, a city's personal computer usage has been used as a rough gauge of access to interactive options.

In addition, radio coverage of physician-assisted suicide is unique in that it is the only medium unable to display pictures in accordance with a topic. Yet radio stations are able to provide a vibrant public forum for the discussion of opposing viewpoints. Previous studies on coverage of Ryan White (the hemophiliac boy with AIDS) and legalization of same-sex marriage support the projections of Tichenor, Donohue, and Olien associating media abundance with a plurality of reporting perspectives and relative openness to political and social change. (See, respectively, Pollock, McNeil, Pizzatello & Hall, 1996; Pollock & Dantas, 1998.) Therefore, the more media outlets available that allow an issue to be further debated or developed, the greater the likelihood of favorable coverage of physician-assisted suicide, specifically:

H¹ *The larger a newspaper's circulation size, the more likely the coverage of physician-assisted suicide will be favorable (Gale's Directory);*

- H² *The greater the number of cable television stations, the more favorable the coverage of physician-assisted suicide will be (Gale's Directory);*
- H³ *The greater the number of radio stations (AM/FM) in a city, the more favorable the coverage of physician-assisted suicide will be (Gale's Directory); and*
- H⁴ *Those cities with a higher percentage of personal computer users will be more likely to have favorable coverage of physician-assisted suicide (Lifestyle Market Analyst).*

Health Care Access and Significance

Health Care Access

As previously stated, The American Medical Association (AMA) has repeatedly voiced its opposition to physician-assisted suicide; however, the central debate in the medical community has changed direction. The AMA supports that most physicians are still against, and are trained to be against, physician-assisted suicide according to the Hippocratic Oath. In contrast to this belief, there has been a recent growth in the "vocal minority" of physicians who either openly support the legalization of physician-assisted suicide or will not condemn its practice. Additionally, the discussion of the issue has developed from approval/disapproval of physician-assisted suicide, to that of quality of end-of-life care. Properly improving end-of-life care requires a great deal of money, forcing a city to make this a noticeable part of their medical budget. This dilemma complicates itself in that most cities which supply this necessary funding have not enacted formally organized end-of-life care programs. Accordingly:

- H⁵ *The higher the number of health care centers in a city, the more favorable the reporting on physician-assisted suicide (Lifestyle Market Analyst); and*
- H⁶ *The greater the physician density per 100,000 residents in a city, the more favorable reporting on physician-assisted suicide is expected to be (Lifestyle Market Analyst).*

Health Care Significance (Age)

Hippocrates wrote that the art of medicine consists of relieving the sufferings of the sick, lessening the violence of their diseases, and refraining from attempts to cure patients who are overmastered by disease (*Hippocrates*, Jones translation, 1992). Consistently, a study of news coverage of Kevorkian between 1990-1993 found that the greater the proportions of older citizens (over seventy-five) in a city, the more supportive the newspaper coverage of Kevorkian's efforts to publicize the physical concerns of older citizens. (Pollock, Coughlin, Thomas & Connaughton 1996). Kevorkian aside, regarding the act of physician-assisted suicide itself, older citizens have a different perspective. It appears that during the past four-year period, the views of Americans over the age of seventy-five have started to change.

In a recent study conducted at Duke University Medical Center, a sample of 168 elderly patients were surveyed on their views regarding physician-assisted suicide. The results of the study reported that only 39.9 percent of the patients surveyed favored physician-assisted suicide (Levine, 1996). This figure stands in contrast, however, to the 59.3 percent of the same patients' relatives who supported physician-assisted suicide in the same poll (Levine, 1996).

Consistently, a national random survey of citizen opinion regarding middle age sponsored by the American Board of Family Practice, conducted by the senior author and released in 1990, found that the older someone is, the less likely he or she is to consider suicide a reasonable or desirable personal option (American Board of Family Practice, 1990). Coverage supporting Kevorkian does not suggest that individuals over seventy-five necessarily approve of physician-assisted suicide for themselves personally. By extension, the greater the proportion of relatively young people in a city, the smaller the proportion of individuals facing mortality and the more reasonable a distant remedy may appear. Accordingly:

- H⁷ *The greater the proportion of residents over the age of seventy-five in a city, the less favorable the coverage of physician-assisted suicide (Lifestyle Market Analyst); and*
- H⁸ *The greater the proportion of residents between the ages of eighteen and thirty-four in a city, the more favorable the coverage of physician-assisted suicide is expected to be (Lifestyle Market Analyst).*

Belief System

From the first publicized cases of physician-assisted suicide, almost all organized religious groups came forward with the position that "no doctor has the right to play God (Stevens, 1996, p. 4)." A previous study suggested that religious beliefs do not vary significantly with reporting on Kevorkian (Pollock, Coughlin, Thomas & Connaughton, 1996). With broader consideration of physician-assisted suicide as the target topic, however, traditional religious perspectives may be more strongly linked to public consideration of this issue. Accordingly:

- H⁹ *The higher the percentage of city residents engaged in devotional reading, the less likely newspapers are to display favorable coverage of physician-assisted suicide (Lifestyle Market Analyst).*

Privilege

A large portion of the medical community blames the popularity of physician-assisted suicide on the lack of study of and funding for end-of-life care (Sulmassy and Lynn, 1997). Does it follow that relatively privileged cities, with a greater capacity to afford long-term care, display newspaper reporting relatively opposed to physician-assisted suicide? On the contrary, previous research suggests that, on balance, privilege is linked to reporting relatively open to new claims regarding personal or political rights.

In *Newspapers and Community Ties: Toward a Dynamic Theory* (1985), Keith Stamm advocates the perspective that cities with higher quality of life will be more likely to have newspapers that will evaluate new issues from a plurality of perspectives. The cities

with higher "lifestyle advantage" will possess populations that are, in the language of the Pollock studies, relatively "buffered" from conditions of poverty and uncertainty, and newspapers in such cities have proved to be somewhat supportive of human rights claims. Examples are found in research on the "Open Door" policy towards Cuban refugees and Anita Hill's claims about workplace sexual harassment. (Pollock, Shier & Slattery, 1995; Pollock & Killeen, 1995). To be sure, this "buffered" population may react differently when the issue can be perceived as "life-threatening," or a "violation" of the privileged groups' buffer zones. Recent support for this "violated buffer" hypothesis is revealed in past studies focusing on examination of news coverage of Magic Johnson's HIV announcement, and Kevorkian's activities (Pollock, Awrachow & Kuntz, 1994; Pollock, Coughlin, Thomas & Connaughton, 1996). To the extent that physician-assisted suicide is regarded as a "right" rather than a contagion, however, the procedure may be viewed as a remote option for relatively privileged individuals, who may tolerate it as an option or "right" for those in so much pain that they choose to exercise that choice.

Therefore:

- H¹⁰ *The higher the city median income, the more likely that reporting on physician-assisted suicide will be favorable (Lifestyle Market Analyst);*
- H¹¹ *The higher the percentage of professionals in a city, the more likely that reporting on physician-assisted suicide will be favorable (Lifestyle Market Analyst); and*
- H¹² *The higher proportion of city residents with annual family incomes of \$100,000 or more, the more likely a city newspaper is to report favorably on physician-assisted suicide (Lifestyle Market Analyst).*

Consistently, citizens who have completed higher levels of education will probably share the same openness to new end-of-life care and non-care options as counterparts who are economically and occupationally privileged. Therefore:

H¹³ *The higher the level of education (college graduates from a four-year program), the more favorable the reporting on physician-assisted suicide (Lifestyle Market Analyst).*

In contrast to those citizens with high incomes and high levels of education are those who struggle to live on a daily basis and who may fear illness due to their lack of financial security. Social and economic marginality, as well as scarcity of information about medical science, may be associated with concerns that decisions are being made "about" less privileged citizens rather than by them. It is possible for the underprivileged to fear physician-assisted suicide, considering it to be a future excuse for medical professionals to end the lives of the ailing poor prematurely. To the extent that the concerns of these citizens are reflected in major newspaper reporting, the following hypotheses are offered:

H¹⁴ *The higher the poverty level, the greater the chance of news coverage less favorable to physician-assisted suicide (Lifestyle Market Analyst); and*

H¹⁵ *The higher the unemployment level, the less favorable news coverage will be of physician-assisted suicide (Lifestyle Market Analyst).*

Ethnic Identity

Another important aspect of physician-assisted suicide that merits examination is variations in reporting associated with ethnicity. Blacks commit suicide at a rate that is less than that of non-blacks. According to the *1997 World Almanac*, in 1994 only 2,350 of the total 32,410 suicides were black. Previous years, including 1990-1993, yield similar percentages of blacks who chose suicide as a way to end their lives (*World Almanac*, 1996). Whatever the reason for this relatively low rate, the following hypothesis is reasonable:

H¹⁶ *The higher the percentage of African Americans in a city, the less favorable the coverage of physician-assisted suicide (City and County Extra).*

Methodology

Sample Selection

To implement a "community structure" approach, this study tracks coverage of physician-assisted suicide systematically in fifteen major newspapers throughout the nation, representing a geographic cross-section of the United States. Up to twenty of the longest articles (or all of the articles, if there were not twenty) printed in each newspaper were sampled from the period of January 1, 1993 through January 1, 1997. This is a period of time when debate over physician-assisted suicide surfaced and developed, and Kevorkian, the "media figurehead" of the topic, continued to perform assisted suicides. The resulting 288 newspaper articles were collected from the DIALOG Classroom Information Program newspaper database, available to college libraries. All of the articles collected were over a paragraph in length and originated from fifteen newspapers including: the *Albany Times-Union*, the *Baltimore Sun*, the *Boston Globe*, the *Charlotte Observer*, the *Chicago Tribune*, the *Detroit Free Press*, the *Houston Post*, *The Los Angeles Times*, the *Miami Herald*, the *New Orleans Times-Picayune*, the *Orlando Sentinel*, the *Phoenix Gazette*, the *Pittsburgh Gazette*, *The Philadelphia Inquirer*, and the *Seattle Times*. Neither *The New York Times* nor *The Washington Post* was selected for analysis because both papers are considered to be, in many ways, "national" newspapers reflecting the views of national decision-makers as well as local concerns.

Measures and Dependent Variables

After each of the articles was read, it was assigned two scores. The first was an attention or display score. This numerical rating, ranging from three to sixteen points, was based on the following criteria: placement (front page of first section, front page of inside section; inside prominent (e.g., editorial), or other), headline word count, length of article word count, and presence or absence of photograph (with/without caption). Those articles that had a higher number of assigned points were considered to have received more

attention. The resulting attention scores were used to calculate one of the two dependent variables described below.

Direction: First Dependent Variable. A second score assigned to each article was the directional score. This score is derived from an evaluation of the article content, using the entire article as a sampling unit. The nominal measurements of favorable, unfavorable, or balanced/neutral toward physician-assisted suicide were assigned to each article by two different coders. One of the major challenges in coding the second score was clarifying the article's perspective on physician-assisted suicide, keeping this issue separate from what might sometimes be the same article's perspective on a key "media figurehead" for the issue, Kevorkian.

Coverage deemed *favorable* to physician-assisted suicide includes those articles that consider this act to be an essential moral human right, even describing it as the "ultimate humanistic choice." In many cases, these articles argue that physician-assisted suicide is a "God given" right, and that a country's legal system has no right to get involved with a decision this personal. An article could also be considered favorable if it was sympathetic to the many organizations that support voluntary euthanasia, or support doctors who aid in the process.

Coverage *unfavorable* to physician-assisted suicide included articles using such phrases as "assisting suicide is the first step towards barbarism," or "no doctor has the right to play God." Unfavorable articles were quite directly opposed to physician-assisted suicide, stating such reasons as basic morals, ethics, and religious stances. Articles were also considered unfavorable if they stated that any doctor who would aid a person looking to end his or her life was violating the Hippocratic oath or if they stressed improved end-of-life care instead of assisted suicide.

Balanced/neutral coverage included the articles that displayed both sides of the debate over physician-assisted suicide in approximately equal measure. Those articles that took the

"higher moral ground approach," stating that this issue is not for any of us to judge were also considered neutral. Finally, articles that dealt solely with Kevorkian and did not render a clear opinion on the more general topic of physician-assisted euthanasia were deemed balanced/neutral. After the collected articles were assigned their directional scores, two researchers coded a systematic sub-sample of half of the articles. This yielded a Holsti's Coefficient of Intercoder Reliability of 0.918. The result was a total of 288 articles coded for "direction" of their coverage, permitting article "direction" alone to be a dependent variable.

Coefficient of Imbalance: Second Dependent Variable. A more complex and sophisticated statistic combines measures of both the likelihood that readers will be exposed to material on physician-assisted suicide (attention scores) and an evaluation of article content (direction scores) to yield a highly sensitive single score for each newspaper's overall coverage of physician-assisted euthanasia across the entire sampling period. After each article was assigned an attention score and a directional score (favorable, unfavorable, balanced/neutral) these were combined to calculate the Janis-Fadner Coefficient of Imbalance for each newspaper.

The resulting statistic, which can vary from +1.00 to -1.00, permitted quantitative comparisons of each newspaper's coverage of physician-assisted suicide. Scores between zero and +1 indicated favorability and scores between zero and -1 indicated unfavorability towards physician-assisted suicide. Articles using the Janis-Fadner Coefficient of Imbalance in communication research have been accepted for publication in such journals as *Comparative Politics, Society, Journalism Quarterly, Mass Communication Review, Newspaper Research Journal* (two articles), *The New Jersey Journal of Communication*, and the edited, refereed collection *Communication Yearbook*. (See respectively Hurwitz, Green & Segal, 1976; Pollock & Robinson, 1977; Pollock, Murray & Robinson, 1978; Pollock, 1995; Pollock,

Coughlin, Thomas & Connaughton, 1996; Pollock, Kreuer & Ouano, 1997; Pollock & Whitney, 1997; and Pollock & Guidette, 1980). See Table 1.

Table 1. Single-Score Content Analysis:
Calculating the Coefficients of Imbalance

u = the sum of the attention scores coded "unfavorable"
f = sum of the attention scores coded "favorable"
n = the sum of the attention scores coded "neutral/balanced"
 $r = f + u + n$

If $f > u$ (or the sum of the "favorable" attention scores is greater than the sum of the "unfavorable" attention scores), then use the following formula:

Coefficient of Favorable Imbalance:
 $C(f) = (f - u)/r^2$ (answers lie between 0 and 1)

If $f < u$ (or the sum of the "unfavorable" attention scores is greater than the sum of the "favorable" attention scores), then use the following formula:

Coefficient of Unfavorable Imbalance:
 $C(u) = (u - f)/r^2$ (answers lie between 0 and -1)

Procedures

An exploration of the relation between the city characteristics described in the hypothesis section and the two dependent variables, direction and coefficient of imbalance, was carried out using a variety of statistical procedures. First, Pearson correlations were run to measure which city characteristics were most strongly associated with each dependent variable. Second, the city characteristics were subjected to factor analysis in order to isolate a few key city dimensions that might provide the highest degree of explanatory power in their association with coverage of physician-assisted euthanasia. Third, regression analysis was used to reveal the relative strength and importance of four dimensions identified in the factor analysis. Two clusters emerged as central to our effort to isolate the most significant variables associated with variations in coverage of physician-assisted suicide. All three procedures revealed that a few key city characteristics are consistently associated strongly with coverage of the issue, and the procedures also demonstrated that city characteristics are far more significant in their association with the newspaper-level variable, the Coefficient of Imbalance, than they are with direction of coverage alone.

Finally, the fifteen cities were grouped in four major U.S. geographic regions, and the

regional averages of the Coefficients of Imbalance were compared with regional polling data (over a similar time period) on physician-assisted euthanasia derived from the General Social Survey conducted each year by the National Opinion Research Center at the University of Chicago. This comparison permits researchers to estimate how closely newspaper coverage and public opinion regarding physician-assisted suicide resemble one another in each region. Any large discrepancies between public opinion and newspaper coverage deserve some attempt at explanation.

Results

Varied Coverage with Nationwide Differences

As predicted, the newspaper coverage of physician-assisted suicide between the years of 1993-1997 was widely varied. The Coefficients of Imbalance ranged from +.380 to -.389, representing a nationwide difference of coverage among newspapers. The proportion of positive coverage was almost equal to that of negative coverage. The cities of Los Angeles and Seattle had the most favorable reports on physician-assisted suicide, while Miami and Albany presented the most unfavorable coverage of the matter.

When looking at the geographic placement of the city newspapers in relation to their coefficients of imbalance, at least one pattern is apparent. City newspapers with negative Coefficients of Imbalance tend to be in cities or states that are located in or near the eastern seaboard.

Table 2. Janis-Fadner Coefficient of Imbalance - C(I)

City	Newspaper	C(I)
Los Angeles	<i>The Los Angeles Times</i>	0.380
Seattle	<i>Seattle Times</i>	0.187
Charlotte	<i>The Charlotte Observer</i>	0.072
Orlando	<i>Orlando Sentinel</i>	0.063
Boston	<i>Boston Globe</i>	0.038
Detroit	<i>Detroit Free Press</i>	0.024
Houston	<i>Houston Post</i>	0.003
Chicago	<i>Chicago Tribune</i>	0.013
New Orleans	<i>New Orleans Times-Picayune</i>	-0.038
Philadelphia	<i>The Philadelphia Inquirer</i>	0.058
Phoenix	<i>Phoenix Gazette</i>	-0.061
Pittsburgh	<i>Pittsburgh Gazette</i>	-0.103
Baltimore	<i>Baltimore Sun</i>	-0.174
Miami	<i>Miami Herald</i>	-0.309
Albany	<i>Albany Times Union</i>	-0.389

Citizens Over Seventy-Five, Access to Media and Health Care, and Privilege Strongly Linked to Coverage of Physician-Assisted Suicide

Calculation of Pearson correlations between city characteristics and direction of newspaper coverage of physician-assisted suicide, as well as between city characteristics and the more sophisticated measure of coverage, the Coefficient of Imbalance, reveals several statistically significant results. The clearest finding is that there is a significant negative relationship between city population age (percentage of age over seventy-five years), direction scores, and Coefficient of Imbalance scores.

Table 3. Significant Pearson Correlations

Independent Variable (City Characteristics)	Direction	Coefficient of Imbalance
Percent population >75 years	-.243**	-.754**
Newspaper circulation	.240**	.585**
Number of health services	.217**	.619**
Number of cable stations	.176**	.555**
Median income	.173**	.576**
Number of AM stations	.165**	.554**
Number of FM stations	.158**	.440**
Number of physicians/100,000 people	.157**	.497**
Percent computer users	.145**	.660**
Percent population >55 years	-.131*	-.212**
Percent Hispanic	.127*	.299**
Percent engaged in devotional reading	.124*	.331**
Percent pop. ages 18-34	.098*	.219**
Percent below the poverty level	-.073	-.350**
Percent families of \$100,000 annual income	.069	.321**
Percent professional	-.074	.200**
Percent college educated	.000	.199**
Percent unemployed	.048	-.115*
Percent black	.029	-.102*

* $p < .05$ ** $p < .01$

It is clear that many city characteristics are associated significantly with both dependent variables, issue direction, or the more complex measure combining both "attention" to an issue by a newspaper and "direction": the Coefficient of Imbalance. It is also clear that the correlations and significance levels for the Correlation of Imbalance are stronger than those for "direction" alone. An examination of the correlations reveals that age or approaching mortality (age seventy-five-plus) is associated, as expected, with relatively negative coverage of physician-assisted euthanasia, while access to media (large newspaper circulation, number of cable stations, FM or AM

stations) and access to health care (number of health care facilities, number of physicians per 100,000 population), as hypothesized, are linked to relatively favorable newspaper coverage of the issue. In addition, privilege (high median income, percent computer users, college educated, or professionals) in a city is associated with relatively favorable coverage of physician-assisted suicide, confirming hypotheses suggesting that the larger the privileged population "buffered" from uncertainty, the more favorable the coverage of human rights issues, in this case the "right" to choose whether to live or die. With so many significant correlations, additional statistical techniques for isolating the most highly significant variable clusters are clearly in order.

Factor analysis of city characteristics. Varimax rotation of all city characteristics yields four significant factors, described in the Table 4, including factor labels.

