

Detail: the Burgos Tapestry  
Image courtesy of the Metropolitan Museum of Art.

# FURY

The Fordham Undergraduate Research Journal

Volume I, Spring 2011

The Burgos Tapestry: Medieval Theatre and Visual Experience | Attitudes towards Immigration Reform in the United States: The Importance of Neighborhoods | The Spontaneous Formation of Selenium Nanoparticles on Gallic Acid Assemblies and their Antioxidant Properties | "A Power Beyond the Reach of Any Magic": Mythology in *Harry Potter* | A Canyon Apart: Immigration Politics and Hispanic Mobilization in Arizona

***The Fordham Undergraduate Research Journal will soon be accepting submissions for our second issue.***

*FURJ* welcomes original research articles, short research communications, book reviews, and review essays for consideration for publication.

Visit [www.fordham.edu/fcrh/furj](http://www.fordham.edu/fcrh/furj) for information and submission guidelines. Please send questions to [tfurj@fordham.edu](mailto:tfurj@fordham.edu).

## **Want to work for *FURJ*?**

*FURJ* is always looking for peer reviewers, staff writers, copy editors, and more!

Visit [www.fordham.edu/fcrh/furj](http://www.fordham.edu/fcrh/furj) for more information and to access the application. Please send questions to [tfurj@fordham.edu](mailto:tfurj@fordham.edu).

# in this issue...

## Matteo Ricci Seminar Makes Great Strides in Inaugural Year

Margaret Palazzolo, FCRH '13

p. 5

## Dr. Naison Enlists Help of Undergrads in Recording Bronx African American History

Aaron Dowdell, FCRH '12

p. 9

## Honors Program Fosters Community of Research at Rose Hill

Margaret Palazzolo, FCRH '13

p. 11

## "Print, Publics, and Culture": The Fall 2010 American Studies Thesis Presentations

Daniela Hess, FCRH '11

p. 13

## The Burgos Tapestry: Medieval Theatre and Visual Experience

Nathalie Rochel, FCRH '11

p. 29

## Attitudes Towards Immigration Reform in the United States: The Importance of Neighborhoods

Noelle Makhoul, FCRH '12

p. 35

## The Spontaneous Formation of Selenium Nanoparticles on Gallic Acid Assemblies and their Antioxidant Properties

Stacey Barnaby, FCRH '11

p. 41

## "A Power Beyond the Reach of Any Magic": Mythology in *Harry Potter*

Daniella Rizza, FCRH '11

p. 47

## A Canyon Apart: Immigration Politics and Ethnic Identity in Arizona

Peter Morrissey, FCRH '11

p. 53

## Mussolini, Romano. *My Father, Il Duce: A Memoir by Mussolini's Son*. Carlsbad, CA: Kales Press (Distributed by W. W. Norton), 2006.

Sarah Sullivan, FCRH '12

p. 17

## A Review of "An Ethical Market in Human Organs," by Charles A. Erin and John Harris, and A Proposed Solution to the Current Organ Shortage

Rachel Rattenni, FCRH '14

p. 20

## Writing Women's Mythology: The Poetry of Eavan Boland and Louise Erdrich

Colleen Taylor, FCRH '12

p. 23

## Energy of Electrons in a Nanowire Subject to Spin-orbit Interaction

Ryan Brennan, FCRH '11

p. 61

## NMR Determination of Enantiomeric Composition of Chiral Alcohols Using Camphorsulfonate Esters

Steven Bondi, FCRH '11

p. 64

## Mobile Sensor Data Mining

Jeff Lockhart, FCRH '13

p. 67

## The Fordham Undergraduate Research Journal

April 27, 2011

To the Fordham Community,

It is our pleasure to present to you the inaugural issue of *FURJ* – the *Fordham Undergraduate Research Journal*. This journal marks a momentous stride for undergraduate research at Fordham; for the first time, a diverse array of high caliber undergraduate research from the sciences, humanities, and social sciences appears in a unified publication. The articles included in this issue range from an art history analysis of a medieval tapestry to material science research on the formation of selenium nanoparticles on gallic acid assemblies. The breadth of research on the proceeding pages only attests to the wide yet focused interests of Fordham undergraduates.

While *FURJ* strives to provide undergraduates with an outlet to display their research, we also hope to inspire our readers. What makes research so great is its promotion of a genuine interest in the pursuit of knowledge and understanding. As Father McShane said on the PBS program *A Walk Through The Bronx*, “We have a great desire to introduce excellence ... we believe that students have to be invited to wrestle with the great ethical issues of their time. We want them to be bothered by the realization that they don't know everything and bothered by injustice.” We believe a zest for research captures this anxiety, the notion that we don't know everything yet we strive to do so. So peruse the following pages and discover what questions students are grappling with, but then we invite you to put this journal down and go out into the world and formulate your own questions – these questions are the foundations of research.

Lastly, we would like to thank everyone who has made *FURJ* a reality. One year ago, the idea of an undergraduate research journal was just a crazy idea we brought up in conversation, and now you hold a printed copy in your hands. This journal would be nowhere without the hard work of our dedicated staff who have worked tirelessly under extremely tight deadlines to produce this issue. Furthermore, we would like to thank all of our peer and faculty reviewers who, for the sake of the double-blind peer review process, shall remain anonymous. We would also like to thank the faculty advisory board for lending their time and expertise to us, for their input served as the foundation upon which the journal was built. Similarly, we owe enormous thanks to Dr. Michelle Bata, Assistant Dean and Director of Undergraduate Research, who serves as the head of the faculty advisory board and primary advisor to *FURJ*. Without Dean Bata there would be no journal. Lastly we would like to thank Dr. Michael Latham, Dean of Fordham College at Rose Hill, for his unbridled support and genuine interest in our cause.

This issue is a celebration of the collective efforts of Fordham undergraduates who conduct research and their dedication to the pursuit of knowledge, and it is our pleasure to share it with the Fordham community.

Sincerely,



Kevin Jordan  
Co-Editor-in-Chief



Alexandria DeCapua-Guarino  
Co-Editor-in-Chief



## *Editorial Board*

**Kevin Jordan**, Co-Editor-in-Chief  
FCRH '12: Biology

**Alexandria DeCapua-Guarino**, Co-Editor-in-Chief  
FCRH '12: Biology, Anthropology

**Andrew Steffan**, Copy Editor  
FCRH '13: Political Science, Theology

**Xavier Montecel**, Reviews Co-Editor  
FCRH '12: Theology

**Stacey Barnaby**, Peer Reviews Co-Editor  
FCRH '11: Chemistry

**Tana Ferris**, News Editor  
FCRH '11: Communications, Latin American Studies

**Helena Guzik**, Design Editor  
FCRH '12: Art History, History

**Kathleen Mroz**, Reviews Co-Editor  
FCRH '11: Theology, Political Science

**Stephen Frayne**, Peer Reviews Co-Editor  
FCRH '12: Chemistry

**Stephen Moccia**, Photographer  
FCRH '12: Theology, Political Science

**Sarah Sullivan**, Public Relations Manager  
FCRH '12: History, Medieval Studies

### *Acknowledgments*

The *FURJ* staff wishes to thank the following for their support as we worked towards creating the first issue:

***THURJ - the Harvard Undergraduate Research Journal***  
executive board

**Fordham University's Office of Marketing and Communications**

**The faculty and students who served as faculty and peer reviewers**

**The *FURJ* Faculty Advisory Board**

**The FCRH Dean's Office**

### *Faculty Advisory Board*

**Dr. Ipsita Banerjee**, Chemistry

**Dr. Michelle Bata**, FCRH Dean's Office

**Dr. Michael Baur**, Philosophy

**Dr. Greta Gilbertson**, Sociology

**Dr. Richard Gyug**, History

**Dr. Susanne Hafner**, Modern Languages

**Dr. Donna Heald**, FCRH Dean's Office

**Dr. Michael Latham**, FCRH Dean's Office

**Dr. Nicholas Tampio**, Political Science

**Dr. John Wehr**, Biological Sciences

### *Staff*

**Fuad Bashjawish**, FCRH '12

**Kristine Beaudoin**, FCRH '11

**Coty Brennan**, FCLC '12

**Drenica Camaj**, FCRH '12

**Navena Chaitoo**, FCRH '13

**Aaron Dowdell**, FCRH '12

**Sean Frey**, FCRH '13

**Christopher Gramuglia**, FCRH '11

**Xavier Griffiths**, FCRH '14

**Daniela Hess**, FCRH '11

**Ariana Jones**, FCRH '11

**Jeffrey Lockhart**, FCRH '13

**Madeleine Metzler**, FCRH '11

**Laura Notess**, FCRH '12

**Michele Paccagnini**, FCRH '12

**Margaret Palazzolo**, FCRH '13

**Rose Puntel**, FCRH '13

**Daniella Rizza**, FCRH '11

**Peter Sanneman**, FCRH '12

**Adrianna Savarese**, FCRH '12

**Colleen Spain**, FCRH '11

**Simon Sulit**, GSB '11

**Stephanie Szempruch**, FCRH '11

**Megan Wiessner**, FCRH '11



Photo Credit:  
Simon Sulit, GSB '11

## Matteo Ricci Seminar Makes Great Strides in Inaugural Year

by Margaret Palazzolo, FCRH '13

The 2010-2011 academic term marks the inaugural year of the Matteo Ricci Seminar, the newest addition to Fordham's burgeoning undergraduate research program. Named for the Italian Jesuit who ministered to China in the late 16th century and generously funded by Fordham alumni, the seminar aims to complement the existing academic-research infrastructure at the University specifically by helping to prepare students — starting early in their undergraduate careers — for opportunities to apply for prestigious scholarships and fellowships.

Fordham's efforts to support research undertakings among the undergraduate population are nothing new: the dean's office of Fordham College offers grants to assist undergraduates pursuing research projects, and the University's St. Edmund Campion Institute for the Ad-

vancement of Intellectual Excellence advises students as they apply for prestigious fellowships and scholarships — and indeed, Fordham has seen increased success in recent years' competitions for these highly selective awards, with more than 60 students earning such honors during the 2009-2010 academic year. Still, University administration and faculty saw a wellspring of potential waiting to be tapped.

"Fordham already does a really good job of providing students opportunities to think about what they're going to do after college," says J. Patrick Hornbeck, Ph.D., assistant professor of theology and co-director of the Matteo Ricci seminar. What Dr. Hornbeck and his colleagues realized, though, was that students often do not take advantage of these resources until their later undergraduate years. This, says Michael Latham, Ph.D., dean of Fordham Col-

lege at Rose Hill, is a critical pitfall.

“A lot of the essential preparation for these students really has to take place well before the time that they apply — certainly writing a competitive and compelling personal statement is important, and doing well in classes is important, but there are other kinds of things that students need to be doing in terms of figuring out what issues they really care about, having experiences outside the classroom,” says Dean Latham. “These are the kinds of things that allow students to figure out what they’re really good at ... and then have some sort of experience or accomplishment that really sets them apart.” An essential objective of the Matteo Ricci seminar, then, says Dr. Hornbeck, is not only to equip students with the practical skills needed to face the demanding and relentlessly competitive application process for these awards, but also to facilitate an environment where these aspiring research fellows and scholars can discern their deeper goals: “We wanted to create a space for students who’d already begun to excel academically to really think about, ‘What are the things that I’m really deeply interested in?’ ‘Is there a particular subject or a set of questions that I really want to commit my life to?’ ... ‘What are the needs of the world?’ ‘What are the gifts and talents I bring to the table?’ and ‘Where do those two things overlap?’ ”

Having detected this need, Dr. Hornbeck and seminar co-director Mary Beth Combs, Ph.D., associate professor of economics — with the support and direction of former FCRH Dean Brennan O’Donnell, Ph.D., and now of his successor, Dean Latham — worked to create a program that would first identify those undergraduates whose demonstrated intellectual

proWess made them promising candidates for eventual research pursuits and prestigious fellowship competitions, and then would prepare them for these undertakings through a carefully crafted course of readings, discussions, lectures, and other activities. The co-directors are themselves both accomplished researchers and educators: Dr. Combs has received a Fordham University Award for Distinguished Teaching in the Social Sciences as well as multiple Fordham Faculty Research Grants and Fellowships, while Dr. Hornbeck not only earned a Jack Kent Cooke Foundation scholarship as an undergraduate that supported his graduate studies at Oxford University, but he also gained relevant experience as coordinator of a post-graduate discernment seminar within Fordham’s Curran Center for American Catholic Studies. These credentials—along with the balance that the pair offered as representatives of divergent academic disciplines in the social sciences and humanities—made it “very clear,” says Dean Latham, “that the two of them would be ideally suited to the job.”

In crafting the seminar’s inaugural class over the summer of 2010, Drs. Combs and Hornbeck first solicited nominations from their faculty colleagues of those first- and second-year undergraduates whose classroom performance and intellectual curiosity had gained their notice in the previous year. To the list of about

a hundred names that this initial call yielded, the co-directors added another fifty students whose GPAs exceeded a particular level — a practice designed to compensate for their compressed first-year timeframe, although one that the co-directors intend to discontinue in the admission of future classes due to their cognizance that, perhaps owing to an initial course load that does not

***The faculty guest speakers all noted the attentiveness of the student audience, as well as the liveliness of their debates.***

tend to discontinue in the admission of future classes due to their cognizance that, perhaps owing to an initial course load that does not

favor their academic strengths, “many students are late bloomers and have a bad first semester — we don’t want that to get in the way of their ability to participate,” says Dr. Hornbeck. The candidates were then invited to submit a one-page résumé with a one-page cover letter detailing their interest in participating; from the roughly ninety applications they received, the co-directors called in thirty students for a

***Students will have a much better sense of who they are, where they’re going, and what really matters in their lives.***

***- Dr. Patrick Hornbeck, Theology***

group interview. After careful observation of this session and their comprehensive review of the applicants’ qualifications, Drs. Combs and Hornbeck selected seventeen students – twelve sophomores and five juniors, all Fordham College students but for a single representative of the Gabelli School of Business — to join the inaugural class.

With the roster finally set, this first group of Matteo Ricci scholars officially commenced their regular course of two-hour, biweekly meetings in September 2010. The program’s structure follows a carefully constructed progression: in their first year, students spend the fall semester confronting substantive issues facing the contemporary world and considering the impact of learning on societal reformation, while in the spring, they shift their attention to more practical affairs, working under the guidance of both faculty- and alumni-mentors to craft plans for their own independent research projects, to be conducted over the summer and through the following academic year. It is this enterprise that will form the capstone of the Matteo Ricci seminar experience and lay the groundwork for the seminar participants’ pursuits of various postgraduate opportunities.

The seminar class has not only tackled a heavy reading load of extracts from news media and academic texts as well as other longer works, but has also engaged with a number of guest lecturers who have shared their expertise. Fordham graduate John P. Cahill, a former chief of staff to ex-New York Governor George Pataki, reflected on his experiences in government, while another alumnus, onetime J.P. Morgan Chase banker Chris Lowney, discussed a book he authored — and which the seminar students read — that examines the Jesuits as models of best practices in the business world. Several faculty members also have

shared their own research with the group, examining topics ranging from the roots of the present conflicts in the Middle East (John Entelis, Ph.D., professor of political science and Middle East Studies) to American approaches to international development (Dean Latham), and from an argument for Jesuit education as a catalyst of justice promotion (Jeannine Hill-Fletcher, Th.D., associate professor of theology) to a multidisciplinary view of environmental sustainability (Elizabeth Johnson, CSJ, Ph.D., distinguished professor of theology, and John Wehr, professor of biology).

Though the nascent program has yet to return quantitative results on some of its concrete goals — the most “instrumental” of which, says Dean Latham, is to give Fordham students a competitive edge in the application process for prestigious scholarships — early feedback has been solidly positive. The faculty guest speakers all noted the attentiveness of the student audience, as well as the liveliness — and fearlessness — of their debates. The program’s co-directors and sponsors have also expressed pleasure with its progress, and while they place great stock in the Matteo Ricci scholars’ potential for competitive successes, they also ex-

tol the seminar's enduring value beyond any awards and accolades.

“Certainly one of our hopes is that students who are in this program will have a better chance of succeeding in competitions like the Rhodes or the Marshall or the Fulbright,” says Dr. Hornbeck. “But of course if they don't win, that's not the end of the world — we think that one of the things that hopefully will come out of this, no matter what happens, is that students will have a much better sense of who they are, where they're going, and what really matters in their lives.”

Dean Latham agrees: “Applying for these sorts of fellowships and scholarships...helps you learn an enormous amount about who you are, what you're good at, and what you care about, and why it should matter to you and to other people. Getting that sense of direction, that understanding of the abilities you possess and what you're actually able to do with them—that can be life-changing in a most profound way. So my hope is that obviously we win more awards, and that we have more people applying for awards, but much more broadly, I hope that these other benefits really do come about.”

### Write on!

FURJ is proud to join Fordham's vibrant undergraduate publishing community. Besides becoming involved with FURJ, undergraduate students looking for an opportunity to flex their editorial muscles can join one of the following:

***Bricolage***: a literary journal featuring commentary and research on the arts and culture.

***The Ampersand***: a literary magazine containing original poetry, prose, short stories, photos and artwork.

***the paper***: a student-run journal of news, analysis, commentary and review.

***The Ram***: Fordham's student-run official journal of record.

***Fordham Political Review***: a new journal featuring essays on foreign affairs, politics, economics and business.

# Dr. Naison Enlists Help of Undergrads in Recording Bronx African American History

by Aaron Dowdell, FCRH '12

The Bronx African American History Project is a colossal research project dedicated to recording the Bronx's African American and African immigrant history from the last half century, with the intention of archiving primary and secondary source material for scholarly and historical research. Dr. Mark D. Naison, professor of American history at Fordham University, is the head of the BAAHP, which has been running out of his department for the last nine years. Almost immediately after its establishment, the BAAHP received an overwhelming response from members of the community who wanted to participate. To meet the public demand, Naison recruited a team of Fordham undergraduate students to work with him. Now he annually hires ten undergraduates to facilitate the various aspects of this multifaceted project including interviewing, transcribing, event planning, and more.

Naison explained that the project originated because “people in the community, particularly those in schools and local cultural organizations, were concerned because there were a lot of people who wanted to know about African American history in the Bronx, but there was no real database.” Those who had written about African American history in New York up to this point had always focused on the other boroughs and excluded the Bronx's historical significance. When people did write about Bronx history, they tended to focus on recalling the times when the Bronx was a predominantly

white community. For a long time the Bronx was associated with Jewish, Irish, and Italian neighborhoods; however, over the last fifty years the population of the Bronx has developed into a much more diverse demographic, a change that has been ignored from a historical perspective. The chief archivist for the Bronx County Historical Society contacted Naison and asked him to create a database to meet the demands of the community for primary and secondary source material on Bronx African American history.

“I did a little research of my own,” said Naison, “and found there were half a million people of African descent in the Bronx ... they were the eighth largest concentration of urban African Americans in the United States ... and in fact they were virtually invisible to historians, journalists, and university based scholars.” The original goal of the BAAHP was thus to work towards remedying this void of important historical information and to begin creating an archival database. Naison describes the origins of the BAAHP as “an oral history project, interviewing people of African descent who lived in the Bronx ... mostly people who were my age or older.” They began interviewing people about their life stories and personal histories and asked them to recollect their memories of living in the Bronx throughout this time period. People who traditionally had been ignored by historians were now given the opportunity to have their lives immortalized in historical record. Shortly after the project began, word of their endeavors spread rapidly. The project was well-received, and once people heard about it they “contacted me [Naison] in droves, and I realized I couldn't handle this myself.”

Soon after the BAAHP began, Naison became overwhelmed by the response of the masses desiring to participate: “I went to the dean of the College at that time ... and said I need help, could you hire some Fordham undergraduates to help me with this?” The Fordham administration appropriated money to Naison to hire four Fordham undergrads as research assistants. He describes the diverse roles of the original four undergraduate research assistants: “Two people were transcribing interviews; one person was a



Photo Credit: Bruce Gilbert

videographer; the other was an archival assistant who would help place the interviews in the Bronx County Historical Society.”

The project continued to escalate. “The summer after we started it, there was a *New York Times* article about my research,” said Dr. Naison describing how, in preparation for the article, a *New York Times* reporter and two of his undergraduate assistants, Mark Smith and Colleen Decatherkey, accompanied him to one of the housing projects where he conducted some of his interviews. The *Times* article, which made the front page of the Metro section, resulted in even more people contacting the BAAHP to tell their stories. “I went to the dean and said four students are not enough.” Naison said.

Soon after the *Times* article, Naison’s team grew to encompass “two faculty positions and ten Fordham undergrads” who did “everything from transcribing, to video editing, to archival work, to working in Bronx schools.” The BAAHP now hires ten Fordham undergraduates each year to work on the many facets of the project.

Over the last nine years, the BAAHP has continued to grow larger, amassing volumes of historical information. According to Naison, “now [it] is considered the largest and best community based oral history project in the United States. We have done over three hundred oral history interviews, transcribed 283, and the average transcript is 80 pages. People from all over the world come to work with us.” Dr. Naison made a point of the pivotal role his undergraduate researchers play in the continuity of the project as a whole: “We’ve been written up in scholarly journals, we are producing several books, so it has just taken off ... but [not] without Fordham undergraduates ... those students remain the backbone of the project.” He went on to explain that without their dedicated work, what the project has already accomplished would not have been possible. “In oral history, your interview doesn’t really get around unless it is transcribed. Listening to a three and a half hour interview is a very arduous process. All of our transcriptions are done by Fordham College students. They are the ones who have done the grunt work that has made this project accessible to people. Now we are ... digitizing [these transcripts] so they can be accessible without actually having to go to the Fordham library or the Bronx Historical Society.” Thus the undergraduates working on the BAAHP have contributed to the scholasticism of the next generation by making historically significant information available to the public.

Naison described some of the undergraduate research projects that have developed based directly upon the work of the BAAHP: “A lot of Fordham students who do research connected to what we are doing are not on payroll. I have had two graduate students write papers for my courses which were published as articles [one was about white flight, the other was about the first-generation residents of Co-op City].” He also described the work of a Fordham College graduate, Michael Partis: “When he was a senior [he] did an ethnographic study of Black and Latino residents of public housing projects in the Bronx, and on the strength of that research he got a five-year fellowship to get a doctorate in cultural anthropology from CUNY.”

One of the most interesting aspects of the BAAHP is that it goes beyond the realm of research and into community outreach through public events and music. In Dr. Naison’s words: “We are not just scholars. We are very connected to the community. We have festivals, parades, concerts, film showings, and lecture series. Students are involved in virtually everything we are doing, and a lot of it is research, but some of it is organization of public events, and research always comes out of public activities.”

When asked how undergraduates could get involved with the project, Dr. Naison replied, “Because Fordham undergrads were central to this from the beginning, I am always looking for people to get involved. Every year I can hire ten undergraduates, and next year there are going to be six positions opening up. I can actually help students get stipends for the other research they are doing related to their courses, and plus, I get to hire a graduate assistant. Now, I will tell you if I hire you and you screw up, you will get fired really fast. You represent us with the community. Don’t send me any turkeys as undergraduates; this is not for the meek. You have to show up on time, you have to do what you say you will do, and that’s how we’ve gotten the respect of the community. We get a very special group of Fordham students and they’ve represented this project and the University unbelievably well in the Bronx. ... We try to pick our undergraduates well.” Any undergraduates that find Dr. Naison and the BAAHP’s work interesting and wish to become involved should contact him immediately to secure a position for the 2011-2012 school year.

# Honors Program Fosters Community of Research at Rose Hill

by Margaret Palazzolo, FCRH '13



Photo Credit: Stephen Moccia, FCRH '12

For some Fordham students, pursuing academic research projects during their undergraduate years comes as an extracurricular activity. For every member of the FCRH Honors Program, such scholarly work — in the form of a formal senior thesis — is a requirement.

A fundamental component of the Honors curriculum since the program's inception in 1950 — indeed, the only such aspect that has survived various revisions to the Honors course-load over the past 61 years—the senior thesis represents the culmination of the Honors student's four-year tenure in Alpha House; “[its]

goal,” says Harry Nasuti, Ph.D., director of the FCRH Honors Program, “is to provide Honors students with the opportunity to do original scholarly work in their major field.”

Though the thesis is not completed and formally defended until the student's senior year, the entire undertaking gets underway much earlier: Honors students devise and propose their projects in the spring semester of their junior year, as their completion of the Honors core course of study is drawing to a close; after receiving approval of their topics and selecting a faculty mentor, they are free to begin their research. “Ideally,” says Dr. Nasuti, the students will conduct “at least some” of this work over the summer between their junior and senior years and complete the remainder during their senior year, when they register for a non-credit, biweekly senior thesis seminar — a series of meetings at which students can discuss their works-in-progress and receive feedback and constructive criticism both from Dr. Nasuti and from their peers in the Honors Program — and then finally defend their theses before their mentors as well as two readers.

Conceiving, investigating, and ultimately composing an Honors senior thesis — most of which amount to roughly 35-40 pages by the final draft — is no easy task, especially when undertaken alongside the already rigorous curricula of both the Honors Program and individual major courses of study. At the outset, the selection of a topic itself often poses the first — and perhaps the greatest — difficulty to students. “I often tell Honors students that if they are not passionate about their topic

they will get tired of it long before they complete the thesis,” says Dr. Nasuti. What’s more, many students find the independent nature of the process to be a particular challenge: “Even though I had greater ownership of my work, it was hard to keep myself on track sometimes,” says Kristie Beaudoin, FCRH ’11, who recently defended her thesis entitled “From Kyoto to Copenhagen: The Role of (Non-Governmental Organizations) in Climate Change Politics,” examining the impact of environmental NGOs in the multilateral negotiation process at climate change conferences. “Since you really work at your own pace ... it’s possible to procrastinate to the point that the project becomes unmanageable.” Developing the self-discipline to complete this kind of project, says Dr. Nasuti, is “one of the most crucial, but also most difficult, demands of being a scholar” — one which, he acknowledges, “is especially difficult during senior year when so many other things are going on in one’s life.”

Amidst these trials, Honors seniors still manage to reach the end of the process relatively unscathed. Ariana Jones, FCRH ’11 (who received the Leahey Award, an internal grant that funded her research abroad for her recently-defended thesis entitled “Transforming Finances and Lives: An Analysis of the Microfinance Sector in Kenya”), found solace in the implicit support of her peers: “[the thesis] was incredibly stressful of course, but it is for everyone. I think knowing that everyone else in Honors has to do it too makes it a bit easier.” Dr. Nasuti points out also the recourse that students have in their faculty mentors, especially as aides in maintaining discipline and deadlines, “since they not only guide their students through the different stages of research and writing but also provide important moral support.”

Above all, the Honors senior thesis requirement is one that intends to challenge students as they reach the end of their undergraduate

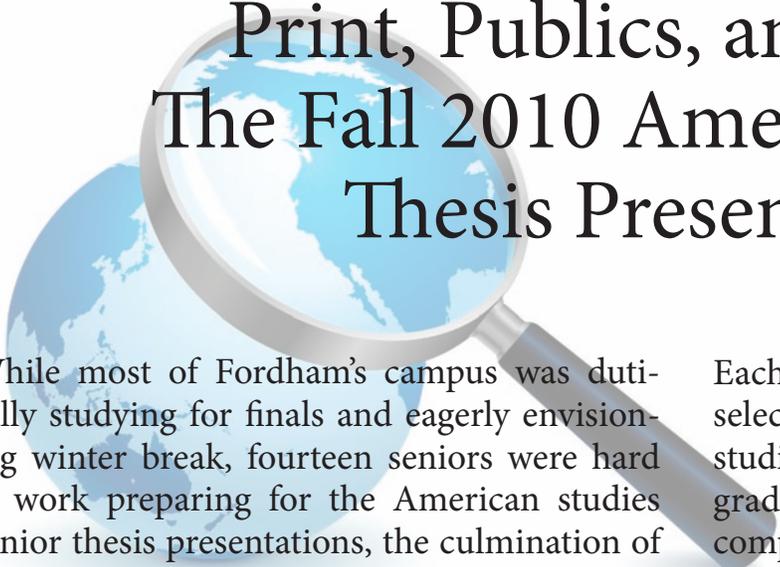
***[The thesis] is a golden opportunity to find one’s own voice as a scholar.***

***- Dr. Harry Nasuti,  
director, Honors Program***

careers to seize and build upon the academic foundations of the Honors core and their major courses of study, parlaying this assemblage of knowledge into scholarship that is entirely their own. “Having the independence to pick a topic and write about whatever I wanted was rewarding,” says Kristie Beaudoin. “At the end, I felt like it was truly my work rather than something I just whipped up for class — I was really proud of it.”

This, says Dr. Nasuti, is what sets the honors thesis apart from other types of academic requirements students encounter on the way to earning a diploma: “[It] should not be just another hoop to jump through before graduation. It is rather a golden opportunity to find one’s own voice as a scholar” — and indeed, many students’ theses have been published in academic journals, or presented at academic conferences. Dr. Nasuti has found also that, “while the researching and writing of a thesis is obviously demanding, most honors students not only complete the thesis with distinction but also look back on it as one of the highlights of their undergraduate careers.

“What stands out to me most is the enthusiasm with which most honors students talk about their research ... each year I see how the individuals whom I greeted at the beginning of their freshman year have blossomed into true scholars with important things to say. It is a wonderful thing to see.”



# Print, Publics, and Culture: The Fall 2010 American Studies Thesis Presentations

by Daniela Hess, FCRH '11

While most of Fordham's campus was dutifully studying for finals and eagerly envisioning winter break, fourteen seniors were hard at work preparing for the American studies senior thesis presentations, the culmination of three years of interdisciplinary coursework and an intense semester of research. On December 14, 2010, the senior American studies majors presented their theses to Fordham's faculty and fellow students in the O'Hare Special Collections Room of the Walsh Family Library.

Professor Edward Cahill, Ph.D., of the English department, is the acting director of the American studies program while Professor Glenn Hendler, Ph.D., is away on faculty fellowship. According to Cahill, American studies majors become involved in "explaining American experience from an interdisciplinary perspective." Students focus on the reality that "increasingly, ideas of America are transnational." Majors take courses across a number of academic departments, including African and African American studies, American Catholic studies, art history and music, English, history, Latin American and Latino studies, philosophy, political science, urban studies, and sociology. Students choose from three areas of concentration: Cultural Products: The Arts, Literature, Thought and Media; Diversity and Difference; and Power, Politics and Institutions. According to the American studies program description, "those majoring or minoring in American studies have in common, however, the desire to link these perspectives into a complex view of the nation and its culture."

Each year, the American studies department selects 15-20 students to become American studies majors. Accepted students have a 3.5 grade point average or higher and successfully complete an application process that includes a faculty recommendation and a writing sample. Professor Cahill notes that students accepted to the American studies program are a "pretty talented and ambitious group of students. They get to know each other pretty well over the course of three years, and that culminates in the senior seminar where they write a senior thesis."

The American studies program leads up to the senior research seminar, a class where students develop their theses with the guidance of professors and peers. In the fall of 2010, Professor Cahill of the English department and Professor Amy Aronson, Ph.D., of the communication and media studies department taught the seminar. Professor Cahill explains, "We both bring our research experience into the classroom." The seminar, titled "Print, Publics, and Culture," focuses on "print culture and the kinds of publics that it constructs largely from within our own kind of research areas but early on in the semester students begin to shape their own projects," explains Cahill. In their junior year, students formulate a research proposal in a separate class called "Approaches to American Studies" and have the option to continue developing it throughout the seminar. According to Cahill, this process gives students the opportunity to "get real hands-on training on how to develop a research project ... how to think about a question, how to learn about a particu-

lar area, to think about the kind of questions that have been asked in the past and then to figure out what is going to be the most likely way to make their own intervention.” Students draft proposals and develop their ideas by following their research interests. According to Cahill, students must ask themselves, “What things have been on your mind, what problems or questions have you found fascinating to devote hours and hours and hours of time to?” These questions produce a wide range of new and innovative research topics amongst the students.

The topics presented at the 2010 American studies theses presentations were divided into five broad areas of interest: contemporary social problems; religion, gender, and politics in the nineteenth century; local communities and social change; gender, performance, and the feminized body in the twentieth century; and transformations in music and dance.

Throughout the research process, students are offered guidance by the faculty and input from fellow students. Cahill explains, “Students will ask you provocative questions that will make you see the holes in your project, but in that same way, students learn to help each other and to work with each other and collaborate ... you learn a lot of very specific intellectual

skills: how to do research, how to write a sophisticated research paper, but you also learn how to think and talk about ideas with people. Students get a lot of training in asking the right questions, taking constructive criticism, and making arguments and defending them.”

The final result is a 25-page thesis and a 15-to-20 minute presentation in front of faculty and fellow students. Presentations are followed by question and answer sessions, in which students are invited to defend and expand upon their presentations. Kate McGee, a senior American studies major, was one of the presenters. “At first, I was nervous about presenting in front of the faculty, but I was confident in my work. I knew I would be presenting something I put my best effort into,” McGee said.

When asked how students would benefit from working on a senior thesis, Professor Cahill explained, “I think there’s something really special about becoming master or mistress about a topic, of really knowing it better than anyone else in the room, knowing it better than your professors do, and that’s what you do when you take on a thesis like that ... you really develop expertise. Now, it’s fairly narrow expertise, but the ability to do that is great training for all sorts of things. It gives you a lot of confidence and teaches

### *2010 American Studies Thesis Topics*

#### *Contemporary Social Problems*

Alex Filippo: “Peter the Nurse and Theresa the Politician: Exploring Gender Norms and Discrimination in the Workplace”

Kate McGee: “Engendering Injustice: Drug Economies, Drug Laws, and the Marginalization of Women in New York State”

Liz Bowen: “Writing Life with Diabetes: The Subjectivity of Chronic Illness in American Memoir”

#### *Religion, Gender, and Politics in the Nineteenth Century*

Sean McGonigle: “Sectarianism and Citizenship: Church and State Debates in Nineteenth Century New York”

Christina Moehrl: “Imperial Domesticity: Native American Gender Ideology and Conformity in the Late Nineteenth and Early Twentieth Centuries”

Jerome Gonzalez: “Feminizing Presidents: Joseph Keppler and Gender in Gilded Age Political Cartoons”

#### *Local Communities and Social Change*

Maryanne Engelbrecht: “Neighborhood Blogging: How Localized Websites are Redefining Community”

Justin Wright: “Gentrification in Spanish Harlem: Untold Stories of Area Residents”

#### *Gender, Performance, and the Feminized Body in the Twentieth Century*

Alexandra Gaudio: “Beauty and the Barbie Doll: When Life Imitates Plastic”

Dan Murphy: “There’s No Crying in Baseball: Feminization, Sport, and Spectacle in the All American Girls’ Professional Baseball League”

Taylor Riccio: “Performing Femininity: Rae Bourbon and Christine Jorgensen Onstage”

#### *Transformations in Music and Dance*

Kaylyn Toale: “From American Bandstand to Total Request Live: Teen Culture, Identity, and Music Television”

Eleni Koutroumanis: “So You Think You Know Dance? Popular Dance and Cultural Identity on Television”

Geoffrey Johnson: “Download This: Artist Development and Interconnectivity in the Internet Age”

you how to solve intellectual problems.” Kate McGee highlighted the ways she grew from the experience: “Working on the thesis gave me the chance to incorporate my own interests into a scholarly project. It really was the culmination of my whole experience with the American studies program and was a representation of all of the skills I had developed, all of the knowledge I had gained. In the end, I was proud to present something I had spent so much time researching and perfecting with the guidance of my professors and my peers.”

American studies majors develop lifelong skills over the course of their experiences in the program at Fordham and in the process of devel-

oping and perfecting a senior thesis. About one third of graduates from the American studies program continue their education at law school. Others move on to graduate programs that specialize in a particular discipline of their major. Some students even continue the research they started at Fordham after graduation. Professor Cahill cites a 2010 graduate who is currently developing his thesis into a research article: “We thought his work was really timely and impressive and would find an audience beyond Fordham.” The experiences of the American studies majors follow them throughout their lives and careers. Cahill concludes that ultimately, “Once students begin to think of themselves not just as students but as scholars who can actually make a contribution to some ongoing intellectual debate that some people might actually be interested in, it can motivate them to seek out the kinds of opportunities that are available.”

**There’s something really special about becoming master or mistress about a topic, of really knowing it better than anyone else in the room.**

**- Dr. Edward Cahill, English**

### Research from Around the World

Fordham undergraduates are not the only ones who have been hard at work conducting research and reporting their findings. Here are some breakthroughs that recently made headlines in international newspapers:

*France:* In October of 2010, *Le Monde Diplomatique* reported that a team of French and African scientists discovered that Malarial pathogens exist in some wild animals. Scientists cannot access these pathogens, meaning that they may never be able to completely eradicate malaria.

*United Kingdom:* On December 22, 2010 *The Guardian* printed an article describing the research of a group of 8 - 10 year old students from England. The students from Blackawton Primary School published a paper in Royal Society’s scientific journal *Biology Letters*. The study proved that bumble bees judge which flower they are going to draw pollen from based on the flower’s color and shape. In addition to their findings, the students wrote in the journal that “science is cool and fun because you get to do stuff that no one has ever done before.”

*United States:* In February of 2011, *New York Magazine* covered the controversy surrounding a paper published in the APA’s *Journal of Personality and Social Psychology*. The paper’s author, Cornell University professor emeritus Daryl Bem, argued that Extrasensory perception (ESP) exists. The report drew criticism from the scientific community for its alleged lack of credibility. Bem employed undergrads as research assistants in his ESP studies, but avoided using graduate students for fear of sabotaging their future academic careers due to the stigma associated with studying ESP.

*United Kingdom:* In 1998, Andrew Wakefield published a paper in the British journal *The Lancet* linking the the development of autism with the MMR (measles, mumps, rubella) vaccine. As a result of the paper, global vaccination rates for MMR plummeted, and the connection between vaccines and autism has been researched and debated ever since. In February 2004, however, the *Sunday Times* (London) ran an article by Brian Deer which had uncovered glaring inconsistencies in Wakefield’s study. By March of the same year, 10 out of 13 of the co-authors had withdrawn their support of the article. In 2010, *The Lancet* finally retracted the article and the UK General Medical Council stripped Wakefield of his medical license. Most recently, in January 2011, Deer published a series of three reports in the *British Medical Journal*. These reports suggested that Wakefield and his co-authors had actually modified facts about their subjects, and argued that they had also failed to recognize that 5 out of their 12 subjects had developmental disorders prior to receiving the MMR shot.

# Reviews

---

The reviews section seeks to showcase pieces which engage the scholarly work of others in any field of study. Critical engagement with the scholarship of others is an essential part of the development of new ideas within a particular field. *Book reviews* typically focus primarily on a single source, while *review essays* may engage multiple sources yet focus on a topical aspect of a field rather than present a comprehensive survey of a field.

---

# Research

A research article reports original research and assesses its contribution to a particular body of knowledge in a field of study. All research articles must contain the student's own conclusion. For the purpose of FURJ, a research article must be performed at least in part by the student and should demonstrate the student's own ideas.

Mussolini, Romano. *My Father, Il Duce: A Memoir by Mussolini's Son*. Carlsbad, CA: Kales Press (distributed by W. W. Norton), 2006.

Sarah Sullivan, FCRH '12

***"I felt that we Mussolinis were a family at the mercy of the winds in a wretched Italy overwhelmed by war."*<sup>1</sup>**

Written by the son of 20th-century dictator Benito Mussolini, this story is of a son's unreserved, blind love for his father—even if his father had been a fascist monster responsible for the slaughter of millions—makes for a complicated and conflicted memoir, which quickly became a bestseller in Italy. *My Father, Il Duce* begins with an introductory essay by Alexander Stille, which can be considered a bold move on the part of the publisher. This essay encourages both readers and historians to research beyond the scope of the memoir and confirms that which deviates from corroborated facts. "While Romano's narration of historical facts, including those of which he was a first- or a second-hand witness, is highly suspect and often flat-out wrong, the feelings of filial affection and love are real and entirely comprehensible."<sup>2</sup> Although this is a fair statement, instead of being an apologist for fascism and for his father, Romano makes the conscious decision to avoid most of his father's crimes against Italians, Ethiopians, Albanians and others. Romano does not acknowledge, in the entire one hundred and sixty-three-page book, the events designed by his father that claimed the lives of hundreds of thousands. It is only when such destruction is directed at the Italian people—as the Allies were bombing the cities—does he mention "the bombing of the big cities that numbered in the thousands."<sup>3</sup> The only crimes of his father that Romano does acknowledge are the ones of infidelity against his mother. Only in the context of his familial relations does Romano, faced with the demands of loyalty to his mother, slacken his otherwise-unflinching support for his father.

As the title would suggest, Romano is more effective in documenting his relationship with his father and the events that occurred in his direct purview than accurate historical events themselves. Even if that were

the case, the memories he offers in *My Father, Il Duce* emerge as self-deceptive and perilously disingenuous. Sixty years after his father's death, Romano still holds true to his father's ideals and dreams, as if we were a living testament to the power and strength of Mussolini's cult of personality over the Italians of his day.

Even as Romano sees *Il Duce* as a kind, sensitive, ambitious and self-sacrificing patriarch, it is precisely the role of the *paterfamilias* on which many tenets of fascism were built. He writes that his father "seemed to live more for others than for himself"; no one would have appreciated this statement more than the dedicated sheep of Mussolini's flock.<sup>4</sup> In addition to the biased nostalgia that influences Romano's memories, he was raised under the powerful notion of an *identità italica*; many followers were blind to Mussolini's murderous mayhem because they felt that a dream would be realized in him. There was never more hope for a truly unified and redeemed Italy than under the fascist regime of Mussolini.

The images that the text offers as textual support present an absurd, inconsistent image of Mussolini, yet one that is not entirely unlike a family album.<sup>5</sup> The images depict one man's father at work and at play: the playful but firm father carrying his young son on his shoulders on one page and, on the next, Benito delivering a speech in his fascist splendor at a family picnic in the countryside. He is also depicted in photographs with Adolf Hitler, Galeazzo Ciano, and Neville Chamberlain; with his rescuers from the Gran Sasso; and as a corpse with other dead bodies before being hung in the Piazzale Loreto Milan. In choosing these specific photographs, Romano combines both family history and Italian and world history, which leads the reader to believe that he

understands and knows factual history equally well as his family's past. Through these photographs, Romano implies that his mere proximity to the important players of World War II is enough to make him a guarantor of authenticity, which is exactly the strategy he uses in the narration throughout his memoir.

Though his account is flawed in terms of his ceaseless support and blind love for his father, Romano Mussolini is most dangerously misleading when he condescendingly interweaves real historical events with familial ones. When detailing the courtship of his sister to Galeazzo Ciano, he asserts, "Edda and Galeazzo's meeting came about because he was the son of Admiral Costanzo Ciano, one of my father's supporters who was very close to him during the crisis following Giacomo Matteotti's assassination."<sup>6</sup> This paints the picture in which Mussolini was greatly distressed by the assassination and its effect on the nation, whereas the truth of the situation is that he himself was a suspected conspirator in the death. In the introduction, Stille points out this incongruity and criticizes Romano for offering absurd commentary without citing any official or reliable documents, as is the case again with the analysis of Ida Dalser.

He discusses Ida Dalser—the woman with whom *Il Duce* had an affair and fathered an illegitimate son and who was later committed to a mental institution by Mussolini—and insists, "I never spoke to him about it, but I know that he wasn't insensitive to her suffering."<sup>7</sup> Stille responds, "The sentence, like many sentences in this book, is worth analyzing for its strategies of deception and self-deception. First, he tells us that he has no direct knowledge of his father's feelings about Ida Dalser, and then he writes with declarative self-assurance that he knows that his father cared about her suffering."<sup>8</sup> Romano also mentions that his "mother reluctantly remembers these events, as I still do," which is odd considering he would have been two years old when Dalser was confined to an asylum and nine years old when she died.<sup>9</sup> He is not in a position to comment on Mussolini's feelings about the mother and child that he both abandoned and persecuted, but this does not stop him from making broad generalizations. This account serves as just one model of Romano's narrative that omits various details while also making many assumptions that are ultimately in Mussolini's favor.

Furthermore, Romano not only avoids citing historical documents to support his assertions but also uses rhetorical tricks to deceive the reader, such as in his

encounter with Generalissimo Franco. Romano declares that Franco was to save his father at the end of the war and give him refuge in Spain. He then supports this claim by writing, "I say this because in 1963, in Madrid, I met the then 71-year-old Francisco Franco . . ."<sup>10</sup> However, nothing that follows in this or any of the other following sentences supports his statement. Then, he changes the subject rapidly to a discussion of how Franco both feared and resigned himself to the inevitable change of the communists. On another occasion, he asserts that his parents "found themselves together in the middle of a war that no one wanted and whose catastrophic developments no one expected."<sup>11</sup> The rhetoric that Romano employs suggests that World War II was something that Mussolini played no role in creating—something that no one wanted. His work seems laced with "absurdly revisionist accounts of historical events and crazy conspiracy theories aimed at absolving Mussolini."<sup>12</sup> *My Father, Il Duce*, at the very least, is effective in alleviating his heavy responsibility of supporting a series of wars that accounted for more than 55 million deaths from 1935 to 1945.

Furthermore, Romano's sporadic interjections of "what actually occurred" weaken his other statements because such wording insinuates that in other accounts he is not stating what actually occurred. This inconsistency establishes this book as more of a family legend than a historical account. For instance, when he mentions the handling of himself and his family after their arrest, he states, "For the sake of complete historical accuracy, I must say that nothing bad happened to us. The agents assigned to surveillance remained at their posts, and no one threatened or bothered us."<sup>13</sup> The attention to historical accuracy in this example implies that the rest of his account was inaccurate.

The most emotional parts of Romano's memoirs are the discussions of the death of his brother, Bruno, and the struggles of his mother, Donna Rachele. The motivation for discussing his brother's death as a pilot testing aircrafts for the regime might be to show a compassionate and emotional Mussolini. He testifies, "My brother's loss profoundly affected my father and caused a kind of fracture in his life."<sup>14</sup> Romano also cites his brother, Vittorio, in stating that there was a Mussolini before the death of Bruno, and another Mussolini after it, creating an image of a very sympathetic and sensitive Mussolini.

The mention of Rachele is twofold because she is not only the wife of one of the most infamous fascist dicta-

tors, but she also is cited incessantly, to the point where she becomes the backbone of the memoir. Through Rachele, the reader sees the pain and devotion of a woman who not only tolerated *Il Duce's* affairs but also offered him comfort and counsel. The only section of the memoir in which Romano does not glorify his father is the one in which he discusses his father's mistress, Claretta Petacci: "Clearly, as her [Donna Rachele's] son, I could do nothing but show solidarity with my mother."<sup>15</sup> However, he does show sympathy for Petacci: "I admit that I felt a sort of tenderness for Claretta Petacci . . . I assume there had to have been something of greater consequence between them than physical attraction, in his soul as well as in hers, for she was devoted to him to the point of sacrificing her life for him without any hesitation."<sup>16</sup> Even though he does clarify that he showed solidarity with his mother, Romano still seeks to explain the extramarital affairs of his father. Such an authorial betrayal of so pivotal and sympathetic a character only serves to further highlight the bias of the author. Romano constantly is trying to justify his father's affairs and not to judge his father's choices to the point where it is obvious that he himself finds something wrong with his father's decisions.

If the work were intended to be a history of a relationship, the book would then be historically valuable, for it is rare to be afforded a view of history from the point of view of a dictator's child. However, Romano states his purpose for writing the memoir in the first chapter:

I wanted . . . to help shed light on certain aspects of *Il Duce's* life. Some will wonder whether, after so many years, anything remains to be revealed and whether any unpublished details are worthy of consideration. My answer is 'Yes.' Much history still needs to be written because reconstructions are often tainted by emotion.<sup>17</sup>

Romano portrays his father as a sensitive family man, full of dreams and charisma, who altruistically sacrifices himself for the sake of an ungrateful, unappreciative country. However, he is more effective in documenting his relationship than historical events. Even though Romano views his father, Benito Mussolini, as a caring, insightful, and determined father and ruler, it is precisely this function and role of the *paterfamilias* on which many principles of fascism were erected. His memories offered in *My Father, Il Duce* emerge as self-deception and perilously deceitful.

## Notes

- <sup>1</sup> Romano Mussolini, *My Father, Il Duce: A Memoir by Mussolini's Son* (Carlsbad, CA: Kales Press, 2006), 115.
- <sup>2</sup> Alexander Stille, "introduction" to *My Father, Il Duce: A Memoir by Mussolini's Son*, by Romano Mussolini (Carlsbad, CA: Kales Press, 2006), xi.
- <sup>3</sup> Mussolini, *My Father, Il Duce*, 55.
- <sup>4</sup> Mussolini, *My Father, Il Duce*, 94.
- <sup>5</sup> Mussolini, *My Father, Il Duce*, 71-87.
- <sup>6</sup> Mussolini, *My Father, Il Duce*, 101.
- <sup>7</sup> Mussolini, *My Father, Il Duce*, 120.
- <sup>8</sup> Stille, "introduction," xvi-xvii.
- <sup>9</sup> Mussolini, *My Father, Il Duce*, 119.
- <sup>10</sup> Mussolini, *My Father, Il Duce*, 5.
- <sup>11</sup> Mussolini, *My Father, Il Duce*, 121.
- <sup>12</sup> Stille, "introduction," xxi.
- <sup>13</sup> Mussolini, *My Father, Il Duce*, 24.
- <sup>14</sup> Mussolini, *My Father, Il Duce*, 134.
- <sup>15</sup> Mussolini, *My Father, Il Duce*, 52.
- <sup>16</sup> Mussolini, *My Father, Il Duce*, 53.
- <sup>17</sup> Mussolini, *My Father, Il Duce*, 3.

# A Review of “An Ethical Market in Human Organs,” by Charles A. Erin and John Harris, and A Proposed Solution to the Current Organ Shortage

Rachel Rattenni, FCRH '14

In 2005, an Israeli man named Nick Rosen answered an ad in his local Tel Aviv newspaper searching for someone interested in selling a kidney. Through funding from the broker who placed the ad, Rosen was flown to New York and set up with a dialysis patient from Brooklyn. After Rosen and the dialysis patient passed a simple procedure for the screening of illegal organ sales by saying the two were old friends, the successful transplant surgery was performed at the esteemed Mount Sinai Medical Center in New York. The Brooklyn resident walked away never again needing to go on dialysis, and Nick Rosen walked away happily with \$15,000.<sup>1</sup>

But was the sale ethical?

While the National Organ Transplant Act bans the exchange of human organs for any “valuable consideration”, illegal organ sales such as the one depicted above occur frequently. There are currently over 100,000 people on the U.S. transplant waiting list, but only 20% can be covered yearly by deceased organ donors.<sup>2</sup> Depending on where the United Network for Organ Sharing places one on its list, his or her chance of survival are most likely slim, since the majority of dialysis patients die within 5-10 years of starting treatment.<sup>3</sup> An untimely death is not the only downfall of prolonged dialysis treatment. In addition, an average program includes four invasive three-hour sessions daily—racking up an expense of over \$65,000 per year. In an effort to escape the high cost of dialysis treatments, several insurance companies have been found promoting illegal organ sales to their clients.<sup>4</sup>

Given the realities of the organ shortage, scholars from a variety of disciplines – including theologians, philosophers, economists, and sociologists – have debated both the merits and ethics of the way that organ donation is currently structured. In fact, in 2003, the *Journal of Medical Ethics* (JME) published a special issue on the supply of organs for transplantation. In this issue, several well-known scholars present arguments on a variety of topics related to organ donation, including

presumed consent, compensated organ donation, and altruism. In this essay, I review one of the articles that appeared in this special issue of JME: “An Ethical Market in Human Organs” by Charles A. Erin and John Harris.<sup>5</sup> I then review the published commentary of this article, which was written by Janet Radcliffe Richards.

In their article, Erin and Harris, both professors at the University of Manchester, begin by making the claim that human lives are at stake because there are not enough organs available for transplantation. They cite the attempts of such organizations as the British Medical Association, the American Medical Association, and the International Forum for Transplant Ethics to try to increase the supply of donor organs. Erin and Harris argue that one such remedy to the organ shortage might include a “market of living donors” that is “ethically supportable” with “safeguards against wrongful exploitation.” Thus the solution, according to the authors, would be a “single-purchaser system within a confined marketplace.”

Effectively, in the system proposed by Erin and Harris, organs would be legally sold and made available to hospitals. They argue that an organization, such as the National Health Service for example, should purchase all organs and provide them to hospitals (much in the same way that organs from deceased organ donors are provided), without allowing for direct private sales. Erin and Harris also argue that organ sales and transplants should be restricted on a national basis, so that if an Indian citizen were to sell an organ in his or her country, then that organ could only be used by a need recipient in India. By restricting organ sales and purchases on a geopolitical basis, Erin and Harris hope to prevent the exploitation of citizens from poorer nations who may be more easily coerced into selling their organs.

Aside from an increase in the amount of organs available for transplant, Erin and Harris note that regulating organ sales may present several other benefits. For example, patients who have received organs from live

donors have double the life expectancy than those who have received organs from cadavers. They point out that insurance companies, as a result, would also spend less money on dialysis every year.<sup>6</sup> There are also benefits to the donor: since medical care would be given to donors after surgery, they could be able to continue living their lives as they had been before their surgery.

To answer the question of whether or not organ sales (as opposed to pure donations) are ethical, Erin and Harris highlight that, in the current system, the only person who is not compensated in some way for a transplant is the donor. They wonder why it is considered more ethical that a transplant surgeon, a hospital, and a patient who can now lead a healthy life all receive payment in some form, yet a donor is left with only a scar. Erin and Harris argue that making organ donation advantageous for the donor would actually increase the ethicality of the process. Further benefits of the system proposed by Erin and Harris are that, as they say, such a market would be more economical and would improve organ availability.

Clearly, Erin and Harris believe that their proposed system constitutes an ethical market for organ donation. However, Janet Radcliffe Richards, in her commentary on the Erin and Harris article in *JME*, says that whether or not an ethical market for organ donation can exist is secondary to the question as to whether organs should be sold. Richards, a bioethicist and philosopher of medicine at University College London, argues that the question of how organ donation should be structured cannot be disentangled from the question as to whether or not organ selling is wrong. In fact, in the context of the Erin and Harris article, she questions whether or not their implicit assumption – that organs can and should be sold, albeit with strict moral guidelines – colors some of their conclusions:

“If it is presumptively bad to prevent sales altogether, because lives will be lost and adults deprived of an option some would choose if they could, it is for the same reason presumptively bad to restrict the selling of organs. Once you recognise that the default presumption is in favour of any such transaction, you should be reluctant to prevent any more sales than necessary.”

Richards goes on to say that what Erin and Harris have effectively proposed are seemingly morally acceptable circumstances under which the buying and selling of organs can be allowed and this, she says, could potentially be viewed as being restrictive. “Is there good

enough reason for ruling out the many potential sales it would prevent?” she asks.

In the remainder of her commentary on the Erin and Harris article, Richards continues to raise questions about the so-called restrictiveness of their proposal: Could equity of distribution really be achieved? What about nations without a national office through which sales could be coordinated? Is there a good reason to prevent private sales of organs? Richards raises these questions rhetorically, simply to point out two things about the logic underscoring Erin and Harris’s argument: 1) that one cannot talk about how to sell organs without first addressing whether organs should be sold; and 2) that strong public opinion against selling organs has likely biased Erin and Harris such that they have conceptualized a rather restrictive market. By asking these rhetorical questions, Richards is asking the authors to reconsider their proposal in light of these points. Because if the restrictions on the market need to be lifted due to the perceived benefit to the rest of society, then there runs a risk of unintended side effects, such as the emergence of privatized organ sales and black markets where organs are illegally traded. As can be learned from the current system for organ allocation, simply banning the private sale of organs does not prevent such transactions from taking place. In 2008, an illegal organ-trading ring in India was broken up. The leaders of the ring claimed to have performed over 500 transplants. None of the donors were paid more than \$2,500, and some were even forced to give up their organs at gunpoint.<sup>7</sup> Additionally, other critics of organ sales argue that the system will undermine the altruism commonly associated with donating an organ.<sup>8</sup> As Richards points out, “the authors recognize that there is a *prima facie* case for allowing organ sales, but they also recognize that a totally free market could do a great deal of harm. What they propose, therefore, is a restricted market, designed to allow the benefits while preventing these harms.”<sup>9</sup> Richards’s point is that their proposal might not prevent these harms at all, but rather encourage the development of them.

As this special issue of *JME* suggests, the debate over organ donation is a hotly contested one. In this essay, I reviewed one small thread of the debate: whether an ethical market for human organs can exist. Though some of their colleagues clearly disagree, Erin and Harris think that such a market can exist so long as very clear guidelines exist to protect the interests of both the recipient and donor. They think that, in an age where there are so many patients waiting on transplant

lists, alternative methods of obtaining organs need to be seriously considered. Nevertheless, questions as to whether organs should be sold remain insufficiently addressed by their proposal. Indeed, the moral ramifications of such an approach, and the potential dangers it could create, remain sources of intense debate among members of the bioethics community.

### References

1. Interlandi J. 2009 Jan 10 [Cited 2010 Nov 15]. Not just urban legend. Newsweek [Internet];1-4. Available from: <http://www.newsweek.com/2009/01/09/not-just-urban-legend.html>
2. Rettner R. 2009 [Cited 2010 Nov 15]. Great debate: Should Organ Donors be paid? Live Science [Internet]; 1. Available from: <http://www.livescience.com/health/090810-organdonation-incentives.html>
3. Rettner R. 2009 [Cited 2010 Nov 15]. Great debate: Should Organ Donors be paid? Live Science [Internet]; 1. Available from: <http://www.livescience.com/health/090810-organdonation-incentives.html>
4. Budiani-Saberi DA, Delmonico FL. 2008 [Cited 2010 Nov 15]. Organ trafficking and transplant tourism: A commentary on the global realities. American Journal of Transplantation [Internet]; 8(5):925-929. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1600-6143.2008.02200.x/full>
5. Erin CA, Harris J. 2003 [Cited 2010 Nov 15]. An ethical market in human organs. Journal of Medical Ethics [Internet]; 29(3):137-138. Available from: <http://jme.bmj.com/content/29/3/137.full>
6. Interlandi J. 2009 Jan 10 [Cited 2010 Nov 15]. Not just urban legend. Newsweek [Internet];1-4. Available from: <http://www.newsweek.com/2009/01/09/not-just-urban-legend.html>
7. Tao D. 2009 Jul 29 [Cited 2010 Nov 15]. Worldwide market fuels illegal traffic in organs. New York Times [Internet]; A26. Available from: <http://www.nytimes.com/2009/07/30/nyregion/30organs.html?pagewanted=1&r=2>
8. Budiani-Saberi DA, Delmonico FL. 2008 [Cited 2010 Nov 15]. Organ trafficking and transplant tourism: A commentary on the global realities. American Journal of Transplantation [Internet]; 8(5):925-929. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1600-6143.2008.02200.x/full>
9. Erin, Charles A., and John Harris. 2003 [Cited 2010 Nov 15]. Janet Radcliffe Richards on our modest proposal. Journal of Medical Ethics [Internet]; 29(3): 141. Available from: <http://jme.bmj.com/content/29/3/137.full>

FCRH wants to know  
about your good news!

Have you:

Published a paper in an  
academic journal?

Presented your research  
at a professional or  
undergraduate research  
conference?

Gained acceptance to  
a competitive summer  
research program?

Gained acceptance to  
a competitive research  
internship?

Won an award for your  
research?

Send the details of your  
achievements to  
[bata@fordham.edu](mailto:bata@fordham.edu).

# Writing Women's Mythology: The Poetry of Eavan Boland and Louise Erdrich

Colleen Taylor, FCRH '12

Eavan Boland and Louise Erdrich are authors who write from very different cultures. Boland's poetry explores Irish history while Erdrich's traverses Native American culture and the Catholic religion. This polarity, however, is not so crucial when compared to the two poets' striking similarities in voice and in subject. As women writers aligned with feminism, both Boland and Erdrich seek to express the female perspective and reverse centuries of women's silence, and even more strikingly, they use the same medium to do so. Mythology is their instrument of choice, with Boland exploring Celtic folklore and Erdrich Native American legend. But these poets do more than explore; they reinterpret and rewrite. Challenging androcentric myths, Boland and Erdrich give the legends of their respective cultures a female voice, thereby creating a new, female mythology. Furthermore, the similarities in their mythological poems speak to the idea of a shared female consciousness. Nevertheless, while the themes, tone, and images parallel one another, their mythological poems do not always end similarly. Erdrich seems to accomplish the liberation of women within her final stanzas, but Boland ends her poetry without freeing her woman-speaker from despair.

Award winning author Louise Erdrich was born in Little Falls, Minnesota to a German-American father and a part-French, part-Chippewa mother.<sup>1</sup> Throughout her life, Erdrich has stayed close to her Chippewa roots. At Dartmouth College, she became involved with Native American Studies, as a result virtually all of her writings engage Native American history and culture.<sup>2</sup> Erdrich successfully writes in many different genres including novels, children's literature, short stories, and poetry, and her first novel, *Love Medicine*, won her the National Book Critics Circle Award for Best Fiction.<sup>3</sup> *Baptism of Desire*, her second book of poetry, published in 1989, traverses Catholic religious themes and ideas, as well as Native American mythology. It is this book of poetry that aligns so well with Eavan Boland's work. Boland was born in Dublin in 1944 to Irish parents. The author of over fifteen collections of poetry, Boland is a highly respected Irish poet and the winner of several awards, including the Lannan Foundation Award in Poetry (Irish Writers).<sup>4</sup>

Like Erdrich, Boland is particularly in touch with her legacy. Her poetry is rooted in Irish history and often invokes an Irish woman's experience to comment on the country's tragic past and national identity. Recently (in 2005) she published a complete collection of her poetry, *New Collected Poems*. In that collection are her more recent sets of poems, including the "In A Time of Violence" (1994) poems and the "Code" (2001) poems, both of which engage Irish mythological stories to discuss women's issues. These recent collections of Boland's parallel Erdrich's *Baptism of Desire*, and it is my conviction that, together, these two sets of poems send a very powerful message.

Native American myth is steeped in the tradition of androcentrism. Although Native American religions and legends often recognize the importance of mother figures, equality for women is virtually absent in the storytelling tradition. Female figures appear in myths, but they are often depicted as "other" and are resigned to the domestic sphere.<sup>5</sup> In *A Feminist Companion to Mythology*, Mart Weigle notes that in Native American traditions, music, religions, and especially myths and legends are "controlled by men."<sup>6</sup> Of course, societal structure and beliefs differ from tribe to tribe, but, for the most part, Native American women are not storytellers.<sup>7</sup> In most Native American mythologies, the trickster takes a central role. The trickster exists, as his name suggests, to create confusion and to upset the progression of a story. He is a clever, important character and is almost always male. The trickster can bend his gender but, as Weigle notes, he is "first of all a man . . . because women are simply not accorded [that] variety of expression."<sup>8</sup> In Native American mythology, women rarely "express" themselves, and they hardly ever tell the story.

Louise Erdrich challenges the sexist mythological tradition in several of her poems, and this is most clear in "Fooling God." Erdrich, in the opening poem of her collection, *Baptism of Desire*, challenges Native American convention by creating a female trickster. The poem is a series of propositions of possible ways the speaker can hide and escape God, such as "I must become small and hide where he cannot reach" or "I must

become very large and block his sight.”<sup>9</sup> Like a true Native American trickster, the speaker of the poem attempts to fool God into believing she is not there. More importantly, however, the poem continually asserts the feminine in correlation with these attempts at deceiving God. The speaker says, “I must turn down the covers and guide him in. / I must fashion his children out of playdough, blue, pink, green. / I must pull them from between my legs.”<sup>10</sup> Erdrich is invoking the two standard, stereotypical female roles: that of sexual partner to man, and that of mother. She puts the trickster in the domestic sphere so as to assert her sex. While this domesticity may appear to comply with the sexist beliefs of Native American traditions, Erdrich combats the stereotype by putting the female trickster into action. For instance, the woman in the poem guides the male god to bed, not the other way around. More importantly, the trickster is by no means a passive object in the birthing process. Rather, she initiates the process and “pulls [the babies] from between [her] legs.”<sup>11</sup> Such exertions by the female trickster resist the belief that Native American women have no active part in legend. Moreover, the rhythmic repetition of “I”—an “I” which belongs to the female speaker—asserts women into the storytelling tradition. After all, the female trickster narrates the story of this poem. “Fooling God” transforms Native American myth into an expression of the female experience.