Table 4. Factor Analysis of City Characteristics Rotated Component Matrix (Factor Loadings)

Factor	Component	Factor Loading
Factor 1: ACCESS	Number of AM radio stations	.837
	Number of cable TV stations	.832
	Physicians/100,000 population	.876
	Number of FM stations	.862
	Number of health services	.819
Factor 2: PRIVILEGE	Newspaper circulation	.792
	Percent college graduates	.793
	Percent computer users	.798
	Incomes > \$100,000 annually	.655
Factor 3: MARGINALITY	Percent professionals	.911
	Ages 18-34	.723
	Percent black	.660
	Median income	.847
	Percent below poverty level	.952
Factor 4: MORTALITY	Percent unemployed	.874
	Percent age 75 or greater	.788
	Percent engaged in devotional reading	-.906

The first factor, labeled "access," refers to access to media (AM radio stations, cable TV stations, FM radio stations, and newspaper circulation of the city newspaper selected for this sample) as well as access to health care (number of physicians/100,000 population and number of health services). The second factor, "privilege," is measured by percent college graduates, percent computer users, family incomes greater than \$100,000, and

percent professionals. The third factor, "marginality," is measured primarily by low median income and high unemployment and poverty levels, high percent black population, and low percent young people ages eighteen to thirty-four. The fourth factor, "mortality," is measured by high percent age seventy-five and over and low percent engaged in devotional reading. It is somewhat curious that high percentages of seventy-five-plus citizens and low percentages of devotional readers are correlated so strongly with a single factor, since conventional wisdom would probably assume aging and devotional reading to vary positively with one another.

Table 5. Correlations of Factors with Coefficient of Imbalance

Component	Pearson Correlations*
Access	.472
Privilege	.278
Marginality	.293
Mortality	-.491

*All correlations significant at .000 level.

Regression of four factors. Regression of the four factors, all of which correlate highly with the Coefficient of Imbalance, yield two principal factors as most significant in accounting for most of the variance accounted for by the factor components. The "mortality" factor (including percent over seventy-five years of age) and the "access" factor (including multiple cable and radio stations, as well as relative abundance of physicians and health facilities) together account for 46.3 percent of the variance in their association with the Coefficient of Imbalance, that is, with reporting favoring physician-assisted suicide. Mortality is associated with relatively negative coverage of physician-assisted suicide, while access is linked to relatively positive coverage of the proposal. The equation using all four factors has a correlation of .79 with the Coefficient of Imbalance, accounting for about sixty-three percent of the total variance.

Table 6. Model Summary: Change Statistics

Model	R (Equation)	R Square (Cumulative)	R Square Change	F Change	Significance of F Change
Mortality	.491	.241	.241	90.651	.000
Mortality & Access	.681	.463	.222	118.058	.000
Mortality, Access & Marginality	.741	.549	.086	54.072	.000
Mortality, Access, Marginality & Privilege	.791	.626	.077	58.639	.000

Four-Region Comparison with Public Opinion. Finding that mortality and access describe city characteristics strongly associated with newspaper coverage of physician-assisted suicide is useful. But a new question immediately arises: what is the process linking those characteristics to newspaper coverage? Are city characteristics linked to public opinion on this issue? Or do city characteristics and public opinion function independently of one another? Which domain, city characteristics, or public opinion, is most closely associated with coverage of physician-assisted suicide? To begin exploring these questions, U.S. Census categories were collapsed into four major regions, and cities were placed in each of the regions: Northeast, South, Midwest, and West. Newspaper coverage "averages" for each region were computed by averaging the Coefficients of Imbalance for all of the sampled newspapers found in each region. These averages were then compared with the percent of the population saying "yes" to whether or not they approved of physician-assisted death, a question asked of national samples over several years by the General Social Survey conducted by the National Opinion Research Center of the University of Chicago. In this case, the most recent data available online covered the years 1990-1994 (each of the years had similar results), similar to the years of coverage sampled for this investigation (1993-1997). The resulting comparison, found in Table 7, merits discussion.

Table 7. Regional Comparisons of Coefficient of Imbalance and Public Opinion

REGION	AVERAGED C(I)	% ANSWERING YES
NORTHEAST	-.1363	68.1
SOUTH	-.0638	61.5
MIDWEST	-.022	69.6
WEST	.1686	75.2

Global Social Survey N=5009.

Although all regions manifest clear, positive majorities of public opinion favoring physician-assisted euthanasia (from 61.5% in the South to the most positive in the West, 75.2%), the Coefficients of Imbalance display more variation. Only the West is positive (.1686), while the East is the most negative (-.1363). Larger samples of newspapers would be necessary to reach solid conclusions about the relation between public opinion and newspaper coverage, but two propositions derived from this primitive comparison appear worth examining. First, where public opinion and newspaper coverage of an issue are both relatively positive (as in the West), a coherent, consensual public policy on an issue such as physician-assisted suicide may have an opportunity to form (as in Oregon or Washington). Second, where public opinion and newspaper coverage diverge the most (as in the East), the likelihood of a coherent, consensual public policy on an issue (such as physician-assisted suicide) is less likely. Both propositions underscore the utility of comparing systematic content analysis of news coverage of critical issues

Conclusions and Implications for Future Research

Comparing the relation between city characteristics and a nationwide sample of city newspaper coverage of physician-assisted suicide reveals several conclusions derived from systematic content analysis, correlations, factor analysis, and regression analysis.

- 1) Generational differences are important in studying media coverage of physician-assisted suicide. Those over age seventy-five may have a different perspective (and a different stake in the issue) compared to those who are substantially younger. Combined with the percentage of those engaged in devotional reading

in each city (derived from polling data), age and devotion both tap an underlying "mortality" factor that is strongly linked to newspaper coverage of physician-assisted euthanasia.

- 2) Access to abundant media outlets (radio stations, cable television stations, and large newspaper circulation) as well as access to health care (number of physicians/100,000, and number of health care facilities) also represent a coherent "access" dimension that, together with the "mortality" factor, accounts for forty-six percent of the variance in newspaper coverage of physician-assisted suicide.
- 3) Two other factors, "privilege" and its opposite, "marginality," account for an additional thirty-three percent of the variance in coverage of physician-assisted suicide.
- 4) Regional differences in newspaper coverage of the issue deserve exploration, in particular in comparison with regional variations in public opinion. In this instance, public opinion and newspaper coverage are most similar in the West, least similar in the East. Possible explanations for those variations merit further exploration.

Media Alignment with Social and Political Change: A Community Structure Perspective
Further studies on physician-assisted suicide should continue to test the correspondence of city demographics and newspaper coverage. This community structure approach has proven useful in investigations of coverage of those with HIV/AIDS, same-sex marriage legalization, legalization of abortion, and a variety of other critical issues. This approach, studying newspaper variation from one city to another, appears most useful when issues are relatively recent in their emergence, before public opinion or the viewpoints of journalists have congealed, so that journalists have a significant amount of discretion in their decisions about how they present new public issues.

The community structure approach, however, is useful not simply for the exploration of emerging public issues, but also for

its illumination of a larger public and theoretical debate on the role of media in society. Following the University of Chicago's Park, who in his exhortation in the 1920s, recommended looking not only at media's influence on society, but also at society's influence on media, the community structure approach, in this study of physician-assisted suicide as well as in other studies, has unearthed several consistent connections between city characteristics and reporting on social and political change. In this study, precise differences in age, access, and privilege across several cities are linked strongly to precise differences in reporting on an issue. These findings suggest that reporting on social change is something far more than the product of individuals exercising reasoned judgments about news values, because news perspectives are linked systematically with city characteristics. Nor does this study support evidence for a national "agenda-setter," such as a single newspaper, group of leading newspapers, or wire services setting perspectives for distinct papers throughout the nation. City differences are distinct, and perhaps regional differences are also distinct in reporting on social change.

As a result, this study illuminates the way newspapers "align" themselves rather precisely with social change, in direct proportion to the relative presence or absence of key groups or sectors in their own communities who may have some stake, perceived or real, in that change. It is one thing to map the existence of this media alignment. It is quite another to make intelligent guesses about the processes that bring about that alignment. How do city characteristics, which are relatively static, become translated into media perspectives on critical social and political issues? Do different groups make their views known in predictable ways? Or are journalists "socialized" to accommodate rather distinct city perspectives through some kind of long-term learning process? Or is there some kind of reporting perspective or ground-level professional theory that helps journalists balance the goals of "objective" reporting with a sensitivity to or understanding of the specific interests of a

city's residents or a newspaper's readers? A number of leading communication scholars have begun to draw attention to news coverage as "negotiated" outcomes, the product of bargaining and balancing different interests. Whatever the negotiation process, the community structure studies on critical public issues suggest that news outcomes are far more patterned and systematic than bargaining at the individual level would evoke, and that there are relative consistent alignments between city configurations and reporting on emerging issues. These and other questions deserve further investigation in order to map further the relation between society and media reporting on social change.

REFERENCES

- AMA Poll. (1997, January). The more patients know, the less they want suicide. *American Medical News*, 40(2), pp. 3-5.
- American Board of Family Practice. (1990). *Perspectives on Middle Age: The Vintage Years*. Lexington, KY: American Board of Family Practice.
- Annual metro, city, and county data book, county and city extra*. (1996). Lanham, Md: Bernan Press.
- Associated Press. (1997, June 28). Kevorkian chronology. *Detroit News, Metro*—Online Ed. Rev. 11/1997. <http://www.detnews.com/search.html>
- Bachman, J., Kirsten, A., Doukas, D., et.al. (1996, February). Attitudes of Michigan physicians and the public toward legalizing physician-assisted suicide and voluntary euthanasia. *The New England Journal of Medicine*, 334(5), pp. 303-310.
- Back, A., Wallace, J., Starks, H., Pearlman, R. (1996, March). Physician-assisted suicide and euthanasia in Washington State: patient requests and physician responses. *Journal of the American Medical Association*, 275, pp.919-925.
- Balch, J.D., O'Steen, D. "What's wrong with voluntary euthanasia." Rev 1/1995. <http://www.ohiolife.org/euthanasia.html> (10/1997).
- Bindels, Patrick. "Euthanasia and physician-assisted suicide in homosexual men with AIDS." Rev. 11/1996. <http://www.mediconsult.com/noframes/aids/journal/automation/content.html> (10/1997).
- Covinsky, K., Goldman, L. (1994). The impact of serious illness on patients families. *The Journal of the American Medical Association*. 156, pp. 1737-1741.
- Dow, S. (1997, July). Dutch laws linked to fears over euthanasia. *The Age*, Online Ed. Rev. 10/1998. <http://www.theage.com.au/dany/970704/news/news16.html> (10/1997)
- Dreele, W.H. (1996, April). Thanatopsis. *National Review*, 48(6), pp. 18-21.

- The Economist*. (1996, March). The anguish of doctors. 338(7957), pp. 35.
- The Economist*. (1997, May). The art of death. 343(8019), pp. 27.
- Emanuel, E., Fairclough, D., Daniels, E., et.al. (1996, June). Euthanasia and physician-assisted suicide: attitudes and experiences of oncology patients, oncologists, and the public. *Lancet*, 347(9018), pp. 1805-1810.
- Gallup - Scripps Howard News Service. (1996, February). Men support legality of doctor-assisted suicide.
- Gianelli, D. (1996, November). AMA to court: No suicide aid. *American Medical News*, 39(44) pp. 1-4.
- Gutmann, S. (1996, June). Death and the maiden. *The New Republic*. 214(26), pp. 20-24.
- Hachinski, V. (1997, June). Physician-assisted suicide. *Archives of Neurology*, 54, pp. 674.
- Hall, R. (1994, December). Final act. *The Humanist*, 54 pp. 10-20.
- Hippocrates. The art, iii. In: Jones WHS, trans. (1992). *Hippocrates*. (pp. 4-20). Cambridge, Mass: Harvard University Press.
- Johansen, Jay. "Euthanasia in the Netherlands." Rev. 2/96. <http://www.ohiolife.org/euthanasia.html> (10/1997).
- Johansen, Jay. "Euthanasia: A case of individual liberty." Rev. 11/95. <http://www.ohiolife.org/euthanasia.html> (10/1997).
- Kevorkian, J. (1994, December). A modern inquisition. *The Humanist*, 54, pp. 7-9.
- Lee, M., Tolle, S. (1996). Oregon's assisted suicide vote: the silver lining. *Annals of Internal Medicine*, 124(2), pp. 267-271.
- Levine, Rebecca. "Frail, Elderly patients more opposed to physician-assisted suicide than younger relatives." Rev. 10/1996. <http://www.dukenews.duke.edu/radio/elderly.html> (10/1997).
- Lessenberry, J. (1994, July). Death becomes him. *Vanity Fair* Rev. 11/1998. <http://www.interme.org/kevorkian/vanityfa.htm> (9/1997).
- The Lifestyle Market Analyst* (1997). Wilmette, Illinois: Standard Rate and Data Service.
- Lynn, J. (1996). Caring at the end of our lives. *The New England Journal of Medicine*, 335(3), pp. 201-203.
- Lycos-Internet Search Utility (1997). "Right-to-die." <http://www.lycos.com> (12/1997).
- McHugh, P. (1997, Winter). The Kevorkian epidemic. *The American Scholar*, 66(1), pp. 15-31.
- Onwuteaka, B., Muller, M., Van der Wall, G., et.al. (1995). Attitudes of Dutch general practitioners and nursing home physicians to active voluntary euthanasia and physician-assisted suicide. *Archives of Family Medicine*, 4, pp. 951-955.
- Pollock, J.C. (1995). Comparing city characteristics and nationwide newspaper coverage of NAFTA. *Mass Communication Review*, 22 (3/4), pp. 166-177.
- Pollock, J., Awrachow, N.J. & Kuntz, W. (1994, July). Comparing city characteristics and newspaper coverage of the Magic Johnson HIV announcement: A community structure approach. Paper accepted for presentation at the Health Communication Division of the 1994 Annual Meeting of the International Communication Association, Sydney, Australia.
- Pollock, J.C., Coughlin, J., Thomas, J. & Connaughton, T. (1996, Summer/Fall). Comparing city characteristics and nationwide newspaper coverage of Dr. Jack Kevorkian: an archival approach. *Newspaper Research Journal*, 17(3/4), pp. 120-133.
- Pollock, J.C. & Dantas, G. (1998, July). Nationwide newspaper coverage of same-sex marriage: A community structure approach. Paper accepted for presentation at the International Communication Association annual conference, Jerusalem, Israel.
- Pollock, J.C. & Guidette, C.L. (1980). Mass media, crisis and political change: a cross-national approach. In Dan Nimmo (Ed.), *Communication Yearbook IV* (pp. 309-324). New Brunswick, Transaction Books.
- Pollock, J.C. & Killeen, K. (1995, Nov.). Newspapers and the Clarence Thomas - Anita Hill hearings: Comparing city structures and major city coverage. Paper presented at the Speech Communication Association annual meeting, San Antonio, Texas.
- Pollock, J.C., Kreuer, B. & Ouano, E. (1997, Summer/Fall). Nationwide newspaper coverage of China's bid for the 2000 Olympics: A community structure approach. *Newspaper Research Journal*, 18 (3/4), pp. 31-49.
- Pollock, J.C., McNeil, K., Pizzatello, L. & Hall, G. (1996, May) Comparing city characteristics and newspaper coverage of Ryan White: A community structure approach. Paper accepted for presentation at the annual meeting of the International Communication Association, Chicago, IL.
- Pollock, J.C. & Montero, E. (1998). Challenging the Mandarins: Comparing city characteristics and nationwide newspaper coverage of the Internet, 1993-1995. In Bosah Ebo (Ed.), *Cyberghetto or cybertopic: Race, class and gender on the internet* (pp. 103-119). Westport, CN: Praeger.
- Pollock, J.C. & Robinson, J.L. Jr. (1977). Reporting rights conflicts. *Society*, 13(1), pp. 44-47.
- The Providence Journal* (1997). The right-to-die chronology 1997. <http://www.projo.com/special/>
- Stamm, K.R. (1985). *Newspaper use and community ties: Toward a dynamic theory*. (pp. 260-264). Norwood, NJ: Ablex Publishing Corporation.
- Statistical Abstract of the United States* (1995). 115th ed. Washington, DC: U.S. Bureau of the Census.
- Stevens, D. (1996, Fall). Seven arguments against physician-assisted suicide. *Today's Christian Doctor*, 27(4), pp. 6-17.
- Sulmassy, D., Lynn, J. (1997, June). End-of-life care. *The Journal of the American Medical Association*, 277(23), pp. 1854-1856.
- Tichenor, P.J., Donohue, G., & Olien, C. (1980). *Community conflict and the press*. Beverly Hills, Sage Publications.

Asymmetry of Visual Perception as a Function of Visual Stimulus and Reading Direction: Israel and United States

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ABSTRACT

This study investigated the differences in visual asymmetries for a variety of visual stimuli. Asymmetrical perception of facial expression, facial identity, dots, and color were measured using pairs of chimeric stimuli. The lateralized processes were compared by measuring direction and degree of lateralization, as well as the effects of reading direction, measured by comparing American students (who read from left to right) to Israeli students (who read from right to left). Right-handed grade school and high school students were used from four Israeli classes and five U.S. classes, comprising a total of ninety-three Israeli students and seventy-six U.S. students. The left visual-field bias for perception of facial expressions was greater than the left visual-field bias for perception of faces without expressions. The direction of perceptual asymmetry paralleled the reading direction (i.e., left for U.S., right for Israel) only for perception of color, suggesting that the asymmetry in color perception is caused by a different lateralized process.

INTRODUCTION

Externally, the body appears to be mostly symmetrical. Yet, we now understand that the brain is lateralized, with the right and left hemispheres of the cerebral cortex specializing in different tasks (Kalat, 1995). The left hemisphere is mostly connected and, therefore, receives input from and controls the right side of the body. Similarly, the right hemisphere is mostly connected to, receives

input from, and controls the left side of the body. Interestingly, in split-brain patients different preferences are made by the left and right hemisphere (Shepherd, 1988). Non-pathological brains tend to have mysterious lateralized tendencies as well. For example, when subjects were asked to choose which article of clothing was the best of four identical stockings, the right-most stocking was preferred over the left-most by a factor of almost four to one (Nisbett & Wilson, 1977). These asymmetries are cause for some of the most intriguing questions in biology. Why would the organization of the brain include such asymmetries? Why does the right side of the brain control the left side of the body? Is there some evolutionary advantage to these lateralizations?

One cognitive process in which these asymmetries are manifest is visual perception. More specifically, research has revealed asymmetrical perception of facial expressions and facial identity with a left visual field advantage. When subjects are presented with chimeric facial stimuli in which the left and right sides portray different emotions, they are more

Author's Note: This paper was submitted in partial fulfillment of the requirements for PSYC 476/477-Honors Thesis in Psychology, supervised by Dr. Margaret Ruddy, an assistant professor of psychology. Committee members included Dr. Daniel Phillips and Dr. MaryAnn Baenninger, psychology department. Yaniv S. Eyny, a 1998 graduate of The College of New Jersey, majored in psychology. He is a research associate/lab manager at the Neurochemical Basis of Motivation and Learning Laboratory at Columbia University.

likely to classify the emotion of the face based on the expression presented on the left visual field (right side of the stimuli face) (Heller & Levy, 1981; Levy, Heller, Banich & Burton, 1983). While less research has focused on the asymmetry of perception of facial identity, Gilbert and Bakan (1973) found that subjects were more likely to find a manufactured composite doubling the side of the face normally appearing in their left visual field to be more similar to the original face than a manufactured composite doubling the side of the face normally appearing in their right visual field.

Evidence supports the hypothesis that any asymmetry in perception of expressions is due to the right hemisphere's specialization in processing of emotion. (This is possible because the left visual field and not the left eye provides information to the right hemisphere. Both eyes receive visual information from both visual fields.) On a task involving judging whether two facial expressions are the same, split-brain patients (Stone, Nisenson, Eliassen, & Gazzaniga, 1996) perform better with their right hemisphere. In addition, lesions in the right hemisphere decrease performance more than lesions in the left hemisphere on a task involving identifying facial expressions (Borod, Koff, Lorch, & Nicholas, 1986). In a similar study, patients with lesions in the right hemisphere were significantly impaired on a task involving matching faces based on expressions, while patients with lesions in the left hemisphere were impaired on a task involving verbal identification of the perceived expression (Kolb & Taylor, 1981). One study found that the right hemisphere was superior at memory for faces (Metcalf, Funnell, & Gazzaniga, 1995). The difficulty with quite a few of these studies is that they do not provide an adequate framework for addressing the issue, potentially oversimplifying the cause of the asymmetry by focusing only on one lateralized process, for example, overemphasizing the role of perception of facial *expression* at the expense of mere facial *identification*.

There are three possibilities for the relationship between perception of expression

and faces. 1) Both asymmetries could be caused by the same lateralized process. It should be mentioned that there could be one mechanism that could cause different degrees of asymmetries for perception of facial emotion and identity. The mechanism could be more specific to one but still have an effect on the other. 2) There could be separate lateralized processes, one for emotion and one for faces, which are entirely responsible for the respective asymmetries. 3) Both asymmetries could be partially caused by a common lateralized process and partially caused by independent lateralized processes. Additionally, the third explanation could be extended to include several common factors and several independent factors.

Given the overlapping cognitive processes (i.e., perception of facial expression might be part of a more general facial identification, which in turn might be part of a more general visual perception), measuring levels of asymmetry is not sufficient to understand which perceptual function is processed asymmetrically. One method of better understanding the underlying mechanisms is to correlate other factors to these asymmetries. The degree of similarity between the correlations of this factor and the different asymmetries will help clarify whether these asymmetries are the same. For example, if we find that reading direction is associated with the asymmetry in facial identity but is in no way associated with the asymmetry of facial expressions, it would indicate that there is at least some underlying separate mechanisms. However, the opposite is not true; if two asymmetries are correlated equally with reading direction, it is not sufficient evidence that these asymmetries are the same.

Most of the research indicates a left visual-field bias for perception of facial expression (Strauss & Moscovitch, 1981). Pizzamiglio, Zoccolotti, Mammucari, and Cesaroni (1983) found that a left visual-field superiority existed even after the role of face identity perception was statistically factored out.

This indicates that the asymmetry of perception of expression is not merely a function of lateralized facial perception, although such a process could have an effect.

The effects of the different lateralized processes—visuospatial, facial, and emotional, can all play a part. These processes can be examined through different tasks. Luh, Rueckert, and Levy (1991) found asymmetry in a Dot task. The Dot task consisted of rectangles and their mirror image (flipped horizontally). Each of the rectangles was filled with dots of various size and shape, asymmetrically distributed. Subjects were asked to decide which of the two rectangles contained more dots (without counting the actual dots). Luh et al. found that different tasks produced different degrees of lateralization, both with left visual-field bias.

Using different tasks, we examined the degree and direction of asymmetry for viewing different objects. The four tasks included a task designed to measure asymmetry in perception of facial expression, a task designed to measure asymmetry in perception of faces regardless of the expression (although this is not completely possible), and two tasks designed to measure visual asymmetry different from faces. The latter two tasks included one focusing on perception of color dots, and one focusing on perception of dots regardless of color.

The four tasks were given to both U.S. citizens (who read from left to right) and Israeli citizens (who read from right to left). The effects of reading direction provide information on the role that innate brain structure (as compared to a visual scanning direction caused by reading) plays in these asymmetries. For example, if the direction of all the asymmetries besides the facial-expression bias is reversed when reading direction is reversed, it would imply that the facial-expression bias is due more to innate brain structure, and the other asymmetries are due to a learned visual scanning direction. In this fashion, reading direction also serves as a factor to correlate with the asymmetries.

The effects of age were also measured. The age factor can also provide information about the effects of reading direction, assuming that for the age range used the quantity that is read increases with age.

METHOD

Participants

Participants were students from four Israeli classes and five American classes, comprising a total of 199 students. Of these, only the 169 right-handed students were used for this research, ninety-three students from Israel and seventy-six American students. There were ninety-eight female and seventy-one male students.

Third grade was the youngest grade level used, partially because at this age Israelis are just beginning to learn English. The oldest class consisted of mixed high school grades. The age of the students ranged from eight to seventeen years. To measure the effects of age, two groups were formed. The younger group consisted of the four third grade classes that were used (mean age for Israeli students = 8.56 years, for American students = 8.79 years). The older group included two seventh grade classes, an eighth grade class, and two ninth grade classes, one of which had some older students (mean age for Israeli students and American students was identical = 13.59 years). College students in Israel read primarily in English and were, therefore, avoided. With this separation, the young group consisted of eighty students, and the older group consisted of eighty-nine students.

Stimuli and Procedure

Four tasks were created: Expression task, Face task, Dots task, and Color task, with sixteen sets of pictures for each task. Each task consisted of a set of two pictures, with the exception of the Face task which consisted of a set of three pictures. The pictures were vertically placed as suggested by Hoptman and Levy (1988). Each subject was asked to complete sixteen problems for each of the four tasks. Each task was designed so that a choice

of the top or bottom picture indicated whether the response was based on the left or right half of the object.

The Expression task was modeled after a similar set by Hoptman and Levy (1988), except the pictures were created digitally to make the manufactured face appear more natural, as recommended by Kowner (1995). For the Expression task, two pictures of twenty-four subjects were taken using a digital camera and downloaded to use with Adobe Photoshop Version 4.0. The subjects were asked to smile for one picture and pose neutrally for the other picture. All pictures were taken against the same background, and subjects sat in the same location and were asked to keep their faces parallel to the camera and the horizon. Two left sides, one from the smiling pose and one from the neutral pose, were combined to form one face. Only the left sides (also the more expressive sides) of the subjects' faces were used because previous studies have shown that there is asymmetry in facial expressions (Borod, Koff, Lorch, & Nicholas, 1986; Rinn, 1984; Moscovitch & Olds, 1982). In other words, the left smiling face was combined with the mirror image of the left neutral face to form one picture. The mirror image of the resulting picture was used as the other face in the two-picture set. (See Figure 1a for example.) Subjects were asked to indicate in which picture the person appears happier.

For the Face task, pictures of fifty-one students were taken in the same method as for the Expression pictures. (Although it is called the Face Task, the pictures include both the shoulders and head.) All subjects were asked to produce a neutral expression. The target picture was composed of the left side of the face and the mirror image of the left side. The target picture was completely vertically symmetrical. The two pictures which participants compared to the target picture either had the same left or the same right side as the target picture. The other side of each picture was either the left side or the mirror image of the left side of another

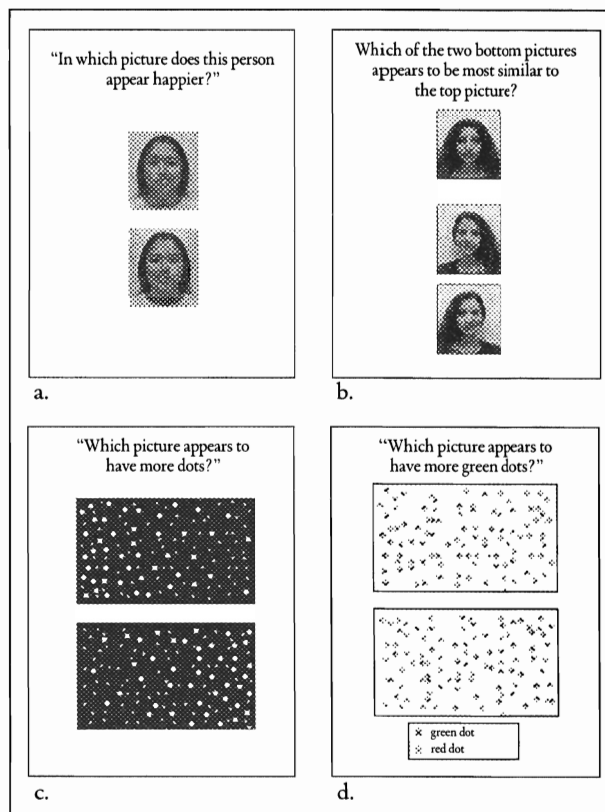


Figure 1. a. Example of Expression task. b. Example of Face task. c. Example of Dots task. d. Example of Color task.

person who had been chosen because of similar-sized features. (See Figure 1b for example.) Subjects were asked to indicate which of the bottom two pictures appeared most like the top picture.

The Dot task was based on a similar task used by Luh, Rueckert, and Levy (1991) in which pairs of rectangles are filled asymmetrically with dots of various sizes. Luh et al. created the other picture in the set by rotating the rectangle 180° instead of using the exact mirror image. This was done to prevent subjects from noticing a pattern of dots and thereby realizing that the pictures were the same. To further prevent this from occurring, in this study, rectangles were divided laterally into five sections, and the number of dots of each size were placed equally on opposite sections of the two rectangles (see Figure 1c). Subjects were asked to indicate which of the two rectangles contained more dots.

The Color task was created in a similar fashion to the Dots task, except one of the rectangles was created with more green dots on the right and more red dots on the left, and its equal opposite was used for the comparison picture (see Figure 1d).

The four tasks were randomized into sixteen blocks because the order of the pictures can have an effect (Luh, personal communication, December 2, 1997). For each task the placement of pictures was randomized in blocks of two (e.g. top picture has smile on left and bottom picture has smile on left). The sixty-four pictures were shown using an overhead projector, which does not produce different results from individual packets (Luh, personal communication, December 2, 1997). An effect of cueing material has not been found (Shwartz & Smith, 1980); therefore, participants were read the relevant questions in either Hebrew or English. The number of the item was read before each question. Participants were asked to base their responses on their general impression. For example, for the Dots and Color tasks, subjects were asked not to count. Subjects received about three seconds for each item, although more time was given if necessary. For responses, Israeli participants received a scantron reading from right to left and American participants received a scantron reading from left to right.

Participants were asked to choose exactly one answer for each item. A left-based response was scored +1 and a right-based response was scored -1. Subjects received a score on each task based on the sum of responses for that task divided by sixteen, the number of responses. The score could range from -1 (all responses are based on the right) to +1 (all responses are based on the left). Some subjects were missing up to three responses. These subjects received scores which were only divided by the number of responses. If participants were missing the last answer, they were not used for fear that a great deal of their answers were placed incorrectly.

Subjects were asked demographic questions including seating location in the classroom in which they sat. (The class was divided into five sections, with section one seating on the left [i.e. they would be looking more to the right] and section five sitting all the way on the right. All groups were asked to put their hands together and indicate which thumb was on top. Some of the groups were asked to indicate which eye was dominant (see Appendix 1). One of the Israeli groups was asked to indicate the hours they spend reading Hebrew per week.

RESULTS AND DISCUSSION

In agreement with previous research (Heller & Levy, 1981; Levy, Heller, Banich & Burton, 1983), the results of the Expression task indicate a left visual-field advantage for processing facial expressions significantly different from zero for both Americans and Israelis. This indicates that the cause of the asymmetry is not reading direction. The means for the four tasks by country are presented in Figure 2 with the whiskers of the error bars representing the ninety-five percent confidence intervals.

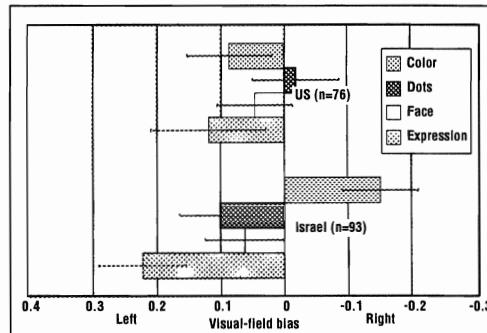


Figure 2. Asymmetries for Tasks as a function of Country.

The same pattern of results was true for the Face task, although, the asymmetries for both countries are of a smaller magnitude and not significantly different from zero (see Figure 2). A paired sample *t*-test was performed, comparing overall asymmetry on Expression task to overall asymmetry on the Face task. The two asymmetry scores were significantly different; $t(169) = 3.91, p < .001$. This supports previous research by Etcoff (1984) and Luh, Rueckert,

and Levy (1991) which suggests that there is at least some different underlying mechanism for the asymmetry of perception of face and perception of expressions. Even though participants photographed for the Face task were asked to produce a natural expression, some expression does exist in the pictures used for the Face task. Also, a neutral expression might be perceived by the same process as a non-neutral expression. The true control is to match degree of expression between the two combined faces. The natural limits of matching expressions perfectly between two separate people could allow perception of expression to influence the Face task. To the degree that participants used the slight expressions on the stimuli of the Face task, the results of the Face task could be caused by a left visual-field advantage for processing expression.

The Dot task did not produce a clear pattern of results. The Israeli subjects produced a significant left visual-field bias. In contrast to the left visual-field advantage found by Luh, Rueckert, and Levy (1991), the American subjects in this study produced a non-significant right visual-field bias (see Figure 2).

With the Color task, American subjects exhibited a significant left visual-field advantage, $t(76) = 2.56, p = .012$, while Israeli subjects exhibited a significant right visual-field advantage, $t(93) = 6.53, p = .000$ (see Figure 2). Pirot, Pulton, and Sutker (1977) found a left visual field advantage for color identification as measured by reaction time. However, Pennal (1977) did not find a visual field advantage on a color-matching task. Both of the studies involved participants who read from left to right.

Asymmetry in color perception appears to be largely related to reading direction. The Color task was the only task that was biased to the right for subjects reading from right to left. An interaction for Task by Country was significant (see Table 1), which seems to be mostly due to the Color task. Furthermore, the tasks were correlated with hours-spent reading Hebrew. The negative correlation between the Color task and hours-spent read-

ing Hebrew was the only significant correlation, $r(21) = -.46, p = .035$. The negative correlation indicates that more time reading from right to left is correlated with more of right-bias (or equally less of a left-bias) response. The correlation between reading Hebrew and the Expression task is $r(21) = -.08, p = .718$, for the Face task $r(21) = -.05, p = .846$, and for the Dots task $r(21) = .05, p = .821$.

Table 1. Analysis of Variance Summary Table for Task by Country by Age

Source	df	MS	F	p value
<i>Between Subjects</i>				
Country	1	.00	.01	.915
Age	1	.03	.26	.612
Country by Age	1	.36	2.79	.097
Ss w/in group	165	.13		
<i>Within Subjects</i>				
Tasks	3	1.14	13.38	.000
Tasks by Country	3	1.04	12.17	.000
Task by Age	3	.13	1.51	.212
Task by Country by Age	3	.09	1.03	.378
Tasks x Ss w/in group	495	.09		

Note. Both the Greenhouse-Geisser and the Hynh-Feldt produced the same results. The lower bound correction produced slightly different results, although significance of tests did not change.

If only American subjects had been used in this study, it would have appeared that color perception is similar to perception of expression. Based on the American subjects alone, the Color task produces more similar results to the Expression task than the Face task does to the Expression task. By testing Israeli students the similarity between the Expression task and Face task and the difference between the Color task and Expression task become more evident.

The main effect of task was significant (see Table 1). The different degrees of lateralization between the Expression task, Face task, and possibly the Dot task could also be related to the degree of their complexity. It is possible that the more complex stimuli are processed further along the visual pathway and that more asymmetry exists further down the visual pathway. However, it is not completely clear that perception of expression is more complex than perception of faces.

A trend exists for the interaction between age and country or reading direction (see Table 1). Assuming that the students are reading a greater quantity as they progress from grade

three to grade ten, the patterns of change with age suggest that reading direction might have some effect on the degree of lateralization for all tasks. For the Israeli subjects, all the left-bias asymmetries decrease with age. For the U.S. subjects, the degree of left-bias increases with age for the Expression, Face, and Color tasks. (See Figure 3.) The opposite effects of age in the different countries suggest that the change is related to reading amount and not some other factor that changes with age. One possibility is that reading direction influences all the asymmetries slightly, but is the cause of the color perception asymmetry.

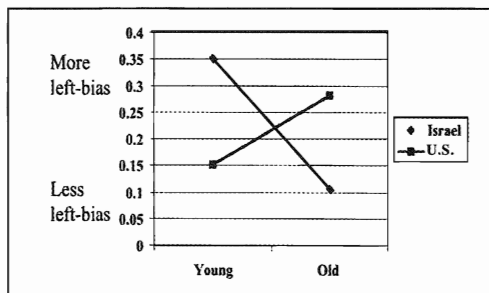


Figure 3. Asymmetries for Country as a function of Age Group.

Future studies should further investigate lateralization of perception of objects which are known to be processed in different areas of the brain, for example, moving objects. By using stimuli which act on different pathways, the cause of the asymmetry could be more clearly understood. As evidenced by this study, simply measuring and comparing degrees of lateralization is not sufficient to understand the underlying mechanisms.

REFERENCES

- Borod, J. C., Koff, E., Lorch, M. & Nicholas, M. (1986). The expression and perception of facial emotion in brain-damaged patients. *Neuropsychologia*, 24, 169-180.
- Etcoff, N. L. (1984). Selective attention to facial identity and facial emotion. *Neuropsychologia*, 22, 281-295.
- Gilbert, C., & Bakan, P. (1973). Visual asymmetry in perception of faces. *Neuropsychologia*, 11, 355-362.
- Heller, W., & Levy, J. (1981). Perception and expression of emotion in right handers and left handers. *Neuropsychologia*, 19, 263-272.
- Hoptman, M. J., & Levy, J. (1988). Perceptual asymmetries in left and right handers for cartoons and real faces. *Brain and Cognition*, 8, 178-188.
- Kalat, J. (1995). *Biological Psychology* (5th edition). New York, NY: Brooks/Cole Publishing Company.
- Kolb, B., & Taylor, L. (1981). Affective behavior in patients with localized cortical excisions: Role of lesion site and side. *Science*, 214, 89-90.
- Kowner, R. (1995). Laterality in facial expressions and its effects on attributions of emotion and personality: A reconsideration. *Neuropsychologia*, 33, 539-559.
- Levy, J., Heller, W., Banich, M. T., & Burton, L. A. (1983). Asymmetry of perception in free viewing of chimeric faces. *Brain and Cognition*, 2, 404-419.
- Luh, K. E., Rueckert, L. M., & Levy, J. (1991). Perceptual asymmetries for free viewing of several types of chimeric stimuli. *Brain and Cognition*, 16, 83-103.
- Moscovitch, M., & Olds, J. (1982). Asymmetries in spontaneous facial expressions and their possible relation to hemispheric specialization. *Neuropsychologia*, 20, 71-81.
- Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84 (3), 231-259.
- Pennal, B. E. (1977). Human cerebral asymmetry in color discrimination. *Neuropsychologia*, 15, 563-568.
- Pirot, M., Pulton, T. W., & Sutker, L. W. (1977). Hemispheric asymmetry in reaction time to color stimuli. *Perceptual and Motor Skills*, 45, 1151-1155.
- Pizzamiglio, L., Zoccolotti, P., Mammucari, A., & Cesaroni, R. (1983). The independence of face identity and facial expression recognition mechanisms: Relationship to sex and cognitive style. *Brain and Cognition*, 2, 176-188.
- Rinn, W. E. (1984). The Neuropsychology of facial expressions: A review of the neurological and psychological mechanisms for producing facial expressions. *Psychological Bulletin*, 95, 52-77.
- Schwartz, M., & Smith, M. L. (1980). Visual asymmetry with chimeric faces. *Neuropsychologia*, 18, 103-106.
- Shepherd, G. M. (1988). *Neurobiology*. New York: Oxford University Press.
- Stone, V. E., Nisenson, L., Eliassen, J. C., & Gassangia, M. S. (1996). Left hemisphere representations of emotional facial expressions. *Neuropsychologia*, 34, 23-29.
- Strauss, E., & Moscovitch, M. (1981). Perception of facial expressions. *Brain and Language*, 13, 308-332.

APPENDIX

- To find which eye is dominant, subjects were asked to block a vertical line in the room with their finger or pencil. Subjects were then instructed to close one eye at a time and observe the amount that the vertical line moved. The eye that when closed causes the larger movement is considered the dominant eye. This assumes that the person was depending on that eye to a larger extent for placing the object in space, and therefore when the eye is closed it forces a shift to the other eye.

On the Synthesis and Analysis of a Novel DNA Binding Agent

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ABSTRACT

An analog of pentamidine [1,5-bis(4'-amidinophenoxy)pentane] has been synthesized and characterized as a representative of a new class of DNA complexing agents. Exploration into a variety of synthetic routes has been performed to optimize product yield. Additionally, the DNA binding affinity of this compound has been measured using UV-thermal melt studies. All synthetic products and intermediates were characterized using a combination of GC-MS, $^1\text{H-NMR}$, and $^{13}\text{C-NMR}$.

INTRODUCTION

Bis(4'-amidinophenoxy)alkanes such as propamidine and pentamidine have been shown to possess antimicrobial activity against a number of resilient bacterial strains, including *Pneumocystis carinii*, one of the leading causes of morbidity and mortality in AIDS patients. There is strong evidence that the action of these compounds is based on their ability to fold into the minor groove of mitochondrial DNA and bind to the helix using the positively charged amidinium termini, thus inhibiting the organism's ability to generate ATP. However, these compounds have a number of undesirable side effects, including nephrotoxicity, hepatotoxicity, hypotension, and sterile abscesses at the site of injection.¹ Clearly there is a need for a medicinal compound that displays similar activity while possessing reduced hazards. The replacement of an amidinium moiety with *cis*-dichloroplatinum (the active portion of *cis*-diamminedichloroplatinum(II), or

Cisplatin, an antineoplastic drug), may prove to fit this need.