Irish, Celtic mythology, like Native American myth, is androcentric. There are far more heroes and male characters in Celtic mythology than there are heroines. But a select number of stories can boast of characters with feminist potential, such as Deirdre of the Sorrows. In her book, *Women, Myth, and the Feminine Principal*, Bettina L. Knapp argues that Deirdre is one of Ireland’s national heroes, and that her “inner fortitude and strength” distinguish her from other female characters in Celtic myth.<sup>12</sup> Although Deirdre’s determination is associated with being with a man, Knapp maintains that she nonetheless represents “a woman’s will for independence.”<sup>13</sup> Knapp also points out that Gráinne of “The Pursuit of Diarmuid and Gráinne” echoes Deirdre’s independence.<sup>14</sup> Fated to marry old, powerful kings, both Deirdre and Gráinne act on their desires and flee from these kings, escaping with their lovers. Like Deirdre, Gráinne reflects autonomy of choice and of action in her elopement with Diarmuid. It is important to note that ancient Celtic society was a place where women were socially independent. They were not on wholly equal footing with men but were

able to choose their professions and control their own wealth.<sup>15</sup> Husbands and wives had very similar rights, unlike in Ancient Greek and Roman societies in which the husband was in control.<sup>16</sup> Although Deirdre and Gráinne are not free from sexism, they represent a tendency toward equality for women.

In repeatedly invoking the Celts and their folklore, Boland’s poetry expresses her desire for a time when women had less prejudices to battle. Boland seems especially interested in the myth of Gráinne and Diarmuid. Her poem “Story” mentions two lovers hiding in the woods, a clear allusion to Gráinne and Diarmuid on the run from the old king Fionn Mac Cumhaill. “Story,” like “Fooling God,” highlights the woman of the legend. While tradition usually centers on the rivalry between Fionn and Diarmuid or Diarmuid’s tragic death, Boland focuses her poem on Gráinne. Early in the poem, the speaker states, “And let the woman be slender.”<sup>17</sup> She asserts the woman in the story, putting an emphasis on the word “woman,” which later recurs with the line “That this woman is growing older.”<sup>18</sup> Never does the poem address “the man.” The poem begins with “Two lovers in an Irish wood,” acknowledging Gráinne and Diarmuid’s fate together, intertwined.<sup>19</sup> But not long after, the poem imaginatively separates Gráinne from Diarmuid, and the speaker says, “I am writing a woman out of legend.”<sup>20</sup> Boland singles out Gráinne, writing her out of the traditional interpretation of the myth and transporting her into a woman’s interpretation. Like Erdrich, Boland rewrites the myth and challenges convention by accenting the woman, rather than the man.

There is a common tone that runs throughout both Erdrich’s and Boland’s poetry, a tonal quality that reflects a position of double oppression. Erdrich and Boland choose to write from oppressed cultures: those of Native Americans destroyed by New World immigrants and the Irish, and suffering from centuries of English oppression, respectively. And, as women, they write from an even greater oppression. Their poetry laments the cruelty brought on by invasion and by sexism. In an article entitled “History, Postmodernism, and Louise Erdrich’s *Tracks*,” Nancy Peterson explains Erdrich’s subjugated position: “For writers such as Erdrich, a part-Chippewa woman, the history of America has often been exclusionary—a monologic narrative of male Anglo-American progress that constructs others as people without history.”<sup>21</sup> This experience of exclusion can be heard in “Fooling God” with the relentless repetition of “I must.”<sup>22</sup> Virtually every line in the poem

begins with “I must,” but rather than create monotony, the repetition manifests that subjugated position. As an “inferior” person, the speaker “must” do certain things; they are required of her. The oppression of Native Americans and of women is directly addressed in “Potchikoo’s Life After Death,” a myth of Erdrich’s own creation. The character Josette is criticized by society for not being remorseful enough about her husband’s death while Potchikoo is denied entrance into heaven because he is an “Indian.”<sup>23</sup> Like Peters argues, Erdrich draws attention to an experience that is neither Anglo-American nor male, and that experience is one of injustice and ostracism.

Boland overtly addresses her twice-oppressed perspective in her essay, “The Woman The Place The Poet.” She explains how she has chosen to express the tragic Irish past, saying, “We yield to our present, but we choose our past. In a defeated country like Ireland we choose it over and over again, relentlessly, obsessively.”<sup>24</sup> Boland does more than choose Ireland: she chooses Irish women specifically. When she contemplates the history of the country, she imagines the poor Irish girls and wives who never had a voice. She is greatly affected by the imprisonment of Irish women in history, because “At an age when I was observing the healings of [Ireland], she [my imagined woman] would have been a scholar of its violations.”<sup>25</sup> The poem “Mother Ireland” expresses the “violations” of being Irish and being female by invoking the wounded country as a woman. Mother Ireland regrets, “[My story] was different than the story told about me.”<sup>26</sup> This line acknowledges how both the Irish voice and the woman’s voice have been silenced throughout history. The voice Boland and Erdrich give to this position of double oppression takes on the tone of anguish. Anguish alone can communicate the exclusion and oppression suffered twice over by the women of these “defeated” cultures.

The character of the abused wife runs throughout the mythological poems of both Boland and Erdrich. In Boland’s poem “Embers” (in the *Code* collection), the speaker engages with a mythical woman entrapped by standards of perfection only to realize her own husband ignores her. She reads aloud the story of the old, haggard woman of the Fianna who is first scorned by scores of men, then made young and beautiful again by the love of a man named Diarmuid. The speaker’s husband will not hear the story, saying, “You are turned away. You have no interest in this.”<sup>27</sup> In the myth, the old woman of the Fianna begs Diarmuid to keep her transformation a secret: “He could not say that she had

been once old and haggard.”<sup>28</sup> The speaker mimics this desperate voice. She entreats her husband, “Look at me in the last, burnished light of it. / Tell me you feel the warmth still.”<sup>29</sup> Distraught over her husband’s disregard, the speaker assumes the same fears that the old woman of the Fianna suffered. Both are terrified of falling short of female standards of beauty. Instead of telling us the end of the myth of Diarmuid and the woman of the Fianna, the speaker gives us her own fate in the last word of the poem: “ashes.” She is made into ashes, torn apart by her husband’s refusal to hear her voice.

Erdrich’s myth about Potchikoo is written in prose-like narrative, rather than in verse like Boland’s “Embers,” but it is nevertheless a powerful story of an abused wife. In the section “Potchikoo Greets Josette,” Potchikoo returns to his wife merely to quench his sexual desires. He continues to have sex with her, even though she falls asleep: “Finally Josette fell asleep, and let him go on and on.”<sup>30</sup> In this moment, Josette is a completely passive, inanimate object, and like Boland’s speaker in “Embers,” her voice is unheard by her husband. She merely exists for Potchikoo’s pleasure. What’s more, directly afterward, Erdrich confronts the issue of machismo by having the adulterous Potchikoo betray Josette. While Josette is at daily Mass, Potchikoo is in the town “calling for women,” a true violation of Josette’s goodness and loyalty to him.<sup>31</sup> Both Boland and Erdrich use mythology to expose how husbands mistreat their wives, whether it be something as simple as the act of ignoring or something as serious as adultery. Both “Embers” and “Potchikoo’s Life After Death” imply that the problems women face today are not distant from those suffered by women of the past and by women in myth.

These two poems are undoubtedly tragic, but “Potchikoo’s Life After Death” and “Embers” also celebrate women. Boland and Erdrich employ mythology to convey the sacredness of woman. In “Potchikoo’s Life After Death,” Josette is directly associated with religion, as she is the only character who is mentioned as going to Mass. Her holiness shows through when she banishes and defeats Potchikoo’s “mean twin,” saying to it, “In the name of the Holy Mother of God! Depart!”<sup>32</sup> The twin obeys her, which suggests that Josette wields a divine-like power. Moreover, Josette traps the mean twin by putting “blue plaster that had fallen off the Blessed Virgin’s robe” in a roasted bird—a symbolic gesture.<sup>33</sup> Something miraculous is contained within the bird just as sacred strength is contained within Josette herself. In “Embers,” when the speaker reads about the old

woman of the Fianna, the audience gets the sense that the story is sacred to her. The old woman in the story is certainly magical, as she is transformed from old and haggard to young and beautiful in one night, but she is also a sacred figure for the speaker in the poem. This is why the speaker becomes utterly dejected when her husband has no interest in the story.

In an essay entitled “Beautiful Labors: Lyricism and Feminist Revisions in Eavan Boland’s Poetry,” Christy Burns argues that Eavan Boland’s poetry denies beauty. She explains that Boland openly critiques art that paints women as a symbol of beauty: “Boland grew suspicious of beauty and its romantic imagery as she began to search for her place as a woman writer.”<sup>34</sup> As a result, Burns says, Boland’s poetry replaces beauty with “the reality of everyday women’s domestic lives.”<sup>35</sup> This refusal of beauty is certainly apparent in “Embers.” The poem centers on the precariousness of woman’s youthful beauty with both the old woman of the Fianna and the speaker herself, who fears her husband no longer finds her attractive. The speaker hopelessly says “Tell me you feel the warmth still.”<sup>36</sup> She futilely asks him to feel desire for her. This same challenge of beauty permeates Boland’s poem about Gráinne and Diarmuid, “Story.” While most versions of “The Pursuit of Gráinne and Diarmuid” present Gráinne’s beauty as her key characteristic, Boland’s poem questions that beauty. The poem says, “That her [(Gráinne’s)] mouth is / cold. That this woman is growing older. / They do not know. They have no idea / how much of this...depend[s] on her to be young and beautiful.”<sup>37</sup> Boland replaces the romantic myth of Gráinne’s unparalleled beauty with the reality of aging. Instead of following convention by elaborating on Gráinne’s loveliness, Boland imagines how things will change when she begins to age, as all women age. Burns’s argument is spot on; Boland seeks to deny the myth of beauty in her poetry.

I would also argue that Burns’s idea can be extended to include Erdrich, who often rejects romanticization and beauty. In her trickster poem “Fooling God,” Erdrich turns Native American mythological traditions upside down by challenging the idealistic image of woman as mother and replaces the beautiful with the artificial. The poem’s description of giving birth is about commercialization rather than nature: “I must fashion his children out of playdough, blue, pink, green. / I must pull them from between my legs / and set them before the television.”<sup>38</sup> The act of giving birth is mechanized with these lines. The speaker’s babies are synthetic, made out of “playdough,” different from one another

only in color. Moreover, they are immediately set in front of the television, as if to suggest they are merely a product of commercialization. By taking all the beauty out of motherhood, Erdrich not only exposes the evils of our materialistic culture, but also directly challenges Native American mythology’s stereotypes about women belonging in the domestic sphere. This theme of fakeness recurs in the poem with lines such as “[perhaps] if I invoke Clare, the patron saint of television” and “flowers made of felt.”<sup>39</sup> She questions the romanticization of sainthood by associating St. Clare with commercial television and abandons natural beauty with the image of artificial flowers made of felt. This denial of beauty is not cynicism for either Erdrich or Boland. It is more likely a step toward creating a new mythology of women, a task they can only accomplish by separating their poetry from past prejudices that claim women are merely beautiful objects to be admired.

So far the parallels between Erdrich and Boland have been striking. Both clearly create a new female mythology and a unique female voice in their poetry. The striking similarities suggest a common consciousness, which, by the tone of their poetry, is one of anguish and dejection at the difficulties presented by long-standing sexism. The poems also assert the feminine perspective in Native American and Irish cultures as a sacred, cherished perspective. However, this parallelism is suspended when comparing their mythological poems’ endings. The two poets begin with the same tone, but end in contrasted ones.

Boland’s tone and voice remain static throughout the entirety of her poems. If they do change, it is only in magnification. She often doubles the voice of sorrow by having her speaker in present time echo the distresses of mythical characters. For instance, the latter half of “Story” explains how Gráinne’s sorrows and fears travel over space and time and are felt by the speaker: “[a]nd suddenly what is happening is not / What happens to the lovers in the wood...But what is whispering out of sycamores / And over river-noise...And a table at which I am writing.”<sup>40</sup> The precariousness and temporality of Gráinne’s youthful beauty is not just an issue within the myth. It resonates with the speaker in her own time as well: “I am thinking how new it is—this story. How hard it will be to tell.”<sup>41</sup> Perhaps the story is “new” because the speaker is just beginning to age and the experience of losing her youthful good looks is still fresh and poignant. Moreover, it is “new” in that it Gráinne’s dangers are modern fears; a woman losing

her looks is in a vulnerable position in modern society. That is why the story will be so hard to tell, because the speaker is hurt and scared by its implications. The poem, therefore, ends on a dejected note. Even Gráinne, who is often seen as a strong, willful female character, cannot rescue the speaker from the chains of sexist prejudices. The speaker in Boland's "Embers" expresses the same dejected concerns. The last line of the poem is, "tell me you will never speak about the ashes."<sup>42</sup> The word "ashes" clearly connotes decaying and deterioration, which are aligned with how the speaker is growing older and perhaps less interesting to her husband. While Boland makes women's voices heard, she cannot separate them from the tone of sorrow and dejection at being entrapped by society's sexism.

Erdrich, however, begins in anguish and ends in triumph. She makes heroes out of her speakers and liberates the female voice from despair. Furthermore, as a part of this liberation, "Potchikoo's Life After Death" enacts the Native American tradition of the trickster. The myth focuses on a male character, Potchikoo, and his journey after his death. However, by the last chapter of the tale, "How Josette Takes Care of It," Potchikoo is virtually erased from the storyline and replaced by Josette. In a trickster-like move, Erdrich asserts Josette as the heroine of the tale. She launches a surprise attack on sexist ideas by waiting until the end of the poem to truly reveal Josette's strength, independence, and determination. Josette is the one who finally defeats the evil spirit that is causing trouble in the town, and she burns Potchikoo's body so that the mean spirit can never return: "[it] crackled in the flames, shed sparks, and was finally reduced to a crisp of ashes, which Josette brushed carefully into a little sack, and saved in her purse."<sup>43</sup> Erdrich does not even bother giving us Potchikoo's fate. Her readers do not learn what happens to him, and yet the story does not feel incomplete. Josette triumphs, and in keeping the remains of Potchikoo's ashes in her purse, she symbolically carries proof of that triumph with her. "Potchikoo's Life After Death" ends in ashes like Boland's "Embers," but these are happy ashes, concrete proof of a woman's triumph.

Erdrich's poetry ends in a defiant way. She addresses the anguish women feel in their oppression but also makes a fool out of sexism by shockingly revealing the heroism of her women characters. Although Boland does not accomplish this level of triumph, her poetry is by no means inferior or less progressive than Erdrich's. In fact, it is appropriate that Boland ends with tragedy because that is how most Celtic myths end. Similarly,

Erdrich's poetry rightly concludes with a trickster's act, an essential part of any Native American myth. Nevertheless, while this difference is important, the two poets' similarities are what is really remarkable about this comparison. That they write from such different backgrounds and styles and yet produce such analogous poetry attests to the idea of a common female consciousness. The female voices they create are harmonious. Though the actual myths may be different, Erdrich and Boland write from the same consciousness and therefore create a universal female voice that all mythologies and all women can recognize. Finally, I would argue that Boland and Erdrich encourage their audiences to find heroines in other culture's mythologies and to create a voice for those mythical characters who have been marginalized. Eavan Boland and Louise Erdrich have lit the fire for a new mythological legacy. It is time for Diarmuid and Potchikoo to make way for Gráinne and Josette.

### Notes

1 "Louise Erdrich," Odyssey Editions, accessed February 27, 2011, <http://www.odysseyleditions.com/EBooks/Louise-Erdrich>.

2 Ibid.

3 Ibid.

4 "Eavan Boland," Irish Writers Online: A Concise Bio-Bibliographical Dictionary of Irish Writers, <http://www.irishwriters-online.com/eavanboland.html>.

5 Marta Weigle, "Southwest Native American Mythology," in *The Feminist Companion to Mythology*, ed. Carolyne Larrington (London: Pandora, 1992), 354.

6 Weigle, "Southwest Native American Mythology," 355.

7 Ibid.

8 Weigle, "Southwest Native American Mythology," 352.

9 Louise Erdrich, "Fooling God," in *Baptism of Desire* (New York: Harper Perennial, 1989), 3.

10 Erdrich, "Fooling God," 3.

11 Ibid.

12 Bettina L. Knapp, *Women, Myth, and the Feminine Principle* (Albany: State University of New York, 1998), 179.

13 Knapp, *Women*, 179.

14 Ibid.

**Excerpts from "Fooling God"**

I must become small and hide where he cannot reach.  
I must become dull and heavy as an iron pot.

...

I must be strange as pity so he'll believe me.  
I must be terrible and brush my hair  
so that he'll find me attractive.  
Perhaps I will evoke Clare,  
the patron saint of television.  
Perhaps if I become the image  
passing through the cells of a woman's brain.

I must become very large and block his sight.  
I must be sharp and impetuous as knives.

...

I must be careful and laugh when he laughs.  
I must turn down the covers and guide him in.  
I must fashion his children out of playdough--  
blue, pink, and green.  
I must pull them from between my legs  
and set them before the television.

...

-Louise Erdrich,  
*Baptism of Desire*

**Excerpts from "Story"**

Two lovers in an Irish wood at dusk  
are hiding from an old and vengeful king.

...

And let the woman be slender. As I was at twenty  
And red-haired. As I was until recently.

They cling together listening to his hounds  
get nearer in the twilight ...

We can be safe, they say. We can start  
a rumour in the wood to reach the king -

that she has lost her youth. That her mouth is  
cold. That this woman is growing older.

They do not know. They have no idea  
how much of this: the ocean-coloured peace

of the dusk, and the way legend stresses it,  
depend on her to be young and beautiful.

...

And suddenly what is happening is not  
What happens to the lovers in the wood

or an angry king and his frantic hounds  
and the tricks and kisses he has planned.

But what is whispering out of sycamores.

...

...And is traveling to enter a suburb  
at the foothills of the mountains in Dublin.

And a garden with jasmine and poplars. And  
a table at which I am writing. I am writing

a woman out of legend. I am thinking  
how new it is - this story. How hard it will be to tell.

- Eavan Boland, *New Collected Poems*  
(originally published in *In a Time of Violence*)

15 Knapp, *Women*, 183.

16 Knapp, *Women*, 182.

17 Eavan Boland, "Story," in *New Collected Poems*, ed. (?) (New York: W.W. Norton, 2005), 283.

18 Boland, "Story," 283.

19 Ibid.

20 Ibid.

21 Nancy Peterson, "History, Postmodernism, and Louise Erdrich's Tracks," *PMLA* 109 no. 5 (1994): 983.

22 Erdrich, "Fooling God"

23 Louise Erdrich, "Potchikoo's Life after Death," in *Baptism by Fire* (New York: Harper Perennial), 51-52.

24 Eavan Boland, "The Woman The Place The Poet," in *Object Lessons: The Life of the Woman and the Poet in Our Time* (New York: W.W. Norton, 1995), 163.

25 Boland, "The Woman The Place The Poet," 163.

26 Eavan Boland, "Mother Ireland," in *New Collected Poems* (New York: W.W. Norton, 2005), 261-2.

27 Eavan Boland, "Embers," in *New Collected Poems* (New York: W.W. Norton, 2005), 236-7.

28 Eavan Boland, "Embers," 236-7.

29 Ibid.

30 Erdrich, "Potchikoo," 54.

31 Erdrich, "Potchikoo," 55.

32 Erdrich, "Potchikoo" 57.

33 Ibid.

34 Christy Burns, "Beautiful Labors: Lyricism and Feminist Revisions in Eavan Boland's Poetry," *Tulsa Studies in Women's Literature* 20 vol. (2001): 223.

35 Burns, "Beautiful Labors," 219.

36 Boland, "Embers," 236-237.

37 Boland, "Story," 283.

38 Erdrich, "Fooling God," 3.

39 Ibid.

40 Boland, "Story," 283.

41 Ibid.

42 Boland, "Embers," 236-237.

43 Erdrich, "Potchikoo," 57.

# The Burgos Tapestry: Medieval Theatre and Visual Experience

Nathalie Rochel, FCRH '11

In the field of art history, the medium of tapestry has only recently begun to gain attention as its own significant art form. This paper examines the possible relationship between the Burgos Tapestry, recently on view at The Cloisters after a thirty-year conservation, and medieval theatre. The compositional and stylistic forms of the tapestry may have been influenced by productions of medieval mystery plays, which through analysis can help provide a greater understanding of the medieval cultural mindset, the possible artistic decisions behind maintaining medieval pictorial traditions into the early sixteenth century, and the medieval viewer's experience when looking at a tapestry demonstrating those traditions. Looking at the tapestry in consideration of other aspects of medieval culture helps to re-examine the dismissal of medieval pictorial tradition as simply a precursor to Renaissance naturalism.

One of the great surviving figurative tapestry sets from the Late Gothic period of tapestry is *The Redemption of Man* series, believed to consist of ten compositions.<sup>1</sup> Many duplicates have been made of the tapestries in the series, but the tapestry at The Cloisters, known as *The Nativity* or *Christ is Born as Man's Redeemer*, is distinctive in that it is the only existing composition from the group to have no duplicates (Fig. 1).<sup>2</sup> The tapestry is twenty-seven feet long by thirteen feet high, its approximate date is between 1500 and 1520, and it is identified as South Netherlandish.<sup>3</sup> Any artists associated with the tapestry, as well as the reasons for its manufacture and how it got into the possession of Bishop Juan Rodríguez de Fonseca of the Burgos Cathedral in Spain, are currently unknown. This lack of information contributes to the appeal and mystery of the tapestry, which is enhanced by its complex subject matter regarding the Fall and Salvation of Man. Many scholars have connected the subject matter to themes seen in popular mystery and morality plays of the time period.<sup>4</sup> An analysis of *The Nativity* in relation to medieval productions of mystery plays suggests that the compositional and stylistic forms of the tapestry may have been directly influenced by the experience of these productions. Considering the influence of the theatrical aspect of medieval culture on tapestry production can also help us to understand the viewing experience of the tapestry within the larger cultural mindset of the time.

The medium of tapestry has suffered from its location outside of the three main art forms most commonly praised and studied in art history, namely painting, sculpture, and architecture.<sup>5</sup> Scholars such as Thomas Campbell and Laura Weigert have noted common problems of various approaches in the field. Tapestry study is limited by poor documentation on the complex contributions of the makers of a tapestry and a lack of surviving works in excellent condition.<sup>6</sup> *The Nativity* is one such case where suggested approaches like patronage study or an analysis of the specifics of the tapestry's production and use cannot be pursued due to a lack of information.<sup>7</sup> Instead, an analysis of the tapestry would benefit from a discussion related to its compositional style, another subject of issue within tapestry study. In general, tapestries are often organized into a linear progression of style that advances from the flatness of medieval tapestries to the Renaissance creations of naturalistic space in later examples.<sup>8</sup> *The Nativity* is one of the types of tapestries that defies this narrative; it is an example that is labeled medieval by the Metropolitan Museum of Art but that dates very late in the period, to the early sixteenth century, when some tapestries are considered to belong to the Renaissance. It is evident that there must be more to the elements of style seen in *The Nativity*, since they have persisted from the early Middle Ages and may indicate a conscious decision on the part of the artist to continue using the style when other artists were beginning to

I would like to thank Dr. Nina Rowe for her invaluable guidance regarding this paper throughout the past semester. I would also like to thank The Cloisters for the use of their library. Direct all correspondence to Nathalie Rochel at rochel@fordham.edu.

use naturalistic depictions of space. Michael Baxandall, in his chapter “The Period Eye,” introduces the concept of visuality, which defines viewing and comprehension as varying from culture to culture.<sup>9</sup> Relating this notion to *The Nativity*, the pictorial organization of the tapestry can be understood both through an attempt to understand the medieval experience of viewing as well as looking at how the experiences of the culture may have informed the artwork. In the case of *The Redemption of*

the Virtues and Vices. Christ’s crucifixion and resurrection ultimately save Man and Nature and the Vices are defeated.<sup>11</sup> *The Nativity* presents the midpoint, possibly even the climax, of the story in the birth of the Redeemer who will bring about the salvation of mankind.

The narrative begins in the upper left corner of *The Nativity* but does not read from left to right, as it is



**Figure 1**  
Episode from *The Story of the Redemption of Man: Christ Is Born as Man's Redeemer*, ca. 1500-1520. Wool warp; wool and silk wefts, 166 1/4 x 315 1/8 in. (422.3 x 800.4 cm), South Netherlandish, The Cloisters Collection, New York, 38.28.  
The Cloisters Collection, 1938.

*Man* series, the compositional and stylistic forms may have been directly influenced by the theatrical experience of mystery plays.

First, it is important to understand the narrative of *The Redemption of Man* series. The story within *The Nativity* is only a small section of a long, complex narrative that interweaves biblical figures with personifications and allegorical figures. Scholars have pinpointed three main themes intertwined in the narrative of the whole ten-tapestry series: “the human conflict” of Man’s moral struggle; “the divine conflict,” or God’s struggle to decide the fate of Man; and the life of Christ, “the Redeemer.”<sup>10</sup> Told throughout each of the ten tapestries, the narrative follows an “everyman” as he succumbs to the Vices while the Virtues plead his case for salvation with the Holy Trinity. Man and the allegorical figure Nature gain salvation in the form of Christ, whose story is outlined alongside images of the battle between

arranged in a complex composition. While the tapestry is divided into two main registers composed of compact scenes, the story could continue in either the scene below or the scene to the right. This first scene shows reconciliation in a field between Christ and the personifications of the Virtues: Justice, Peace, Mercy, and Truth, along with Humility and Charity. Most of the important figures, like the Virtues, are labeled or identifiable by an attribute, such as a sword for Justice. Continuing to the right, a group of figures is assembled beneath a canopy on a grassy hill. Mercy and an enthroned God prepare the angel Gabriel for the Annunciation as Humility and Justice look on, and Truth holds a small image of Mary and the Christ Child. In a small scene taking place further in the background and to the right, Joseph and Mary pay taxes in Jerusalem, which is depicted as a medieval city with battlements. Directly in front of this is a large octagonal temple; the marriage of Mary and Joseph is shown on

a platform in front of the temple. The Annunciation is shown within a large rectangular pavilion behind and to the right of this scene. Humility, God the Father, and the Holy Spirit are present as well, and there is a stream in front of them. In the upper right corner are scenes of three astrologers and the three Magi looking up into the sky at a vision of the nude Christ Child. The image of the Magi washing their feet is an unusual but not unknown detail.<sup>12</sup> The Nativity takes place in the bottom right corner and is set in a meadow in front of a manger; Humility, Chastity, and Devotion are part of the crowd. Opposite this in the bottom left corner is a scene of Man shackled to the Earth next to the allegorical figure of Nature, with Old Testament figures, including Abraham, coming out of a cave. While it is unclear when this scene occurs within the narrative of the Incarnation, it reveals the allegorical significance of the Nativity, which will free Man and Nature from their imprisonment.<sup>13</sup> At the bottom corners in this and most of the other tapestries are two men representative of prophets or other figures from the Old Testament who have scrolls quoting the Bible.<sup>14</sup> All of the images of meadows and hills are created with intricate pattern-like flowers, with a similar flowery border around the entire piece.

The presence of the personifications and allegorical figures in the tapestry has a theological basis and actually reflects common allegorical ideas that had been present for some time in popular and theological discourse.<sup>15</sup> The particular storyline of the personified Vices and Virtues' conflict is thought to derive from a fourth century poem by Prudentius titled *Psychomachia*.<sup>16</sup> According to Barbara Newman, the use of the Vices and Virtues may have been a way to analyze and visualize God's inner conflict regarding the fate of Man, as well as a way to create a narrative without employing the Trinity in a blasphemous or heretical manner.<sup>17</sup> Like the personifications or goddess-like Virtues, allegorical figures are also a way to "dramatize human conflicts."<sup>18</sup> The Virtues function at a level above humans but below God, acting like mediators within the story; the virtues aid Man while the Vices hinder him. The figure of Man refers to humankind as a whole. Nature, on the other hand, is more difficult to define. While most scholars agree that she does not represent Mother Earth and vegetation as we think of Nature today, interpretations range from her representing Human Nature to the part of Man which suffers from his actions.<sup>19</sup>

The other significant aspects of *The Nativity*, and those most crucial to this analysis of the tapestry, are the or-

ganization of the narrative and its representation of space. In order to understand the significance of its composition, it is necessary to consider the norm from which it deviates. Art historians have traditionally extolled the use of one-point perspective, a practice in which an artist utilizes linear perspective in order to create an illusionistic effect. The resulting images are considered to be more naturalistic; this has been customarily associated with two-dimensional artworks, especially painting, in which achieving the illusion of space is celebrated. Popularized during the Renaissance by Leon Battista Alberti in his treatise *De pictura*, one-point perspective was considered a manifestation of Renaissance ideals.

*The Nativity*, in contrast to the rational and naturalistic depictions of space in typical Renaissance artworks, has a non-naturalistic depiction of space. The tapestry combines nine separate scenes into a single composition. Space within the tapestry is flat; the only sense of spatial recession and volume comes from the use of smaller figures to indicate the background and the overlapping of the figures and scenes to create depth. Even these methods are not completely systematic because figures presented as if in the same foreground are sometimes different sizes. This approach results in a landscape that is difficult to read as coherent and unified. There is also no pattern to reading the tapestry; while the story starts in the upper left hand corner, the narrative does not follow a strict left-to-right or even diagonal pattern. For instance, if the story is read straight across the top, the Annunciation comes before the marriage of Mary and Joseph. In addition, the tapestry also uses a simultaneous narrative, a type of narrative in which the artist creates a concurrent depiction of successive moments from a story in a single scene. This lack of clear narrative direction within the scenes as a whole creates the sense of all the scenes happening at the same time. There is also no clear central focus to the tapestry, which adds to this effect. While the marriage of Mary and Joseph appears to be in the center, it is located slightly off-center, to the right. Each one of the individual scenes is shown as if it is the central image, resulting in the effect of having multiple viewpoints instead of having all the scenes taking place from a single perspective. In addition to having no central focal point, the scenes are all presented in different sizes. The largest scene with the biggest figures is the one in the bottom left with the shackled Man, which unbalances the composition. The rectangular pavilion with the Annunciation also cre-

ates a sense of imbalance because its large size is only tempered with three smaller scenes on the other side. Even the slight off-centered position of the marriage disrupts the composition. As a result of this lack of balance, the viewer's eye constantly moves around the tapestry. The composition avoids becoming too chaotic with the use of strict divisions between each scene, all of which are either enclosed within a structure or located outside, defined by a natural barrier.

Many of these visual characteristics can be located within a style typical of the Brussels school of tapestry weaving around the late fifteenth and early sixteenth centuries.<sup>20</sup> While the style is most indicative of its date and origin, it should be noted that there is no conclusive proof that the tapestry was created in Brussels.<sup>21</sup> Designs typical of the Brussels school often emphasized “ornament, line, and pattern over perspectival effects.”<sup>22</sup> This emphasis on pattern suggests the late medieval viewer's desire for an engaging design instead of one that imitated reality. In *The Nativity* there is a large amount of detail—for instance, in the eye-catching folds in the costumes as well as other decorative elements, like the intricate structures and pattern-like flora. *The Nativity* also represents some staples of tapestry composition that were prominent in the fifteenth century and continued into the sixteenth, such as an “avoidance of blank space,” the use of framing devices to link narrative episodes, the use of magnificent costumes, and an “overall emphasis on narrative and anecdotal detail at the expense of coherent visual structure.”<sup>23</sup> These characteristics cannot simply be explained by the limitations of the medium. While it is difficult to recreate the illusionistic effects seen in paintings with tapestries, some tapestries as early as 1476, predating our tapestry, attempted to imitate panel paintings.<sup>24</sup> This indicates that the stylistic formula seen in *The Nativity* continued to be used despite advances in weaving techniques and some weavers' desires to imitate paintings. In order to gain a better understanding of this stylistic issue and the visual composition of the tapestry, it is imperative to analyze *The Nativity* with an understanding of the problems in the art-historical field regarding tapestries as outlined at the beginning of this article. Keeping in mind the concept of visuality, the continued use of the medieval style of pictorial organization seen in *The Nativity* may be the result of influences from a completely different medium, that of medieval theatre and its mystery plays.