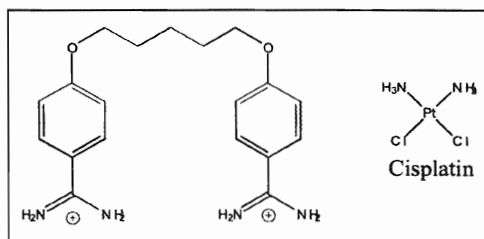


Figure 1. Molecules with Known Biological Activity.

Prior studies on a platinum-pentamidine trimer showed that, when complexed with DNA, the double helix was stabilized.² Since many combination therapies result in an overall lower toxicity and heightened activity, the stoichiometric compounds proposed may prove to be more clinically desirable than the parent compounds as antibiotics or as chemotherapy drugs.

Current research focuses on developing compounds with a strong DNA binding affinity and nucleotide sequence selectivity. Since the amidinium moiety has shown preference for the AT base pair series, these molecules can possibly be altered in an effect to produce a synthetic non-degenerate code for probing the double helix. Furthermore,

Author's Note: This paper was completed in partial fulfillment of the requirements for CHEM 499-Independent Study in chemistry. Dr. Georgia M. Arvanitis is a professor of chemistry, and this work is part of her ongoing research program. Brian Falcone is a chemistry major. This research with Dr. Arvanitis was supported financially by the Phi Kappa Phi Student-Faculty Research Scholarship and by American Cyanamid Corporation.

tailoring the ligands present on the platinum coordination sphere and capitalizing on the benefit of the heavy atom can make these compounds valuable for X-ray crystallographic studies.

RESULTS AND DISCUSSION

Synthetic Scheme and Considerations: The synthetic scheme for the desired products is shown below in Figure 2.

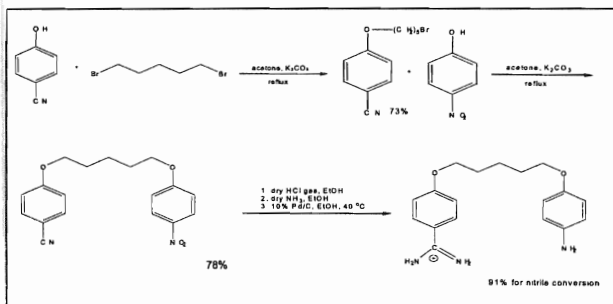


Figure 2. Synthetic Scheme.

The procedure involves first deprotonating the phenol with a weak base, followed by a standard S_N2 reaction to displace the bromine. By adding the phenol slowly to the chilled alkyl halide, a strong degree of selectivity is maintained for the monosubstituted product, which then undergoes a similar reaction to form the pentamidine backbone. Yield optimization required a variety of considerations. First, attempts at using protecting groups were made difficult by intramolecular cyclizations, as demonstrated by mass spectral analysis. The low acidity of *p*-aminophenol proton precluded the use of this compound as a nucleophile, necessitating the nitro to amine conversion. BOC (Butoxycarbonyl) protection of the amine increased the acidity of the phenolic hydrogen slightly, but this was not found to be the optimum route. It was discovered that a higher yield could be obtained by first adding the weaker of the two nucleophiles (i.e., *p*-cyanophenol, then *p*-nitrophenol). On the plus side, it was observed that few, if any, elimination side products were observed from the reaction series.

The conversion of the nitro moiety to the amine was performed successfully using S_n

(tin) and concentrated HCl, as shown by infrared analysis, but difficulty in separating the products from the tin salts precluded this method. Instead, the reduction was achieved with a high degree of success using 10% Pd/C and H_2 . The resulting product was highly reactive and quickly oxidized into a variety of components if not kept either as the quaternary ammonium salt or at $-80^\circ C$ in an inert atmosphere (i.e., nitrogen or argon). The oxidation process was monitored by watching the changes in peak heights and positions in the ^{13}C -NMR. Additional characterization of the amine was obtained by a positive result to the ninhydrin test as well as by 1H -NMR. Because this reaction produces a very sensitive product, this step will probably be carried out as late as possible in the overall synthetic strategy in order to optimize yield.

Conversion of the nitrile to the amidinium moiety involved dissolving the chosen compound in dry absolute ethanol and then saturating it with HCl gas for fifteen minutes. The reaction mixture was allowed to stir for forty-eight hours under $CaCl_2$, thus completing the conversion to the imidate. The product was recovered and redissolved in ethanol, where it was subjected to ammonia gas. This completed the formation of the amidinium moiety, which was identified by 1H - and ^{13}C -NMR.

Characterization and Analysis of the Spectral Data: 5-bromo-1-(4'-cyanophenoxy)pentane:

Mass spectra of this product showed a molecular ion peak at 267, with a peak of equal height at 269, accounting for the 1:1 isotopic ratio of bromine. A similar isotopic ratio was found at the peaks at 149 and 151, which accounts for the dissociation of the alkyl chain from the ether oxygen. Finally, the peak at 119 is likely due to the *p*-cyanophenoxy group, which completes the structure. Analysis by 1H -NMR shows two aromatic doublets which suggest *para* substitution on the ring, followed by a series of triplets at δ 4.08 and δ 3.55 ppm, which correspond to the protons relative to the ether oxygen and the bromine, respectively. The other two

peaks, a multiplet and quintet, qualify as the remainder of the alkyl backbone. Finally, the ^{13}C -NMR spectrum displays carbon peaks in the appropriate regions for the desired compound, including individual peaks for each distinct carbon in the alkyl chain.

1-(4'-cyanophenoxy)-5-(4'-nitrophenoxy)pentane: Mass spectral analysis was used primarily to confirm the presence of the molecular ion peak at 327. Loss of a stable NO_2 molecule is demonstrated at the 281 peak. ^1H -NMR spectroscopy was used in a greater capacity for analysis purposes. The presence of another set of doublets in the aromatic region with little shift from the two previous peaks confirms the addition of the second phenoxy group, and the shift of the mid-range triplet to form a pair of triplets shows the formation of two similar but distinct ether groups. Again, the use of ^{13}C -NMR was primarily done to associate the proper positions of the carbons in the spectrum.

Characterization of the Alternate Functional Groups: Because the order of forming the amidium and amine were exchanged during the course of the study, a brief description of the characterization method will be detailed here. Analysis of the amidium group was not permitted by its mass spectrum because of the localized positive charge, and therefore NMR analyses had to be used. ^1H -NMR showed the appearance of two peaks at δ 9.25 and δ 9.01 ppm, which are in the same position relative to the amidium protons in pentamidine. ^{13}C -NMR shows the shift of the nitrile group from 101 to 118 ppm.

Analysis of the aniline compound was made difficult by its high reactivity. A ^1H -NMR spectrum was successfully obtained which shows the amine protons at δ 4.55 ppm, a shift in two of the four phenolic doublets from the altered electronic nature of the ring, and the separation of the false doublet of triplets. ^{13}C -NMR analysis of this compound showed the decay of the molecule during the course of the scanning procedure. Finally, a positive ninhydrin test to a red/purple color indicated the presence of the primary amine.

*The UV-Thermal Melt Study:*⁴ Analysis of double strand DNA has shown that the individual base pairs absorb at $\lambda = 260$ nm. The absorption of this radiation is increased when the base pairs are "free," that is, they are no longer bound to their complementary base pair in the double helix by hydrogen bonds. The most direct way to separate the double helix without using enzymes is to watch the increase in absorption as the temperature is ramped. This results in a sigmoidal curve; the point at which the derivative of the curve is the greatest is known as the thermal melt temperature of DNA. A DNA oligomer consisting of twelve complementary base pairs of adenine and thiamine was prepared and buffered at pH = 7.0, and the thermal melt characteristics were observed at two different sodium ion concentrations. These results are shown below in Figure 3.

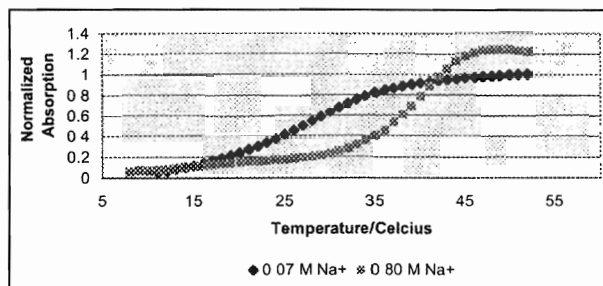


Figure 3. Thermal Melt Data for poly(dA)(dT) Dodecamer.

These results show that the higher sodium ion concentration stabilizes the double helix, as it requires a greater melting temperature to affect the dissociation (28°C at 0.07 M Na^+ versus 38°C 0.8 M Na^+). This result is logical knowing the nature of DNA, which is relatively negatively charged. This detail is important in the development of DNA binding compounds.

Pentamidine was dissolved in buffer and the concentration was brought to the point where there was approximately one drug molecule for every oligomer strand. The results of the thermal melt study are shown in Figure 4.

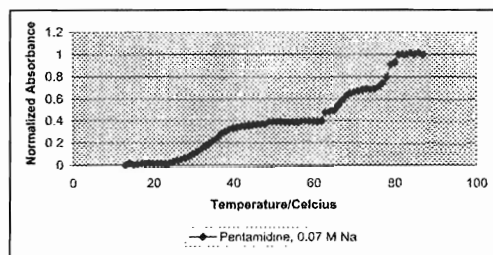


Figure 4. Pentamidine Melt Data.

There are three distinct points of dissociation shown in this curve. It is likely that these points of dissociation are first due to the separation of the pentamidine from the oligomer, and further dissociation of the oligomer helix in the presence of the medicinal compound. The high melting points of the curve show that pentamidine highly stabilizes the molecule from dissociation, thus offering an explanation for the biological activity of the compound.

CONCLUSION AND FURTHER STUDIES

The desired products were synthesized and characterized on a route towards the development of a novel DNA complexing agent. By platinating the amine moiety of the new organic backbone, the target complexing agent will be generated and can be identified by ^1H -, ^{13}C -, and ^{195}Pt -NMR. This compound will be tested for DNA binding activity and tenacity using the oligomer study performed successfully herein and compared to the parent compounds pentamidine and CisplatinTM. Further research will include synthesis of the di-platinated pentamidine analog and perhaps the berenil analogs of these molecules, changing the ligands in the coordination sphere of the platinum and the functional groups attached to the platinated phenoxy moiety to optimize activity, and testing the compounds' antibiotic and antineoplastic activity.

EXPERIMENTAL

All GC-MS analyses were performed on a Hewlett-Packard 5890 Gas Chromatograph-Mass Spectrometer, all ^1H - and ^{13}C -NMR analyses were performed on a Varian-Gemini

300 MHz NMR, and the UV-thermal melt analyses were performed on a Varian Cary Bio-1 Ultraviolet/Visible Light Spectrophotometer.

Synthesis and Characterization of 5-bromo-1-(4'-cyanophenoxy)pentane: In 150 mL of dry acetone, *p*-cyanophenol (15.785 g, 133 mmol) was dissolved in K_2CO_3 (19.148 g, 139 mmol) and refluxed for thirty minutes. The resulting solution was cooled and added slowly to chilled 1,5-dibromopentane (1.3 equivalents, 23.5 mL, 173 mmol) over the course of an hour. The resulting mixture was refluxed for forty-eight hours, brought to room temperature, and extracted with three 30 mL portions of CH_2Cl_2 and 45 mL of distilled H_2O . The organic layer was dried over MgSO_4 , and condensed by rotary evaporation to afford 26.03 g of product (73% yield).

Product analysis involved GC-MS (M^+ 267, 149, 119, 69, 41), ^1H -NMR (δ 7.75, d, $J=8.5$, 2H; δ 7.09, d, $J=8.5$, 2H; δ 4.08, t, $J=6.03$, 2H; δ 3.55, t, $J=6.33$, 2H; δ 1.79, m, 4H; δ 1.54, p, $J=7.59$, 2H) and ^{13}C -NMR (δ 161, 133, 118, 114, 66 (d), 33, 30, 27, 26, 23).

Synthesis and Characterization of 1-(4'-cyanophenoxy)-5-(4'-nitrophenoxy)pentane: In 35 mL of dry acetone, *p*-nitrophenol (1.747 g, 12.5 mmol) was mixed with K_2CO_3 (1.870 g, 13.5 mmol) and allowed to reflux for thirty minutes. The mixture was brought to room temperature, chilled, and added slowly to a chilled mixture of 5-bromo-1-(4'-cyanophenoxy)pentane (3.344 g, 12.4 mmol), after which it was permitted to reflux for forty-eight hours. The resulting product was extracted as in the above procedure to yield 2.83 g of product (70% yield).

Product analysis involved GC-MS (M^+ 327, 281, 254, 135), ^1H -NMR (δ 8.17, d, $J=9.3$, 2H; δ 7.73, d, $J=8.79$, 2H; δ 7.10, dd, 4H; δ 4.11, dt (non-coupling), $J_1=6.3$, $J_2=6.3$, 4H; δ 1.80, m, 4H; δ 1.58, p, 6.8), and ^{13}C -NMR (δ 161, 133, 124, 118, 114.7, 144.4, 113, 101, 67, 66, 27, 21).

Nitrile \rightarrow Amidinium Conversion Procedure and Characterization: Conversion of the nitrile to amidinium functional group was affected by dissolving the desired compound in dry ethanol and sparging dry HCl gas

through the solution for fifteen minutes. The resulting solution was stirred for forty-eight hours, and the desired product was precipitated by chilling the mixture and adding dry petroleum ether. The product was filtered and redissolved in dry ethanol, at which time ammonia gas was sparged through the solution for fifteen minutes. The mixture was again allowed to stir for forty-eight hours, after which time the volume was halved by rotary evaporation, followed by precipitation by petroleum ether. The resulting products will show a slight shift in the phenolic doublets in the $^1\text{H-NMR}$ spectrum, as well as the appearance of two broad singlets in the $\delta 9\text{-}10$ ppm region.

Nitro \rightarrow Amine Conversion Procedure and Characterization: Successful conversion of this group was achieved by dissolving the target molecule in dry ethanol, followed by the addition of 3% catalytic equivalent of 10% Pd/C. The reaction vessel was then purged twice with argon gas, followed by placing the mixture under H_2 gas. The course of the reaction was monitored by watching the volume change of the gas in the vessel. Isolation of the compound has not been effectively optimized yet; inert atmosphere environments will be experimented with as a method of fully recovering the desired compound. Analysis by $^1\text{H-NMR}$ showed the appearance of an amine peak at 4.55 ppm, a shift in two of the four phenolic doublets, and the separation of the pair of triplets from the ether protons.

Thermal Melt Procedure for Control and Pentamidine: Polydeoxyadenylic acid-polydeoxythymidylic acid dodecamer was purchased from Sigma and diluted to the proper equivalency (1.0 O.D.₂₆₀) using 0.01 M PIPES buffer [piperazine-N, N'-bis{2-ethane sulfonic acid}], 0.001 M EDTA in sterile water adjusted to pH = 7.0 by the addition of aqueous NaOH. 300 μL of the oligomer was then withdrawn and added to a 1.0 cm path length quartz cuvette, using additional buffer to bring the volume up to 1.0 mL. Sodium concentration

was regulated by the addition of 4.0 M NaCl or solid NaCl. The UV-thermal melt plot was taken at $\lambda = 260$ nm, temperature range 0-90°C, rate 0.5°C/minute, using a buffer/salt mixture as a reference. For the pentamidine run, one equivalent of pentamidine (dissolved in the sterile buffer) was added for each equivalent of oligomer.

ACKNOWLEDGEMENTS

I would like to offer my sincere thanks to Dr. G. Arvanitis, Dr. L. Bradley, and Dr. M. Berardini of the TCNJ chemistry department for their guidance and insight. Additionally, I would like to thank my research peers (Homar Barcena, Karen Chan, Patricia Fitzgerald, Jason Giurleo, David Henningsen, and Diana Johnson) for their support and insight. Finally, my thanks goes to Christopher Masterson for his previous research on this topic, Dr. David Hunt for his outside advice, and facilities from American Cyanamid.

REFERENCES

- ¹ R.R. Tidwell *et al.* *J. Med. Chem.*, 33, 1990 (1252).
- ² T.C. Jenkins, A.N. Lane, S. Neidle, and D.G. Brown. *Eur. J. Biochem.*, 213, 1993 (1175).
- ³ H.S. Jaffe *et al.* *Lancet*, 2, 1983 (1109).
- ⁴ T.C. Jenkins, and A.N. Lane. *Biochem. Et Biophys. Acta*, 1350, 1997 (189).

Metalation Reaction of 3,5-dichloro-N-ethylbenzamide

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ABSTRACT

The metalation reaction of 3,5-dichloro-N-ethylbenzamide was compared with that of 3,5-dichloro-N,N-diethylbenzamide in order to study the effects of regioselectivity and sterics of the functional groups. This is a continuation of the research performed by Demas and Bradley, 1998. The substituted 3,5-dichloro-N-ethylbenzamide was synthesized by reacting the benzamide with a base, sec-butyllithium, followed by the addition of an electrophile, benzyl bromide. All the products were characterized by thin-layer chromatography (TLC), Varian Gemini 300MHz Proton Nuclear Magnetic Resonance (¹H-NMR), and Perkin Elmer 2000 Fourier Transform Infrared Spectrometer (IR).

INTRODUCTION

Organic halides, more specifically aromatic halides, are popularly used as insecticides, herbicides, and germicides. As a result, many pharmaceutical and agrochemical companies introduce new functional groups into aromatic compounds for the exclusive purpose of activity modification. Many chlorinated organic compounds are used as herbicides and have been found to cause disfiguring skin diseases such as chloracne because they may be passed up the food chain.¹ The introduction of new functional groups to the benzene ring may decrease the toxicity to the skin, but unfortunately they may also decrease the effectiveness of the herbicide. It is therefore important to produce a wide range of candidates in order to find a compound with the desired effects.

Many of these targets require regiospecific preparation of polysubstituted aromatic compounds; industrial and academic laboratories may encounter problems in these reactions. In many cases, classical electrophilic substitution is used. This means that a benzenoid arene undergoes substitution with an electrophilic reagent, which is usually a positive ion or an electron-deficient species with a partial positive charge.² One method of functional group introduction to an aromatic ring involves a heteroatom-directed ortho-lithiation reaction.³ Directed ortho-metalation (DoM) is a three-step process. The first step involves the coordination of the lithiated aggregate to the directed metalating group (DMG). Deprotonation yields the ortho-lithiated species. Lastly, an electrophilic reaction yields an alkylated product.⁴

Under normal electrophilic substitution conditions, the amide group is a very powerful ortho-director and the chlorine is only very weakly ortho-directing. It has been demonstrated that tertiary amides direct metalation to the adjacent ortho-site.⁵ In addition, it has been found that in 1,3-dihalogenated benzenes, it rarely occurs that the electrophile adds at the C₂ position.⁶ As a result of these studies, it was very unexpected that the meta-

Author's Note: This paper was submitted in partial fulfillment of the requirements for CHEM 499-Independent Study in Chemistry. Supervised by Dr. Lynn Bradley, an assistant professor of chemistry, it was also supported by David Hunt, a chemist at American Cyanamid. Patricia Fitzgerald is a chemistry major.

lation and alkylation of the 3,5-dichloro-N,N-diethylbenzamide would occur at the C₄ position. However, in a previous study performed by Demas and Bradley (1988) alkylation at the C₄ position was observed under all reaction conditions (Figure 1, Scheme 1).

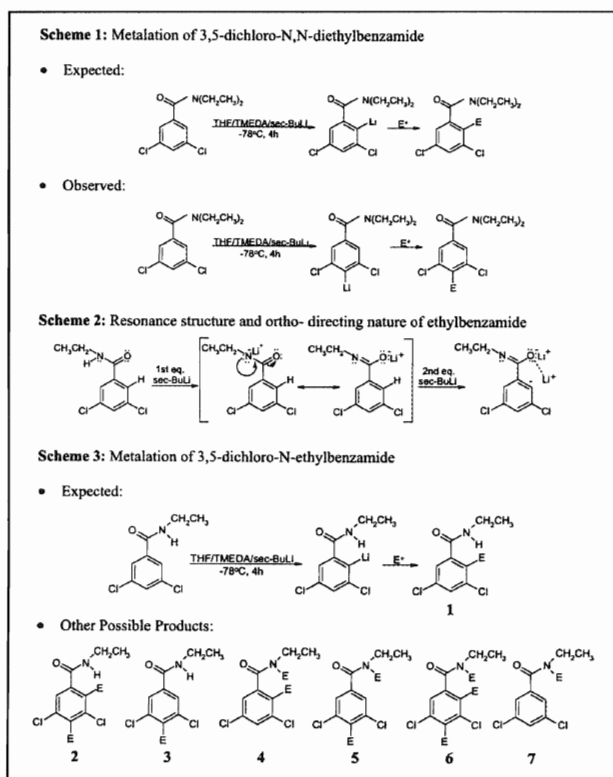


Figure 1.