The name “mystery play” comes from the Latin *ministerium*, meaning “service,” because the plays originated as part of church services particularly around Easter and Christmas.<sup>25</sup> They were based on stories from the Bible, with the most popular dealing with the birth and resurrection of Christ. The plays were staged in their own special setting within the church known as a “mansion”; it is not known exactly how the mansions were arranged inside churches, but supposedly the interiors resembled outdoor markets.<sup>26</sup> Eventually the clergy stopped acting in the plays and guilds took over, taking the plays outside into the churchyard, streets, or

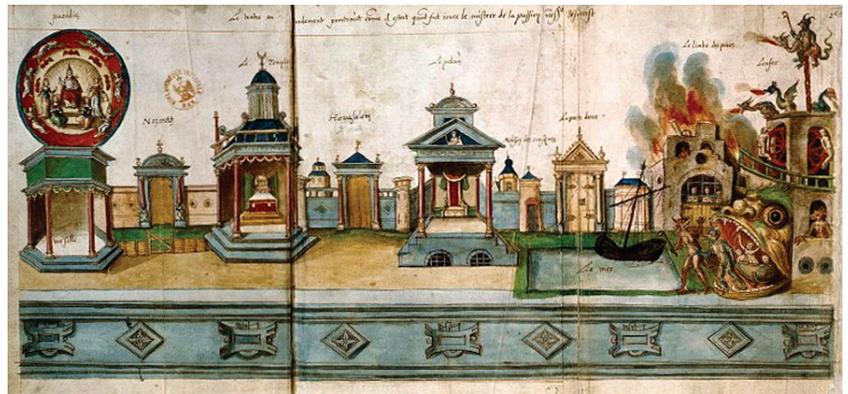


Figure 2  
Scenery for the Valenciennes Mystery Play, 1547 (Paris: BnF MS fr. 12536, fol. 1v-2)

fields and lawns. According to Alexander Franklin, the plays were either stationary, with small stages known as “pageants,” or performed in a procession, where the pageants were put on wagons and the medieval viewer would wait at a specific station to watch the play go by.<sup>27</sup> Each pageant represented a single scene and allowed different settings to be seen side-by-side.<sup>28</sup> The construction of these miniature stages varied, from having drapery for walls to being open on all sides; most productions favored elaborate sets and costumes with labels to help identify characters.<sup>29</sup> The plays were in vogue in the fifteenth and sixteenth centuries but soon afterwards lessened in popularity.<sup>30</sup> A new type of medieval drama, the morality play, became the new fashion. Morality plays developed from the mystery plays but differed in that they moved away from the biblical stories, focusing instead on conflicts of humankind.<sup>31</sup>

In most of the scholarship on *The Nativity* and its related tapestries, scholars suggest that the narrative of the story may have originally been based on a mystery or morality play.<sup>32</sup> Many elements of the story in *The Redemption of Man* can be found in countless different dramas, but no single source on which the tapes-

tries may have been based is known.<sup>33</sup> The story of the allegories and the contest between Vices and Virtues is noted as being a common idea at the time that was “imprinted on the popular mind by mystery plays.”<sup>34</sup> Scholars and poets were known to help guide tapestry artists with more elaborate compositions during the preliminary stages of the tapestry production process.<sup>35</sup> It is possible that in the course of designing the tapestry an artist used an actual play as a text, but it is also just as likely that a scholar simply created a new text from commonly known plays. More important than identifying an elusive, unknown play as the source of the story is the fact that the lessons and conventions of narratives in mystery plays were pervasive throughout medieval society.

Elements of actual productions of mystery plays most likely influenced the designs of the tapestries, which contain many stage-like elements. In the scenes of God in the canopy and the Annunciation, the figures are placed within a structure that has drapery for walls and is open on three sides, resembling both the mobile pageants and the stationary pavilion stages used in productions of mystery plays. In addition, the marriage of Mary and Joseph is located on a platform, as if the figures are arranged on a stage. The distinct division of the scenes also relates to the way the plays would have each scene on its own stage. Even the scenes which are not within a structure are clearly defined within a compact space, like the line of the ground in the section with Man and Nature. The presence of meadows may also have been influenced by the presentation of plays in fields. Furthermore, the shallow depiction of space and the presence of the figures close to the picture plane enhance the stage-like quality in the tapestry. Another element seen in mystery plays is the use of labels for the figures, which derives from a common practice in some productions.<sup>36</sup> Even the use of the elaborate costumes and settings may have been influenced by the productions of mystery plays.

The possibility that the compositional forms of the tapestry were derived from conventions in medieval theatre also informs the subject of viewer experience with the tapestry. This tapestry was not meant to be seen simply as a decorative piece or a painting. *The Nativity* had a theatrical function, bringing to life the story and stimulating the viewer just like actors in a play would engage the audience. The simultaneous narrative mimics the ambulatory productions of mystery plays, where all of the scenes happen at once and there is no single viewpoint or central focal point from which to see the

events unfold. Laura Weigert discusses this as analogous to a three-ring circus in which a single location would be highlighted while the others would remain within the viewers’ visual fields.<sup>37</sup> For a viewer during the procession, space was further distorted because the pageants presented different locations side-by-side. Furthermore, in such a large tapestry many of the figures are almost more than life-size, mimicking the closeness between the audience of a play and the stage. A common element described in many of the plays is their requirement of imaginative participation on the part of the audience.<sup>38</sup> *The Nativity* encourages participation through its use of pattern, the use of an unbalanced composition that encourages the eye to move around, and the inclusion of a multitude of detailed figures. This theatrical and interactive experience would have allowed the viewer to also further connect with the religious significance of the story, which reminds viewers of the sacrifice made by Christ on behalf of the sinful nature of man. *The Nativity* provides a visually rich landscape and theologically significant allegorical figures for the viewer to contemplate and interpret. The viewer would have had to visually negotiate the presentation of space and narrative in the tapestry just like in mystery plays.

Considering the fact that *The Nativity* is typical of many late medieval tapestries, it is possible that these pictorial conventions of the time, which encourage viewer interaction and present a lively space, are a result of the general outlook of people in regards to theatricality. Weigert has noted that the increase in quantity and popularity of mystery plays from the fourteenth to sixteenth century corresponds to the expansion of the tapestry industry.<sup>39</sup> The compositional forms that persisted until the early sixteenth century may have continued due to the medieval viewers’ preference for a similar theatrical experience with tapestries. There are very rare but noted occasions that strengthen the argument for a cultural influence by medieval drama; plays were staged based on tapestries and at least one pageant designer was commissioned to design tapestries.<sup>40</sup> This small hint at the exchanges between the world of medieval theatre and tapestry production suggests an encompassing cultural attitude that on some level equated both artistic and theatrical production as well as the importance of viewer activation of a work.

For the modern person with preconceived Albertian notions about art and tapestries, it may be impossible to fully appreciate and comprehend the experience of the medieval viewer when looking at a tapestry like *The*

*Nativity*. Still, the connection between *The Redemption of Man* series and mystery plays suggests one new method of understanding medieval tapestry, not as a lesser art form but as a sophisticated medium meant as more than just decoration. *The Nativity*, in its similarities to mystery play productions, moves towards becoming a performative art with the interaction of a viewer. What might be interpreted as a precursor to the more realistic depictions of space is in reality an engaging composition at a high point of tapestry production. This also indicates the need to look at tapestry not as an art form produced in a vacuum, but to acknowledge the “ways in which tapestry overlaps with other media,” such as theatre.<sup>41</sup> Modern viewers must strive to avoid applying contemporary standards for art, like painting, to tapestries such as *The Nativity*, and work instead towards understanding the values of the artwork in terms of the medieval cultural mindset. The tapestry of *The Nativity* (and *The Redemption of Man* series as a whole) and its connection to the influences of medieval theatre is only one of many examples that demonstrates the relationship between culture, experience, and artwork.

## Notes

<sup>1</sup> William H. Forsyth, “A Tapestry from Burgos Cathedral,” *The Metropolitan Museum of Art Bulletin* 33, no. 6 (1938): 148; and Adolfo S. Cavallo, *Medieval Tapestries in The Metropolitan Museum of Art* (New York: The Metropolitan Museum of Art, 1993), 428.

<sup>2</sup> Anna G. Bennet, *Five Centuries of Tapestries from the Fine Arts Museums of San Francisco* (San Francisco: Fine Arts Museums of San Francisco, 1976), 60; and Adolph S. Cavallo, *Tapestries of Europe and of Colonial Peru in the Museum of Fine Arts*, Boston (Boston, MA: Museum of Fine Arts, 1967), 94.

<sup>3</sup> James J. Rorimer, “New Acquisitions for the Cloisters,” *The Metropolitan Museum of Art Bulletin* 33, no. 5 (1938): 19; and Forsyth, “A Tapestry from Burgos Cathedral,” 148.

<sup>4</sup> D.T.B. Wood, “Tapestries of The Seven Deadly Sins-II,” *The Burlington Magazine for Connoisseurs* 20, no. 107 (1912): 227; Cavallo, *Medieval Tapestries*, 428; Bennet, *Five Centuries*, 56; and Forsyth, “A Tapestry from Burgos Cathedral,” 150.

<sup>5</sup> Weigert, Laura. “Tapestry Exposed,” *The Art Bulletin* 85 (2003): 785.

<sup>6</sup> Thomas P. Campbell, *Tapestry in the Renaissance: Art and Magnificence* (New York: The Metropolitan Museum of Art, 2002), 9.

<sup>7</sup> Suggested by Weigert in “Tapestry Exposed,” 794.

<sup>8</sup> Weigert, “Tapestry Exposed,” 789.

<sup>9</sup> See Michael Baxandall, “The Period Eye,” in *Painting and Experience in Fifteenth Century Italy: A Primer in the Social History of Pictorial Style*, 22-108 (Oxford: Oxford University Press, 1972).

<sup>10</sup> Bennet, *Five Centuries*, 55. Similar themes outlined in D.T.B. Wood, “Tapestries of The Seven Deadly Sins-I,” *The Burlington Magazine for Connoisseurs* 20, no. 106 (1912): 215.

<sup>11</sup> Storyline and iconography outlined in: Cavallo, *Medieval Tapestries*, 440-442.

<sup>12</sup> Cavallo, *Medieval Tapestries*, 427.

<sup>13</sup> Cavallo, *Medieval Tapestries*, 433

<sup>14</sup> Cavallo, *Medieval Tapestries*, 436.

<sup>15</sup> Forsyth, “A Tapestry from Burgos Cathedral,” 150; and Wood, “Seven Deadly Sins-I,” 215.

<sup>16</sup> Wood, “Seven Deadly Sins-II,” 283; Cavallo, *Medieval Tapestries*, 428; Aurelius Prudentius Clemens, *Psychomachia*, ed. and trans. H.J. Thomson, Vol. 1, Loeb Classical Library, vol. 387 (Cambridge, MA: Harvard University Press, 1949; repr. 1969).

<sup>17</sup> Barbara Newman, *God and the Goddesses: Vision, Poetry, and Belief in the Middle Ages* (Philadelphia: University of Pennsylvania Press 2003), 39, 40.

<sup>18</sup> *Ibid.*, 39.

<sup>19</sup> Adolph S. Cavallo, “The Redemption of Man: A Christian Allegory in Tapestry,” *Bulletin of the Museum of Fine Arts* 56, no. 306 (1958): 154; and Cavallo, *Medieval Tapestries*, 431.

<sup>20</sup> Rorimer, “New Acquisitions,” 19; Forsyth, “A Tapestry from Burgos Cathedral,” 150; and Cavallo, *Medieval Tapestries*, 438.

<sup>21</sup> Cavallo, *Medieval Tapestries*, 439.

<sup>22</sup> Campbell, *Tapestry in the Renaissance*, 48.

<sup>23</sup> Campbell, *Tapestry in the Renaissance*, 49.

<sup>24</sup> Campbell, *Tapestry in the Renaissance*, 135.

<sup>25</sup> Alexander Franklin, *Seven Miracle Plays* (London: Oxford University Press, 1963), 11.

<sup>26</sup> Franklin, *Miracle Plays*, 12.

<sup>27</sup> Franklin, *Miracle Plays*, 12-14.

<sup>28</sup> Laura Weigert, “Medieval Theatricality in Tapestry and its Afterlife in Painting,” *Art History* 32, no. 3 (2010): 225.

<sup>29</sup> Franklin, *Miracle Plays*, 16.

<sup>30</sup> Forsyth, “A Tapestry from Burgos Cathedral,” 148; and Franklin, *Seven Miracle Plays*, 12.

<sup>31</sup> Wood, “Seven Deadly Sins-II,” 278; and Forsyth, “A Tapestry from Burgos Cathedral,” 150.

<sup>32</sup> Forsyth, “A Tapestry from Burgos Cathedral,” 150; Wood, “Seven Deadly Sins-II,” 227; Cavallo, *Medieval Tapestries*, 428; and Bennet, *Five Centuries*, 56.

<sup>33</sup> Cavallo, *Medieval Tapestries*, 428; and Bennet, *Five Centuries*, 56.

<sup>34</sup> Wood, “Seven Deadly Sins-II,” 278.

<sup>35</sup> Cavallo, *Tapestries of Europe*, 26.

<sup>36</sup> Cavallo, *Medieval Tapestries*, 34.

<sup>37</sup> Weigert, “Medieval Theatricality,” 228.

<sup>38</sup> Robert S. Sturges, “Spectacle and Self-Knowledge: The Authority of the Audience in the Mystery Plays,” *South Central Review* 9, no.2 (1992): 28.

<sup>39</sup> Weigert, “Medieval Theatricality,” 226.

<sup>40</sup> Weigert, “Medieval Theatricality,” 226; and Cavallo, *Medieval Tapestries*, 34.

<sup>41</sup> Weigert, “Tapestry Exposed,” 794.

# Attitudes towards Immigration Reform in the United States:

## The Importance of Neighborhoods

Noelle Makhoul, FCRH '12

Americans are greatly divided over immigration reform. Public opinion literature provides multiple explanations for these attitudinal differences. One contention in the literature is that the amount of ethnic diversity in one's neighborhood affects mass attitudes towards immigration reform. Within this literature, some scholars argue that ethnic diversity triggers more negative attitudes towards immigration. Others posit that ethnic diversity is associated with positive attitudes towards immigration. In this paper, I seek to contribute to this debate by exploring the role of ethnic diversity in one's neighborhood in shaping public attitudes toward immigration reform. This study is based upon semi-structured interviews with thirteen human subjects conducted in November 2010. The results reveal that individuals residing in ethnically homogenous towns are more likely to support a more liberal immigration reform. These results advance our understanding of how exposure to ethnic diversity influences attitudes towards immigration. These findings provide policymakers with some insights into how to build public support for immigration reform in various neighborhoods.

### Introduction

In 2010, Americans ranked immigration fourth among the most important problems facing the United States (Morales, 2010). Immigrants from around the world choose to settle down in the United States in pursuit of something that their home country could not offer. However, not all US-born Americans appreciate the influx of immigrants. Consequently, there is a constant debate in the policymaking community about the extent to which the United States should "open its doors" to foreigners. On one hand, some analysts fear that excessive immigration may have detrimental effects on the economy. According to the Center of Immigration Studies, the fiscal cost of unskilled immigrants is estimated to be anywhere from 11 to 22 billion dollars a year, which offsets any economic gains from access to immigrant labor (Camarota, 2003). On the other hand, others claim that the American work force cannot function without immigrants. The American Immigration Law Foundation (2002), for example, concluded that Mexican immigration is integral to economic growth. Public opinion plays a prominent role in this debate over immigration reform. Most US-born Americans

are able to relate their family history to immigration. Yet, many of them are unwilling to embrace the idea of continuous immigration.

Why are some individuals more likely to favor a less restrictive immigration reform than others? This paper seeks to answer this question by exploring the significance of neighborhoods in shaping attitudes toward immigration reform. The findings suggest that individuals residing in ethnically homogenous towns, compared to those in ethnically diverse towns, are more likely to support the implementation of an immigration policy aimed at increasing the number of legal immigrants. The data from semi-structured interviews indicate that individuals residing in ethnically diverse towns developed a sense of frustration with immigrants, while those without much firsthand contact with immigrants held more accepting views towards immigrants. This study seeks to contribute to existing literature by illuminating citizens' reasoning behind their attitudes toward immigration reform.

In this paper, the key terms are defined in the following manner. The term *immigration* is used to describe le-

I would like to thank Dr. Nikolayenko for her supervision of my research and the participants in this study for their willingness to share their attitudes toward immigration. Direct all correspondence to Noelle Makhoul at makhoul@fordham.edu.

gal immigration as opposed to illegal immigration. In addition, the term *liberal immigration reform* refers to an overall increase in the amount of immigrants who are allowed to enter the country legally and are granted citizenship. The word *native* describes anyone who was born in the United States. Finally, the phrase *ethnically homogenous town* refers to towns that are mainly composed of Caucasians and towns that have a small percentage of recent immigrants.

This paper proceeds as follows: The first section discusses current debates in the literature on attitudes towards immigration reform. The second section describes the research methodology and socio-demographic background of the respondents. The third section presents the empirical findings. The paper concludes by specifying policymaking implications of these findings and pointing out limitations of this research.

### Theoretical Background

Over the past four decades, scholars have analyzed the role of economic, political, and cultural factors in explaining support for immigration reform (Espenshade & Hempstead, 1995; Fenelley & Federico, 2007; Wilkes et al., 2008). Numerous attempts have been made to test the effects of education, income, ideology, party affiliation, and culture on attitudes toward immigration. In recent years, the impact of contact with minorities has attracted academic attention. Yet, this research has produced mixed results.

In the 1970s and the 1980s, researchers devoted considerable attention to the impact of economic factors on support for immigration reform (e.g., LeVine & Campbell, 1972). Neorestrictionism emerged in the United States during that period because of concerns with the state of the economy. Proponents of the neorestrictionist view argued that the biggest problem caused by immigrants was economic in nature. A major concern was that immigrants would take jobs away from natives, contributing to a greater level of unemployment. In support of this view, Mayda (2006), for example, finds that the state of a country's national economy and immigrant-to-native skill ratio influenced attitudes toward immigration. A related argument in the literature is that income and education are positively related to tolerant attitudes towards immigration. According to the labor market competition hypothesis, most of complaints about the influx of immigrants are made by individuals at the bottom of the socioeconomic ladder, because low-skill and low-wage native workers have

occupational characteristics similar to those of today's new immigrants (Abowd & Freeman, 1991; Borjas & Freeman, 1992; Espenshade & Hempstead, 1995; Simon, 1987). This threat may exist only for certain subgroups, which, as a result, makes it harder to capture empirically (Ayers et al., 2009).

By the same token, previous research suggests racial undertones in attitudes toward immigration policy (Ayers et al., 2009; Dustmann & Preston, 2004). According to the ideological model, attitudes about immigration are driven by racism (Wilkes et al., 2008). Ayers et al., (2009) argues that immigration policy preferences are strongly influenced by racial resentment toward the racial groups of incoming immigrants. Similarly, Lovemann and Hofstretter (1972) conclude that certain ethnicities, such as Latinos, are perceived as undesirable in comparison to European immigrants.

In addition, the role of cultural factors has recently attracted academic attention. The cultural affinity hypothesis states that individuals who have close cultural ties as well as ethnic ties to their home country would be more likely to favor liberal immigration policies (Espenshade & Hempstead, 1995). In addition, those who have close relatives in other countries, especially relatives who would like to come to the United States, are more likely to support a more lenient immigration policy. For instance, Espenshade and Hempstead (1995) find that Hispanic, African Americans, and Asian Americans are more likely to be pro-immigration than non-Hispanic whites.

In contrast, the contextual interaction hypothesis focuses on proximity to minorities. Past studies have assumed that contact with minorities mitigates prejudice because prejudices are based on easily falsified beliefs (Allport, 1954; Ayers et al., 2009). According to Allport (1954), when groups are of equal status and when contact receives support from authority figures and the greater society, inter-group hostility is lessened. In addition, the greater heterogeneity of certain geographic areas is often associated with greater tolerance of diversity (Fennelly & Federico, 2007). It is assumed that contact with minority groups in neighborhoods facilitate social bonds and may introduce common goals between members of different ethnic groups.

Social bonds are critical to explaining immigration attitudes. Researchers find that individual contact with minorities reduces the approval of the deportation of

immigrants (Ayers et al., 2009; McLaren 2003). In addition, empirical evidence indicates that living in areas with concentrations of Latinos and Asians is associated with more liberal stances on immigration among native residents (Ayers et al., 2009; Hood & Morris, 1997). Some studies that employ direct measures of contact with immigrants show that individuals with low contact are more likely to support restrictive immigration policies (Fennelly & Federico, 2007). This adds to the idea that individuals living in ethnically diverse areas who encounter immigrants frequently are likely to support a more liberal immigration reform.

However, recent empirical evidence challenges the validity of the contextual interaction argument. A study conducted by Ayers et al. (2009) concludes that living in neighborhoods with larger Latino concentrations decreased support of immigration. In addition, those living close to the Mexican border, such as in Texas or California, are more likely to support more restrictive immigration policies than Americans living in other parts of the country (Fennelly & Federico, 2007). Some researchers advance a realistic group conflict theory to explain why increased proximity to migrants may cause more negative attitudes towards immigrants. It is assumed that increased proximity may amplify ideological and material competition, which can accentuate divisions (Ayers et al., 2009; LeVine & Campbell, 1972). In other words, individuals may be more prone to reject a liberal immigration reform to protect their own beliefs and status. Negative sentiments regarding immigration can be understood as a defensive reaction to competition (Espenshade & Hempstead, 1995).

This study seeks to engage in this debate by examining how ethnic diversity in one's neighborhood shapes individual attitudes towards immigration. Although some research has been conducted on this topic, it is still debatable in the literature. This article aims to contribute to the literature by providing evidence that ethnic diversity in one's neighborhood is an important factor in determining attitudes towards immigration reform.

### Methodology

In order to understand how ethnic diversity in one's neighborhood impacts attitudes toward immigration, I conducted semi-structured interviews with human subjects. According to Wengraf (2001), "semi-structured interviews are designed to have a number of interviewer questions prepared in advance but such pre-

pared questions are designed to be sufficiently open that the subsequent questions of the interviewer cannot be planned in advance but must be improvised in a careful and theorized way." The advantage of this research method is that it allows new questions to be developed throughout the interview. Written questionnaires, consisting mainly of close-ended questions, place constraints on the quality of data that could be collected for they prevent the use of follow-up questions. Quite often, however, respondents are hesitant to answer certain questions. In this study, this was especially true for the questions pertaining to the potential job losses as a result of immigration. Therefore, in these instances, it was necessary to use follow-up questions to collect additional data, which is not typically allowed in written questionnaires. Because semi-structured interviews allow for a more "open" interview process, they are best suited to answer my research question.

The convenience sample was drawn. Thirteen individuals were interviewed in November 2010. The first five interviewees referred me to the remaining eight participants in the study. All of the participants were, at least, first generation Americans and had basic knowledge about their ethnic background. They were between the ages of 18 and 22. Five of them were female. Six of the interviewees identified themselves with the Republican Party, the other six with the Democratic Party, and one respondent was not affiliated with any particular party. They were full-time students enrolled at Fordham University, New York University, Montclair State University, and Rutgers University. Many of the participants attended school in New York City and therefore were familiar with the locale. Most of the participants permanently resided on the East Coast, and one individual resided on the West Coast.

The sample included seven individuals who resided in such ethnically diverse towns as Fort Lee, NJ; La Habra, CA; Miami, FL; and New York City. According to the census data, Fort Lee, New Jersey has the following ethnic composition: 62.8% Whites (7.9% - Hispanic), 31.4% Asian Americans, 1.7% African Americans (United States Census, 2010). The census data also confirm the racial and ethnic diversity of the other cities. The ethnic composition of La Habra is 63.0% Whites, 5.9% Asian-Americans, and 49% of La Habra's population reported that they were of Hispanic descent. In Miami, Florida, 65.8% of the population reported that they were of Hispanic descent. Finally, the population of New York City, which was listed as a city of residence by one participant, consists of 44.7% Whites,

26.6% African Americans, and 9.8% Asian Americans. Of all New Yorkers, 27.0% are of Hispanic descent.

The remaining six individuals claimed that they lived in an ethnically homogenous, predominantly Caucasian town. One respondent, for example, resided in Newton, New Hampshire where the majority of the population, 96.2%, was white. Only 1.7% of the city's population consisted of Asian Americans, and 2.2% were of Hispanic descent (United States Census, 2010).

In sum, the interview process consisted of approximately twenty open-ended questions (for a list of questions, see the Appendix). The interviews lasted from twenty to thirty minutes.

### Findings

Based on the data from semi-structured interviews, this study challenged the assumption that individuals living in ethnically diverse towns are more likely to support a more liberal immigration reform than individuals living in ethnically homogenous, predominantly Caucasian, towns. A close analysis of the participants' responses revealed why such a trend was observed in the sample.

The results indicated that the respondents had some common understanding of the key terms. When the interviewees were asked to define the term *immigrant*, the common response was "somebody who moves to another country from his or her homeland." Such initial responses, however, lacked any indication of how the respondents felt about immigrants.

Upon further probing, the findings revealed variations in attitudes toward immigration. When presented with the question "Do you support immigration?" all the respondents residing in ethnically homogenous towns answered in the positive, without any qualifications. In contrast, the respondents who resided in ethnically diverse towns expressed more skepticism about the ongoing influx of immigrants. One respondent from La Habra, California, an ethnically diverse area with a high percentage of Mexican, as well as other Latino, immigrants stated, "I think everyone deserves a chance; however, I support immigration to a limited extent" (Subject 6). This individual lived in La Habra for his whole life. In addition, he is considered a second-generation American, being that his father is a Canadian immigrant.<sup>1</sup> Yet, his place of residence and family back-

ground failed to produce the strong endorsement of liberal immigration policies. Another respondent from Fort Lee, an ethnically diverse town in New Jersey, reported lukewarm support for immigration: "It kind of bothers me, because the immigrants in my town hate everyone but themselves" (Subject 8). This participant also noted that she is a third-generation American with the majority of her family emigrating from Europe. The findings suggested that neighborhoods have a more pronounced effect on support for a less restrictive immigration policy than a recent record of immigration in the family histories of these participants.

Furthermore, this study found that the respondents living in ethnically diverse towns were likely to support a more selective process in allowing immigrants to enter the country. One respondent living in an ethnically diverse town consisting of many recent immigrants stated, "I support [a less restrictive] immigration reform. However, those who legally enter the country should be allowed to do so based on how qualified they are to live here" (Subject 4). Another respondent residing in an ethnically diverse town stated:

*It depends. I do support [a more liberal] immigration reform but other reforms need to come with it. If a greater amount of individuals were to enter the country, I wouldn't mind but the fact is, we need to maintain our "American" identity. By this, I mean that in areas concentrated with different ethnic groups, it is important to respect their cultures while maintaining certain standards, such as English taking precedence over other languages. Too frequently our national language is superseded by different languages (Subject 8).*

These findings challenged the contextual interaction hypothesis. If contact with minorities and greater heterogeneity in one's neighborhood is supposed to account for a greater tolerance of diversity, then individuals living in ethnically diverse towns would be more prone to support immigration without qualifications, for immigration increases ethnic diversity. Yet, this assumption did not hold. Instead, the findings supported the hypothesis that increased proximity to minorities is associated with more restrictive attitudes towards immigration. One explanation for this trend is provided by realistic group conflict theory, stating that increased proximity to minorities may increase material and ideological competition.

<sup>1</sup> Second-generation American refers to "the children of contemporary immigrants" (Zhou, 1997, p. 64)

The survey data lend support to the realistic group conflict theory. The respondent (Subject 8), who resided in a very ethnically diverse neighborhood with a large number of recent immigrants and first generation Americans, pointed out that she was bothered by the amount of recent immigrants in her neighborhood. According to Subject 8, the recent immigrants in her residence “hate anybody who is not them.” In addition, this respondent expressed the belief that the “American” identity was suppressed due to immigration. On numerous occasions, the respondent mentioned the unwillingness of immigrants to assimilate as a reason for her lack of support for immigration thus supporting the theoretical argument about the significance of ideological competition. Additional support for realistic group conflict theory is provided by data from the interview with the respondent from La Habra. He specifically stated that he “did not want too many people to come in” and expressed a concern with overpopulation. Excessive crowding in one area could cause material competition amongst individuals for certain resources, such land and public housing, thus creating conflict between groups. Therefore, this respondent’s concern with overpopulation parallels with the idea set forth by realistic group conflict theory.

Next, the findings indicated that those who resided in an ethnically homogenous town were more likely to support a less restrictive immigration reform. One respondent, from Newton, New Hampshire, stated that he was in favor of immigration because his “ancestors were all immigrants” (Subject 1). When this individual was further questioned about his ethnic background, he had difficulty tracking his origins to any specific ethnic group. Instead, he proudly stated that he was American. As a resident of Newton, he correctly estimated the percentage of immigrants in his town. He also noted that he did not have much interaction with them. Another individual from an ethnically homogenous town stated that he “would like to see less restrictions on immigration” (Subject 3). As a high school student, he went to a private preparatory school where the student population was quite homogenous. This respondent also stated that he had descendents from Ireland but overall, very little contact with recent immigrants. The findings from individuals residing in ethnically homogenous towns showed that the dearth of contact with recent immigrants fostered favorable attitudes toward immigration.

Turning to the influx of immigrants to a specific locale, the study gauged the respondents’ feelings toward the

number of immigrants in New York City. The results showed that all the respondents, despite their attitudes towards immigration as a whole, expressed positive feelings about the number of immigrants in the city. In part, these findings derive from the fact that the respondents were shielded from the regular interaction with immigrants due to their university experience. On campus, students mostly socialized other with U.S.-born students. It must be noted that only one of the respondents actually resided in New York City, while other participants only made frequent trips to the city. However, this individual stated that she spent most of her formative years in South Korea, an ethnically homogenous country. This suggests that when individuals are not directly and constantly exposed to a large number of immigrants, they are more likely to express positive sentiments towards the idea of immigration. Even individuals who were skeptical about immigration in general did not express the same level of skepticism when describing their feelings about immigrants in New York City. Thus, increased proximity to immigrants, such as residing in ethnically diverse towns, does not make individuals more prone to support diversity caused by immigration.

In sum, the empirical evidence derived from semi-structured interviews challenged the argument that ethnic diversity in one’s neighborhood promotes support for more liberal immigration reform. The findings showed that respondents from ethnically homogenous towns who did not have a lot of contact with recent immigrants were more likely to support liberal immigration policies.

### Conclusion

The findings supported the argument that individuals who reside in ethnically homogenous towns are more likely to support liberal immigration reform than individuals who reside in ethnically heterogeneous towns. The results showed that respondents from ethnically diverse towns were more likely to place restrictions on immigration, indicating their skepticism about the positive effects of increased immigration. The empirical evidence documenting that individuals within the physical proximity to immigrants appeared to be somewhat intolerant of such diversity suggested that the contextual interaction hypothesis did not hold. In contrast, these findings provided empirical evidence in support of the realistic group conflict theory.

Since the main issue underlying realistic group conflict

theory is ideological and material competition, policy-makers might reduce the magnitude of such competition by fostering dialogue among recent immigrants and US-born Americans. In particular, educators can raise students' awareness of multiple effects of immigration on their communities and create opportunities for students' exposure to ethnic and racial diversity in their neighborhoods. At Fordham, for example, courses with a service learning component can bring students closer to the neighborhoods in which they reside. On a macroeconomic level, to remedy such intolerance of immigration, the government could allocate more funding to provide education and jobs to recent immigrants. When immigrants are of the same status as natives and are driven to reach common goals, natives are more likely to accept the idea of immigration.

This study has some limitations. The sample consisted of only college-aged students, which is not representative of the general population. This is especially problematic because older individuals tend to have more conservative views on immigration which could have provided more data on attitudes towards immigration reform. In addition, the convenience sample was quite small. Only 13 individuals were interviewed, which does not allow me to make generalizations about the student population in the United States. Further research is necessary to arrive at stronger conclusions about the effects of ethnic diversity in one's neighborhood on attitudes toward immigration.

**References**

Allport, G.W. (1954). *The Nature of prejudice*. Garden City, NJ: Doubleday Anchor Books.