It is hypothesized that substitution at the C₄ position of 3,5-dichloro-N,N-diethylbenzamide may be a result of steric effects. It is expected that if an ethyl group is removed from the benzamide, the problem of steric hindrance should be eliminated. This should allow for ortho-substitution of 3,5-dichloro-N-ethylbenzamide during the metalation reaction. In addition to this, it is suspected that having a hydrogen on the nitrogen should promote the electrophilic substitution at the ortho-site because it will allow for resonance. In the resonance structure, the oxygen should coordinate with the lithium and direct a second lithium to the hydrogen at the ortho-position (Figure 1,

Scheme 2). This aspect of the project was the focus of our attention this semester.

RESULTS AND DISCUSSION

In an attempt to study the steric effects as well as the regiocontrol of the ethylamido and chloro functional groups, a series of reactions was performed using both previously prepared 3,5-dichloro-N,N-diethylbenzamide and 3,5-dichloro-N-ethylbenzamide. The 3,5-dichloro-N-ethylbenzamide was first prepared by altering the preparation conditions given by McCabe,⁷ the same procedure used for diethylbenzamide. For the electrophilic substitution reactions, the inverse addition method was used. The benzamide in tetrahydrofuran (THF) was first added to *sec*-butyllithium (*sec*-BuLi) in tetramethylethylenediamine (TMEDA) followed by addition of the electrophile, benzyl bromide, to yield the substituted benzamide.

In the study performed by Demas and Bradley, it was found that the best solvent for metalation of the diethylbenzamide was ethyl ether. However, because the ethylbenzamide used in our studies is insoluble in ethyl ether, the reactions were performed in THF. Although THF and *sec*-BuLi do not work as well as the combination of ethyl ether and *sec*-BuLi,⁸ THF had to be used as the solvent so that a valid comparison between the two amides could be made. TMEDA was again used in the reaction to free the *sec*-BuLi from the aggregate since THF is not effective in doing this, as reported earlier.

As already demonstrated, the electrophile substituted at the C₄ position of the diethylbenzamide (Figure 1, Scheme 1). The structure of the product was confirmed by ¹H-NMR (Figure 2). Various reactions were performed on the ethylbenzamide, but only a few afforded reasonable results. In addition, yields to date have not been optimized for the reactions studied. It is theorized that seven possible products could have been synthesized in the ethylbenzamide reaction (Figure 1, Scheme 3). In the ideal situation, the electrophile should substitute at only the ortho-position (1),

because after lithiation at this position, it would be more nucleophilic than the lithiated oxygen site. It is feasible that because an excess of the base and electrophile were used, there is a combination of mono- (1, 3, and 7), di- (2, 4, and 5), and tri- (6) substituted products. It is possible that the electrophile could have substituted at the ortho-, para-, and nitrogen positions of the compound. It is unclear by $^1\text{H-NMR}$ exactly how many compounds are present in the product. Characterization by $^1\text{H-NMR}$ and IR (Figures 3 and 4) is also inconclusive as to whether a N-H bond remains. The $^1\text{H-NMR}$ does not demonstrate a N-H bond, which should occur at $\delta = 6.1$ ppm, but the IR spectrum does show a peak at 3468cm^{-1} , which is indicative of a N-H peak. This apparent inconsistency will be further explored in order to determine the actual structure of this product.

CONCLUSION

Under the conditions studied, the metalation reaction of 3,5-dichloro-N,N-diethylbenzamide afforded exclusively the para-substituted product. Characterization is yet incomplete for the 3,5-dichloro-N-ethylbenzamide, but it appears that substitution may have occurred at the ortho- and para-positions as it seems the hydrogen at the nitrogen position is present in the product.

In the future, the reaction of the ethylbenzamide will be repeated for characterization purposes. This includes, but is not limited to, $^{13}\text{C-NMR}$, Mass Spectrometry, and a variable temperature $^1\text{H-NMR}$ experiment. These studies may determine how many compounds are present in the product, whether or not a hydrogen is attached to the nitrogen, and how many times the electrophile substituted on the compound. Modified reactions will also

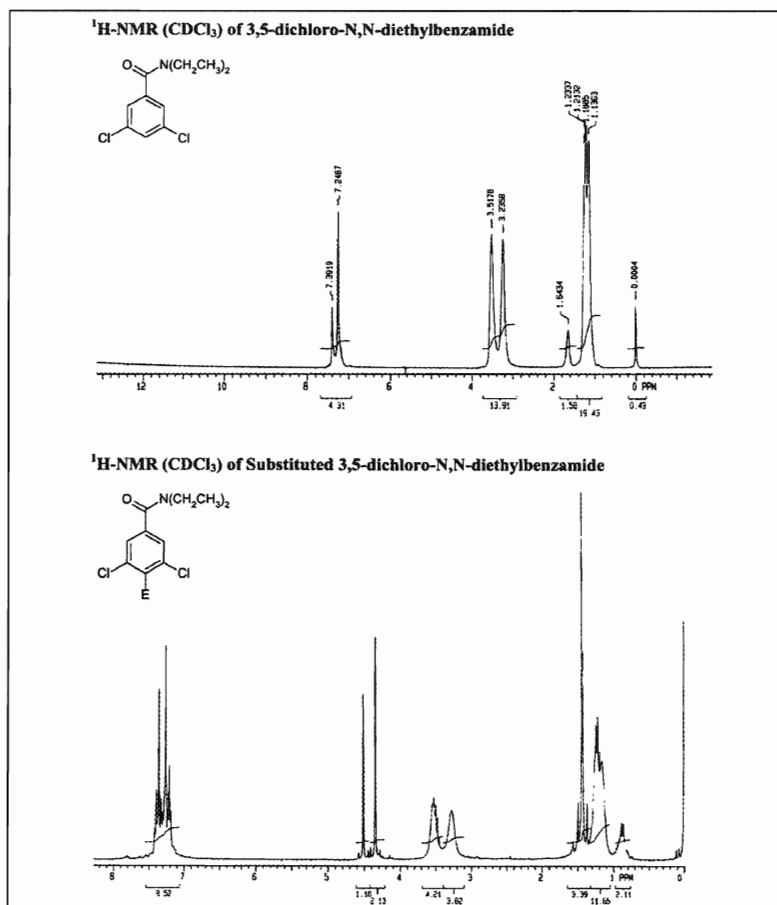


Figure 2.

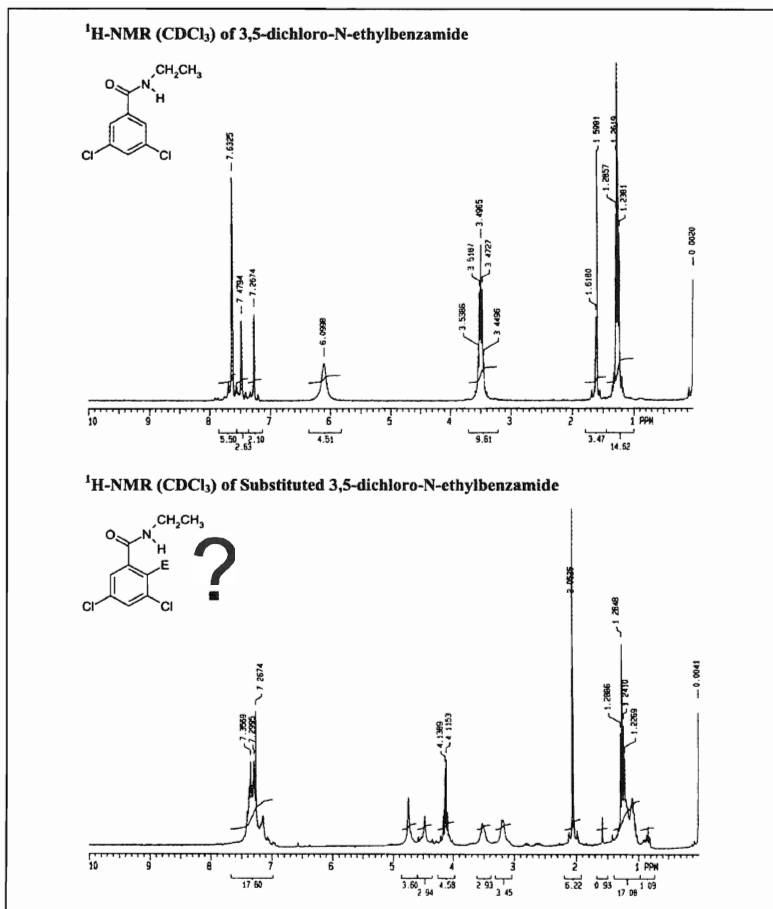


Figure 3.

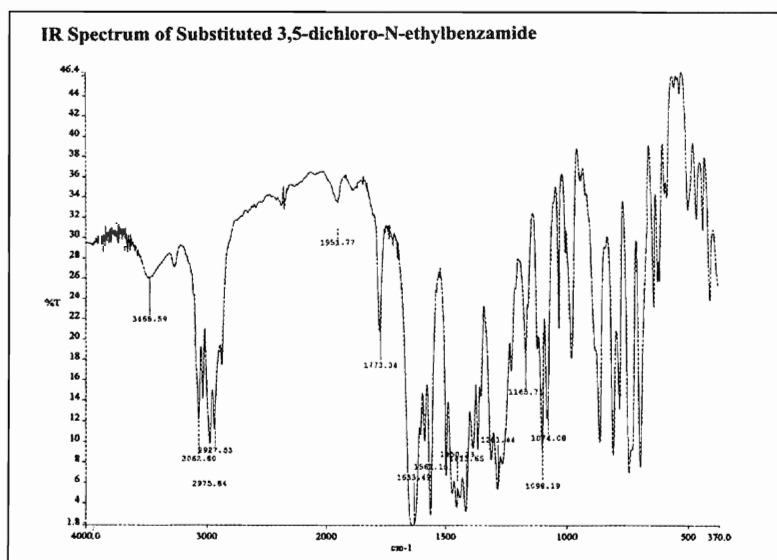


Figure 4. IR Spectrum of Substituted 3,5-dichloro-N-ethylbenzamide.

be performed to improve yields and to better direct the electrophilic substitution. For example, a reaction employing 2.1 equivalents each of the base and TMEDA and 0.9 equivalents of the electrophile will be performed. This should eliminate any problem of di- or tri-substitution of the benzyl group, which may have occurred in the reactions studied. In this case, the base should theoretically attack the hydrogen on the nitrogen first and then go to the ortho- position due to differences in their acidities. Since only 0.9 equivalents of the electrophile will be used, it should only substitute at the ortho- position, the more unstable and thus more reactive of the two positions. Another modification will be carried out by performing the reaction under the same conditions as described but without washing the product with 5% sodium hydroxide in the work-up. This is to prevent the loss of product into the aqueous phase. In addition to this, improved purification techniques (i.e. a larger column) could be used. Another possible reaction scheme to use for comparative purposes would include using smaller alkyl groups on the nitrogen in order to decrease or even eliminate the steric problem as well as the possibility of the base reacting with the hydrogen on the nitrogen.

EXPERIMENTAL

The ethylbenzamide was prepared following the procedure given by McCabe with some modifications. The reaction was carried out in a roundbottom flask equipped with a magnetic stir bar under dry atmosphere conditions. Ethylamine was placed in ethyl ether in the roundbottom flask and stirred in an ice water bath. 3,5-dichlorobenzoyl chloride was added dropwise and the solution was stirred at ambient temperature. The solution was taken up in ethyl ether and washed with 5% hydrochloric acid followed by two washings with 5% sodium hydroxide and finally with brine. The white precipitate in the organic layer was taken up in dichloromethane and evaporated on a rotary evaporator. (For future reactions, the solution should be taken up in dichloromethane

because the product is insoluble in ethyl ether.) The products were characterized by ¹H-NMR (300 MHz, CDCl₃) and silica gel TLC (9:1 petroleum ether/ethyl acetate).

All benzamide reactions were performed under a dry atmosphere in a three-necked roundbottom flask equipped with a magnetic stir bar and a cold temperature thermometer. Additions were made using a dry needle and syringe. Inverse addition methods were employed. First, sec-BuLi was dissolved in TMEDA in the roundbottom flask at -75°C (dry ice/acetone). Next, the benzamide in THF (10mL) was added slowly using an addition funnel. Each reaction was stirred for four hours at this temperature and then the benzylbromide was added dropwise. After addition was complete, the reaction was taken out of the dry ice/acetone bath and stirred at ambient temperature overnight. The solution was taken up in methylene chloride and washed with distilled water, followed by 5% hydrochloric acid, 5% sodium hydroxide, and brine. It was dried over anhydrous magnesium sulfate, evaporated on a rotary evaporator, and characterized by ¹H-NMR (300 MHz, CDCl₃) and silica gel TLC (9:1 petroleum ether/ethyl acetate). The ethylbenzamide products were purified using silica gel column chromatography with 9:1 petroleum ether/ethyl acetate as the eluent.

The diethylbenzamide was reacted using 1.2 equivalents each of the base and the TMEDA and 1.5 equivalents of the electrophile. The ethylbenzamide was reacted using 2.4 equivalents of both the base and TMEDA and 2.5 equivalents of the electrophile. The difference in equivalents for each of the reactions is a result of the additional acidic hydrogen on the nitrogen of the ethylbenzamide. Reaction at this site must be accounted for in the number of equivalents of each of the ethylbenzamide reactions. A reaction of the ethylbenzamide was also performed using 2.1 equivalents of the base and TMEDA and 0.9 equivalents of the electrophile, but only starting material was recovered, possibly because one or more of the reactants was wet.

ACKNOWLEDGMENTS

The first author would like to thank Dr. Lynn Bradley and Dr. David Hunt for their support in this project, as well as Dr. Georgia Arvanitis, Homar Barcena, Dr. Michael Berardini, The Arvanitis Research Group, Surjit Chowdary, American Cyanamid, and The College of New Jersey chemistry department.

REFERENCES

- ¹ Solomons, T.W.G. *Organic Chemistry*, 5th ed.; John Wiley & Sons: New York, 1992, 991-995.
- ² Solomons, T.W.G. *Organic Chemistry*, 5th ed.; John Wiley & Sons: New York, 1992, 636-637.
- ³ McCabe, E.T., *et al.* Contribution from *The Bureau of Entomology and Plant Quarantine*, Agricultural Research Administration, U.S. Department of Agriculture. Oct. 1953, 493.
- ⁴ Thornton, T.J.; Jarman, M. *Synthesis*. April 1990, 295-297.
- ⁵ Beak, P.; Brown, R.A. *J. Org. Chem.* 1982, 47, 34-46.
- ⁶ Morrison, R.T.; Boyd, R.N. *Organic Chemistry*, 5th ed.; Allyn and Bacon, Inc.: Boston, 1987.
- ⁷ McCabe, *et al.* *J. Org. Chem.* 1954, 19, 493.
- ⁸ Demas, M.; Bradley, L. *The College of New Jersey Journal of Student Scholarship*, 1998, 8-13.

Detection of *elrA* Protein in *Danio rerio* Embryos During Embryonic Development

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ABSTRACT

Early embryonic development in zebrafish is regulated by maternal products (mRNAs and proteins) that are deposited in the egg during oogenesis. Fertilization triggers the activation of a subset of these maternal factors. One triggering mechanism that is used to translate dormant mRNAs is cytoplasmic polyadenylation. The mRNA for the gene *elrA* is stored in zebrafish eggs with a short polyA tail, and is polyadenylated after fertilization. In order to determine whether the translation of the *elrA* mRNA is triggered by this cytoplasmic polyadenylation, Western analysis was performed on protein extracts from zebrafish eggs and embryos. The results from these experiments suggest that the *elrA* mRNA is translated immediately following fertilization, and that its translation is therefore regulated by polyadenylation. Furthermore, the precise temporal regulation of the synthesis of the *elrA* protein suggests that the *elrA* protein is needed immediately after fertilization, and may play some key regulatory role early in zebrafish embryogenesis.

INTRODUCTION

On the broad level the topic of study is maternal regulation in vertebrate development and specifically a mechanism for regulating the translation of maternal mRNA, or cytoplasmic polyadenylation. In the process of cytoplasmic polyadenylation, mRNA is either rendered dormant in the cytoplasm because it possesses a short poly(A) tail, or the mRNA possesses a longer poly(A) tail that is sufficient

to trigger translation. This mechanism of cytoplasmic polyadenylation is under investigation in several vertebrate species. The goal of these experiments was to study cytoplasmic polyadenylation in *Danio rerio* embryos by following the translation of a gene called *elrA*. The significance of this gene is that the *elrA* mRNA is polyadenylated at fertilization and the *elrA* protein is an RNA binding protein. In order to detect this protein, embryos from zebrafish were collected and stored at -70°C . Protein extracts of these embryos were run using gel electrophoresis to follow total protein synthesis. The zebrafish embryos were later analyzed by Western Blots and Immunostained to specifically detect the presence of the *elrA* protein and to determine the stage at which this protein was translated. The presence of the *elrA* protein was detected at various developmental stages including the one cell, four cell, and shield stage. However, the presence of this protein was not detected in unfertilized ova. The data from these experiments are likely to elucidate the mechanisms involved in cytoplasmic polyadenylation.

The *elrA* gene corresponds to the *elav* gene and thus is named *elav*-like

Author's Note: This paper was completed in partial fulfillment of the requirements for BIOL 499-Independent Study in Biology, supervised by Dr. Marcia O'Connell, an assistant professor of biology. This work is a part of Dr. O'Connell's ongoing research program, and was supported by a National Science Foundation Research Planning Grant. A 1998 graduate of The College of New Jersey, Rebecca M. Ford majored in biology and is currently a lab technician for a microbiology lab at SGS U.S. Testing Company.

ribonucleoprotein A. The *elav* gene has been identified in *Drosophila* and in humans and is a gene that encodes an RNA binding protein (Good 1995). These genes are believed to bind to RNA and function in posttranscriptional activities such as polyadenylation, RNA transport, nuclear transport, and RNA processing (Good 1995). The analysis of these genes could reveal more information about the mechanisms involved in cytoplasmic polyadenylation. This is a mechanism in which the maternal control of development is regulated by the translation of dormant mRNAs that gather in the cytoplasm of the oocyte. Translation occurs at fertilization or at early embryogenesis and the translation of these stored maternal mRNAs is controlled by cytoplasmic polyadenylation, which corresponds to maternal control (Salles et al., 1992).

In order to determine the events that can be regulated by the *elav*-like proteins, these proteins need to be analyzed at the various developmental stages in vertebrates. The localization of these proteins will be significant in determining the role of these genes. Research was performed on the *elrA* gene and the analysis of the RNA by PCR analysis and gel electrophoresis demonstrated a difference in the length of the poly(A) tail. Thus the next step was to detect the presence of this *elrA* protein in zebrafish embryos.

MATERIALS AND METHODS

Collection of fertilized embryos

Collection of embryos occurred in the morning after the lights were turned on. The embryos were then transferred from the marble tank to a petri dish filled with fish water. The embryos were then added to a petri dish (excess debris was removed) containing 1 mg/ml pronase. Then the chorions were removed by triturating with a Pasteur pipette. This procedure was continued until the embryos were expelled from the chorion or until five minutes were up. Once the chorions broke off, the embryos were rinsed

with 1X PBS. The chorions were removed, as well as the pronase, and the 1X PBS was added continuously until the solution contained only 1X PBS. The embryos were then transferred into 1.5 ml Eppendorf tubes. The excess solution (1X PBS) was then removed with a pipette and embryos were added one at a time into Eppendorf tubes. Cold SDS sample buffer was added at 1 μ l per embryo. The embryos were then homogenized with a pestle and stored in the freezer at -70°C . The tubes were labeled with the amount of embryos collected at the various cell stages.