American Immigration Law Foundation. (2002). Mexican immigrant workers and the U.S. economy: an increasingly vital role. *Immigration Policy Focus*, 1. Retrieved from [http://www.unityblueprint.org/\\_documents/research-and-policy/immigrant-workers/2.AILF-MexImmWorkers&USEcon.pdf](http://www.unityblueprint.org/_documents/research-and-policy/immigrant-workers/2.AILF-MexImmWorkers&USEcon.pdf)

Ayers, J., Hofstetter, C.R., Schnakenberg K., & Bohdan, K. (2009). Is immigration a racial issue? Anglo attitudes on immigration policies in a border county. *Social Science Quarterly*, 90, 593-610.

Camarota, S. (2003). *The Impact of Immigration on American Workers*. Retrieved from <http://www.cis.org/node/531>.

Espenshade, T.J., and Hempstead, K. (1995). Contemporary American attitudes toward U.S. immigration. *International Migration Review*, 30, 535-609.

Fennelly, K., and Federico, C. (2007). Rural residence as a determinant of attitudes toward US immigration policy. *International Migration*, 1-34.

Hood III, M.V., and Morris, I.L. (1997). Amigo o enemigo?: context, attitudes, and Anglo public opinion toward immigration. *Social Science Quarterly*, 78, 309-23.

LeVine, R.A., and Campbell, D.T. (1972). *Ethnocentrism: Theories of conflict, ethnic attitudes, and group behavior*. New York: Wiley.

**Appendix. Question Wording**

- How old are you?
- Political Party Affiliation: Which political party do you identify with?
- Residence (City, State): Where do you live?
- Could you describe the neighborhood in which you grew up?
- What type of setting is it?
- Have you lived there your whole life?
- How ethnically diverse is it?
- Do a lot of recent immigrants or first generation Americans live in that neighborhood?
- How do you feel about the number of immigrants in your neighborhood?
- Define the word "Immigrant."
- Do you agree with the idea that immigrants take away jobs?
- Do you support the idea of immigration?
- What is your level of support for immigration reform? Why?
- How do you feel about the number of immigrants in NYC?
- How do you feel about the Arizona Laws?
- Hypothetically speaking, if you were elected into political office, what would your political stance be about immigration?
- Can you state your ethnic background?
- Which generation are you?

Loveman, B., and Hofstetter, C.R. (1984). American perceptions of undocumented immigrants: political implications. *New Scholar*, 9, 111-18.

Mayda, A. M. (2006). Who is against immigration? A cross-country investigation of individual attitudes toward immigrants. *Review of Economics and Statistics*, 88, 510-30.

Morales, L. (2010, July 27). Amid immigration debate, Americans' views ease slightly. *Gallup*. Retrieved from <http://www.gallup.com/poll/141560/Amid-Immigration-Debate-Americans-Views-Ease-Slightly.aspx>

Muller, T., & Espenshade, T.J. (1995). *The fourth wave: California's newest immigrants*. Washington D.C: The Urban Institute Press.

U.S. Census. (2011). "States and countries quick facts". [Data file]. Retrieved from <http://quickfacts.census.gov/qfd/index.html>.

Wengraf, T. (2001). *Qualitative research interviewing: Biographic narrative and semi-structure methods*. Thousand Oaks, CA: Sage.

Wilkes, R., Guppy, N., & Farris, L. (2008). "No thanks, we're full": individual characteristics, national context and changing attitudes toward immigration. *International Migration Review*, 42, 302-29.

Zhou, M. (1997). Growing up in America: the challenge confronting immigrant children and children of immigrants. *Annual Review of Sociology*, 23, 63-95.

# The Spontaneous Formation of Selenium Nanoparticles on Gallic Acid Assemblies and their Antioxidant Properties

Stacey Barnaby, FCRH '11  
 Nazmul Sarker, FCRH '13  
 Aaron Dowdell, FCRH '12  
 Dr. Ipsita Banerjee

Gallic acid (GA) is a naturally occurring plant phenol known for its anti-inflammatory and antioxidant properties. In this work, we probed the molecular self-assembly of GA for the development of GA based nanocomposites for potential device fabrications and enhanced antioxidant applications. We found that the formation of GA nanostructures was pH dependent. Further, we examined the interactions of selenite with GA and subsequently examined the biomimetic formation of selenium (Se) nanoparticles. We found that in the presence of selenite, the yield of nanofibers was significantly higher, and selenium nanoparticle coated nanofibers were formed. The ability of the nanocomposites to scavenge free radicals was also explored. Thus, we have developed a new family of Se nanoparticle coated GA nanofibers, which could not only be applicable as potent antioxidants at the nanoscale but may also have potential applications in optoelectronics and sensors.

## Introduction

Nanomaterials have been gaining popularity in recent times due to their wide range of applications in the development of magnetic materials for data storage, optoelectronics, medical diagnostics, sensors, and alternative energy.<sup>1</sup> The potential for nanomaterials to be utilized in a plethora of applications often stems from their ability to self-assemble into supramolecular structures, such as nanotubes, nanofibers, nanocrystals, nanorods, nanocapsules, and nanowires.<sup>2</sup> These nanostructures form the basic building blocks of nanodevices by the bottom-up approach. Succinctly, self-assembly begins at the atomic level, where it relies upon chemical complementarity in order to allow materials on the molecular level to come together and form higher ordered structures. Non-covalent interactions, such as hydrogen bonding and ionic interactions, hydrophobic interactions, Van der Waals forces, and  $\pi$ - $\pi$  stacking interactions have been known to direct the formation of the aforementioned supramolecular nanostructures.<sup>3</sup> Although these forces are individually weak, they work in tandem to direct the formation of the resulting hierarchical structures, and are seen ubiquitously throughout nature in biomolecules such as proteins, nucleic acids, lipids, and phytohormones.

In this work, we explored the formation of nanostructures of the plant polyphenol Gallic acid (GA) and

examined its potential to direct the formation of selenium nanoparticles. The rationale being that, at the nanoscale, the properties of GA may be significantly altered compared to bulk materials due to size and shape control. Gallic acid (3,4,5-trihydroxyl-benzoic acid) is naturally found in various plants, fruits, and foods such as gallnuts, oak, green tea, grapes, strawberries, pineapples, bananas, lemons, and apple peels.<sup>4</sup> In nature, GA exists in two forms: either in its free state or as an ingredient of tannins,<sup>5</sup> namely gallotannin.<sup>6</sup> Previous studies have indicated a number of biomedical applications for GA due to its antibacterial, antiviral,<sup>7</sup> anti-inflammatory,<sup>8</sup> and antioxidant properties.<sup>9</sup> In addition, GA has been shown to also portray anti-cancer activity in a multitude of cancer cells such as leukemia, prostate, lung, gastric, colon, breast, cervical, and esophageal.<sup>10</sup>

A variety of metal nanoparticles such as Ag, Au, Pd, and Pt have been synthesized, and GA specifically has been utilized to form Au and Ag nanoparticles.<sup>11-13</sup> However, to our knowledge, no study has been carried out to examine the biomimetic formation of GA – Se nanocomposites. It would be advantageous to develop GA – Se nanocomposites as it might lead to the formation of highly potent antioxidant materials, due to the inherent biological properties of GA and Se indi-

The authors thank Dr. Areti Tsiola and Dr. Karl Fath at the Queens College (CUNY) Core Facilities for Imaging, Cell and Molecular Biology for the use of the transmission electron microscope and the NanoDrop 2000 spectrophotometer. SB thanks the Fordham College Undergraduate Research Grant for financial support. The authors would like to thank Brian Williams for his assistance with the DPPH assay. Direct all correspondence to Dr. Ipsita Banerjee, Department of Chemistry, Fordham University, Bronx, NY 10458 (banerjee@fordham.edu)

vidually. The antioxidant abilities of Se are believed to be a result of selenoenzymes such as selenium-dependent glutathione peroxidases, which prevent free radical damage to cells.<sup>14</sup> This property is of prime importance to the biomedical field, particularly in the area of cancer prevention.

Other advances in the area of selenium based nanotechnology stem from its high photoconductivity; catalytic activity for hydration and oxidation reactions;<sup>15</sup> as well as its high piezoelectric, thermoelectric, and nonlinear optical responses<sup>16</sup>—all of which can be applied to systems such as solar cells and rectifiers. In the past, Se nanoparticles have been synthesized utilizing a variety of methods, including using the redox reaction of selenourea and peroxyxynitrite.<sup>17</sup> It has also been reported that the decomposition of sodium selenosulfate using acids in solutions of surfactants (sodium dodecylsulfonate, cetylpyridinium chloride) or certain polymers (sodium polyphosphate, gelatin, polyvinyl alcohol, polyethyleneglycol) allow for the formation of colloidal Se nanoparticles.<sup>15</sup> This allows for a more uniform size distribution.

While the above methods can be used to synthesize Se nanoparticles in a fairly narrow range of diameters, they require harsh reducing agents or stabilizers.<sup>16</sup> The recent surge in the development of environmentally friendly synthetic methods has led to the development of biomimetic methods, which allow nanoparticles to form spontaneously,<sup>18</sup> and provide control over the formation of size, structure, orientation, and shape of the resulting nanoparticles. This could lead to numerous possibilities for designing nanoparticles with very specific attributes. It has been reported that the protein bovine serum albumin (BSA) is involved in the formation of Se nanoparticles when selenium precursors were combined with BSA and hydrazine in a 6:1 ratio at 85°C in an aqueous solution, forming selenium nanobars; whereas in a 1:1 ratio, nanospheres were

formed.<sup>19</sup> Thus, the concentration of the Se precursor, in the presence of the stabilizer, dictated the shape of the nanoparticles formed. Further, it was found that changing the temperature, the shape directing agent, as well as the pH value allowed for control over the formation of the nanoparticles. Herein, we have examined the self-assembly of GA as well as the growth of Se nanoparticles in the presence of GA. We also examined the radical scavenging efficacy of the nanoconjugates.

## Materials and Methods

### Materials

2,2-diphenyl-1-picrylhydrazyl (DPPH), dithiothreitol (DTT), and sodium selenite were all purchased from Sigma Aldrich. Buffer solutions of various pH values were purchased from Fisher Scientific. Gallic acid was purchased from Acros Organic.

### Methods

#### SELF-ASSEMBLY OF GALLIC ACID

The growth of GA nanostructures was probed at different concentrations (3 mM- 20 mM). The effect of pH was studied in a range of 2-9. The structures were allowed to self-assemble for a duration of one to four weeks, at which point they were centrifuged and washed thrice using distilled water. Supernatant was removed via micropipette before analysis.

#### GROWTH OF SE NANOPARTICLES IN THE PRESENCE OF GALLIC ACID

GA solution was prepared at different concentrations (3 mM- 20 mM) in pH 5, 7, and in distilled water. Sodium selenite was added to the GA solution in a 1:1 ratio. The reducing agent dithiothreitol was added dropwise ( $\approx 10 \mu\text{L}$ ) until a brick red color was observed. The formation of nanoparticles was monitored over a period of twenty-four hours using fluorescence spectroscopy, followed by centrifugation, washing solution twice, and removal of supernatant via micropipette before analysis.

#### DPPH RADICAL SCAVENGING ASSAYS

Studies were carried out with selenium nanoparticle bound GA nanostructures as well as on GA nanofibers alone. For the assays, the concentrations of GA nanofibers as well as the GA fibers coated with Se nanoparticles was varied from a range of 1.0 mM - 3.0 mM. The concentration of DPPH was kept constant at 0.75 M and the solutions were brought to a constant volume

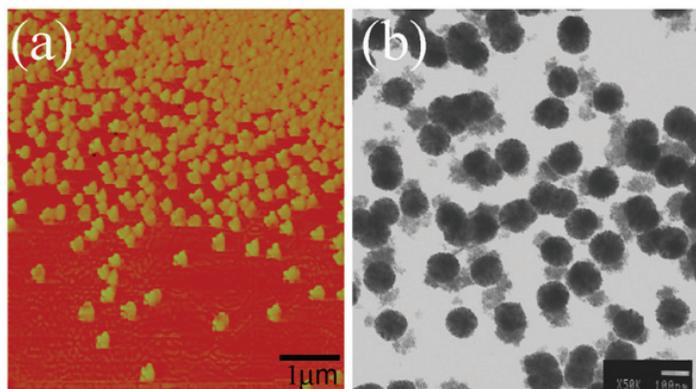


Figure 1- AFM images of self-assembled GA nanostructures grown at a) pH 5; b) pH 7.

by addition of buffer solution (pH 7.4). Immediately upon addition of the DPPH stock solution, absorbance spectroscopy readings were carried out for a period of one hour.

## Characterization

### FTIR Spectroscopy

Analyses of the GA monomer and self-assembled GA were performed using Matteson Infinity IR equipped with DIGILAB, ExcaliBur HE Series FTS 3100 software. The washed samples were dried, mixed with spectroscopic grade KBr, and pressed into pellets. The measurements for the samples were carried out at 400-4000  $\text{cm}^{-1}$ .

### UV Vis (Absorbance) Spectroscopy

UV Vis spectroscopy was carried out using a Thermo Scientific NanoDrop 2000 spectrometer. Readings were taken at a wavelength range of 190 nm to 700 nm using a 1-2  $\mu\text{L}$  solution. A buffer solution was utilized as the solvent. All samples were repeated in triplicates.

### Fluorescence Spectroscopy

Analyses of the presence of Se nanoparticles in various GA solutions were carried out using a Jobin Yvon Fluoromax 3 fluorimeter. Samples were excited at 597 nm.

### Atomic Force Microscopy

The samples were centrifuged and washed twice using distilled water. The supernatant was removed using a micropipette and then the sample was placed on mica sheets and dried for analysis using a Quesant Universal

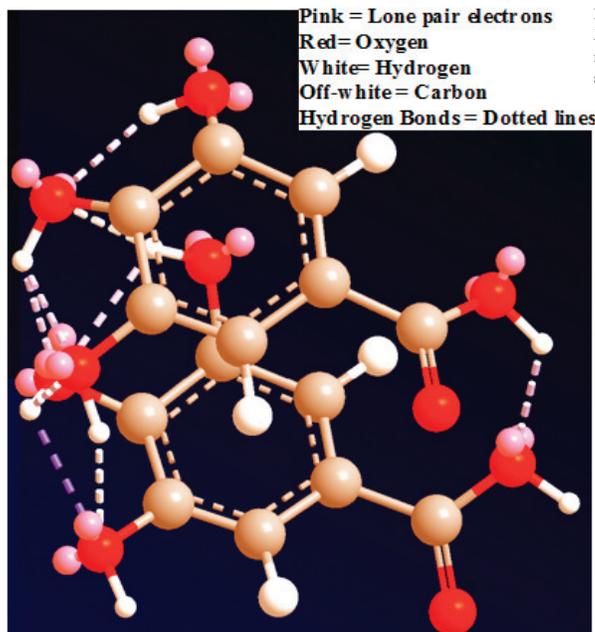


Figure 2- Molecular model of GA self-assembly.

SPM microscope, which was used in contact mode in air using a silicon nitride cantilever.

### Transmission Electron Microscopy

The morphologies of the samples were analyzed by TEM (JEOL 1200 EX), operated at 100 KV. Samples were washed twice in distilled water and air-dried on carbon-coated copper grids for analysis.

## Results and Discussion

### Growth of GA nanostructures

The GA moiety contains a phenolic ring system as well as three hydroxyl groups and a single carboxyl group, making it a pH sensitive molecule potentially capable of aromatic stacking interactions under appropriate growth conditions due to its ring system. Self-assembly processes involving a range of aromatic ring systems such as azopyridine side chain polymers,<sup>20</sup> tetra-aryl derivative of bimesityl,<sup>21</sup> and different linear triblock

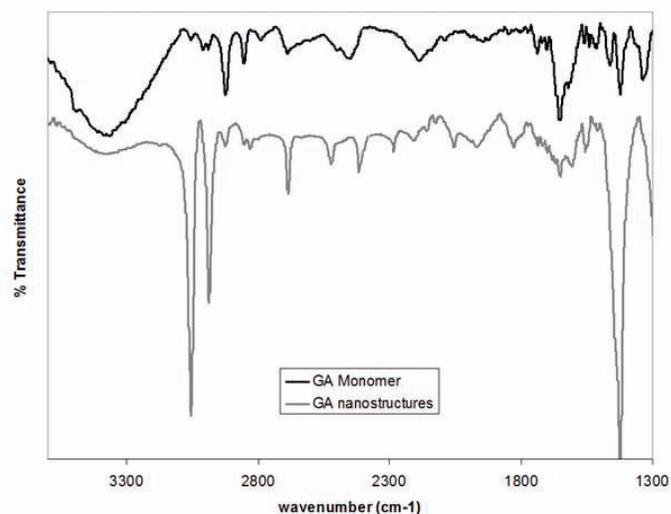


Figure 3- Comparison of FTIR spectra of GA monomer with self-assembled nanostructures.

copolymers of poly(*tert*-butoxystyrene)-*b*-polystyrene-*b*-poly(4-vinylpyridine) have been investigated.<sup>22</sup> For example, in the case of phenolic -OH groups in bimesityl derivatives, various packing motifs were formed via self-assembly, wherein the helical motif was the predominant form observed.<sup>21,23</sup> In contrast, the carboxyl groups mainly form a dimeric catemeric motif.<sup>24</sup> In the case of triblock copolymers, the addition of pentadecylphenol and/or nanodecylphenol allowed for cylindrical assembly.<sup>22</sup> Thus, aromatic residues play an important role in the self-assembly process due to stacking interactions.<sup>25</sup> Phenolic ring systems have also been reported to play vital roles in the self-assembly of long and hollow peptide nanotubes of Trp-Phe,<sup>26</sup> due

to  $\pi$ -stacking interactions.<sup>27</sup> Therefore, GA is primed to be an ideal molecule for the formation of unique nanostructures via self-assembly. In fact, Faggi and co-workers found that the synthesis of fluorinated derivatives of GA self-assemble into nanosized fibers or balls.<sup>28</sup> It was seen that the semi-perfluorinated chains played a vital role in the aggregation.

The growth of GA nanostructures was probed by AFM and TEM. When grown under mildly acidic to neutral conditions (pH 5-7), we observed a high propensity of nanospheres (Figures 1a and 1b). However, when grown at pH 7, nanospheres larger in diameter (>500 nm) were obtained. It was observed that GA showed color changes, which were dependent on the pH in which it was grown. Specifically, at pH 5 a yellow-orange color was observed while at pH 7, it turned dark brown. This demonstrates the potential use of GA as a pH sensor.<sup>29</sup> The pKa values of GA are 4.10 and 8.38, indicating that it undergoes step-wise deprotonation as the pH increases.<sup>30</sup> At elevated pH values, there is a higher propensity of negative charges, which is inhibitory to the self-assembly due to repulsion. This is consistent with our results, as the most abundant supramolecular structures were observed at lower pH values. Mechanistically, this confirms that hydrogen bonding plays a pivotal role in the self-assembly process, wherein at lower pH, hydrogen bonding is higher. The proposed self-assembly of GA at low pH is shown in Figure 2.

FTIR spectroscopy was also utilized to further confirm the formation of self-assembled nanostructures. As seen in Figure 3, in the case of the GA monomer, the hydroxyl group peak is observed at 3385 cm<sup>-1</sup>. However, in the case of the nanostructures, the peak is shifted to 3396 cm<sup>-1</sup>, most likely due to the fact that the hydroxyl groups are hydrogen bonded intramolecularly, as well as intermolecularly with other -OH groups and with carboxyl groups of GA moieties in the vicinity. In addition, strong peaks are observed at 3054 cm<sup>-1</sup> and 2990 cm<sup>-1</sup> due to the presence of hydrogen bonded carboxyl groups and aromatic C-H stretch of phenolic groups. The C=C ring stretch is shifted from

1655 cm<sup>-1</sup> to 1652 cm<sup>-1</sup> in the case of the nanostructures. An intense C-O stretching peak is also observed at 1425 cm<sup>-1</sup> in the case of the nanostructures, which are shifted compared to the relatively less intense peak at 1423 cm<sup>-1</sup> in the case of the monomer. These results further confirm the formation of nanostructures.

#### Formation of Se Nanoparticles in the Presence of Gallic Acid

In the presence of Se ions, we observed a remarkable transformation in the growth of the nanostructures, as nanofibers of uniform diameter 50-75 nm were formed upon incubation with Se within one week at pH 7. Depending on the growth period, the nanofibers were an average of 5-10  $\mu$ m. This is most likely because selenium ions form complexes with GA. Previous studies have shown that a 1:1 reaction of iron (III) and GA forms a binary complex, where the Fe is complexed with GA via the hydroxyl groups.<sup>31</sup> It is likely that similar interactions between GA and Se<sup>2+</sup> occur, where the Se ion complexes with GA. The proposed structure for formation of the complex is shown in Figure 4.

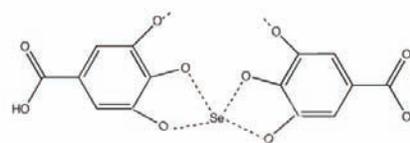


Figure 4- Complexation of GA with selenium.

The formation of GA-Se complexes was also confirmed visually, wherein a blue color was observed upon formation of the complexes. Furthermore, FTIR spectroscopy of the complexes showed that the peak at 570 nm was red shifted by 20 nm, most likely due to coordination with GA.<sup>32</sup> Since Se successfully bound to GA, resulting in the formation of nanofibers, we explored

the coating of nanoparticles on the GA nanofiber templates. Thus, DTT was added to the GA nanofibers complexed with Se in order to induce the formation of Se nanoparticles. We observed a color change to brick red, thus confirming Se nanoparticle formation. TEM analyses revealed that the quantity and organization of nanofibers is much greater in the presence of Se nanoparticles, (Figure 5) indicating that interactions with Se accelerate the growth of the nanofibers, due to binding interactions between Se

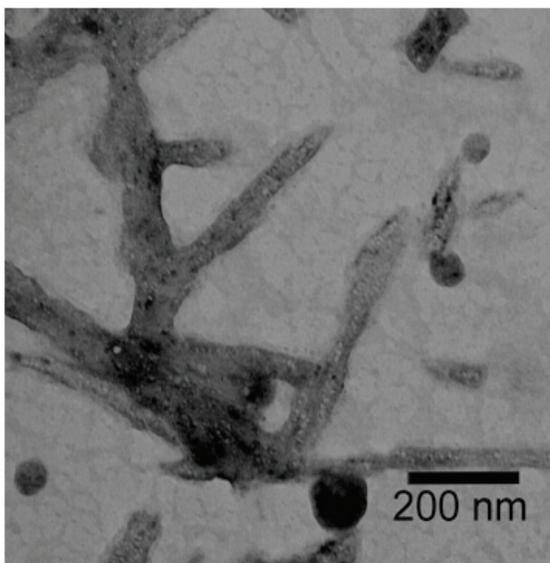


Figure 5- TEM image of Se nanoparticle coated GA nanofibers.

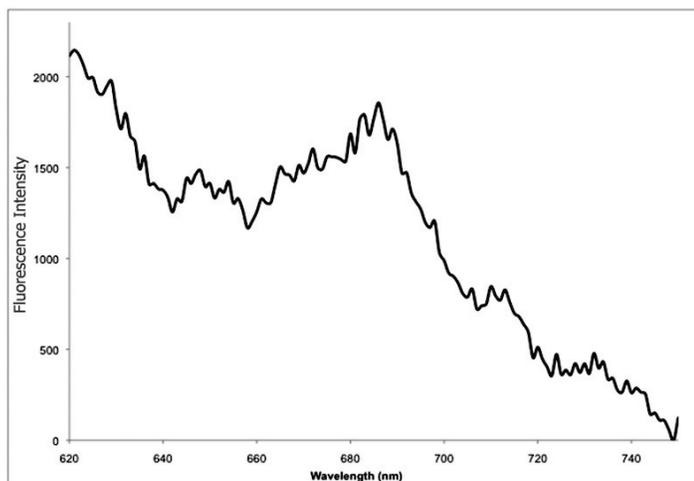


Figure 6- Emission spectrum of Se nanoparticle coated GA nanofibers.

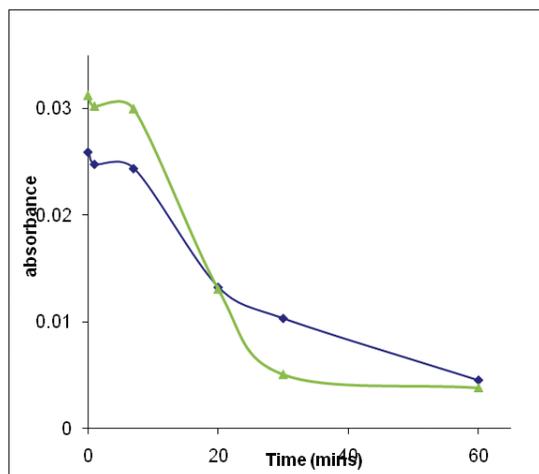


Figure 7- Comparison of (DPPH) radical scavenging activity of Se nanoparticle coated GA nanofibers with GA. The wavelength at 517 nm was monitored over time.

and GA.

Excitation and emission spectroscopic analysis were also conducted to confirm the formation of Se nanoparticles. In the excitation spectrum recorded, the lambda max was obtained at 597 nm. The emission spectrum (Figure 6) shows a peak at 682 nm, confirming the formation of Se nanoparticles.<sup>33</sup>

#### The 2,2-diphenyl-1-picrylhydrazyl (DPPH) Radical Scavenging Assay

The development of antioxidant materials to quench reactive oxygen species (ROS) is essential because of the damage caused by ROS in the body, which plays a role in the development of cancer, cardiovascular disease,<sup>34-36</sup> malarial anemia,<sup>37</sup> and age-associated health problems.<sup>38</sup> The DPPH radical scavenging assay has been effectively utilized to assess the ability of a polyphenol to transfer an H atom to a free radical and is thus a means of measuring a system's capacity to serve as an antioxidant in the body.<sup>33</sup> Past studies have utilized the DPPH assay to measure the antioxidant ca-

capacity of polyphenols such as flavonols, tannins, caffeic acid, caffeoyl esters,<sup>34</sup> conjugated linoleic acids,<sup>39</sup> bromophenols from the marine red alga *Polysiphonia urceolata*,<sup>41</sup> red wine pigments,<sup>41</sup> as well as isoflavones and their metabolites.<sup>42</sup> Kawabata and co-workers have assessed the formation of oxidative dimers produced from GA using the DPPH assay.<sup>29</sup> The DPPH assay works by measuring the reduction of the DPPH radical. Therefore, this modified spectrophotometric approach measures a decrease in absorbance of the peak as the electron becomes scavenged and thus measures its action as a free radical scavenging antioxidant. We compared Gallic acid control to Se nanoparticle coated nanofibers. As shown in Figure 7, over time we observed that the absorbance decreased and in 60 minutes, a reduction was observed for the Se nanoparticle coated GA nanofibers. Furthermore, the absorbance spectrum of the DPPH radical scavenging activity of GA over time is shown in Figure 8. These results indicate that Se nanoparticle coated GA nanofibers could potentially work as potent antioxidants.

#### Conclusions

We have developed a new family of GA based nanostructures. We found that the growth was pH dependent where, in general, self-assembly occurred in one to four weeks. Further, selenium nanoparticles were formed biomimetically over time in the presence of GA, leading to the formation of GA-Se nanocomposites. Complexation with Se resulted in a significant alteration in the shape of GA nanoparticles from nanospheres to nanofibers. The results were confirmed through various spectroscopic and microscopic methods. Finally, we examined the antioxidant abilities of the nanocomposites using the DPPH radical scavenging assay, where the nanostructures were found to be highly potent.

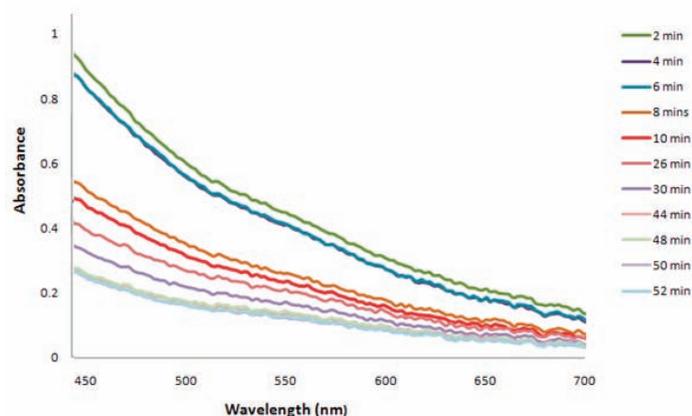


Figure 8- Absorbance spectra showing the 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity of GA.