Collection of unfertilized eggs

Females were separated from the males for a period of time prior to collection in order to expel unfertilized eggs. Collection of the females occurred early in the morning (same as for fertilized embryos). The female zebrafish was placed in a beaker filled with 8.4 ml of tricaine solution to 200 ml of fish water. Once the fish stopped swimming it was placed in a dry petri dish (the fish should not be kept in this solution for a great period of time or it will die). The belly of the fish was gently rubbed to expel the embryos (one direction from head to tail). The belly was then pressed until the stomach felt deflated. The fish was then placed back in the tank. Then with a thin spatula the embryos were placed in an Eppendorf tube filled with 50 μ l of SDS sample buffer. If a lot of embryos were collected, an additional 50 μ l of SDS sample buffer was added. The eggs were homogenized with a pestle. They were labeled and stored at -70°C .

Gel electrophoresis and staining with 1x Rapid Coomassie Stain

The apparatus was set up according to standard procedure. The first well on the electrophoresis gel was loaded with a low range molecular marker. The samples of embryos to be loaded on the following wells were prepared by heating at 95°C for five minutes. They were then centrifuged for three minutes at high speed. Depending on the amount added to each well, an empty

Eppendorf tube was filled with equal amounts of sample buffer (1 ml SDS sample buffer with a pinch of Bromophenol Blue) to the embryo sample. For example, if 20 μ l were added to a well, 20 μ l of the embryo sample would be added to 20 μ l of sample buffer. Then from this solution 20 μ l would be added to the well. The gel was then run for forty-five minutes at 15 mA.

To stain the gel it was first placed in deionized water. Then the polyacrylamide gel was placed in 12.5% trichloroacetic acid for ten minutes. The 12.5% trichloroacetic acid was removed and 1X Rapid Coomassie Stain was added. The gel was kept in this solution between twenty to forty minutes (forty minutes overstained the gel). The 1X Rapid Coomassie Stain was then discarded and the destain, which is 7.5% methanol and 5% acetic acid, was added. The gel was kept in this solution for five minutes. The gel was then removed from this solution and its picture was taken.

Western Blot and Immunostaining

The procedure for gel electrophoresis was followed. Then immobilon blot paper was used and cut out (to the size of the gel) and soaked in 100% methanol for five seconds. The blot was drained and rinsed immediately with deionized water. The blot was soaked for one-half hour before use (two pairs of gloves were worn when handled). Four pieces of filter paper were cut to the size of the gel. The filter paper was then soaked, as well as two pieces of sponge, in blotting buffer before they were used. The frame was placed (dark side down) in a glass tray filled with blotting buffer. The following items were then placed on the dark frame: a sponge, two pieces of filter paper, the gel, immobilon paper, two more pieces of filter paper, and a second sponge (in that order) and the frame was then closed. The frame was placed in the apparatus and the voltage was adjusted to 20 volts. This was run for two hours or if time permitted overnight.

The immobilon was removed and washed with 1X PBS for fifteen minutes. Then the 1X PBS was removed and 2% BM Blocking

solution (12 -15 ml) was added. The blot was incubated in this solution for one hour at room temperature. Then the blot was incubated overnight in primary *elrA* rabbit antibodies diluted 1:500 in 2% BM Blocking solution at 4°C. The blot was then washed four times, fifteen minutes each in PBT. The blot was then incubated in secondary antirabbit IgG-AP antibodies diluted 1:100 in 2% BM Blocking solution. The enzymatic reaction was performed with 10 ml alkaline phosphatase buffer solution to 50 μ l of NBT and 37.5 μ l of X-phosphatase. The reaction was then stopped in methanol and a picture was taken. (This procedure was not performed when the blot was stripped.)

Protein Assay

The cuvettes were washed thoroughly before use. The stock of 2 mg/ml BSA standard was diluted as follows:

Volume of Albumin Standard Stock	Volume of H ₂ O
.10 ml	.90 ml
.20 ml	.80 ml
.30 ml	.70 ml
.40 ml	.60 ml
.50 ml	.50 ml

Then .1 ml of each of these five dilutions were taken and 2 ml of Working Reagent (50 ml Reagent A, 1 ml Reagent B) were added to each sample. A blank of .1 ml of H₂O was prepared, and the samples to be analyzed (zebrafish embryos) were prepared by adding 2 ml of Working Reagent to .1 ml of each zebrafish embryo sample. This was then incubated at 37°C for thirty minutes. The absorbance at 562 nm was measured for each sample and compared to the water reference. Then a standard curve was plotted using the bovine serum albumin standard to determine the total protein concentration of each zebrafish embryo extract. This procedure was followed using the BCA Protein Assay Reagent.

RESULTS

Fertilized embryos of various developmental stages were first collected and run using gel

electrophoresis. This was done to determine where the *elrA* protein would be located in relation to yolk proteins or other proteins. The *elrA* protein in *Xenopus* migrates at an apparent molecular weight of 36 KDa, therefore, the detection of this protein was analyzed in this area.

The Western Blot was performed using the shield stage and four cell stage, since bands had been detected with an apparent molecular weight of 36 KDa at these two developmental stages in the first gel electrophoresis that was run (Figure 1).

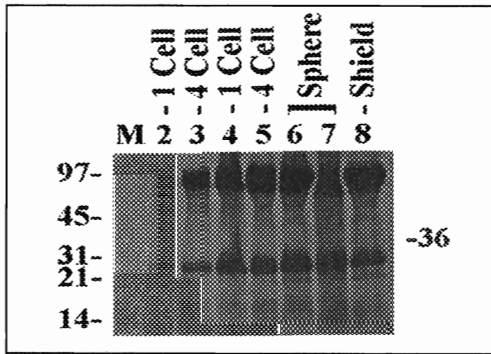


Figure 1. 2% SDS Polyacrylamide Gel of Fertilized Embryos Stained with 1X Rapid Coomassie Stain.

The wells of the polyacrylamide gel were loaded with five, ten, and twenty embryo equivalents, in order to ascertain the amount of embryo extract at which the *elrA* protein could be specifically detected. The Western Blot was also run to determine the developmental stage at which this protein would be present. The results from the Western Blot indicated that a protein with an apparent molecular weight of 36 KDa was detected with the *elrA* antibodies at the shield stage loaded with twenty embryo equivalents.

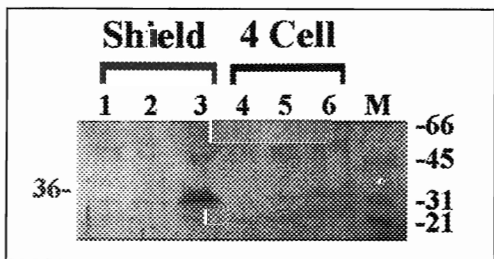


Figure 2. Western Blot of Fertilized Embryos.

However, this protein was also detected at low levels at five and ten embryo equivalents at the shield stage, as well as at ten and twenty embryo equivalents at the four cell stage (Figure 2).

The next step was to collect unfertilized eggs from zebrafish. These eggs were collected and run using gel electrophoresis. The wells of the 6% SDS polyacrylamide gel were loaded with 20 µl and 10 µl of egg extracts (Figure 3).

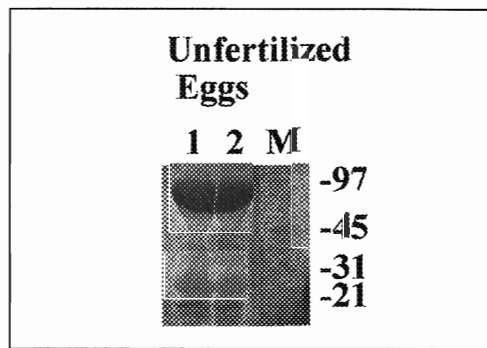


Figure 3. 2% SDS Polyacrylamide Gel of Unfertilized Ova Stained with 1X Rapid Coomassie Stain.

The polyacrylamide gel determined that protein bands were evident and that there were high concentrations of the protein collected. The number of unfertilized eggs was unknown due to the large amount of unfertilized eggs obtained at the time of collection.

After the unfertilized eggs were collected, a Western Blot was performed to determine the developmental stage at which the *elrA* protein could be detected and to determine if the protein was evident in unfertilized eggs. The wells of the 6% SDS polyacrylamide gel were loaded with twenty and ten embryo equivalents of unfertilized eggs, one cell, four cell and shield stage respectively. A protein that reacts with the *elrA* antibodies with an apparent molecular weight of 36 KDa was detected in the one cell, four cell and shield stage. However, this protein was not detected in the unfertilized eggs (Figure 4).

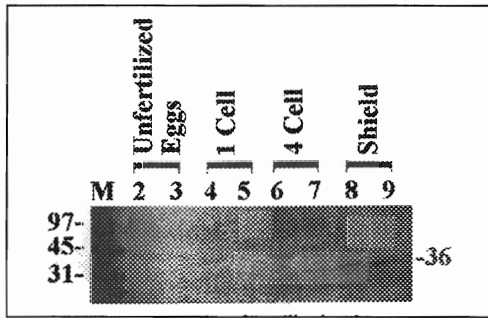


Figure 4. Western Blot of Fertilized and Unfertilized Ova.

Since bands were not present in the wells loaded with unfertilized eggs, a protein assay was performed. This assay was performed in order to determine the total protein concentration of each developmental stage that had been analyzed in the Western Blots and gel electrophoresis of fertilized embryos and unfertilized eggs. This was accomplished by creating a standard curve using bovine serum albumin standard. This standard curve plotted the absorbance at 562 nm versus the protein concentration. The total protein concentration of each zebrafish embryo extract was determined using this standard curve. The data, when analyzed, revealed that the concentration of unfertilized eggs was 1.4 times greater than the one-cell stage embryos and 1.75 times greater than the shield-stage embryos (Table 1).

Table 1. Protein Assay to Determine Total Protein Concentration

Sample	Absorbance @ 562 nm	Concentration (ug/ml)
Unfertilized Eggs	.270	70
1 Cell Stage	.181	50
Shield Stage	.148	40

Thus there was a higher concentration of unfertilized eggs than at the other developmental stages and yet the *elrA* protein was not detected in the Western Blot (Figure 4).

CONCLUSION

The egg and embryo extracts contained intact protein, and there was no sign of degradation. This was seen from the 6% SDS polyacrylamide gels that were run using electrophoresis. A protein with an apparent molecular weight of 36 KDa was detected by Western Blot with the *elrA* antibodies in the

zebrafish embryos. This suggests that the *Xenopus* antibody recognizes the zebrafish *elrA* protein. This protein was evident at high concentrations at the shield stage. This may be both maternal and zygotic protein. This protein was not translated in unfertilized eggs but was translated in fertilized zebrafish embryos, hence the translation of maternal *elrA* mRNA correlates with its polyadenylation. Thus these experiments suggest that the translation of this protein, *elrA*, is regulated by cytoplasmic polyadenylation. The data presented from these experiments will likely elucidate the mechanisms involved in cytoplasmic polyadenylation for future studies in vertebrates.

REFERENCES

Good, P.J. (1995). A conserved family of *elav*-like genes in vertebrates. *Proc. Natl. Acad. Sci.* 92: 4557-4561.
 Salles, F.J., A.L. Darrow, M.L. O'Connell, and S. Strickland (1992). Isolation of novel murine maternal mRNAs regulated by cytoplasmic polyadenylation. *Genes & Dev.* 6: 1202- 1212.
 Westerfield, M. (1995). *The Zebrafish Book*. 3rd ed. University of Oregon Press, Oregon.

Predator/Prey Relationships of Upper Cretaceous Lamniform Chondrichthyans, *Squalicorax kaupi*, and *Squalicorax pristodontus* from the Northern Coastal Plain of New Jersey

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ABSTRACT

The Wenonah-Mt. Laurel and Navesink Formations in New Jersey's northern coastal plain contain abundant fossil lamniform chondrichthyan teeth from the species *Squalicorax kaupi* (Agassiz) and *Squalicorax pristodontus* (Agassiz). These two species of sharks are now extinct; they lived in the ancient seas of New Jersey approximately seventy million years ago during the upper Cretaceous period. Many of the fossil teeth show signs of damage and flaking, suggesting that a diet consisting largely of prey items containing hard parts was common to these sharks. Spiral coprolites are the fossilized fecal pellets that can be traced to the chondrichthyans. These coprolites can be collected directly adjacent to fragments of mollusks, decapods, reptiles, and bony fish in the sediments surrounding the fossils. Petrographic analysis, a method of identifying substances by viewing them under a microscope and through cross polarized light, reveals the presence of processed bone fragments, shell material, quartz sand, and glauconite. The co-occurrence of damaged or worn teeth with spiral coprolites containing both exoskeletal and endoskeletal fragments suggests that mollusks, decapods, reptiles, and bony fish were common prey items for New Jersey's upper Cretaceous lamniform chondrichthyans, and in particular *Squalicorax kaupi* and *Squalicorax pristodontus*.

INTRODUCTION

In a recent report on chondrichthyans from the upper Cretaceous of the northern coastal plain of New Jersey, Case (1995) lists a total of twenty-nine genera occurring in the Wenonah-Mt. Laurel and Navesink Formations. Chondrichthyan fossils from these deposits consist mainly of teeth, fin spines, vertebra, and skin fragments, all of which have been well documented for over eight decades (Fowler 1911; Cappetta and Case, 1975; Case, 1982; Case, 1995). The predominant focus of these earlier studies has been identification and classification of chondrichthyan teeth, as well as the relationship of fossil teeth to those of modern species.

Twelve years of collecting chondrichthyan teeth from these formations has yielded a comprehensive collection of over thirty-thousand chondrichthyan teeth, in which two members of the Order Lamniformes, *Squalicorax kaupi* and *Squalicorax pristodontus* comprise better than half of the total number of teeth collected (Becker, 1997, unpublished thesis).

The case study reported here analyzes potential food sources for *Squalicorax kaupi* and *Squalicorax pristodontus* populations living in New Jersey's northern coastal plain

Author's Note: This paper was completed in partial fulfillment of the requirements of PHYS 499-Independent Study in Physics. Dr. Martin Becker is an assistant professor of physics, and Jonathon Lancaster is an English major. This work was completed as part of Dr. Becker's ongoing research program.

during the upper Cretaceous. Our conclusions are, in part, based on what we argue is feeding-related damage to their teeth. The unusual abundance of chondrichthyan, osteichthyan, mollusk, decapod, and reptile fossils contained in the Wenonah-Mt. Laurel and Navesink Formations provide insights into the: 1) origin of recurrent flaking patterns and wear facets seen on *Squalicorax kaupi* and *Squalicorax pristodontus* teeth; 2) composition of spiral coprolites, attributed to chondrichthyans; and 3) common relationships between chondrichthyan predators and their prey-taking place in the upper Cretaceous sea-way of the northern coastal plain of New Jersey and perhaps in other similar basins during this time interval.

Previous Studies of Chondrichthyan Predator and Prey Relationships

Teeth Bite Marks

Siverson (1992) has identified twelve species of lamniform chondrichthyan in the Kristanstad Basin from the upper Cretaceous, Campanian of Sweden. The diversity of this assemblage is suggested to be a result of an abundance of food sources such as belemnites, *Belemnellocamax mammillatus*. Additional prey items may have included reptiles, in particular turtles, elasmosaurs, bony fish, and cephalopods. Fragments of these probable prey items can be found in association with lamniform teeth from *Archaeolamna kopingensis*, *Cretoxyrhina mantelli*, and *Squalicorax kaupi* in the Ugnsmunnarna and Asen regions of Sweden (Siverson 1992).

According to Rothschild and Martin (1992), the skeletons of mosasaurs from the upper Cretaceous of Kansas-Nebraska provide substantial support for the role of reptiles in the diets of lamniform chondrichthyans. Fossils from mosasaur genera *Clidastes* and *Platecarpus* provide evidence for shark attacks along the caudal vertebra (Rothschild and Martin, 1993). In both instances the shark attacked from above leaving bite marks and the outline of the mouth. In the *Clidastes* skeleton, a small tooth fragment from *Squalicorax kaupi* was even recovered from

one of the puncture wounds. Striated bite marks from probable chondrichthyans were observed on: 1) a mosasaur vertebra collected from the Campanian, Taylor Group along the North Sulfur River in Central Texas (Welton and Farish, 1993); and 2) a plesiosaur skeleton discovered along with four teeth from *Archaeolamna kopingensis judithensis* in the Campanian strata of the Judith River Formation near Suction Creek, Blaine County Montana (Siverson 1992).

Johnson (1987) identified rare deformed Xenacanthodiid shark teeth from Wichita-Albany and Clear Fork Groups in the Permian of Texas. Deformed teeth are suggested to be the product of trauma during feeding to embryonic teeth that have not yet erupted in the functional position in the mouth of the organism (Johnson, 1987).

While the trauma inflicted on endoskeletal remains through contact with chondrichthyan teeth serves to support the theory of chondrichthyans eating animals with hard parts, research documenting feeding patterns upon shell-bearing prey is equally valuable in establishing this argument. Boucot (1990) reported predation by the shell-crushing shark *Ptychodus* on inoceramid bivalves. This is further supported by Welton and Farish (1993) who identify similar wear facets on *Ptychodus whipplei* from the Santonian of Texas. The suggested diet of these chondrichthyans, based on tooth morphology and wear facets, appears to consist of bottom-dwelling bivalves and mollusks.

From the Paleozoic, Mapes and Hansen (1984) document predation by a large symmoriid shark from the lower Pennsylvanian, Kendrick Shale in Kentucky. Puncture wounds on the body chamber of a coiled nautiloid indicate the chondrichthyan predator was most probably *Symmorium reniforme*, the largest of known Pennsylvanian sharks. Mapes and Hansen (1984) also identify three other occurrences where well-preserved chondrichthyans were found with identifiable stomach contents. Paleozoic chondrichthyans preserved with brachiopods,

crinoids, foraminifera, crabs, and fish in their stomachs included: 1) a late Permian petalodont, *Janassa bituminosa*; 2) a late Permian eugeneodontid, *Fadenia*; and 3) a late Devonian shark, *Cladoselache*. More recently, Mapes et al. (1995) recorded eighteen specimens of the ammonoid *Gonioloboceras goniolobum* from forty-two middle and upper Pennsylvanian localities in Texas, Oklahoma, Kansas, and Missouri with fish and chondrichthyan bite marks.

Coprolites

While much research concerning Chondrichthyan predator-prey relationships relies on evidence resulting from actual attacks, the study of coprolites has also revealed interesting information concerning this issue. Spiral intestine valves occur in modern and fossil chondrichthyans (Boucot, 1990; Perrine, 1995; and Woodward, 1917). The complexly coiled spiral design of the valve slows the passage of food material through the gut and increases its absorptive capacity without a comparable increase in intestinal length. However, spiral intestine valves restrict the size of material passing through the intestine, necessitating other methods for disposing of large waste. Boucot (1990) and Perrine (1995) note that larger particles or masses of undigested foods are regurgitated as pellets and compact food masses. The spiral valve is a primitive feature found primarily in chondrichthyans, although it also occurs in primitive sturgeons, bichirs, lungfish, and bowfins (Budker, 1971 and Moss, 1984). Budker (1971) indicates that the presence of a spiral valve in fossil chondrichthyans is demonstrated by the characteristically twisted shape and spiraling structure of coprolites.

Woodward (1917) indicated that Cretaceous Chalk deposits of England containing spiral coprolites also contained abundant remains of chondrichthyans, *Acrodus*, and *Hybodus*. As additional proof for the relationship between spiral coprolites and chondrichthyans, Woodward (1917) illustrated a ventral view of the upper Devonian chondrichthyan, *Cladoselache clarki*, from Berea, Ohio, illustrating the

intestine with spiral valve and partially digested food.

Williams (1972) analyzed spiral coprolites from the central Kansas, Wymore Shale Member of the lower Permian Matfield Shale. His research suggests that spiral fecal masses were more than likely the product of the chondrichthyans, *Xenacanthus* and *Helodus*, whose remains are abundant throughout the area. Williams (1972) was able to identify palaeoniscoid and lungfish scales as well as bone fragments in thin sections made from Wymore Shale Member coprolites. Furthermore, he noted a striking similarity between the construction of Wymore Shale spiral coprolites with those occurring in the Cretaceous Chalk of England, and with the spiral valve intestine structures seen in the modern chondrichthyans.

Kloc (1987) identified coprolites from the middle and upper Devonian of New York that contained small ammonoid fragments. Coprolites occurred as cigar shaped nodules, ranging in size from 5 to 15 cm in length. The suggested predator of the nektonic ammonoids included cladodont sharks whose teeth have been found within the same strata.