## References

- Blonder R. 2011. The story of nanomaterials in modern technology: an advanced course for chemistry teachers. *J. Chem. Education* 88(1): 49-52.
- Liu H, Xu J, Li Yongjun, Li Yuliang. 2010. Aggregate nanostructures of organic molecular materials. *Acc. Chem. Res* 43(12): 1496-1508.
- Zhao X, Zhang, S. 2006. Molecular designer self-assembling peptides. *Chem. Soc. Rev.* 35: 1105-1110.
- You BR, Moon HJ, Han YH, Park WH. 2010. Gallic acid inhibits the growth of HeLa cervical cancer cells via apoptosis and/or necrosis. *Food and Chemical Toxicology* 48:1334-1340.
- Fazary AE, Taha M, Ju Y. 2009. Iron Complexation studies of Gallic acid. *J. Chem. Eng* 54:35-42.
- Niemetz R, Gross GG. 2005. Enzymology of gallotannin and ellagitannin biosynthesis. *Phytochemistry* 66:2001-2011.
- Kratz JM, Andrighetti-Frohner CR, Leal PC, Nunes RJ, Yunes RA, Trybala E, Bergstro T, Barardi CR, Simoes CM. 2008. Evaluation of anti-HSV-2 activity of Gallic acid and pentyl gallate. *Biol. Pharm. Bull* 31:903-907.
- Kim SH, Jun CD, Suk K, Choi BJ, Lim H, Park S, Lee SH, Shin HY, Kim DK, Shin TY. 2006. Gallic acid inhibits histamine release and pro-inflammatory cytokine production in mast cells. *Toxicol. Science* 91:123-131.
- a) Yen GC, Duh PD, Tsai HL. 2002. Antioxidant and pro-oxidant properties of ascorbic acid and Gallic acid *Food Chemistry* 79(3):307-313; b) Golombic C, Mattill HA. 1942. The antioxidant properties of Gallic acid and allied compounds. *J. Am. Oil Chem. Soc.* 19(8):144-145.
- You BR, Moon HJ, Han YH, Park WH. 2010. Gallic acid inhibits the growth of HeLa cervical cancer cells via apoptosis and/or necrosis. *Food and Chemical Toxicology* 48:1334-1340.
- a) Chamoun-Emanuelli AM, Primera-Pedrozo OM, Barreto-Caban MA, Jerez-Rozo JI, Hernández-Rivera SP. 2009. Enhanced Raman Scattering of TNT on nanoparticles substrates: Ag, Au and Bimetallic Au/Ag Colloidal Suspensions. *nanoscience and nanotechnology for chemical and biological defense* 17:217-232; b) Lan Y, Yang L, Zhang M, Zhang W, Wang S. 2010. Microreactor of Pd nanoparticles immobilized hollow microspheres for catalytic Hydrodechlorination of Chlorophenols in water. *ACS Appl. Mater. Interfaces* 2(1):127-133; c) Ron I, Friedman N, Sheves M, Cahen D. 2010. Enhanced Electronic Conductance across Bacteriorhodopsin, Induced by Coupling to Pt Nanoparticles. *J. Phys. Chem. Letter* 1(20):3072-3077.
- Yoosaf K, Ipe BI, Suresh CH, Thomas KG. 2007. In Situ synthesis of metal nanoparticles and selective naked-eye detection of lead ions from aqueous media. *J. Phys. Chemical* 11:12839-12847.
- Njagi CE, Huang H, Stafford L, Genuino H, Galindo MH, Collins BJ, Hoag EG, Suib LS. Biosynthesis of iron and silver nanoparticles at room temperature using aqueous Sorghum Bran extracts. *Langmuir* 27:264-271.
- Zhang Y, Wang J, Zhang L. 2010. Creation of highly stable selenium nanoparticles capped with hyper-branched polysaccharide in water. *Langmuir* 26(2):17617-17623.
- Stroyuk AL, Raevskaya AE, Kuchmyi SY, Dzhanan VM, Zahn DRT, Schulze S. 2008. Structural and optical characterization of colloidal Se nanoparticles prepared via The Acidic Decomposition of Sodium Selenosulfate. *Colloids and Surfaces A: Physicochem. Eng. Aspects* 320:169-174.
- Chen H, Shin DW, Nam JG, Kwon KW, Yoo JB. 2010. Selenium nanowires and nanotubes synthesized via a Facile Template-Free Solution method. *Materials Research Bulletin* 45:699-704.
- Mishra B, Hassan PA, Priyadarsini KI, Mohan H. 2005. Reactions of biological oxidants with Selenourea: foundations of redox active nanoselenium. *J. Phys. Chem. B* 109:12718-12723.
- Zhao Y, Xie Y, Yan S, Zhu X. 2008. Surfactant-Assisted etching in Biomimetic mineralization of Ferric Phosphate. *Chem. Mater* 20(12):3959-3964.
- Kaur G, Iqbal M, Bakshi MS. 2009. Biomimetalization of fine Selenium crystalline rods and amorphous spheres. *J. Phys. Chem. C* 113(31):13670-13676.
- Cui L, Zhao Y. 2004. Azopyridine side chain polymers: an efficient way to prepare photoactive liquid Crystalline materials through self-assembly. *Chem. Mater* 16:2076-2082.
- Moorthy JN, Natarajan R, Mal P, Venugopalan P. 2002. *J. Am. Chem. Soc* 124: 6530.
- Gobius du Sart G, Vukovic I, van Ekenstein GA, Polushkin E, Loos K, Brinke G. 2010. Self-assembly of Supramolecular Triblock Copolymer Complexes. *Macromolecules* 43:2970-2980.
- a) Brock CP, Duncan LL. 1994. *Chem. Mater.* 6:1307; b) Thallapally PK, Katz AK, Carrel HL, Desiraju GR. 2002. *Chemistry Communication*
- a) Kolotuchin SV, Fenlon EE, Wilson E, Lowth CJ, Zimmerman SC. 1995. *Angew Chemistry. Int. Ed.* 34:2654; b) Almarsson Ö, Zaworotko MJ. (2004). *Chem. Commun.*, 1889.
- a) Gazit EA. 2002. Possible role for pi-stacking in the self-assembly of amyloid fibrils. *FASEB J* 16:77-83; b) Gazit E. 2005. Mechanisms of amyloid fibril self-assembly and inhibition: model short peptides as a key research tool. *FEBS J.* 272:5971-5978; c) Marek P, Abedini A, Song B, Kanung M, Johnson ME, Gupta R, Zaman W, Wong SS, Raleigh DP. 2007. Aromatic interactions are not required for amyloid fibril formation and fibril morphology. *Biochemistry* 46:3255-3261; d) Krysmann MJ, Catelletto V, Hamley IW. 2007. Fibrilisation of hydrophobically modified amyloid peptide fragments in an organic solvent. *Soft Matter* 3:1401-1406; e) Krysmann MJ, Castelletto V, Kalarakis A, Hamley IW, Hule RA, Pchan DJ. 2008. Self-assembly and hydrogelation of an amyloid peptide fragment. *Biochemistry* 47:4597-4605.
- Pandit A, Fay N, Bordes L, Valéry Cherif-Cheikh R, Robert B, Artznier F, Paternostre M. 2009. Self-assembly of the octapeptide lanreotide and lanreotide-based derivatives: the role of aromatic residues. *J. Pept. Sci.* 14:66-75.
- a) Chaudhary N, Nagaraj R. 2011. Impact of the replacement of Phe by Trp in a short fragment of A $\beta$  amyloid peptide on the formation of fibrils. *J. Pept. Sci.*, 17: 115-123; b) Reches M, Gazit E. 2003. Casting metal nanowires within discrete self-assembled peptide nanotubes. *Science* 300:625-627; c) Reches M, Gazit E. 2011. Designed aromatic homo-dipeptides: formation of ordered nanostructures and potential nanotechnology applications. *Phys. Biol.* 3:S10-S19.
- Faggi E, Sebastián RM, Vallribera A. 2010. Fluorous Gallic acid derivatives as versatile gelators. Self-assembly into nanosized fibers or balls. *Tetrahedron* 66: 5190-5195.
- Kawabata J, Okamoto, Y, Kodama A, Makimoto T, Kasai T. 2002. Oxidative dimers produced from Photocatechuic and Gallic Esters in the DPPH Radical Scavenging Reaction. *J. Agric. Food. Chem.* 50:5468-5471.
- Fazary AE, Taha M, Ju Y. 2009. Iron complexation studies of Gallic acid. *J. Chem. Eng* 54:35-42.
- Balón M, Guardado P, Muñoz MA, Carmona CA. 2008. Spectroscopic study of the hydrogen bonding and  $\pi$ - $\pi$  stacking interaction of harmaline with Quinoline. *Biospectroscopy* 4:185-195.
- Fazary AE, Taha M, Ju YH. 2009. Iron complexation studies of gallic acid. *J. Chem. Eng. Data* 54:35-42.
- Brabson GD, Andrews L. 1992. Infrared and visible spectra of small Selenium cluster (n = 2, 3, 4) in solid Argon. *J. Phys. Chem.* 96:9172-9177.
- Jiang X, Kemal L, Yu A. 2007. Silver-induced growth of selenium nanowires in aqueous solution. *Mater. Letters* 61:2584-2588.
- Goupy P, Dufour C, Loonis M, Dangles O. 2003. Quantitative kinetic analysis of hydrogen transfer reactions from dietary Polyphenols to the DPPH Radical. *J. Agric. Food Chem.* 51:615-622.
- a) Pietta PG. 2000. Flavonoids as antioxidants. *J. Nat. Prod.*, 63:1035-1042; b) Cos P, Ying L, Calomme M, Hu JP, Cimanga K, Van Poel B, Pieters L, Vlietinck AJ, Vanden Berghe D. 1998. Structure-activity relationships and classification of flavonoids as inhibitors of xanthine oxidase and superoxide scavengers. *J. Nat. Prod.*, 61:71-76; c) Foti M, Piattelli M, Baratta MT, Ruberto G. 1996. Flavonoids, coumarins and cinnamic acids as antioxidant in a micellar system; structure-activity relationship. *J. Agric. Food Chem* 44:497-501; d) Dangles O, Dufour C, Fargeix, G. 1996. Inhibition of lipid peroxidation by quercetin and quercetin derivatives: antioxidant and prooxidant effects. *J. Chem. Soc., Perkin Trans. 2.* 1215-1222; e) Jovanovic, SV, Steenken S, Hara Y, Simic M.G. 1996. Reduction potentials of flavonoid and model phenoxyl radicals. Which ring in flavonoids is responsible for the antioxidant activity? *J. Chem. Soc., Perkin Trans. 2.* 2497-2504; f) Cotelle N, Bernier JL, Cateau JP, Pommery J, Wallet JC, Gaydou EM. 1996. Antioxidant properties of hydroxyflavones. *Free Radical Biol. Med.* 20:35-43.
- a) Bors W, Heller W, Michel C, Saran M. 1990/ Flavonoids as antioxidants: determination of radical scavenging activities. *Methods Enzymol.* 186:343-355; b) Jovanovic SV, Steenken S, Tosic M, Marjanovic B, Simic MG. 1994. Flavonoids as antioxidants. *J. Am. Chem. Soc.* 116:4846-4851; c) Van Acker SABE, Van den Berg DJ, Tromp MNJL, Griffioen DH, Van der Vijgh WJE, Bast A. 1996. Structural aspects of antioxidant activity of flavonoids. *Free Radical Biol. Medical* 20:331-342; d) Rice-Evans C, Miller NJ, Paganga G. 1996. Structure-antioxidant activity relationships of flavonoids and phenolic acids. *Free Radical Bio. Medical* 20:933-956; e) Vinson JA, Dabbagh YA, Serry MM, Jang J. 1995. Plant Flavonoids, especially tea flavanols, are powerful antioxidants using an in vitro oxidation model for heart disease. *J. Agric. Food Chemistry* 43:2800-2802; f) Riedl KM, Hagerman AE. 2001. Tannin-protein complexes as radical scavengers and radical sinks. *J. Agric Food Chemistry* 49:4917-4923.
- a) Prasannachandra, D'Souza V, D'Souza B. 2006. Comparative study on lipid peroxidation and antioxidant vitamins E and C in falciparum and vivax malaria. *Indian J. Clin. Biochemistry* 21(2):103-106; b) Kremser PG, Greve B, Lell B, Luckner D, Schmid D. 2000. Malarial anemia in African children associated with high oxygen radical production. *Lancet* 355:40-41; c) Clark IA, Hunt NH. 1983. Evidence for reactive oxygen intermediates causing hemolysis and parasite death in malaria. *Infection and Immunity* 39(1):1-6.
- a) Cheng Z, Moore J, Yu L. 2006. High-Throughput relative DPPH radical scavenging capacity assay. *J. Agric. Food Chemistry* 54(20):7429-7436; b) Hertog MG, Feskens EJ, Hollman PC, Katan MB, Kromhout D. 1993. Dietary antioxidant flavonoids and risk of coronary heart disease: The Zutphen elderly study. *Lancet* 342:1007-1011; c) Block G, Patterson B, Subar A. 1992. Fruit, vegetable and cancer prevention: A review of the epidemiological evidence. *Nutr. Cancer* 18:1-29; d) Steinmetz KA, Potter JD. 1996. Vegetables, fruits and prevention: a review. *J. Am. Diet. Association* 96:1027-1039.
- Yu L. 2001. Free radical scavenging properties of conjugated Linoleic acids. *J. Agric. Food Chemistry* 9:3452-3456.
- Li K, Li XM, Ji NY, Wang BG. 2008. Bromophenols from the marine red Alga *Lophosiphonia urceolata* with DPPH radical scavenging activity. *J. Nat. Prod.*, 71: 28-30.
- Goupy P, Bautista-Ortin AB, Fulcrand H, Dangles O. 2009. Antioxidant activity of wine pigments derived from Anthocyanins: hydrogen transfer reactions to the DPPH radical and inhibition of the heme-induced peroxidation of Linoleic acid. *J. Agric. Food Chemistry* 57:5762-5770.
- Liang XL, Wang XL, Li Z, Hao QH, Wang SY. 2010. Improved in vitro assays of superoxide anion and 1,1-Diphenyl-2-picrylhydrazyl (DPPH) radical-scavenging activity of Isoflavones and Isoflavone metabolites. *J. Agric. Food Chemistry* 58: 11548-11552.

# “A Power Beyond the Reach of Any Magic”: Mythology in *Harry Potter*

Daniella Rizza, FCRH '11

J.K. Rowling's *Harry Potter* novels have over the last decade become a worldwide phenomenon, but why? It is perhaps because of the mythical elements that underlie Harry's story, particularly the myths of the child and the hero. Comparing the Potter novels to works by mythological theorists Carl Jung and Joseph Campbell, it is clear how Rowling both uses and updates traditional mythological structures and elements in the novels. The *Harry Potter* novels both incorporate the standard myths of the child and the hero, which accounts for the series' immense ability to grab the reader, and update these myths, making Harry's quest even more accessible to the modern audience in its rejection of a high-born, kingly hero. Instead, the series exalts a hero that destiny does not create whose quest is more democratic, necessarily involving collaboration with many others.

J.K. Rowling's *Harry Potter* novels have over the last decade become a worldwide phenomenon, but why? It is perhaps because of the mythical elements that underlie Harry's story, particularly the myths of the child and the hero. The *Harry Potter* novels both incorporate the standard myths of the child and the hero, accounting for the series' immense ability to grab the reader, and update these myths, making Harry's quest even more accessible to the modern audience in its rejection of a high-born, kingly hero. Instead, the series exalts a hero that destiny does not create whose quest is more democratic, necessarily involving collaboration with many others. Harry is an orphan raised outside his true home, the Wizarding world, in a house with his Muggle, or non-magic, aunt and uncle. As an infant, Harry became the only known survivor of the Killing Curse, seemingly defeating Lord Voldemort, the most evil wizard of all time, in the process. Harry's status as an abandoned orphan with some unique power invites comparison with the myth of the child as postulated by Carl Jung, the renowned psychologist and thinker. Over the course of the series, Harry matures and faces the choice to once and for all rid the world of Voldemort, who reclaims a body thirteen years after the night Harry survives his attack. Harry sets out with his best friends, Ron Weasley and Hermione Granger, to kill Voldemort, a task which requires him to surpass

a number of trials along the way. In order to defeat Voldemort, Harry must first destroy six Horcruxes, external items into which Voldemort places pieces of his soul, before he can finally battle Voldemort. Harry's heroic mission, contained mostly in *Harry Potter and the Deathly Hallows*, the final novel in the series, has parallels with the hero quest theories of Jung and Joseph Campbell.

In his discussion of the myth of the child, Jung claims “the child in mythology represents ... the archetypal child, who symbolizes life's possibilities.”<sup>1</sup> Jung argues that the goal of childhood is individuation, which is completed “from the synthesis of conscious and unconscious elements in the personality.”<sup>2</sup> The end result of individuation is what Jung calls the Self, “this wholeness that transcends consciousness.”<sup>3</sup> Along the way, Jung's child hero confronts both “miraculous birth and the adversities of early childhood—abandonment and danger through persecution.”<sup>4</sup> The element of abandonment is particularly important, for “‘Child’ means something evolving toward independence. This it cannot do without detaching itself from its origins: abandonment is therefore a necessary condition, not just a concomitant symptom.”<sup>5</sup> Jung also notes a common paradox present in myths of the child, who “is on the one hand delivered helpless into the power of terrible

I would first and foremost like to thank Father Martin Chase, S.J., for acting as my mentor, listening to all my ideas and worries, explaining the quite abstract mythological theories, and for reading and rereading my many drafts. Dr. Susan Greenfield and Dr. Jude Jones also offered valuable insights which deepened my analysis even after I presented what I thought was my final draft. Finally, I would like to thank Dr. Mary Erler for encouraging me to write my senior thesis on this magical topic which met with much skepticism. Direct all correspondence to Daniella Rizza at rizza@fordham.edu.

enemies and in continual danger of extinction, while on the other he possesses powers far exceeding those of ordinary humanity.”<sup>6</sup> Jung heavily influences Campbell, but Campbell at times diverges from Jungian concepts in his book *The Hero with a Thousand Faces*. Campbell does not elaborate upon or care much about the hero’s childhood—one such way in which he wanders from Jung—but he too prescribes that the hero has some sort of miraculous birth, arguing that “the makers of legend have seldom rested content to regard the world’s great heroes as mere human beings who broke past the horizons that limited their fellows and returned with such boons as any man with equal faith and courage might have found.”<sup>7</sup>

At the surface level, Harry seems to match up to the implications that Jung and Campbell make about a special child of some sort of high birth or prodigious inborn skill. The series begins with an infant Harry, who has just inexplicably survived a Killing Curse cast by Lord Voldemort directly after Voldemort kills Harry’s parents, Lily and James Potter, with the same curse. For “eleven years,” Voldemort and the Death Eaters, his followers, tortured and killed many people in order to establish a world order where wizards would dominate Muggles, the non-magic people from whom the wizards hide their powers in a secret Wizarding world.<sup>8</sup> Harry’s feat is remarkable, for not only has he survived an attack from the darkest wizard of all time, but he also has become the only known survivor of Avada Kedavra, the Killing Curse, which “has no countercurse.”<sup>9</sup> The Killing Curse bounced back upon Voldemort and seemingly killed him. Harry’s ability to survive this attack from the wizard so feared that wizards cannot even utter his name certainly reflects the supreme powers associated with Jung’s “child” and Campbell’s “hero’s childhood.”

Though Harry appears to have been provided with superior powers at birth, he in fact does not have the inborn skill or royal title which Jung and Campbell attribute to a child hero. As a wizard living in the Wizarding world, Harry is the equivalent of a “mere human being” who is not endowed with any spectacular powers.<sup>10</sup> Compared to the world’s Muggle population, Harry is more than a mere human being, but as Harry’s challenge is to defeat a fellow wizard in the Wizarding world, he is on equal footing with the rest of his society. Also, Harry’s parents are not gods or royalty. James is a wizard and Lily is a witch, but since they live in the Wizarding world, they do not own any superior powers or position of nobility relative to their neigh-

bors. Lily, in fact, is Muggle-born witch, meaning she has no blood relatives who are in any way members of the Wizarding society. Before he was born, a special prophecy that applied to Harry, describing how he will defeat the Dark Lord, also applied to another wizard boy, Neville Longbottom. Since this other boy also fits the prophecy, it diminishes the significance of Harry’s birth. Albus Dumbledore, headmaster of Hogwarts School of Witchcraft and Wizardry, also explains that the prophecy did not come to fruition because of destiny when he says, “If Voldemort had never heard the prophecy, would it have been fulfilled? Would it have meant anything? Of course not!”<sup>11</sup> In addition, Lily’s choice to die attempting to protect Harry, not Harry’s inborn skill, provides him with the power to survive Voldemort’s attack, for “to have been loved so deeply ... will give us some protection forever,” which is in Harry’s case a magical shield preventing Voldemort’s spells from harming him.<sup>12</sup> Unlike a king or god, Harry is not born into a position of power, but obtains what little power he has through the choices of others.

The adulthood of the hero’s life is of much greater significance for Campbell and Jung. Jung’s child must fight to establish consciousness, but his hero must then return to his unconscious in order to fulfill his quest. In his outline of “the typical struggle of the hero with the monster (the unconscious content),” Jung says that the hero “cuts off a portion of the viscera, the heart for instance, or some essential organ by virtue of which the monster lives.... Thus he kills the monster, which then drifts to land, where the hero, new-born through the transcendent function ... steps forth.”<sup>13</sup> Jung likens the hero’s quest to the human’s struggle to reclaim connection with the unconscious that has been lost.

Campbell, who dismisses the idea of childhood heroism, provides a much more detailed account of exactly how the hero completes his mission. He breaks the hero’s quest into departure, initiation, and return. The hero, responding to a call to adventure which “signifies that destiny has summoned the hero and transferred his spiritual center of gravity from the pale of his society to a zone unknown,” sets forth from his home to enter a world apart from his own in which the quest takes place, performing some task to cross the threshold of adventure.<sup>14</sup> This ends the first stage, separation. While in this new place, the hero undergoes a series of trials with the aid of magical helpers, and after “a decisive victory is won,” he “gains his reward,” usually sacred marriage, atonement with the father, or apotheosis.<sup>15, 16</sup> This ends the second phase, initiation. The hero must

then successfully return to whence he came to deliver the reward he has earned to the rest of his nation.

Harry's adult hero quest officially begins when he is sixteen years old and in his sixth year at Hogwarts. At the close of his fifth year, Dumbledore tells Harry about the prophecy, which must be fulfilled since Voldemort acted upon it when Harry was a baby, marking Harry as his equal. Harry is now the only one who can defeat Voldemort, and he comes to accept that the prophecy will be fulfilled. Harry learns that Voldemort has likely created six Horcruxes. His quest is to locate and destroy all of Voldemort's Horcruxes before he can fulfill his final task of killing Voldemort; Dumbledore has begun the quest for him by destroying one, a ring which Voldemort's grandfather, Marvolo Gaunt, owned, and has already begun searching for the next Horcrux. Harry decides to accompany Dumbledore for this trial, but when Dumbledore and Harry return from their mission, Professor Severus Snape kills Dumbledore, leaving Harry alone as the leader of this quest.

Harry's call is a decision of whether or not to complete the task that Dumbledore began for him. After Dumbledore's funeral, Harry decides to answer that call, to remove himself from the expectation of protection, and to actively fight Voldemort, unlike their previous encounters in which Harry had merely escaped. Following Dumbledore's example, Harry chooses "to fight, and fight again, and keep fighting, for only then could evil be kept at bay, though never quite eradicated."<sup>17</sup> Instead of completing his seventh and final year at Hogwarts, the place "where he had been happiest; the first and only place he had felt at home," Harry leaves this home and crosses the threshold of adventure when he enters the uncharted territory of finding the Horcruxes.<sup>18</sup>

Harry's initiation trials and the destruction of the viscera are the elimination of the Horcruxes, which are well-hidden and difficult to destroy. Harry learns that Dolores Umbridge, a Ministry of Magic official, has Slytherin's locket, which is, unbeknownst to her, a Horcrux. Harry, Ron, and Hermione sneak into the Ministry disguised as employees and successfully steal it from her, but they have no weapon with which to destroy it. There is "something beating inside the locket, like a tiny metal heart," which is again the exact vital organ Jung names in his description of the hero.<sup>19</sup> For weeks, they are stuck with an indestructible Horcrux and no ideas as to where the rest of them are or what they even are, until Harry encounters "a silver-white

doe, moon-bright and dazzling," which he follows to a frozen pool in which lies Gryffindor's Sword.<sup>20</sup> The magical aid from this doe provides Harry with one of the only methods that can conceivably destroy a Horcrux, for the sword is goblin-made and thus capable of "imbibing only that which strengthens it," including the basilisk venom which it absorbed when Harry had stabbed the basilisk through the mouth.<sup>21</sup> When Harry tries to retrieve the sword, however, the Horcrux chokes him upon hitting the freezing water. It is Ron, not Harry, who is able to pull the sword from the pool, using it to cut the locket off of Harry's neck. Though Harry opens the locket when he speaks to the snakes on it in Parseltongue, a rare wizard gift of speaking to snakes which Voldemort inadvertently transferred to baby Harry, Ron is the one who destroys it. Ron is Harry's savior and performs Harry's task when he eliminates the Horcrux, although Harry is the hero of this quest. Ron's heroism here also runs counter to the theorists' ideas that a hero has some sort of destiny or inborn power because Ron is just as able to complete this essential step to Voldemort's demise. The goblins are also essential to Harry's quest, as they are the only beings capable of creating such a sword, without which Harry could not destroy the Horcruxes. The importance of this race—which under current Wizarding law does not share equal rights with humans—in this quest shows a clear rejection of an aristocratic, monarchical society.

Ron later proves this again when the trio is at Hogwarts in search of Ravenclaw's diadem Horcrux. While Harry searches for the diadem, Ron and Hermione go to the Chamber of Secrets, a hidden room which is the final resting place of a gigantic snake called a basilisk, whose fang they wish to obtain to destroy the cup Horcrux. Although Ron does not speak Parseltongue like Harry does, he imitates the noise Harry made to open the locket before he stabbed it. It takes him "a few goes to get it right," but he successfully opens the entrance to the Chamber and retrieves the basilisk's fang, with which Hermione stabs the cup Horcrux.<sup>22</sup> Even Parseltongue, Harry's one tangible power that he has which the average wizard does not, is not necessary for destroying the Horcruxes, as Ron proves.

The rest of Harry's trials are similar to the locket episode. With each Horcrux, he receives help from many varied beings, and someone other than himself ultimately eliminates it. Hufflepuff's cup Horcrux is locked away in a vault which belongs to Death Eater Bellatrix Lestrange at Gringotts, the wizards' bank run

by goblins. With the help of Griphook, a goblin on the run from the Death Eaters, they break into Bellatrix's vault, but an enchantment preventing robberies makes it so that anything they touch which does not belong to them burns their skin. Harry finally locates the cup, "and although he could feel it scalding his flesh he did not relinquish it," and the trio escapes on the back of the blind dragon which was guarding the vault.<sup>23</sup> With the help of Dumbledore's brother, Aberforth, they enter Hogwarts through a secret passage in the Hog's Head bar. As mentioned above, Hermione and Ron enter the Chamber of Secrets and destroy the cup, then reunite with Harry when the three of them search for Ravenclaw's diadem Horcrux. When they finally find it, Death Eater Vincent Crabbe accidentally melts the Horcrux and kills himself when he tries to attack them with Fiendfyre, a dangerous cursed fire. Since Dumbledore destroys the ring, and Neville later kills Nagini, Voldemort's pet snake and final Horcrux, the only Horcrux which Harry physically eliminates himself is the diary Horcrux, which he does back in his second year at Hogwarts when he rescues Ron's sister, Ginny, from the basilisk in the Chamber. At the time, Harry did not even know what a Horcrux was yet he destroys it to rescue Ginny, a different hero quest. Harry passes these trials, eliminating all the Horcruxes, but it is in large part through the efforts and aid of many others. The power to defeat Voldemort is not concentrated in Harry, but is available to anyone with the skill and bravery to help him.

Before Harry can face a final decisive victory and provide the boon for his nation, Harry quite literally lives out the task that Jung assigns his hero, the return to the unconscious. Harry learns that when Voldemort's Killing Curse failed to kill him as an infant, a piece of Voldemort's soul accidentally was transferred into Harry, making Harry himself a Horcrux. Even though it means sacrificing himself, Harry bravely continues his mission to destroy all the Horcruxes to bring an end to Voldemort, the boon he has hoped to bring to the Wizarding world all along. He meets Voldemort in the woods and lets Killing Curse hit him, but to Harry's surprise, his thoughts continue after the spell hits:

He lay facedown, listening to the silence. He was perfectly alone. [...] Nobody else was there. He was not perfectly sure that he was there himself.

A long time later, or maybe no time at all, it came to him that he must exist, must be more than disembodied thought, because he was lying, definitely lying, on some surface. Therefore he had a sense of touch, and the thing

against which he lay existed too.

Almost as soon as he had reached this conclusion, Harry became conscious that he was naked.<sup>24</sup>

At this point, it is still unclear where Harry is. He has a body, as he feels himself lying down, but it is not the body that Voldemort killed, for he is now naked, "unscathed ... [and] not wearing glasses anymore."<sup>25</sup> Wherever he is, there is no concept of time, for he cannot determine the relative length of the period between recognizing that he exists and recognizing that he is naked. Harry also determines that he exercises some control over the place, for when he hears "a pitiful noise" and wishes he were clothed, "Barely had the wish formed in his head than [sic] robes appeared a short distance away."<sup>26</sup> The source of this noise has "the form of a small, naked child, curled on the ground, its skin raw and rough, flayed-looking, and it lay shuddering under a seat where it had been left, unwanted, stuffed out of sight, struggling for breath."<sup>27</sup> The curse separates the piece of Voldemort's soul from Harry's, leaving Harry "new-born" while the part of Voldemort's soul remains gruesome, maimed, and dying.<sup>28</sup>

As Harry examines the grotesque being, Dumbledore appears. Not knowing what to make of this, Harry asks, "But you're dead. ... Then ... I'm dead too?"<sup>29</sup> Dumbledore replies, "That is the question, isn't it? On the whole, dear boy, I think not."<sup>30</sup> Harry demands an explanation, but Dumbledore merely states, "you already know."<sup>31</sup> Since Harry is not dead, he is in some sort of unconscious state in which he reasons through all that has happened to him, things he already knows but could not piece together properly in his consciousness. Harry has now done precisely what Jung says the adult hero must do: reconnect with the unconscious. While he is here, Harry works out the answers to the questions he had while he was in his consciousness, like why he again survives the Killing Curse and how he can defeat Voldemort. Dumbledore affirms Harry's control over this place when he says, "This is, as they say, your party."<sup>32</sup> Dumbledore's closing line—"Of course it is happening inside your head, Harry, but why on earth should that mean that it is not real?"—indicates that Harry is indeed in his unconscious, reflecting on the things going on inside his own mind, rather than in some sort of afterlife.<sup>33</sup> Rowling herself explains on her official website that the curse "disables Harry severely enough that he could have succumbed to death if he had chosen that path [...] But Harry does decide to struggle back to consciousness."<sup>34</sup> Finally hav-

ing achieved separation from the piece of Voldemort's soul, Harry defeats the evil that dwells in him when he chooses to go back to his conscious self without taking the piece of Voldemort with him. In this sense, Harry is literally conquering an archetype that was present in his own mind, coming to recognize that it has always been there and leaving it to die when he proceeds back to his consciousness. This is really the moment of Harry crossing back over the threshold, for he survives the ultimate trial, the invincible Killing Curse, and with his transcendence of this challenge, eliminates another piece of Voldemort's soul.

On top of all this, Harry's connection with the unconscious material of his mind allows him to proceed confidently into his final battle with Voldemort when he comes back to consciousness, now having a fully established Self. While talking to Dumbledore in his unconscious, the two discuss the Elder Wand, a legendary unbeatable wand whose possessor "must capture it from its previous owner, if he is to be truly master of it."<sup>35</sup> When Harry returns to consciousness, he is finally able to understand that he is indeed the master of this wand, for Draco Malfoy, a young Death Eater from Harry's class at Hogwarts, took the Elder Wand from Dumbledore before Snape killed him, and later Harry took Draco's wand during a scuffle with Death Eaters. Thus, when Voldemort celebrates his apparent victory by humiliating Harry's body with the Cruciatu Curse, a spell that physically tortures its recipient, "the pain [Harry] expected did not come."<sup>36</sup> Uniting his unconscious and his conscious, Harry synthesizes that the Elder Wand will not work against him.

When he and Voldemort face each other in their final battle, Harry reveals the boon which he delivers to his people, a love shield like the one his mother gave to him. Harry explains, "I was ready to die to stop you from hurting those people [...] I've done what my mother did. They're protected from you."<sup>37</sup> This battle also further emphasizes that Harry's becoming a hero is Voldemort's choice. Though he knows that the Elder Wand will not work properly against himself, its master, instead of tricking Voldemort into attempting another Killing Curse, Harry explains the situation to him and invites him to "try for some remorse."<sup>38</sup> Harry's final, decisive victory over Voldemort, toward which he has been actively working for two years, is not a showcase of Harry's superior magical strength. In fact, Harry does not even cast a spell meant to harm Voldemort, opting for Expelliarmus, a defensive spell which merely removes the opponent's wand from his

or her hand. The quest, according to Campbell, has already been completed because Harry's decision to die and his status as master of the Elder Wand make it so that Voldemort is no longer a threat to Harry or to his friends. It is Voldemort's own hubris that causes his final death, as he persists to attack Harry with the Killing Curse despite Harry's evidence that it would not work correctly. Voldemort is "killed by his own rebounding curse," refusing to accept Harry's offer of atonement.<sup>39</sup>

According to Campbell, "It has always been the prime function of mythology and rite to supply the symbols that carry the human spirit forward."<sup>40</sup> The readers of the Harry Potter novels experience this carrying-forward of the human spirit as they identify with Harry and his struggles, an identification that Rowling makes simpler with her updates to the child and hero myths. Harry is not a king or a deity; he is an average boy from his society who needs to handle problems which are thrust upon him. In its rejection of this high-born hero, the updates which Rowling makes to the mythological structures establish the Potter series as myth for the democratic era. Voldemort and his Death Eaters represent a monarchical and hierarchal society, where Voldemort is the despot and where birth determines one's placement in society. Pureblood wizards—those descended from two magical families—reign supreme, followed by halfbloods, while Muggle-born wizards, Muggles, and creatures of "near-human intelligence," including centaurs, goblins, and house elves, are all doomed to marginalization and limited rights.<sup>41</sup> Harry and his friends stand in direct opposition to Voldemort's system. It takes the work of many for Harry to complete his quest, and many types of beings are instrumental in his quest. Each Horcrux is destroyed by a different witch or wizard of varying blood statuses, while nonhumans are also helpful. Gryffindor's sword only has the power to destroy Horcruxes because it is goblin-made, and house elf Dobby nobly dies to save Harry's life in their escape from Malfoy Manor.<sup>42</sup> In the final battle at Hogwarts, Harry sees the Death Eaters "folding under sheer weight of numbers" when the house elves emerge from the kitchen, attacking with their knives.<sup>43</sup> Harry's victory is a victory for democracy, where abilities are worth more than birth and where a majority can enact a change.

Harry Potter's quest to defeat Voldemort generally follows the mythological structures of the child and the hero, according to the theories Jung and Campbell compiled after studying myths from many locations and time periods. Harry's quest includes important

elements of both theories, including the departure-initiation-return structure Campbell proposes, and the all-important return to the psychological unconscious which Jung claims is a task with which all humans must struggle. Myths like the ones Jung and Campbell describe have always had the “magical” ability to grab the reader, for they express the archetypes which reside in the collective unconscious, archetypes that in turn characterize the real life experiences of all people. The immense worldwide popularity that this little series of children’s books about an adolescent British wizard has enjoyed, however, goes even beyond the normal grasp of a myth in the updates which Rowling makes. Gone is the high-born, demigod hero, and in its place, the novels revolve around Harry, a reluctant hero who gets his powers from others’ choices and who collaborates with other wizards and beings to complete his hero quest. The series’ adherence to myth structures gives it the same psychological allure, but its deviances from typical myths make it a modern myth and thus even more relevant to—and reflective of—readers today.