Perhaps the best documentation in North America of soft-bodied preservation of chondrichthyans comes from the Pennsylvanian age, Cleveland Shales. The anoxic bottom conditions prevalent in this area allowed for the preservation of the spiral valve structure and identifiable prey in digestive tracts. These digestive tracts along with coprolites from the Cleveland Shales contain cladodont teeth, cartilage fragments, conodonts, sand grains, and palaeoniscoid scales from *Kentuckia blavini* and arthropod fragments (Boucot, 1990).

Location and Geologic Age

Chondrichthyan teeth and spiral coprolites were collected along Ramanessin, Willow, and Big Brooks in the northern coastal plain of Monmouth County, New Jersey at these approximate latitudes and longitudes: N 40° 22'00"/W 74° 10'30"; N 40° 21'00"/W 74° 12'20". and N 40° 19'05"/W 74° 13'55" respectively. These brooks downcut through

unconsolidated sediments of the Wenonah-Mt. Laurel and Navesink Formations providing a good cross-sectional exposure of formation contacts and good accessibility to chondrichthyan teeth deposits.

Teeth and coprolites were collected by sieving outcrops with 0.5 centimeter screens. Furthermore, only in situ material was collected and identified. Tooth identification was based on the known chondrichthyan paleontology for the Cretaceous Atlantic Coastal and Western Interior Seaways as given in: Cappetta and Case, 1975; Cappetta, 1987; Case, 1995; Hartstein and Decina, 1986; Lauginger, 1986; Case and Schwimmer, 1988; and Welton and Farish, 1993.

The Wenonah-Mt. Laurel Formation in outcrop has been designated as upper Campanian age based on the occurrence of ammonites *Menuites portlocki* and *Trachyscaphites pulcherrimus* (Kennedy and Cobban, 1994). The occurrence of *Menuites portlocki* is equivalent to the *Baculites reduncus* and *Baculites scotti* zones of the Western Interior (Kennedy and Cobban, 1994). Bentonites associated with the occurrence of these two ammonite zones in the Western Interior give radiometric ages of 75.5 ± 0.6 Ma (Obradovich, 1988). Sugarman et al. (1995) cite the occurrence of *Nostoceras hyatti* in outcrops of the basal Navesink Formation. The *Baculites jenseni* zone of the Western Interior Seaway contains *Nostoceras hyatti* and has been designated as of latest Campanian age (Kennedy and Cobban, 1994). Bentonites associated with the occurrence of this ammonite zone gives radiometric age ranges between 73.2 ± 0.7 and 70.1 ± 0.7 Ma. (Obradovich, 1988 and Kennedy et al., 1992).

LABORATORY ANALYSIS

We analyzed a total of 7,128 fossil teeth, 5,940 from *Squalicorax kaupi* and 1,188 from *Squalicorax pristodontus*. Under a binocular microscope, teeth were studied for patterns of damage or wear which could be attributed to a hard-parts diet and distinguished from the effects of diagenetic alteration or taphonomic processes. Only well

preserved, complete teeth specimens were selected for analysis.

Tumbler Experiment Information

Additionally, twenty thin-sections of spiral coprolites, showing both longitudinal and cross-section exposures were prepared. All thin sections were examined under plain and cross-polarized light at both low (4X) and high (40X) magnification with respect to: 1) concentric, mucosal fold structures, 2) mineralogical composition; and 3) shelly or bony inclusions.

Data on Flaking Patterns and Coprolites

Flaking Patterns

Tooth damage was observed under a binocular microscope and found, most consistently, in two forms, flaking or chipping. Patterns of either flaking or chipping were identified on 10.9% and 12.5% respectively of *pristodontus* and *kaupi* teeth. The vast majority of observable damage could be seen on the longer, convex surface or mesial edge of the tooth. Nevertheless, wear could also be noticed on the facing distal surface. These flakes or chips were measured and recorded consistently in lengths of 5 mm or less along the mesial, distal, and apex of the tooth cusp. The flaking occurs within the tooth serrations and most often involves removal of the outer enameloid and exposure of internal osteodentine and orthodentine tissues on both the lingual and labial faces. In some specimens the apex of the cusp is broken or rounded over, removing up to 4 mm of the enameloid and also exposing internal tooth tissues.

Coprolites

The largest coprolites studied achieved a maximum length of approximately 5 cm and maximum width of approximately 2 cm; however, most were somewhat smaller. All coprolite thin sections contained: 1) spiraling and muscoidal fold structures related to peristalsis of the valve structure; 2) rounded to sub-rounded quartz grains; and 3) angular fragments of calcite, glauconite, and clay minerals.

Small bone fragments, less than 3 mm in length, were observed in fourteen of the

twenty thin sections of spiral coprolites. Additionally, minor amounts of angular, aragonite and calcite, approximately 3 mm or less in diameter, were identified in the spiral coprolites.

INTERPRETATIONS

Tooth Damage:

Post-Mortem or Life Related?

Chondrichthyan teeth are primarily composed of highly resistant and insoluble biogenic apatite, $\text{Ca}_5(\text{PO}_4)_3\text{F}$, produced within a gum tissue that lines the upper and lower jaws. This durability of apatite permits accumulated teeth to be reworked and transported by wave action and cyclical fluctuation in regional sea level, yet maintain pristine preservation. Taphonomic processes would have randomly distributed flaking and wear to various areas along tooth cusp and root structure.

Squalicorax kaupi and *Squalicorax pristodontus* teeth studied in this project were collected from unconsolidated sediments of the northern coastal plain of New Jersey. The unconsolidated sediments of this area have not been subjected to deep burial, lithification, or metamorphism; thus the effects of such agents are not likely to be an important factor in the observed tooth damage.

Teeth

We interpret the similar, repeated flaking and chipping along the mesial edge and cusp apex to have taken place as the result of the dietary habits of *Squalicorax kaupi* and *Squalicorax pristodontus*, specifically the taking of prey with hard parts. The application of tremendous jaw pressure to hard parts contained in prey items and/or the struggle of these prey during the attack would both contribute to the type of damage observed. This assessment seems quite reasonable when compared to modern chondrichthyans with similar dental morphologies. Boucot (1990) notes that breakage of modern chondrichthyan teeth is not uncommon due to the delicate nature of the teeth and the power exerted on the short

moment of the jaws. Benchley (1998) notes that a modest great white shark can exert a biting pressure as much as twenty tons per square inch. An 8.5 foot dusky shark is estimated to have a biting power of eighteen tons per square inch (Boucot 1990).

Additionally, rapid biting, thrashing, and head shaking are common behaviors observable in the feeding practices of most modern, nektonic chondrichthyans (Perrine 1995). Presumably this same behavior occurred in ancestral chondrichthyans. In support of this association, the case study of Mapes et al. (1995) documented a lethal attack on *Gonioloboceras* sp. by chondrichthyan, *Symmorium reniforme*, in which one or more rapid bites were inflicted in quick succession. The prey was then shaken to allow the ammonoids' body tissues to be separated from their phragmocones and fragmented shell material.

The mesial edge of the tooth blade occurs on an angle such that hard parts of prey items would most likely have intercepted the tooth cusp along the mesial edge and slid down cutting serrations. Hard parts and fleshy materials alike would have become locked between the distal edges of adjacent teeth. Thus wedged between the serrated distal edge of one tooth and the serrations present on the mesial side of the neighboring tooth, biting and prey struggle would have resulted in observable damage to the appropriate points of contact. Considering the locations of the greatest pressure, this damage would manifest itself as significant chipping along the mesial edge and possible flaking of the main of the cusp.

Coprolites

No direct evidence of soft organ preservation, including identifiable prey in digestive tracts of chondrichthyans, has been documented from the Wenonah-Mt. Laurel and Navesink Formations. Furthermore, no primitive sturgeon, bichir, lungfish, or bowfin fossils have ever been documented in the upper Cretaceous of New Jersey. In light of this, we attribute a chondrichthyan origin for the

studied coprolites from the Wenonah-Mt. Laurel and Navesink Formations based on: 1) the spiraled structure of coprolites created by the spiral valve; 2) the small size of the coprolites, related to the small size of the spiral valve; and 3) the abundance of chondrichthyan teeth which co-occur with coprolites from these formations.

Bony fish, reptile, mosasaur, or plesiosaur remains co-occur with chondrichthyan teeth and coprolites and are probably the sources of bone fragments found in coprolites. The highly fragmentary nature of the biogenic apatite comprising these bony fragments makes identification of individual sources speculative. However, in our experience, bony fish remains, including teeth, jaw bone sections, and vertebra, from bony fish teeth-*Ischodus bifurcatus*, *Enchodus feroxi*, *Anomodus phaseolus*, *Stephanodus* sp., *Xiphanchitus* sp., and *Parabulai casi*, are far more common than are reptile or mosasaur fossil remains in the Wenonah-Mt. Laurel and Navesink Formations.

In all likelihood, the abundance and smaller size of bony fish make them more probable candidates for common prey items for lamniform chondrichthyans as compared to larger reptiles such as mosasaurs and plesiosaurs, which were equipped with large jaws and excellent teeth of their own. However, this does not rule out the juveniles, sick, injured, or old from the list of possible prey candidates as well as scavenged dead carcasses. Siverson (1990) notes that juveniles and injured or otherwise weakened elasmosaur individuals were susceptible to attacks by *Squalicorax kaupi* which may have hunted in packs cruising around islands and rocky shorelines of the Kristanstad Basin in Sweden.

Modern lamniform chondrichthyans such as the great white, *Carcharodon* sp., sand tiger, *Carcharis* sp., thresher, *Alopias* sp., and mako, *Isurus* sp. support our interpretations of a diet rich in bony fish. To a lesser extent the following food sources for these lamniforms include small sharks, rays, squid, crabs, lobsters, and occasionally turtles,

seabirds, and marine mammals (Perine, 1995). *Carcharis* sp. occasionally preys upon large marine mammals such as dead whales or seals; however, the majority of prey is much smaller than the lamniform predator.

Chondrichthyan predation on ammonoids during the Paleozoic and Mesozoic is well documented by Mapes and Hansen 1984; Boston et al., 1987; Bond and Saunders, 1989; Bukowski and Bond, 1989; Boucot, 1990; Siverson, 1992; and Mapes et al., 1995. Moreover, predation on modern squid, octopus, and nautiloids also appears to be a common occurrence (Budker 1971; Shafer 1972; Lehmann, 1981; Moss, 1984; and Perrine, 1995). Becker et al. (1996) documented the following ammonite species in the Wenonah-Mt. Laurel and Navesink Formations along Ramanessin, Willow, and Big Brooks: *Menuites portlocki*, *Placenticeras placenta*, *Placenticeras minor*, *Didymoceras binodosum*, and *Trachyscaphites pulcherrimus*. Other mollusks that are extremely abundant in our field areas are *Belemnites* sp., *Pycnodonte* sp., *Exogyra* sp., *Choristothyris* sp., and *Ostrea* sp. In addition, fragmentary exoskeleton fossil evidence from decapods, *Hoploparia gabbi*, and *Protocallianassa mortoni*, occurs in the Wenonah-Mt. Laurel and Navesink Formations. However, no decapod fragments were observed in the coprolites we examined, and benthic molluscan assemblages are not noted prey items for the nektonic life modes of modern, and in all likelihood fossil, lamniform chondrichthyans (Perrine, 1995).

The abundance and nektonic life mode of belemnites and ammonites makes them likely candidates for potential prey items. Moreover, the appearance of aragonite and calcite in coprolites supports the interpretations of (Williams, 1972; Kloc, 1987; and Boucot, 1990), for fossil chondrichthyan predation and diet being comprised of ammonites and belemnites. The angular nature of aragonite and calcite fragments found in coprolites argues against an authigenic origin. Therefore, aragonite and calcite

fragments are likely to be the products of predation on ammonites and belemnites in the northern coastal plain of New Jersey.

CONCLUSIONS

Whether or not any of the twenty coprolites studied in thin section were produced by *Squalicorax kaupi* or *Squalicorax pristodontus* remains somewhat speculative but certainly not unreasonable considering their abundance in the Wenonah-Mt. Laurel and Navesink Formations. Our research has shown that *Squalicorax kaupi* and *Squalicorax pristodontus*: 1) were the most abundant chondrichthyans living in the northern coastal plain of New Jersey during the upper Cretaceous; 2) have similar flaking patterns along the mesial tooth edge related to damage sustained during feeding on hard parts; and 3) occur with abundant bony fish, ammonites, belemnites, and coprolites containing bone fragments and carbonate shell material.

REFERENCES

- Becker, M. A., W. Slattery, and J. A. Chamberlain. 1996. Reworked Campanian and Maastrichtian Macrofossils in a Sequence Bounding, Transgressive Lag Deposit, Monmouth County, New Jersey. *Northeast Geology and Environmental Science*, 18:234-252.
- Becker, M. A. and P. R. Stoffer. 1998. Rare Occurrences of Deformed Upper Cretaceous Fossil Chondrichthyan Teeth from the Atlantic and Eastern Gulf Coastal Plains. *The Spriferid: Journal of the New York Paleontological Society*, Vol. II
- Benchley, P. 1998. *Swimming With Sharks*. Audubon, 100:52-57.
- Bond, P. N., and F. Bukowski. 1990. A predator attacks *Sphenodiscus*. *The Mosasaur*, 4:69-74.
- Bond, P. N., and W. B. Saunders. 1989. Sublethal Injury and shell repair in Upper Mississippian ammonoids. *Paleobiology*, 15:414-428.
- Boston, W. B., M. S. Sims, and R. H. Mapes. 1987. Predation on Cephalopods from the Finis Shale (Pennsylvanian-Virgilian) of Texas. *Geologic Society of America, Abstracts with Programs*, 19:6.
- Boucot, A. J. 1990. *Evolutionary Paleobiology of Behavior and Coevolution*, Elsevier Science Publishers.
- Budker, P. 1971. *The Life of Sharks*, Weidenfeld and Nicolson Inc.
- Cappetta, H. and G. R. Case. 1975. Contributions al' Etude des Selaciens du groupe Monmouth (Campanian-Maastrichtian) du New Jersey. *Paleontographica, Abteilung A* 151:1-46.
- Case, G. R. 1995. Fossil Shark Remains From the Early and Middle Maastrichtian of the Upper Cretaceous of Monmouth County, New Jersey. In Baker, J. (ed.), *Contributions to the Paleontology of New Jersey*. The Geological Society of New Jersey, 12:72-80.
- Case, G. R. and D. R. Schwimmer. 1988. Late Cretaceous Fish From the Blufftown Formation (Campanian) in Western Georgia. *Journal of Paleontology*, 62:290-301.
- Cappetta, H. 1987. Vol. 3B. Chondrichthyes II, Mesozoic and Cenozoic Elasmobranchii. In Schultze, H. P. (ed.). *Handbook of Paleichthyology*. Gustav Fisher Verlag, Stuttgart, New York.
- Fowler, H. W. 1911. A description of the fossil fish remains of the Cretaceous, Eocene, and Miocene Formations of New Jersey. *Geological Society Survey of New Jersey Bulletin*.
- Hansen, M. C. and R. H. Mapes 1990. A predator-prey relationship between sharks cephalopods in the late Paleozoic, p. 182-192. In BOUCOT, A. J. *Evolutionary Paleobiology of Behavior and Coevolution*, Elsevier Amsterdam, Netherlands.
- Harstein, E. F. and L. Decina. 1986. A New Severn Formation (Early Middle Maastrichtian, Late Cretaceous) Locality in Prince Georges County, Maryland. *The Mosasaur*, 3:87-95.
- Johnson, G. D. 1987. Deformed Xenacanthoid Shark Teeth from the Permian of Texas. *Dakoterra*, 3:22-27.
- Kennedy, W. J. and W. A. Cobban. 1994. Ammonite Fauna From the Wenonah Formation (Upper Cretaceous) of New Jersey. *Journal of Paleontology*, 68:95-110.
- Kloc, G. T. 1987. Coprolites containing ammonoids from the devonian of New York. *Geologic Society of America, Abstracts with Programs*, 19:23.
- Lauginiger, E. M. 1986. An Upper Cretaceous Vertebrate Assemblage from Big Brook, New Jersey. *The Mosasaur*, 3:53-61.
- Litman, G. S. 1996. Sharks and the Origin of Immunity. *Scientific American*, 275:66-71.
- Mapes, R. H. and M. C. Hansen. 1984. Pennsylvanian shark-cephalopod predation: a case study. *Lethia*, 17:175-183.
- Mapes, R. H., M. S. Sims, and D. R. Boardman. 1995. Predation on the Pennsylvanian Ammonoid *Gonioloboceras* and its Implications for Allochthonous vs. Autochthonous Accumulations of Goniatites and Other Ammonoids. *Journal of Paleontology*, 69:441-446.
- Maisey J. G. 1996. *Discovering Fossil Fishes*. Henry Holt and Company, New York.
- Mestel, R. 1996. *Sharks' Healing Powers*, *Natural History*, Vol. 105, p. 40-47.
- Moss, S. A. 1984. *Sharks*. Prentice Hall Inc.

- Obradovich, J. 1988. A Different Perspective on Glauconite as a Chronometer for Geologic Time Scale Studies, *Paleoceanography*, 3:757-770.
- Perrine, D. 1995. *Sharks*, Voyageur Press Publishers Inc., Stillwater MN.
- Siverson, M. 1992. Biology, Dental Morphology, and Taxonomy of Lamniform Sharks From the Campanian of the Kristianstad Basin, Sweden. *Paleontology* 35:519-554.
- Sugarman, P., Miller, D. Bukry, and M. Feigenson. 1995. Uppermost Campanian-Maestrichtian Strontium Isotopic Biostratigraphic, and Sequence Stratigraphic Framework of the New Jersey Coastal Plain, *Geologic Society of America Bulletin*, 107:19-37.
- Welton, B. J. and R. F. Farish. 1993. *The Collector's Guide to Fossil Sharks and Rays from the Cretaceous of Texas*, Before Time Publishers.
- Williams, M. 1972. The Origin of Spiral Coprolites. *The University of Kansas Paleontological Contributions*, Paper 59.
- Woodward, S. 1917. The So-Called Coprolites of Ichthyosaurs and Labyrinthodonts. *Geology Magazine*, 4:540-542.

Conference Proceedings

Listed below are abstracts of student-faculty collaborative work presented at regional and national conferences.

Michael P. Verzi and Donald L. Lovett,
Department of Biology,
The College of New Jersey
(Donald L. Lovett, Faculty Sponsor)

Osmoregulatory Modulation of Gill
Na⁺/K⁺-ATPase Activity from the Blue Crab
Callinectes sapidus by Endogenous Compounds
Presented at the Annual Meeting of the New Jersey Academy of Science, April 18, 1998, Monmouth University, West Long Branch, NJ. Abstract published in *The Bulletin of the New Jersey Academy of Science* (1998) Vol. 43 (1).

Estuarine organisms are confronted by continual fluctuations in ambient salinity. Hyperosmoregulating crabs, such as the blue crab *Callinectes sapidus*, apparently maintain a stable hemolymph osmolality by modulating the activity of Na⁺/K⁺-ATPase in their gills. Short-term (acute) changes both in hemolymph concentrations of the terpenoid methyl farnesoate and in gill tissue concentrations of polyamines (spermine and putrescine) are elicited by changes in salinity. Specifically, methyl farnesoate and spermine levels increase when crabs acclimated to high salinity are transferred to low salinity, whereas putrescine levels increase when crabs acclimated to low salinity are transferred to high salinity. Previous studies of the effects of these compounds on Na⁺/K⁺-ATPase activity have been inconclusive because of difficulties associated with using a linked PK/LDH-NADH enzyme assay. In this study, the *in vitro* effects of methyl farnesoate and polyamines on the reaction

kinetics (K_m , V_{max}) of Na⁺/K⁺-ATPase from crab gills were examined by measuring the liberation of Pi. The rapid changes in gill Na⁺/K⁺-ATPase activity that occur in crabs when ambient salinity changes, therefore, appear to be modulated by methyl farnesoate activating Na⁺/K⁺-ATPase and by putrescine inhibiting it.

Michael P. Verzi and Donald L. Lovett,
Department of Biology,
The College of New Jersey
(Donald L. Lovett, Faculty Sponsor)

Methyl Farnesoate: A Hormone that May
Modulate Blood Salt Levels in Crabs
Presented at the Undergraduate Research Poster Session on Capitol Hill sponsored by the Council on Undergraduate Research, April 21, 1998, Dirksen Senate Office Building.

The enzyme sodium/potassium adenosine triphosphatase (Na⁺/K⁺-ATPase) serves many functions (absorption of nutrients in the gut, regulation of salt content in the blood and cells, and establishing membrane potential in nerve cells). Recent studies have suggested that the crustacean hormone methyl farnesoate (MF) may affect the activity of this enzyme. The purposes of this study were (i) to examine the relationship between MF blood concentrations and Na⁺/K⁺-ATPase activity in crab gills and (ii) to examine the *in vitro* effect of MF on the enzyme kinetics (V_{max} , K_m) of Na⁺/K⁺-ATPase. When crabs were exposed to low salinities, both the concentration of MF in the blood and the activity of Na⁺/K⁺-

ATPase in gills increased. For salinities between 15 and 75‰ seawater, there was an inverse relationship between salinity and MF levels and between salinity and Na^+/K^+ -ATPase activity. The significance of this work to science is that it proposes a new mechanism by which Na^+/K^+ -ATPase activity is modulated. Potential applications include its use in developing models for medical research and its use in managing our coastal resources. In particular, a more complete understanding of the modulation of Na^+/K^+ -ATPase activity in crabs may help us develop models to study hypertension and kidney function in humans. In crabs (and other shellfish), regulation of Na^+/K^+ -ATPase activity is necessary to tolerate salinity changes. Since some pollutants have their greatest effect on those developmental stages least tolerant of salinity change, measurement of MF production may be a sensitive bioassay for certain pollutants. Washington, DC.

Jean Kirnan, Maura Reilly,
and William Decker,
The College of New Jersey
(Jean Kirnan, Faculty Sponsor)

*Implementation and Assessment
of an Undergraduate Program in
Industrial/Organizational Psychology*
Presented at the Annual Meetings of the
American Psychological Society, May 1998,
Washington, DC.

An undergraduate concentration in industrial/organizational psychology was designed as a supplement to the regular psychology major. Five years after the track was implemented, a survey of graduates revealed higher first-year salaries, a more direct relationship between major and job, but similar levels of job satisfaction relative to traditional psychology majors.

Thomas Patrick and Michelle Landis,
The College of New Jersey
(Thomas Patrick, Faculty Sponsor)

Mutual Funds Risk and Return
Presented at the Annual Meetings of the
Northeast Business and Economics
Association, October 1998, Bentley College,
Waltham, MA.

This paper tests to see if there is a strong correlation between a mutual fund's risk and return. Management risk should be considered before investing in any mutual fund. This idea was developed from the Capital Asset Pricing Model and the Security Market Line. These models explain the relation that risk and return have with one another. The more risk assumed, the more the return should be earned. This theory was tested on mutual funds. Data were collected on roughly 100 mutual funds that were similar in growth, income, and the cost to invest (front-load fees). These funds were ranked by the inception date. Funds that were at least five years old were analyzed. Forty-five mutual funds fit this criterion. A regression analysis was performed on these funds using their five-year betas and five-year returns. Betas were used rather than standard deviation. Since the return received on a mutual fund is highly correlated to the market, beta was a better representation of risk. Regression variables were beta as the independent variable (X) and return as the dependent variable (Y).

The results of the regression analysis indicate that risk is not a good predictor of return. The R-square, which is the measure of correlation between risk and return, was only 22%. The regression equation was: Predicted Return = 2.9% + 12.3% (beta). The residual output explains what the regression equation calculated. It gave a predicted return and then measured it against the actual return the fund achieved and then produced a residual. These residuals were then plotted on the Risk Line Fit Plot. This plot indicates the observed return plotted against the fund's beta. By observing the

Risk Residual Plot, the mutual funds should have been as close as possible to the .00 line. The closer the fund to that line, the closer its return matches that predicted by the equation. There were, however, many funds that the regression equation did not predict very well. The funds that were above the line outperformed the predicted return and those below the line underperformed the predicted return. Among those that outperformed the greatest were Aim Aggressive Growth Fund and Oppenheimer Main Street Income and Growth Fund. Those that underperformed the greatest were Calvert Social Equity A Fund and Aim Growth Fund.

What did those funds that strayed from the norm do to make them so unique? Aim Aggressive Fund: The regression equation predicted a return of 17.8%, however, this fund yielded 28.4%. This discrepancy was explained by its fund manager—Robert Kippes. Kippes has guidelines that he believes makes his fund stand out from the competition. They include: 1) Don't time the market; 2) Don't waste time visiting companies and talking to management; 3) Knowing when to sell is more important than when to buy; 4) Wait for a clear indication that a stock price has changed direction before buying or selling; and 5) Do not buy unless the company has a ROE of at least 20%. Kippes's investment strategy recently shifted from mostly technology to consumer cyclical stocks. He invested in cyclicals because of the increase in consumer spending habits. He feels that technology stocks are not a good buy anymore due to an over capacity of investors, strong pricing competition, and decline in earnings. Kippes also invests mostly in small growth companies.

Oppenheimer Main Street Income and Growth Fund: This fund yielded 23.5%. It was predicted to earn 13.8%. Fund manager Robert J. Milmanow believes his success results from investing 75% of his portfolio in the stock of companies representing the five strategic areas of the stock market: emerging and improving industries, large

growth companies, smaller companies with specialized businesses, companies undergoing restructuring, and strong companies selling at low market valuation. The other 25% of the fund was invested in short-term notes and treasury securities to protect net-asset value from significant volatility of the stock market.

Aim Growth Fund: The regression equation predicted a return of 17.8%; this fund earned only 11.1%. Fund manager Jonathan Scholar reported that the primary goal of this fund to be highly diversified in preparation for virtually any market condition. Most of his 380 holdings were invested in large growth companies.

Calvert Social-Equity A Fund: The regression predicted a 15.5%; this fund earned only 7.8%. Loomis, Sayles and Company managed this fund. This fund restricts investments to companies that have a healthy impact on the environment, produce safe and useful products, and maintain standards of fairness in the workplace.

The underperformers appear to limit themselves. The Aim Growth manager invests most of its holdings in only large companies and the Calvert Social managers invest only in environmental-friendly companies. Therefore, the risk assumed does not entirely predict the return earned. The manager that handles the fund is a critical factor to the return a fund achieves. Even though a particular fund is high risk, it may earn less than expected due to its manager's business practice and intuitive sense.

Michele A. Barbieri,
The College of New Jersey
(Blythe Hinitz, Faculty Sponsor)

*Cultural Differences in
Infant/Toddler Child Care*
Presented at Ready! Set! Go! Annual
Conference of the New Jersey Association for
the Education of Young Children, October
1998, Somerset, NJ.

This is an oral presentation of a comparative case study conducted in two infant/toddler

childcare centers with differing cultural emphases. This study is a pioneering collaboration between the early childhood education and sociology department faculty with the presenter. This research study fulfilled the research requirement in courses in both early childhood education and sociology seminars and is widely applicable in the field. The presenter was a participant observer in both settings as a requirement for the two courses.

By 1990, more than 6.5 million children under the age of five were cared for by someone other than a parent. Of this number, 37.9% were in childcare centers. In recent years more mothers are returning to work soon after their child's birth, causing an increased demand for infant and toddler childcare. With this demand came research. The effect of day care on children has been debated by several authors. Some say that extensive infant day care negatively affects the children; it is associated with insecure attachments during infancy and heightened aggressiveness during school years. Others argue that the effects of day care are related to the quality of care provided. The topic of this research is the definition of quality care. Professional standards of quality care have been developed by experts in the field of Early Childhood Education. These educators have agreed on eight basic components of quality care: 1) promoting health and safety; 2) serving infants and toddlers in small groups with high staff-to-child-ratios; 3) primary caregiver assignments; 4) continuity of care; 5) responsive caregiving/planning; 6) cultural, linguistic, and familial continuity; 7) meeting the needs of the individual within the group context; and 8) the environment.

While many educators accept this standard, others feel that the definition of quality is not universal, but influenced by culture and the individual needs of each particular center. My research is a comparative case study of two infant/toddler care centers. The purpose is to determine if each center uses the professional

standards of quality care, or constructs definitions of quality care based on the needs of their particular centers. Both centers are located in an urban environment, one populated and staffed by African Americans and the other by European Americans, and both serve children from infancy through toddlerhood. Twenty-five to thirty hours of participant and direct observation techniques were used in order to gain as much understanding of the dynamics of each center as an "outsider" could.

The results of the research showed that neither center completely adheres to the definition of quality care set forth by the experts. Both centers constructed their own criteria for quality care that best fit the needs of the individual children and staff of the center. Further research on this topic may lead to less emphasis on professional standards, and more emphasis on defining quality care based on each center's particular needs. In the future we may see a movement towards relying less on the "experts" and more on listening to the real experts: the children.

Blythe F. Hinitz and Rebecca M. Collins,
The College of New Jersey,
(*Blythe Hinitz, Faculty Sponsor*)

Native-American Cultural Arts: Combining Skill Building and Aesthetic Development (A Workshop)

Presented at Ready! Set! Go! Annual Conference of the New Jersey Association for the Education of Young Children, October 1998, Somerset, NJ.

Program Description: Attendees will be introduced to some underlying principles of Native-American creative arts and will develop initial aesthetic and educational understanding of and appreciation for these principles. Attendees will develop skills and strategies for inclusion of meaningful Native-American arts experiences in their curriculum and sharing their experiences with children.

Objectives:

1. After participation in the workshop, attendees will be able to recognize basic principles of Native-American education and arts, and relate them to their own work.
2. Attendees will be able to identify cultural meaning within Native-American creative arts.
3. Through participation in the workshop, attendees will develop the ability to plan and create Native-American arts experiences within their own programs.
4. Attendees will participate in at least two creative arts experiences taken from Native-American creative arts and professional early childhood and arts education sources (which may include art, music, creative drama, or creative movement experiences).

Attendees will gain awareness of available print and media resources and the strategies for accessing those resources.

S. Kilibarda Dalafave, H. Barcena, and D. Henningsen,

The College of New Jersey

(S. Kilibarda Dalafave, Faculty Sponsor)

Thermoelectric Properties of Doped Rhenium Chalcogenides $Re_6M_xTe_{15}$
($x=0, 1, 2$; $M=Ga, In, Ag$)

Presented at the Materials Research Society Fall Meeting, November–December, 1998, Boston, MA.

Temperature dependencies of the electrical resistivity, Δ , and the thermoelectric power, ∇ , are reported for $Re_6M_xTe_{15}$ ($M=Ga, In, Ag$; $x=0, 1, 2$) between 90–380 K. Theoretical discussion of the results is presented. The materials, synthesized by filling large voids in the Re_6Te_{15} cluster system, may have potential thermoelectric applications around and below room temperatures. The samples are prepared by reacting 99.99% pure elemental powders in evacuated and sealed quartz ampoules at 1070 K for 170 hours. The resistivity data indicate semiconducting behavior for all samples. Possible hopping

conduction is present at lower temperatures. The energy gap of 10^{-1} eV is observed at higher temperatures in all the samples.

Positive values of ∇ in $Re_6(Ga, In)_xTe_{15}$ ($x=0, 1, 2$) indicate p -type semiconducting behavior in the studied temperature range. For these samples ∇ , increases initially with temperature, then levels off to a nearly constant value. The positions of the sharp peaks in, ∇ , observed at lower temperatures for $x=1, 2$ only, depend on the Ga (In) concentration. High values of ∇ ($-300 \mu V/K$) are measured at room temperatures. In Re_6AgTe_{15} ∇ has small positive values ($-20-40 \mu V/K$) between 185K and 270K. Outside this range ∇ is negative. It reaches local maxima of $-340 \mu V/K$ at 105K and $-350 \mu V/K$ at 370K. In $Re_6Ag_2Te_{15}$ ∇ changes from positive to negative values above 295K. A maximum positive value of $+350 \mu V/K$ is reached at 250 K and maximum negative of $-250 \mu V/K$ at 330K. The power factor, ∇^2/Δ , increases with temperature for all studied samples. Theoretical fits to $\nabla(T)$ for all samples are discussed. Also discussed is the effect of filling the voids in the rhenium-telluride system on the thermal conductivity and the figure of merit.

Michael P. Verzi, Jeffrey T. Ogan, Donald L. Lovett, and David W. Borst, *The College of New Jersey and Illinois State University*,
(Donald L. Lovett, Faculty Sponsor)

*Change in Methyl Farnesoate Levels in Response to Hemolymph Osmolality in the Green Crab *Carcinus maenas**

Presented at the Annual Meeting of the Society for Integrative and Comparative Biology, January 6–10, 1999, Denver, CO. Abstract published in *American Zoologist* (1998) Vol. 38(5).

Hemolymph levels of methyl farnesoate (MF) increase in crabs exposed to low salinity. With some stressors, MF levels increase within 1 h, and then decrease within 2 to 24h. However, following exposure to low

salinity, MF levels do not increase until after 6 h. We have examined whether this delay may be due to a delay in the decrease in hemolymph osmolality. We found no significant difference after 4, 6 and 8 h between crabs injected with distilled water and crabs injected with isotonic saline. We did find a significant difference in the rate at which hemolymph osmolality decreased among crabs transferred to various dilutions of seawater. We conclude that the increase in MF levels is delayed because MF secretion is not stimulated until the hemolymph osmolality drops below a critical level of approximately 800 mOsm/kg.

Edward P. Sarafino and Patricia Goehring,
The College of New Jersey
 (Edward P. Sarafino, Faculty Sponsor)

Developmental Differences in Biofeedback Mastery and Reduction of Headache Pain

Presented at the Annual Meetings of the Society of Behavioral Medicine, March 4, 1999, San Diego, CA.

We conducted a review and archival analysis to assess age differences in biofeedback mastery and success in treating chronic headache by using data from thirty-three studies with either adult (total $N=397$) or child (total $N=99$) subjects. All studies focused on treating headache with temperature or EMG biofeedback. Because measures varied across studies, we standardized the data by calculating each study's percent change scores: for biofeedback performance, percent change was based on temperature or EMG scores from the start to the end of treatment; for headache reduction, percent change was based on headache ratings in diary records in the weeks before and after treatment. In examining headache reduction, we required that the one measure of headache activity we used from each study include the assessment of pain intensity. We then calculated subject-weighted means of percent change for biofeedback performance and for headache activity by summing the products

of each relevant percent change score and N , and then dividing by the total number of subjects contributing to those sums. Results showed that children were superior to adults in biofeedback performance and headache improvement with temperature biofeedback treatment and in headache improvement with EMG biofeedback treatment. No age difference in EMG biofeedback performance was shown. Further analysis revealed that headache activity continues to decrease in the weeks following biofeedback treatment, and this decrease is much greater for children than adults.

S. Jill Dawson,
The College of New Jersey
 (Margaret Ruddy, Faculty Sponsor)

"Just Right" and Repetitive Behaviors in Toddlers: Predictions from Temperament at Six and Eighteen Months

Presented at the Annual Meetings of the Eastern Psychological Association, April 1999, Providence, RI.

This study focused on the relationship between temperament and both "just right" and repetitive behaviors as assessed by the Childhood Routines Inventory (CRI). Six-month-olds with higher fear-of-novelty scores on Rothbart's Infant Behavior Questionnaire showed more "just right" behaviors than toddlers, while higher duration-of-orienting scores predicted more repetitive behaviors. At eighteen months, higher intensity and lower threshold, measured by the Toddler Temperament Scale, were associated with CRI scores.

James Graham, Donald Huff, Jr.,
 and Charles Restrepo,
The College of New Jersey
 (James Graham, Faculty Sponsor)

Relational Schemas and Friendship Quality in Inner City School Children

Presented at the Annual Meetings of the Eastern Psychological Association, April 1999, Providence, RI.

Children enter new relationships and/or social experiences with expectations based on preexisting categorical information, such as gender, race, etc., derived from previous behavioral information and prior experiences (McAninch, Manolis, Milich, & Harris, 1993). However, research that systematically investigates the associations of relational schemas (internally represented relationship knowledge) to children's evaluations of peers is relatively scant. The present research evaluates the quality of children's friendships and the impact of relational schemas in children's person perception.

Fifty-six African-American children (twenty-eight males and twenty-eight females from grades three and four participated in the present research. Two studies were used in the present research. In Study 1, children completed two questionnaires: a friendship nominations measure and a Friendship Quality Questionnaire (adapted from Parker and Asher, 1993). There were two phases to Study 2. For Phase 1, each child listened to an audiotape about a hypothetical peer named "Chris" and formulated initial impression ratings. During Phase 2, each child was presented with a vignette describing either positive or negative interactions between the child and "Chris", plus some additional behavioral information. Thus, children formulated more impression ratings based on the information heard from both tapes. In other words, this questionnaire assessed how positive or negative behavioral information in Phase 2 influenced the relational schema from Phase 1.

Results demonstrated that children's perceptions of their friendships (relational schemas) are related to quality of the relationship; and more specifically, higher or (more positive) ratings were consistently attributed to children presented as best friends than as non-friends. Results are discussed in terms of the relationship between the degree of friendship quality and the salience of the relational schemas in friendships. Discussion is focused on the

importance of the perceptions of friendship quality and relational schemas in minority children's social cognition.

Silvia Martins and Melissa Terlecki,
The College of New Jersey,
(Margaret Ruddy, Faculty Sponsor)

In Your Wallet, Do You Sort Your Money by Denomination?

Presented at the Annual Meetings of the Eastern Psychological Association, April 1999, Providence, RI.

A thirty-five-item Likert-scale questionnaire was developed to assess compulsive tendencies (i.e., preferences for organization and routine) in normal college students. It includes questions about tidiness and organization of possessions, about approach to tasks, and about rituals and routines. While women preferred organization and routine more than men preferred them, neither birth order nor GPA was associated with these preferences. Scores were related to specific counts (e.g., number of items of clothing lying around your room).

Lauren Priday,
The College of New Jersey,
(Margaret G. Ruddy, Faculty Sponsor)

Effect of Childcare Arrangement on Degree of Autonomous Play at Eighteen Months

Presented at the Annual Meetings of the Eastern Psychological Association, April 1999, Providence, RI.

Does group-based childcare affect children's development of autonomy? At eighteen months children's level of autonomy was assessed during a laboratory play session. Compared with maternal-care children, children who attended group-based care were found to demonstrate higher levels of autonomous behavior; they spent significantly less time playing by the mother and asking the mother questions during the independent play session.

Corinne Yananton,
The College of New Jersey
 (Margaret Ruddy, Faculty Sponsor)

Infant Attention and Toddler Compulsivity

Presented at the Annual Meetings of the Eastern Psychological Association, April 1999, Providence, RI.

Compulsivity is a normal part of child development, but can its magnitude be predicted from infant attention? In a longitudinal study, six-month-olds' attentiveness to a series of slides was assessed. At eighteen months, compulsivity was observed in the lab, and parents completed the Childhood Routines Inventory (Evans et al. 1997). Children with longer looks at slides and fewer shifts between slides did more organizing with certain toys at eighteen months.

BIBLIOGRAPHIC LISTINGS

Listed below are citations of published student-faculty collaborative scholarships.

- Kilibarda-Dalafave, S. and Ziegler, J. (November 1998)
 "Seebeck Coefficient and Electrical Resistivity in $\text{Re}_6\text{Te}_{15-x}\text{Se}_x$ at Room Temperature," *Journal of Materials Science Letters*, 17, 17.
- Kilibarda-Dalafave, S., Ziegler, J., and McAllister, H., (1999). "Thermoelectric Properties of Mixed Chalcogenides $\text{Re}_6\text{Te}_{15-x}\text{Se}_x$ ($0 < x < 8$)," to be published in *Thermoelectric Materials 1998—The Next Generation Materials for Small-Scale Refrigeration and Power Generation Applications, Refereed Proceedings of the Materials Research Society 1998 Fall Meeting*, editors, T.M. Tritt, H. B. Lyon, Jr., G. Mahan, M. G. Kanatzidis.
- Kilibarda-Dalafave, S., Barcena, H., and Henningsen, D. (1999). "Thermoelectric Properties of Doped Rhenium Chalcogenides $\text{Re}_6\text{M}_x\text{Te}_x$ ($x = 0, 1, 2$; $\text{M} = \text{Ga, In, Ag}$)," to be published in *Thermoelectric Materials 1998—The Next Generation Materials for Small-Scale Refrigeration and Power Generation Applications, Refereed Proceedings of the Materials Research Society 1998 Fall Meeting*, editors, T. M. Tritt, H. B. Lyon, Jr., G. Mahan, M. G. Kanatzidis.
- Malchow, R., Verzi, M., and Smith, P. (1998)
 Extracellular pH Gradients Measured from Isolated Retinal Cells. *Biological Bulletin* 195:203-204.