## Notes

<sup>1</sup> Carl G. Jung, *Encountering Jung on Mythology*, Comp. Robert A. Segal (Princeton, N.J.: Princeton University Press, 1998), 123.

<sup>2</sup> Jung, *Encountering Jung on Mythology*, 129.

<sup>3</sup> Jung, *Encountering Jung on Mythology*, 130.

<sup>4</sup> Jung, *Encountering Jung on Mythology*, 131.

<sup>5</sup> Jung, *Encountering Jung on Mythology*, 133.

<sup>6</sup> Jung, *Encountering Jung on Mythology*, 135.

<sup>7</sup> Joseph Campbell, *The Hero with a Thousand Faces* (Princeton, N.J.: Princeton University Press, 1973), 319.

<sup>8</sup> J. K. Rowling, *Harry Potter and the Sorcerer’s Stone* (New York: Scholastic, 1997), 10.

<sup>9</sup> J. K. Rowling, *Harry Potter and the Goblet of Fire* (New York: Scholastic, 2000), 216.

<sup>10</sup> Campbell, *Hero with a Thousand Faces*, 319.

<sup>11</sup> J. K. Rowling, *Harry Potter and the Half-Blood Prince* (New York: Scholastic, 2005), 510.

<sup>12</sup> Rowling, *Sorcerer’s Stone*, 299.

<sup>13</sup> Jung, *Encountering Jung on Mythology*, 164.

<sup>14</sup> Campbell, *Hero with a Thousand Faces*, 58.

<sup>15</sup> Campbell, *Hero with a Thousand Faces*, 30.

<sup>16</sup> Campbell, *Hero with a Thousand Faces*, 246.

<sup>17</sup> Rowling, *Half-Blood Prince*, 645.

<sup>18</sup> Rowling, *Half-Blood Prince*, 431.

<sup>19</sup> Rowling, *Harry Potter and the Deathly Hallows* (New York: Scholastic, 2007), 276.

<sup>20</sup> Rowling, *Deathly Hallows*, 366.

<sup>21</sup> Rowling, *Deathly Hallows*, 303.

<sup>22</sup> Rowling, *Deathly Hallows*, 623.

<sup>23</sup> Rowling, *Deathly Hallows*, 540.

<sup>24</sup> Rowling, *Deathly Hallows*, 705.

<sup>25</sup> Rowling, *Deathly Hallows*, 706.

<sup>26</sup> Rowling, *Deathly Hallows*, 706.

<sup>27</sup> Rowling, *Deathly Hallows*, 706-7.

<sup>28</sup> Jung, *Encountering Jung on Mythology*, 164.

<sup>29</sup> Rowling, *Deathly Hallows*, 707.

<sup>30</sup> Rowling, *Deathly Hallows*, 707.

<sup>31</sup> Rowling, *Deathly Hallows*, 708.

<sup>32</sup> Rowling, *Deathly Hallows*, 712.

<sup>33</sup> Rowling, *Deathly Hallows*, 723.

<sup>34</sup> J. K. Rowling, *J.K Rowling Official Site*, 18 Nov 2010 <[http://www.jkrowling.com/textonly/en/faq\\_view.cfm?id=122](http://www.jkrowling.com/textonly/en/faq_view.cfm?id=122)>.

<sup>35</sup> Rowling, *Deathly Hallows*, 412.

<sup>36</sup> Rowling, *Deathly Hallows*, 727.

<sup>37</sup> Rowling, *Deathly Hallows*, 738.

<sup>38</sup> Rowling, *Deathly Hallows*, 741.

<sup>39</sup> Rowling, *Deathly Hallows*, 744.

<sup>40</sup> Campbell, *Hero with a Thousand Faces*, 11.

<sup>41</sup> J. K. Rowling, *Harry Potter and the Order of the Phoenix* (New York: Scholastic, 2003), 754.

<sup>42</sup> Rowling, *Deathly Hallows*, 475.

<sup>43</sup> Rowling, *Deathly Hallows*, 735.

# A Canyon Apart: Immigration Politics and Hispanic Mobilization in Arizona

Peter Morrissey, FCRH '11

This article examines the political and social forces surrounding the April 23, 2010 passage of Arizona's stringent immigration enforcement measure, Senate Bill (S.B.) 1070, which empowered local law enforcement to demand proof of legal residency from any person suspected of being undocumented. A person's failure to produce documentation would result in arrest, detention, investigation, and potentially deportation to his or her nation of origin. Through the law's lens, the article explores the development of the social tension that followed Arizona's explosive population growth, and examines how Arizona's large Hispanic population has been unable to assert itself at the ballot box or in statewide government. The article argues that the political exigencies of Arizona are dissimilar from the other border states, explaining why measures such as S.B. 1070 have failed elsewhere. The author employs local and national news sources from the time of the bill's consideration, U.S. Census Bureau population data, and case studies and journal articles on Hispanic political organization to explore this unique and fascinating battle over public policy, society, and identity.

Immigration has long been among the most contentious issues in the United States, striking at the nexus of American identity, law, security, and justice. Given this extraordinary degree of overlapping complexity, it is not surprising that political firestorms flare around the issue with relative frequency. The most recent immigration-related battle concerns Arizona lawmakers' aggressive attempt to address this challenge through the now-famous Senate Bill (S.B.) 1070. This state law directly penalizes undocumented immigrants on the state level, and represents the most drastic measures taken by any state to address illegal immigration. The resulting furor has polarized the state along racial, ethnic, and political lines. This study will explore S.B. 1070, its components, and the political environment in which it became law. Through this lens, it will examine (1.) how this law is unique to the social circumstances of Arizona and (2.) why Arizona's growing Hispanic population has been unable to achieve political influence. Toward this second question, the article will examine why Arizona's Hispanics were so unsuccessful at blocking a law they detested, and why non-Hispanic residents were generally supportive of the measure.

First, it is important to clarify terminology. In this paper, the term *Hispanic* will be used to refer to Americans and Arizonans of Latin American origin and extraction; it should be understood as functionally the same as *Latino* when used in the popular sense. One's assignment as *Hispanic* or *Latino* is primarily determined through self-identification and both identifiers are used by various scholarly sources and media outlets. In the context of Arizona, *Hispanic* will often, though not exclusively, refer to individuals of Mexican origin or ancestry, as the overwhelming majority of Hispanics in said state are in some way linked to Mexico. Furthermore, there is a great deal of discussion of "Hispanic issues," an imprecise but necessary group of political issues historically linked to this group. These include, but are not limited to, immigration, bilingual education, and law enforcement practices. While it is naïve and inaccurate to paint Hispanics, Arizonans, Mexican-Americans, or even two residents of the same block in Tucson with one broad stroke, for the purposes of this paper it will sometimes be necessary.

It is first important to examine the elements and passage of the contentious law in question. Immigration

is a staple of Arizona politics, but the intensity surrounding the issue reached a fever pitch in March 2010, when rancher Brian Krentz of Cochise County was killed while walking his dog. As rumors swirled, law enforcement was unable to determine who had killed Krentz. Public sentiment concluded that the killer was an illegal alien who fled back to Mexico after the murder (Thornburgh, 2010). The state legislature, mired in a budget crisis and desperate for distraction, turned its attention to immigration reform, with supporters of punitive reform arguing that any bill should be named after Krentz, who was quickly becoming the poster-child for state-level legislation. Several years-worth of attempts to pass a more stringent immigration bill were frantically combined to produce S.B. 1070, the Support Our Law Enforcement and Safe Neighborhoods Act, which passed both chambers that April.

There are three major components of the law, which in the words of one of its statehouse supporters, will stem the tide of immigrants who will come back “larger, stronger, and more destructive than they were several years ago” (Rossi, 2010). First, the law establishes as a state (and not federal, as per past precedent) misdemeanor an alien’s presence in Arizona without proper identification on one’s person. Second, the law bars state or local officials from restricting enforcement of federal immigration laws. This measure applies to both so-called “sanctuary cities” and individual police departments which restrain their officers from demanding identification. Finally and most significantly, the law empowers law enforcement officers to demand proof of legal residency if they have “reasonable suspicion” of an individual’s illegal status. Taken together, the law constitutes an extraordinarily aggressive attempt to toughen in-state immigration enforcement, rather than border security (Rossi, 2010).

After its passage by the state legislature, the bill went to the desk of Republican Governor Jan Brewer, who ascended to the office following Democrat Janet Napolitano’s resignation to become President Obama’s Secretary of Homeland Security. While Napolitano had repeatedly vetoed enforcement-only immigration bills (Archibold, 2010a) and testified to the Senate that she would have vetoed this one (Gorman & Riccardi, 2010), Governor Brewer remained silent during the course of the bill’s legislative debate. Local news sources documented a number of competing interests as she considered whether to sign or veto the bill. Aides said her initial concerns over the racial-profiling implications of the law had been partially allayed by a line-by-

line reading with its primary sponsor. Messages from citizens regarding the law were, according to one of her assistants, “running three-to-one in favor” (Phoenix News, 2010). Politics played a role in Brewer’s decision as well: she was facing a challenge in the August Republican gubernatorial primary, and had damaged her *bona fides* among influential conservatives by advocating for a 1% increase in the state sales tax to avoid cuts in public services (Archibold, 2010a). With these considerations in mind, Governor Brewer signed S.B. 1070 into law on April 23, 2010.

Not surprisingly, the passage of S.B. 1070 caused a massive national uproar. Supporters claimed a victory for states’ rights and national security and a rebuke aimed at an inept and unconcerned federal government. President Obama dubbed the law “misguided” and worried that it would “undermine basic notions of fairness that we cherish as Americans, as well as the trust between police and our communities that is so crucial to keeping us safe” (Archibold, 2010a). Mexican President Felipe Calderon termed the law a “violation of human rights” which “opens the door to intolerance and hatred” (Booth, 2010). Law enforcement officers were split between chiefs and rank-and-file officers: while the Arizona Association of Chiefs of Police criticized the law as “problematic,” the Phoenix Law Enforcement Association (the largest police union in the state) supported it (Johnson, 2010). Los Angeles Cardinal Roger Mahoney summed up the reaction of the U.S. Conference of Catholic Bishops when he blasted Arizona for “reverting to German Nazi and Russian Communist techniques whereby people are required to turn one another in to the authorities on any suspicion of documentation” (Watanabe, 2010). And, of course, the Phoenix Suns famously wore “Los Suns” jerseys in solidarity with Arizona’s immigrant community, broadening the court of public opinion ever more.

S.B. 1070’s fate, however, will likely be decided in a different sort of court. A number of advocacy organizations, ranging from the National Council of La Raza (NCLR) to the American Civil Liberties Union (ACLU), filed lawsuits against the law, but a suit filed by the Justice Department carried the most weight. In July, Judge Susan Bolton, a U.S. District Court Judge for the Federal District of Arizona, issued a preliminary injunction in response to the Justice Department’s suit, writing that “preserving the status quo through a preliminary injunction is less harmful than allowing state laws that are likely pre-empted by federal law to be enforced” (Archibold, 2010b). Essentially,

Judge Bolton based her opinion on the Constitution's Supremacy Clause, under which immigration (along with other political issues) is delegated exclusively to federal authorities. She was also sympathetic to opponents who argued along less procedural grounds, finding that "there is a substantial likelihood that officers will mistakenly arrest legal resident aliens," and that Arizona was imposing a "'distinct, unusual and extraordinary' burden on legal resident aliens that only the federal government has the authority to impose" (Archibold, 2010b). Unsurprisingly, Arizona appealed the decision, and the case is working its way through the courts. The bill's original sponsor, Senator Russell Pearce, expects it to be ultimately decided by the Supreme Court (Rau, 2010).

The next logical step in the analysis of S.B. 1070 is, unsurprisingly, where does the law go from here? With anti-immigrant rhetoric a popular centerfold of modern politicking, it would be expected that bills similar to S.B. 1070 would appear in state legislatures around the region. Surprisingly, however, this is not the case. While a few individual state legislators have voiced their support, Arizona's law has not been replicated in the border region since its passage. The opinions of the other border-state politicians are significant, as theirs are the only states that can begin to approximate the social and political challenges facing Arizona and help determine if S.B. 1070 was a unique phenomenon. Democratic Governor Bill Richardson of New Mexico, the only Hispanic governor in the country, condemned the bill as "against the democratic ideals of this country." California's Arnold Schwarzenegger, a centrist Republican (and immigrant), responded by saying "this is very clearly something we will not do here in California." But most remarkable in his opposition was Texas' conservative Republican Governor Rick Perry. Perry, a pistol-packing favorite of the Tea Party, said that Arizona's law "would not be the right direction for Texas" and would distract law enforcement from fighting other crimes (Spagat, 2010). Interestingly, none opposed the law on the grounds of Bolton's Supremacy argument; rather, three governors from all across the political spectrum (left, center-right, and far-right) all signaled concern with the substance of the bill and not just its constitutional propriety.

Hispanics in Arizona also signaled their displeasure. One local poll suggested that 81% of Hispanic registered voters in the state opposed the law's passage (Gonzalez, 2010). In fact, some so deplored it that between April and November roughly 100,000 Hispanics

left Arizona, with nearly 25,000 returning to Mexico (Stevensen, 2010). With 1.7 million Hispanics in Arizona, it is truly remarkable that nearly one in seventeen Arizona Hispanics left following the law's passage. These two pieces of data are inspirations for the second portion of this undertaking. Arizona Hispanics are both overwhelmingly opposed to the law and quite numerous in the state, and yet S.B. 1070 advanced through the legislature with relatively little difficulty.

To understand this, it is crucial to examine Arizona's unique demographics and their social implications. The 2005-2007 American Community Survey provides the best, most recent Census population updates, and according to its estimates, self-identifying Hispanics constitute 29.0% of Arizona's population, some 1.7 million people out of a population of 6.1 million (US Census Bureau, 2008). Within this population (both of Hispanics and statewide), undocumented immigrants constitute a sizeable chunk of Arizonans: a Department of Homeland Security report from 2009 estimated that 460,000 undocumented immigrants (almost entirely of Latin American origin, and more than any Western state, save for California) reside in Arizona, meaning that undocumented immigrants constitute roughly 27% of Arizona Hispanics, and 7.5% of the state as a whole. Indeed, the nearly 700-mile long border between Arizona and Mexico has been the entry point for roughly 40% of all border-crossers from Mexico through much of this decade (*Economist*, 2006). Given these two figures, it is not surprising that illegal immigration is a highly publicized, visible issue in Arizona.

Further contributing to the significance and central status of immigration as a political issue in Arizona is the rapidly changing nature of the state. The massive growth that Arizona has experienced in the last thirty years has contributed to a constantly changing society as successive waves of newcomers (from north and south alike) have reinvented Arizona. It has grown faster than nearly every other state, quadrupling in population since 1970 (US Census Bureau, 2009). This growth can be attributed mainly to two sources. First and obviously, Hispanic immigration, particularly from Mexico, is an enormous contributor to Arizona's population boom. But second, Arizona welcomed thousands of out-of-state, often out-of-region, non-Hispanics from northern cities ("Sunbirds"). This particular group is significant to examining the social strain Arizona underwent throughout the last decades as its population evolved. Arizona's Hispanics find

themselves in a unique sort of “demographic donut hole”, numerous enough that they are associated with immigration issues and highly present in the eyes of the rest of the state, yet not so numerous that they can meaningfully advocate policy changes or rebut aggressive legislation. Further contributing to this lack of influence is the poorly mobilized nature of this community and its relative lack of political engagement.

Another aspect of this growth in Arizona’s population is evident in the settlement patterns of newcomers: the state, for all intents and purposes, is remarkably segregated. Maricopa County, the state’s largest, is the most instructive example of this divide. Using the *New York Times*’ recently published “Mapping America” American Community Survey census tool, a cursory glance across the county underscores the extraordinary divide (2010). Most precincts in the city of Phoenix proper, (aside from a small cosmopolitan downtown area) are overwhelmingly Hispanic, with census tracts in densely populated eastern Phoenix approaching 90% Hispanic. However, the suburbs surrounding the city (yet still within the county) are quite the opposite: most precincts in suburban Scottsdale, for example, are nearly 80% white. Outside of Maricopa County, this degree of racial stratification continues: Hispanics comprise huge majorities of several southern border counties, such as Santa Cruz County, which in 2008 was approximately 80% Hispanic. While in the northern part of the state, Hispanics are far more scarce; Cococino County is barely 12% Hispanic. Given this data, it is highly plausible that a white resident of Arizona is acutely aware of immigration as a political issue, and associates said immigration with Hispanic Arizonans. However, given the relative lack of social integration in the state, it is unlikely that that resident has many interpersonal relationships with Hispanics to dampen attitudes based solely on the perception of illegal immigration as a “problem.” Conversely, an Arizona Hispanic has relatively few natural outlets to develop social bonds with non-Hispanic Arizonans, as Hispanics are highly localized.

Though the entire border region grew quickly and re-invented itself dramatically in the past thirty years, its other three states all have more well-established Hispanic populations and non-Hispanic populations with longer histories and stronger bonds with immigrants and Mexico than Arizona. The more well-established bonds prevent the sort of social stratification that enables socially-divisive laws like S.B. 1070 to pass with enormous support. In New Mexico in 2000, for ex-

ample, fully 88% of adult Hispanics were native New Mexicans and therefore, American citizens by birth, demonstrating the longstanding influence and stability of that community (Garcia & Sierra, 2004). New Mexico’s Hispanic population is, proportionally, the highest in the nation at 45% of the state’s total, and equal to that of whites. Though California and Texas do not have similarly high rates of native-born Hispanics (at 61% and 68%, respectively) each has a strong history of well-organized Hispanic advocacy (Pew Hispanic Center). In California, for example, “the post-World War II period spawned Unity Leagues that attacked discrimination and fought for greater political representation” (Navarro & Mejia, 2004), culminating in the return of Hispanic representation to the Los Angeles City Council in 1949 after seventy years absence. Similarly, in the 1960s Hispanic college students in Texas were remarkably influential in pressuring administrators to recruit more Mexican-American students, offer more ethnic-specific scholarships and grants, and establish courses and programs relating to the Mexican American experience (Navarro & Mejia, 2008). Advocacy for the needs of and challenges facing Hispanic communities in other border states was well established and remarkably successful for decades before most of the current residents of Arizona arrived in the region. Between 2000 and 2010, the population of Hispanics in Arizona increased by nearly 50% (more than any other border state), signaling the recentness of the arrival of many of today’s Hispanics. Thus, Arizonans lacked the same social and communitarian bonds that make the other border states more socially cohesive and responsive to organized Hispanic advocacy.

In addition, however, to disadvantageous demographics and a less-than-cohesive history, another challenge facing Arizona Hispanics is a remarkably poor degree of political organization, resulting in greatly diminished political advocacy potential. At both the mass and elite levels, Arizona’s Hispanic population is not capable of leveraging its sizable numbers toward the advancement of policy goals. The first, most basic issue is the low turnout rate among Hispanic voters. Despite representing 29% of the state’s population, Hispanics made up only 16% of Arizona voters in the 2008 Presidential election (Lopez, 2008). Even taking into account the proportion of Arizona Hispanics who are ineligible to vote, Arizona Hispanics still failed to represent themselves strongly at the polls. Looking back on the 2000 election, Hispanic voters’ apathy is brought into even starker relief. Arizona’s ballot fea-

tured a proposition (Proposition 203) that would have ended bilingual education in public schools. Despite overwhelming opposition among Latino advocacy groups, Proposition 203's presence "did not substantially increase voter turnout among the Latino electorate" (Garcia & Sierra, 2004). Given these data, it is clear that Arizona Hispanics endemically fail to assert themselves at the polls.

The implications of Arizona Hispanics' absence is felt in the dearth of Hispanic officeholders. The National Association of Latino Elected and Appointed Officials reported that, as of 2010, only 16% of the Arizona legislature was Hispanic. In contrast, New Mexico's legislature is 44% Hispanic, California's is 23%, and Texas's is 20% (Spagat, 2010). While Hispanics' representation in both California and Texas's legislatures falls below their numbers statewide, they are appreciably closer than Arizona's. These statistics illustrate why S.B. 1070 was able to pass the Arizona legislature with relatively little fanfare. Certainly, a higher proportion of visible Hispanic public officials would have helped drive public opposition.

The implications of the lack of political mobilization of Hispanic voters are clear. Given their degree of underrepresentation, both political parties in Arizona lack an incentive to aggressively seek out Hispanic preferences and craft appealing policy positions: Arizona Republicans can win elections without appreciable Hispanic support, while Democrats take Hispanic support as a foregone conclusion. New Mexico Republicans specifically recruited an Hispanic gubernatorial candidate, while California Democrats were able to survive the 2010 wave because of successful Hispanic-outreach efforts (Sharry, 2010). In Texas, of course, the most famous conservative Republican of the past century, George W. Bush, aggressively supported comprehensive immigration reform both in Austin and in Washington, recognizing Hispanics as the future of his party in his home state. S.B. 1070, thus, is partially the result of a lack of Hispanic political engagement.

Two possible explanations for this failure of Hispanic voter mobilization are germane to Arizona and deserve brief treatment. First, Arizona's status as a strongly anti-labor state deprives Hispanic advocacy groups of natural organizing ground. While national labor unions have sometimes bemoaned immigrant-friendly legislation which they believe drives down wages at the state-level, in the southwest Hispanic advocacy groups and labor unions have been tightly bound. The most

famous example is the United Farm Workers in California, who are credited with greatly expanding Hispanic political influence in that state by employing organizing tactics and providing a mouthpiece for Hispanic leaders who shared policy concerns with non-Hispanics, thereby increasing multiethnic political cooperation (Navarro & Mejia, 2004). Indeed, to the extent that they exist, Arizona's labor unions strongly opposed S.B. 1070, even organizing boycotts of state attractions after its passage (*Phoenix Business Journal*, 2010). However, their impact was marginal given that their organizational strength is minimal: only 6.5% of Arizona employees are dues-paying union members, while 17.2% of Californian workers are unionized (Bureau of Labor Statistics, 2010). Much of this disparity is legalistic in nature: Arizona is a right-to-work state, making the formation of new unions much more difficult (National Right to Work Legal Defense Foundation). Without this historic linkage, Arizona Hispanics lose a potent political organizing mechanism.

A second aspect of the lack of meaningful Hispanic voter mobilization is found in an examination of the proliferation of Hispanic advocacy organizations. The League of United Latin American Citizens (LULAC) is the nation's largest grassroots Hispanic advocacy group, with 115,000 members in more than 600 chapters nationwide. LULAC's policy focus is political advocacy at the state and local levels, and it has successfully advocated for bilingual education, challenged discriminatory legislation in court, and pushed for access to voting in heavily Hispanic communities (Martinez, 2009). But in Arizona, there are only 14 local councils, in contrast to 46 in New Mexico, 82 in California, and an astounding 291 in Texas where LULAC was founded (League of United Latin American Citizens Online). Given this lack of grassroots infrastructure, it is unsurprising that Arizona Hispanics are relatively disengaged.

The above analysis paints a fairly bleak picture for Arizona Hispanics. S.B. 1070, a bill shunned outside of Arizona, is the result of both massive, recently-arrived populations and poorly established Hispanic communities, and the absence of meaningful Hispanic political organization, union establishment, and advocacy groups. However, just as it was in California, Texas, and New Mexico, the tide of history is against the supporters of S.B. 1070. A first reason, of course, is continued demographic shifts. Texas, California, and New Mexico have joined Hawaii as majority-minority American states, states in which groups classified as

racial or ethnic minorities constitute a majority of the population. Arizona is not far behind and may join their ranks as early as 2015 (MSNBC News, 2005). With greater diversity comes greater political sensitivity to the needs of minority communities and greater influence therein. Arizona's Hispanic population, though currently not quite numerous enough to drive political discourse, may soon have the opportunity to do so.

The second evolution, however, may be more significant. It is possible that Arizona Hispanics may be able to reverse their political disorganization through the most unlikely device imaginable: the galvanizing detestation of S.B. 1070 itself. While this may seem counterintuitive, it is not without historical analog. California in the 1990s was very similar to Arizona today: huge numbers of newcomers caused considerable, misplaced backlash against illegal immigrants, and spurred the passage of the infamous Proposition 187. "Prop 187" denied all public services to undocumented immigrants, establishing citizenship checks in order to receive public education, health care, and food stamps. The effort to place Proposition 187 on the 1994 ballot was orchestrated by California's Republican Governor Pete Wilson, who stoked public dissatisfaction with illegal immigration in order to orchestrate a come-from-behind reelection campaign. While Wilson managed to win, the long-term political consequences of Proposition 187 were disastrous for the California Republican Party, which has generally been unable to escape the association with anti-immigrant rhetoric and policy. Proposition 187 provided the impetus for a massive Hispanic registration drive in California, and Republican candidates saw their average share of the Hispanic vote fall from 35% in 1990 to 24% in 1998, with further drop-offs occurring in the 2000s (Davies & Morgan, 2007). Absent Proposition 187, it is conceivable that California's Hispanics would never have organized to the degree or at the pace they did. They are now an integral part of any winning electoral coalition in California, and have yet to forgive California Republicans not named Arnold Schwarzenegger. (Proposition 187 did pass, but nearly all of its provisions were struck down on court challenges.)

An additional galvanizing feature of Proposition 187 was an easily identifiable "bogey-man"—Governor Wilson—whose comments and tone fueled the perception that the campaign was overtly anti-Hispanic (Barreto & Woods, 2005). Here, another parallel exists with Arizona, as two possible candidates for this

role exist today. The first, unsurprisingly, is Governor Brewer, who drew the additional ire of immigrants and Mexican-Americans when she declared that "a majority of the illegal trespassers [from Mexico]...are under the direction and control of organized drug cartels" (Rough, 2010). The other, perhaps more likely candidate to become the galvanizing public face of Arizona's Hispanic population is Maricopa County Sheriff Joe Arpaio, who terms himself "America's toughest sheriff"; Sheriff Arpaio has organized a "posse" of some three thousand volunteers who serve as freelance immigration enforcers and conduct questionably-legal raids of heavily Hispanic neighborhoods in Phoenix in an effort to root out undocumented immigrants (Finnegan, 2009). Generally speaking, Arizona today possesses many of the same political forces as California in the mid-1990s: a politically dormant but fast-growing Hispanic population, public officials easily harnessing anti-immigrant furor, and near-total Hispanic opposition to a controversial piece of immigration-related legislation. While there is no guarantee that S.B. 1070 will have the same galvanizing effect as Proposition 187, the parallels seem hopeful for Arizona Hispanics.

Arizona's S.B. 1070 is an important piece of legislation not only for scholars of immigration politics and the state-federal divide, but also because it sheds light upon the political forces that exist uniquely in Arizona. It is a striking combination of history, demographics, and social politics, which make such a law not only plausible but perhaps unavoidable. Furthermore, the failure of Arizona's Hispanic population and its advocates to rally public opinion against it is indicative of the challenges of Hispanic political organization in Arizona. S.B. 1070 provides a fascinating (if convoluted) cross-section of society, politics, and culture in America's fastest growing region and among America's fastest growing demographic. Its example will be instructive in identity battles for years to come.

### References

- Archibold, R.C. 2010a. Arizona enacts stringent law on immigration. *New York Times*, April 23. Retrieved from <http://www.nytimes.com/2010/04/24/us/politics/24immig.html?>
- . 2010b. Judge blocks part of Arizona's immigration law. *New York Times*, July 28. Retrieved from <http://www.nytimes.com/2010/07/29/us/29arizona.html>.
- Phoenix News*. 2010. Arizona lawmakers pass controversial illegal immigration

- bill. April 23.  
Retrieved from <http://www.kpho.com/politics/23179490/detail.html>
- Phoenix Business Journal*. 2010. Arizona union calls off S.B. 1070 boycott. September 23.  
Retrieved from <http://www.bizjournals.com/phoenix/stories/2010/09/20/daily70.html>
- Barreto, M.A. & Woods, N.D. 2005. Latino voting behavior in an anti-Latino political context: the case of Los Angeles. In Gary M. Segura and Shaun Bowler (Eds.), *Diversity in Democracy, Minority Representation in the United States* (pp. 149-167). Richmond: University of Virginia Press.
- Booth, W. 2010. Mexican officials condemn Arizona's tough new immigration law. *Washington Post*, April 27. Retrieved from <http://www.washingtonpost.com/wp-dyn/content/article/2010/04/26/AR2010042603810.html>
- Bureau of Labor Statistics. 2010. Union affiliation of employed wage and salary workers by state, 2008-2009. Retrieved from <http://www.bls.gov/news.release/union2.t05.htm>
- Davies, P., & Morgan, I. 2007. *America's Americans: Population Issues in U.S. Society and Politics*. London: Institute for the Study of the Americas Press.
- Department of Homeland Security. 2010. Estimates of Unauthorized Immigrant Population Residing in the United States: January 2009. Retrieved from [http://www.dhs.gov/xlibrary/assets/statistics/publications/ois\\_ill\\_pe\\_2009.pdf](http://www.dhs.gov/xlibrary/assets/statistics/publications/ois_ill_pe_2009.pdf)
- The Economist*. 2006. Don't fence us in: the debate over immigration is subtler than it seems, October 19. Retrieved from [http://www.economist.com/node/8058048?story\\_id=8058048](http://www.economist.com/node/8058048?story_id=8058048)
- Garcia, F., Sierra, C., Sierra, C.M.. 2004. New Mexico Hispanics in the 2000 election. In Rodolfo O. de la Garza and Louis DeSipio (Eds.), *Muted Voices: Latinos and the 2000 Election* (pp. 101-129). New York: Rowman and Littlefield Publishers.
- Gonzalez, D. 2010. S.B. 1070 backlash urges Hispanics to join Democrats. *Arizona Republic*, June 8. Retrieved from <http://www.azcentral.com/arizonarepublic/news/articles/2010/06/08/20100608arizona-immigration-law-backlash.html>
- Gorman, A., & Riccardi, N. 2010. Calls to boycott Arizona grow over new immigration law. *Los Angeles Times*, April 28. Retrieved from <http://articles.latimes.com/2010/apr/28/local/la-me-0428-arizona-boycott-20100428>
- Finnegan, W. 2009. Joe Arpaio: America's Toughest Sheriff. *The New Yorker*, July 20. Retrieved from [http://www.newyorker.com/reporting/2009/07/20/090720fa\\_fact\\_finnegan](http://www.newyorker.com/reporting/2009/07/20/090720fa_fact_finnegan)
- Johnson, E. 2010. Police agencies split over immigration bill. *Phoenix News*, April 15. Retrieved from <http://www.kpho.com/news/23155537/detail.html>
- League of United Latin American Citizens. 2010. LULAC Councils, 2010. Retrieved from [http://lulac.org/about/find\\_lulac\\_councils/](http://lulac.org/about/find_lulac_councils/)
- Lopez, M.H. 2008. How Hispanics voted in the 2008 presidential election. *Pew Research Center*, November 5. Retrieved from <http://pewresearch.org/pubs/1024/exit-poll-analysis-hispanics>
- New York Times*. 2010. Mapping America: Every city, every block. Retrieved from <http://projects.nytimes.com/census/2010/explorer?view=raceethnicity&lat=39.7392&lng=-104.984&l=10>
- Martinez, D. 2009. *Who Speaks for Hispanics? Hispanic Interest Groups in Washington*. Albany: State University of New York Press.
- Michelson, M.R. 2005. Meeting the challenge of Latino voter mobilization. *Annals of the American Academy of Political and Social Science* (September), 85-101. Retrieved from <http://www.jstor.org/stable/25046126>.
- MSNBC News*. 2005. Minority population surging in Texas, August 18. Retrieved from <http://www.msnbc.msn.com/id/8902484/>
- National Right to Work Legal Defense Foundation. Right to Work Laws: Arizona. Retrieved from <http://www.nrtw.org/c/azrtwlaw.htm>
- Navarro, S.A., & Mejia, A.X. 2004. *Latino Americans and Political Participation*. Santa Barbara, CA: ABC-CLIO Press.
- Pew Hispanic Center. Demographic profile of Hispanics in the United States. Retrieved from <http://pewhispanic.org/states/>
- Rau, A. 2010. Arizona immigration law: state to appeal injunction. *Arizona Republic*, July 28. Retrieved from <http://www.azcentral.com/news/election/azelections/articles/2010/07/28/20100728arizona-immigration-law-court-ruling-brk28-ON.html>
- Rossi, D. 2010. Immigration bill takes huge step forward, supporters say. *Phoenix News*, April 13. Retrieved from <http://www.kpho.com/news/23143174/detail.html>
- Rough, G. 2010. Brewer: most illegal immigrants smuggling drugs." *Arizona Republic*, June 25. Retrieved from <http://www.azcentral.com/news/articles/2010/06/25/20100625arizona-governor-says-most-illegal-immigrants-smuggle-drugs.html>
- Sharry, F. 2010. Memo: Latino voters, the 2010 elections, and beyond. *America's Voice*, November 22. Retrieved from [http://americasvoiceonline.org/research/entry/latino\\_voters\\_the\\_2010\\_elections\\_and\\_beyond](http://americasvoiceonline.org/research/entry/latino_voters_the_2010_elections_and_beyond)
- Spagat, E. 2010. Other border states shun Arizona's immigration law." *MSNBC News*, May 13. Retrieved from <http://www.msnbc.msn.com/id/37116159>
- Stevensen, M. 2010. Study: 100,000 Hispanics leave Arizona." *MSNBC News*, November 11. Retrieved from [http://www.msnbc.msn.com/id/40141843/ns/us\\_news-immigration\\_a\\_nation\\_divided/](http://www.msnbc.msn.com/id/40141843/ns/us_news-immigration_a_nation_divided/)
- Thornburgh, N. 2010. The battle for Arizona: will border crackdown work? *Time*, June 14.
- U.S. Census Bureau. 2008. Arizona ACS demographic and housing estimates 2005-2007. Retrieved from <http://factfinder.census.gov/servlet/ADPTable>
- U.S. Census Bureau. 2009. Selected historical decennial census population and housing counts. Retrieved from <http://www.census.gov/population/www/censusdata/hiscendata.html>
- Watanabe, T. 2010. Cardinal Mahoney criticizes Arizona immigration bill. *Los Angeles Times*, April 20. Retrieved from <http://articles.latimes.com/2010/apr/20/local/la-me-0420-mahony-immigration-20100420>

---

## *Communications*

Communications are short reports of original research that focus on highlighting an important finding that will likely be of considerable interest to others in the discipline.

# Energy of Electrons in a Nanowire Subject to Spin-orbit Interaction

Ryan Brennan, FCRH '11; Sheehan Ahmed, FCRH '11;  
Dr. Antonios Balassis; Dr. Vassilios Fessatidis

## The Physics

The Hamiltonian for a particle subject to spin-orbit interaction is more complicated than that of a free particle, containing terms corresponding to the electric dipole and Thomas precession processes. For a thin quantum wire in the  $x$ - $y$  plane, a non-zero electric field perpendicular to the plane of the wire gives rise to yet another process of spin-orbit interaction called the Rashba spin-orbit interaction. The contribution of this Rashba mechanism is dictated by a parameter  $\alpha$  which is proportional to the perpendicular electric field. Additionally, a strong potential well within the  $x$ - $y$  plane may be associated with an electric field, which is not negligible compared to the field that causes the  $\alpha$ -interaction. In this case of planar, as well as perpendicular confinement, there is one more contribution to the Hamiltonian and the spin-orbit interaction, this time corresponding to the parameter  $\beta$ , which is dictated by the width and potential depth of the nanowire. Typical values of  $\beta$  are about one tenth of  $\alpha$ .<sup>1</sup> Our goal was to write a program that would compute the eigenenergies of an electron in the nanowire.

## The Problem

Electrons are confined to a long, thin nanowire in the  $x$ - $y$  plane. They are subject to the Rashba  $\alpha$ -coupling due to an electric field in the  $z$ -direction. In addition, the particles are confined along the  $x$ -direction by the sides of the wire, only able to move between  $x=0$  and  $x=W$ , which gives rise to the  $\beta$  spin-orbit coupling. The total wave function of an electron within the nanowire has the form<sup>1</sup>

$$(1) \quad \phi(\mathbf{r}) = \frac{e^{ik_y y}}{\sqrt{L_y}} \begin{bmatrix} \psi_A(x) \\ \psi_B(x) \end{bmatrix}$$

where  $k_y$  is the wave number in the  $y$  direction,  $L_y$  is a normalization length used to set the probability of finding the particle somewhere in space equal to one, and  $\psi_A(x)$  and  $\psi_B(x)$  are two different spin states of

the particle. Applying the Hamiltonian containing all of the SOI (spin-orbit interaction) terms to the above wave function gives two coupled differential equations. The Hamiltonian and the two differential equations are as follows:

$$(2) \quad \hat{H} = \frac{\mathbf{p}^2}{2m^*} + \frac{\alpha_R}{\hbar} (\boldsymbol{\sigma} \times \mathbf{p})_z + i\beta F(x) \sigma_z \frac{\partial}{\partial y}$$

$$(3) \quad -\frac{\hbar^2}{2m^*} \left( \frac{d^2}{dx^2} - k_y^2 \right) \psi_A(x) + \alpha \left( \frac{d}{dx} + k_y \right) \psi_B(x) - \beta k_y F(x) \psi_A(x) = \varepsilon \psi_A(x)$$

$$(4) \quad -\frac{\hbar^2}{2m^*} \left( \frac{d^2}{dx^2} - k_y^2 \right) \psi_B(x) - \alpha \left( \frac{d}{dx} - k_y \right) \psi_A(x) + \beta k_y F(x) \psi_B(x) = \varepsilon \psi_B(x)$$

where the Hamiltonian is comprised of the free particle contribution, the  $\alpha$  contribution that arises from the asymmetry of the quantum well (Rashba mechanism), and the  $\beta$  contribution that arises from the lateral confining electric field.  $m^*$  is the reduced mass of the electron,  $\hbar$  is the reduced Planck's constant,  $\varepsilon$  is the eigenenergy of the particle and

$F(x) = \left( \frac{W}{l_0} \right) \left\{ \exp \left[ -\frac{(x-W)^2}{2l_0^2} \right] - \exp \left[ -\frac{x^2}{2l_0^2} \right] \right\}$ .  $F(x)$  is related to the lateral confinement field in the  $x$ - $y$  plane, where  $l_0$  is a measure of the steepness of the potential at the edges of the nanowire. A small value of  $l_0$  means that the the particle hits a very steep potential at the edge of the wire. We needed to find  $\varepsilon$ -, the energies that satisfy these two equations simultaneously.

## Solving the Problem

Our first task was to cast the equations in dimensionless form. We made our unit of length dimensionless

by changing  $x$  to  $X = \frac{x}{W}$ , and adjusting the derivatives and the function  $F(x)$  accordingly. We introduced

$$l_\alpha = \frac{\hbar^2}{2m^* \alpha}, l_\beta = \frac{\hbar^2}{2m^* \beta}, K_y = k_y W \text{ and } E = \frac{2m^* w^2 \varepsilon}{\hbar^2}$$

. Finally, we made the  $l_\alpha$ ,  $l_\beta$  and  $l_0$  parameters dimensionless by setting  $\tau_\alpha = \frac{W}{l_\alpha}$ ,  $\tau_\beta = \frac{W}{l_\beta}$  and  $\tau_0 = \frac{W}{l_0}$ .

Equations 1 and 2 became:

$$(5) \left( K_y^2 - \frac{d^2}{dX^2} \right) \psi_A(X) + \tau_\alpha \left( K_y + \frac{d}{dX} \right) \psi_B(X) - \tau_\beta K_y F(X) \psi_A(X) = E \psi_A(X)$$

$$(6) \left( K_y^2 - \frac{d^2}{dX^2} \right) \psi_B(X) - \tau_\alpha \left( \frac{d}{dX} - K_y \right) \psi_A(X) + \tau_\beta K_y F(X) \psi_B(X) = E \psi_B(X)$$

where

$$F(X) = \tau_0 \left\{ \exp \left[ -\frac{\tau_0^2}{2} (X - 1)^2 \right] - \exp \left[ -\frac{\tau_0^2}{2} X^2 \right] \right\}$$

and typical values were  $\tau_\alpha \approx 5 - 10$ ,  $\tau_\beta \approx .5 - 1$  and  $\tau_0 \approx 1000$ . It became clear that while these equations did not look very daunting, they could not be solved by elementary functions. We used a central difference approximation to replace the derivatives in the two equations:

$$\frac{d\psi(X)}{dX} = \frac{\psi(X + \delta) - \psi(X - \delta)}{2\delta}$$

$$\frac{d^2\psi(X)}{dX^2} = \frac{\psi(X + \delta) + \psi(X - \delta) - 2\psi(X)}{\delta^2}$$

where  $\delta$  is a small distance in the  $x$ -direction. The derivative of the wave function at each point can be approximated by using the values of the function around the point of interest. The smaller the increment, the better the approximation. We first thought that we could write the two equations at  $X=0$ , setting  $\psi_{A/B}(X - \delta) = \psi_{A/B}(X) = 0$ , and solve for  $\psi_{A/B}(X + \delta)$ . We would then plug these values into the two equations as the current values of the wave functions and solve for the wave functions at the next step of  $X$ . We soon realized that the values of the wave functions at each point would be in terms of  $E$  and  $K_y$  and we would have no way to solve for the energies. This method also did not take into account the second boundary condition  $\psi_A(1) = \psi_B(1) = 0$ . Since the electron could not leave the nanowire, its wave function had to go to zero at both ends of the wire. It became clear that we had to write the two equations at each  $X$  value between 0 and 1 in steps of  $\delta$  and solve them simultaneously. At

$X = \delta$ ,  $\psi_A(X - \delta)$  and  $\psi_B(X - \delta)$  would be  $\psi_A(0)$  and  $\psi_B(0)$  and could be set equal to 0. At  $X = 1 - \delta$  the same could be done for  $\psi_A(X + \delta)$  and  $\psi_B(X + \delta)$  and in this way the boundary conditions at both sides were addressed. Several equations of this kind can be written at once as one matrix equation in the following way:

$$(7) \begin{matrix} x + 3y - 4z = Ex \\ 2x - 7y + 6z = Ey \\ y - z = Ez \end{matrix}$$

becomes

$$(8) \begin{bmatrix} 1 & 3 & -4 \\ 2 & -7 & 6 \\ 0 & 1 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = E \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

or  $\mathbf{M} \cdot \mathbf{r} = E\mathbf{r}$ . In our case,  $\mathbf{M}$  was a large matrix of mostly zeroes, since for any given equation, only the current, previous and next values of the wave functions were present, and had non-zero coefficients. The matrix  $\mathbf{r}$  became  $\Psi$ , a long column matrix containing the two wave functions at each  $x$  coordinate between 0 and 1:

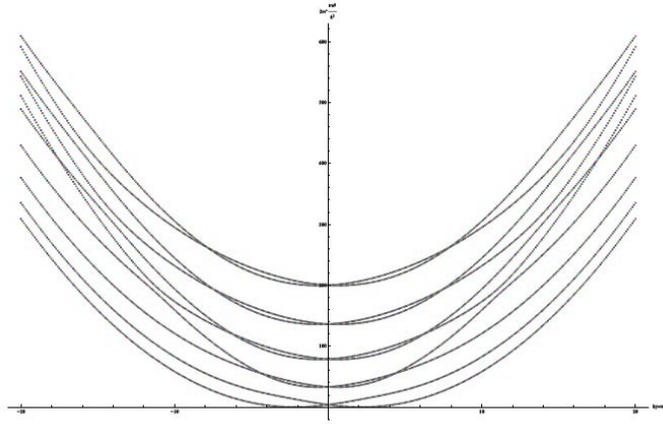
$$(9) \Psi = \begin{bmatrix} \psi_A(\delta) \\ \psi_B(\delta) \\ \psi_A(2\delta) \\ \psi_B(2\delta) \\ \vdots \\ \psi_A(1-\delta) \\ \psi_B(1-\delta) \end{bmatrix}$$

We could solve an equation of the form  $\mathbf{M} \cdot \Psi = E\Psi$  for  $E$ , the eigenvalues of  $\mathbf{M}$ , by setting the determinant of equal to zero without having to know the value of the wave functions at each point. These eigenvalues are the

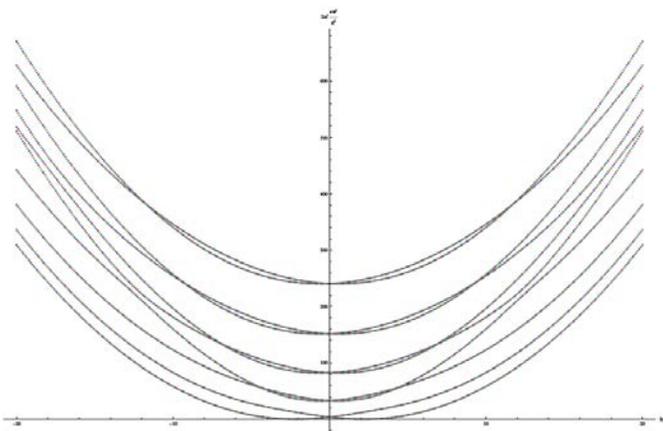
energies of the electrons in units of  $\frac{2m^* w^2}{\hbar^2}$ . We assigned values to  $\tau_\alpha$ ,  $\tau_\beta$  and  $\tau_0$ , leaving  $K_y$  as the only undefined variable in the matrix. When we solved for the eigenvalues of  $\mathbf{M}$  we obtained as many eigenvalues as there were equations. For example, when  $\delta = .01$ , there are 99  $X$  coordinates, giving 198 equations and 198 eigenvalues. We solved for these eigenvalues in terms of  $K_y$ , but the computing power needed became too much beyond a step size of .01. Since Mathematica could handle a purely numerical calculation much more easily, we assigned values to  $K_y$  from -20 to 20 in increments of .1 and solved for all of the eigenvalues at each value of  $K_y$ . In this way, we were able to produce

graphs of  $E$  vs.  $K_y$ , or  $\frac{2m^* w^2 \varepsilon}{\hbar^2}$  vs.  $k_y W$ . Figures 1, 2,

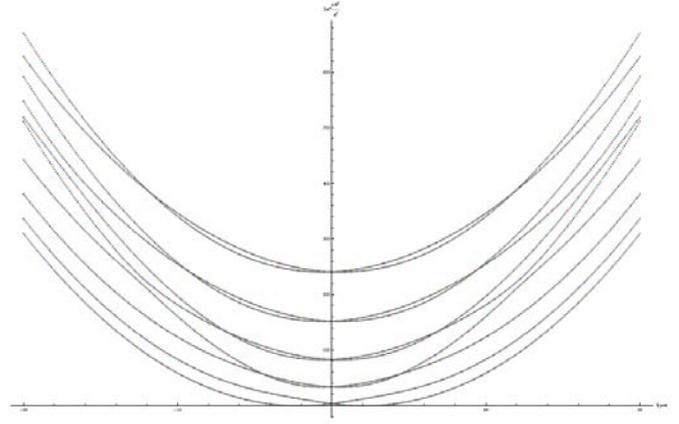
and 3 are graphs of the first ten energy bands with  $\delta$  values of 0.1, 0.001 and 0.0005, respectively.



**Figure 1:** The first ten energy bands of  $\frac{2m^*w^2\varepsilon}{\hbar^2}$  vs.  $k_y W$  with an  $X$  step size of 0.1. This step size was not small enough to take into account the edges of the potential.  $\tau_\alpha = 5$ ,  $\tau_\beta = 1$  and  $\tau_0 = 1000$ . These values remained consistent for Figures 2 and 3 as well. (Plotting  $E$  vs.  $K_y$ )



**Figure 2:** The first ten energy bands with an  $X$  step size of 0.001. The bands are much different as our calculation became more accurate. (Plotting  $E$  vs.  $K_y$ )



**Figure 3:** The first ten energy bands with an  $X$  step size of 0.0005. This graph and the last graph were very similar as they both take into account change in potential at the edges of the nanowire. (Plotting  $E$  vs.  $K_y$ )

### Possibilities for Further Research

As our step size for  $X$  got smaller and smaller, we began to push the boundaries of what our computers could do. Now that we have access to more powerful computers, we would like to get even more accurate approximations by creating larger matrices. We can also now take our eigenvalues and plug them back into our equations and solve for the wave functions of the electrons in the nanowire. This project may aid us in doing similar work on the carbon allotrope graphene. Graphene is a one-atom-thick plane of carbon atoms in a honeycomb-shaped lattice which has become a popular research topic because of its unique conduction properties. We hope to do a similar project on this interesting substance in the near future.

### Reference

1. Balassis A, Gumbs G, Huang, D. Energybands, conductance and thermoelectric power for ballistic electrons in a nanowire with spin-orbit interaction. *Forthcoming*.

# NMR Determination of Enantiomeric Composition of Chiral Alcohols Using Camphorsulfonate Esters

Steven Bondi, FCRH '11  
 Thomas Lobasso, FCRH '09  
 Christa Iwanoski, FCRH '09  
 Dr. Shahrokh Saba  
 Dr. Donald Clarke

## Introduction

Most biologically active compounds, including pharmaceuticals, have chiral molecular structures. With increased recognition that enantiomers of chiral drugs are metabolized differently, there has been enormous interest in the development of enantioselective methodologies for the synthesis of chiral compounds.

NMR spectroscopy has emerged as a powerful method for discrimination of enantiomers of chiral compounds.<sup>1</sup> One strategy by which the NMR method is exploited is based on converting the enantiomers of a chiral compound to diastereomers using a chiral derivatizing agent. These diastereomers often display anisochronous NMR signals, which can be identified and integrated affording quantitative measurements of the optical purity of a sample.

The hydroxyl group is a highly prevalent functionality found in naturally occurring compounds and pharmaceuticals. The chiral auxiliaries used in common practice to identify enantiomeric alcohols are usually chiral carboxylic acids, or their chlorides, which readily form diastereomeric esters and show appreciable diastereomeric differences at certain positions in the molecule. The most widely used carboxylic acid for such studies is that developed by Mosher, namely  $\alpha$ -methoxy- $\alpha$ -trifluoromethylphenylacetic acid.<sup>2</sup> However, while commercially available, this compound is 173 times more expensive than (*S*)-camphorsulfonyl chloride [(*S*)-CSCl] (Figure 1).

A much older chiral auxiliary is camphorsulfonic acid,

which has been used extensively to derivatize chiral amines, but not to make derivatives of chiral alcohols. It has not been extensively used to make derivatives of chiral alcohols. This is because sulfonate esters are more difficult to prepare than carboxylate esters. On the other hand, the poor reactivity of sulfonyl chlorides, as compared to carboxylic acid chlorides, makes this reagent more easily stored without decomposition by hydrolysis.

We have recently expanded the protocol for the hydration of 1-hexene, which affords 2- and 3-hexanols, by treating the reaction product with (*S*)-CSCl and triethylamine to produce diastereomeric esters of these chiral alcohols. <sup>1</sup>H and <sup>13</sup>C NMR spectroscopy were used to determine the enantiomeric composition of alcohols obtained.<sup>3</sup>

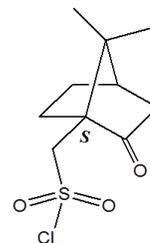


Figure 1

We have now extended our studies to other chiral alcohols and herein report on the synthesis and <sup>1</sup>H and <sup>13</sup>C NMR spectra of camphorsulfonate esters of (+/-)-ethyl-3-hydroxybutyrate, (+/-)-2-butanol, (+/-)-1-phenylethanol, (+/-)-2-hydroxymethylloxirane, and (+/-)-1-phenyl-2-propyn-1-ol.



The  $^1\text{H}$  NMR spectrum of the CS ester derived from authentic (+/-)-2-hydroxymethyloxirane shows baseline resolved signals centered at 3.1 and 3.6 ppm for the  $\text{SCH}_2$  moiety (Figure 5). Assignment of these signals to the individual diastereomers has not yet been made.

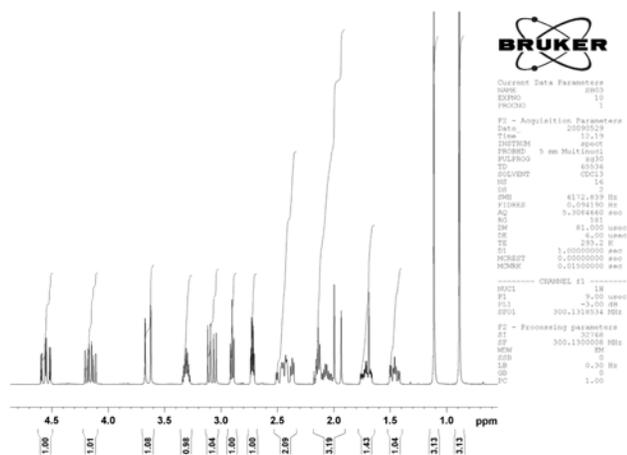


Figure 5

The  $^1\text{H}$  NMR spectrum of the CS ester derived from authentic (+/-)-1-phenyl-2-propyn-1-ol shows baseline resolved signals at 5.2 and 5.6 ppm for the  $\text{OCH}$  moiety (Figure 6). Assignment of these signals to the

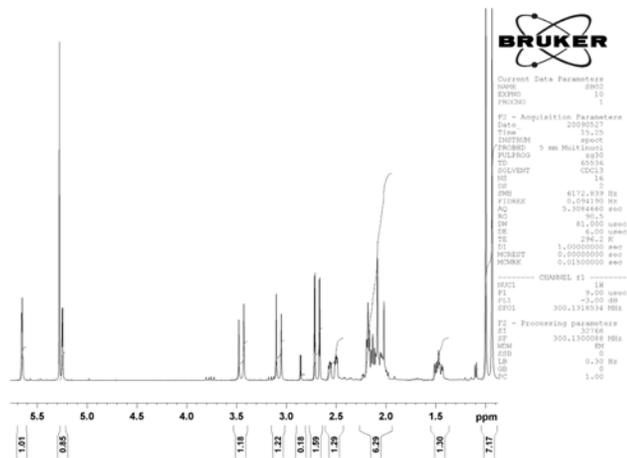


Figure 6

individual diastereomers has not yet been made.

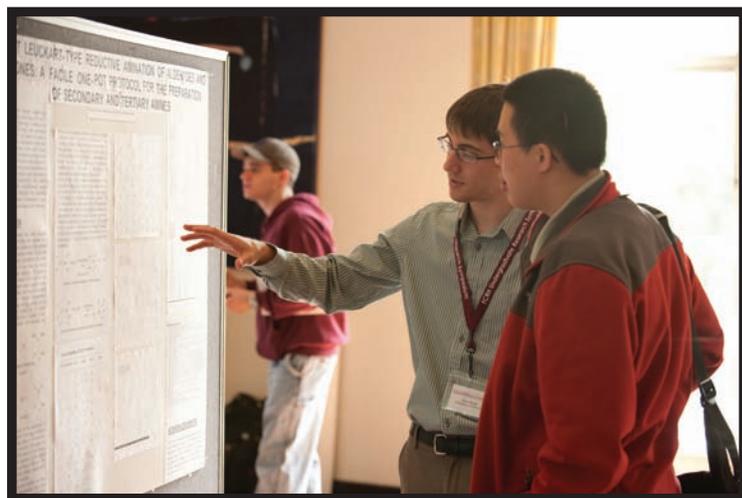
## Conclusion

NMR spectroscopy has become a powerful method for discriminating enantiomers of chiral compounds. One such methodology is accomplished by converting the enantiomers of a chiral compound into diastereomers using a chiral derivatizing agent.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectroscopy is then used to determine the enantiomeric ratio of the desired compound. In our experimentation, (*S*)-Camphorsulfonyl chloride proved to be a useful chiral derivatizing agent for chiral alcohols such as (+/-)-ethyl-3-hydroxybutyrate, (+/-)-2-butanol, (+/-)-1-phenylethanol, (+/-)-2-hydroxymethyloxirane, and (+/-)-1-phenyl-2-propyn-1-ol. Future work will focus on expanding the range of alcohols used for derivatization, and on assigning peaks to the camphor-sulfonate esters obtained.

## References

1. Wenzel TJ. 2007. Discrimination of chiral compounds by NMR spectroscopy. Hoboken, NJ: John Wiley and Sons, Inc.
2. Mosher H, Dale, J. 1973. Nuclear magnetic resonance enantiomer reagents. Configurational correlations via nuclear magnetic resonance chemical shifts of diastereomeric mandelate, O-methylmandelate, and  $\alpha$ -methoxy- $\alpha$ -trifluoromethylphenylacetate (MTPA) esters. Journal of the American Chemical Society 95(2):512-519.
3. Saba S, Clarke D, Iwanoski C, Lobasso T. 2010. Using NMR to probe the Regio- and stereochemistry of the hydration of 1-Hexene. Journal of Chemical Education. 87(11): 1238-1241.

Photo Credit: Bill Denison



# Mobile Sensor Data Mining

by Jeff Lockhart, FCRH '13

## Introduction

At an ever increasing rate, the smartphones and other devices people carry with them in their everyday lives are packed with sensors and processing power. This provides an unprecedented opportunity to apply data mining techniques to people's activities as they go about their daily lives, without changing their routine. The goal of the Wireless Sensor Data Mining (WISDM) Project is to explore the possibilities of data mining on these powerful mobile platforms.<sup>1</sup> Data mining involves extracting knowledge from data using computer algorithms. A major sensor in these devices is the tri-axial accelerometer originally included for screen rotation and advanced gaming. Our work, so far, has focused on using data mining methods on the accelerometer data to identify the activities users are performing (activity recognition) while carrying the phone. Many useful applications can be built if accelerometers can be used to recognize a person's activity. We have also demonstrated that accelerometer data can be used to uniquely identify and authenticate users. While some previous work has examined sensor-based gait recognition,<sup>2-12</sup> our work in this communication differs in that we identify users based on the way they move during multiple activities (i.e., not just walking) using only commercially available smartphones, which are carried in the user's pocket.

In this communication, as is commonly the case, data mining is done offline by researchers who manually retrieve and prepare the data. The WISDM team is actively working to automate the process of receiving, aggregating, preprocessing, classifying, and reporting so that useful applications can be deployed to cell phone users. This automated architecture will also support future research efforts by providing a platform for data mining on mobile devices.

The WISDM project is moving ahead rapidly with over a dozen undergraduate members, in addition to a graduate student and our faculty team leader, Dr. Gary Weiss. We are continuing to submit new work to major industry conferences and broaden the project's scope. More information about the WISDM project can be found at <http://www.fordham.edu/wisdm>.

Thanks to Dr. Gary M. Weiss, my faculty mentor, for guiding the work and reviewing the results. Thanks also to Jennifer Kwapisz, FCRH '10, and Sam Moore, FCRH '10, who laid the groundwork for this effort. This work was financially supported by a Fordham Faculty Research Grant and a Google Faculty Research Award, and by a FCRH Summer Science Research Internship. Direct all correspondence to Jeff Lockhart at [jlockhart@fordham.edu](mailto:jlockhart@fordham.edu).

## Experimental

### A. Materials and Data

Android-based cell phones (as opposed to the iPhone) were chosen for our platform because the Android operating system is free, open-source, easy to program and already becoming a dominant entry in the cell phone marketplace. Further, Android and our data mining tools (Weka<sup>13</sup>) use the same programming language, Java. The WISDM project employs eight types of Android phones from several manufacturers, including Google, HTC, Motorola, and Samsung. Our devices use a range of Android OS versions from 1.5 to 2.2, a representative sample of current device-dependent diversity.

Data was collected from 53 subjects while they performed a set of pre-defined activities under the supervision of a researcher. The data collection protocol was approved by Fordham's Institutional Review Board. Users were asked to place one of our Android cell phones, running our data collection application, in their right front pants pocket and then to perform a set of activities for pre-defined periods of time, generally totaling 10 minutes each. Some users did not perform all activities due to physical limitations, and some activities (such as sitting and standing) were limited to only a few minutes because we expected that the data would remain fairly constant over time, which it, in fact, did. As users performed the activities, our application re-

## References

1. [WISDM] Wireless Sensor Data Mining Project. Fordham University, Department of Computer and Information Science [Internet]. Bronx (NY). Available from: <http://storm.cis.fordham.edu/~gweiss/wisdm/>.
2. Mantyjarvi J, Lindholdm M, Vildjounaite E., Makela SM, Ailisto H. 2005. Identifying users of portable devices from gait pattern with accelerometers. Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing. ICASSP. Pp. 973-976.
3. Gafurov D, Helkala K, Sondrol T. 2006. Biometric gait authentication using accelerometer sensor, Journal of Computers 1(7):51-59.
4. Gafurov D, Snekenes E, Buvarp TE. 2006 Oct 29-Nov 3. Robustness of biometric gait authentication against impersonation attack," International Workshop on Information Security, OnTheMove Federated Conferences. France.
5. Mathie M, Celler B, Lovell N, Coster A. 2004. Classification of basic daily movements using a triaxial accelerometer. Medical & Biological Engineering and Computing: 42.

corded the accelerometer values every 50 ms (any faster and the data begins to repeat due to hardware limitations). When they had completed the set (walking, jogging, sitting, standing, ascending and descending stairs, and lying down), researchers copied the data from the application into our computers for future examination. Typical classification algorithms cannot interpret raw time series data;<sup>14</sup> rather, these algorithms classify examples. Thus we represent a period of data as a single example by transforming it into 43 descriptive features, (e.g. average values, time between peak values in the sinusoidal waves associated with repetitive steps, and descriptions of the distribution of values).

## B. Modeling, Testing and Results

Our activity recognition task identifies seven activities from the accelerometer data: walking, jogging, climbing up and down stairs, sitting, standing, and lying down. These activities were chosen because they represent most of the activities smartphone users perform in the course of a day. The first step in evaluation is building classification models by feeding a standard classification algorithm training examples. These models are then tested for accuracy with new data. We find that generalized, impersonal models—those built from one set of subjects and tested on another—are, on average, 71% accurate. The advantage of this method is that a universal model can be downloaded and used by all. However, when a personal model is built from a single user's accelerometer data, the accuracy of the model on that user rises to an average 97%. This second scenario is akin to having application users train and personalize their devices before use. These results suggest that there are substantial differences in the way different people perform the same activities.

Our user authentication task uses the same data and techniques to identify the correct user from a pool of 36 initial users for whom we have data. Our results show that using only one sample containing 10 seconds of data, we can predict a user with about 72% accuracy. However, significantly better results can be achieved with more than 10 seconds of data. In order to identify a user, we use all of that user's data (typically 5-10 minutes worth) and make predictions on each sample within it, then choose the user who is most frequently predicted. This yields 100% accuracy for all 36 of our initial subjects. Thus, we are able to perfectly identify each of our 36 users based on their movements.

## Conclusions and Future Work

The widespread use of sensor-packed mobile devices, including smartphones, tablet PC's, and gaming devices provides us with an unprecedented opportunity to study and develop applications for people's daily lives. User identification offers a broad range of possible applications. It can be used to provide device security and theft prevention. Identification can also be used to automatically personalize mobile device settings after identifying the current user of the device and his/her current activity. Applications that recognize activities and adapt phones as a result (such as selecting a certain playlist or sending calls to voicemail while running) can encourage healthy behavior. Moreover, the records of a user's activity can be tracked and reported over time, enabling health and fitness applications for users, and allowing people to see how sedentary they or their kids really are.

6. Brezmes, T., Gorricho, J.L., and Cotrina, J. 2009. Activity Recognition from accelerometer data on mobile phones. IWANN '09: Proceedings of the 10th International Work-Conference on Artificial Neural Networks. Pp. 796-799.

7. Cho, Y., Nam, Y., Choi, Y.-J., and Cho, W.-D. 2008. Smart-Buckle: human activity recognition using a 3-axis accelerometer and a wearable camera. In *HealthNet*.

8. Choudhury T, Consolvo S, Harrison B, LaMarca A, LeGrand L, Rahimi A, Rea A, Borriello G, Hemingway B, Klasnja P, Koscher K, Landay J, Lester J, WyattD, Haehnel D. 2008. The mobile sensing platform: An embedded activity recognition system. In *IEEE Pervasive Computing*; 7(2):32-41.

9. Gyorbiro N, Fabian A, Homanyi G. 2008. An activity recognition system for mobile phones. *Mobile Networks and Applications*; 14(1):82-91.

10. Krishnan N, Colbry D, Juillard C, Panchanathan S. 2008. Real time human activity recognition using tri-Axial accelerometers. *Sensors, Signals and Information Processing Workshop*.

11. Lester J, Choudhury T, Borriello G. 2006. A practical approach to recognizing

physical activities. *Lecture Notes in Computer Science: Pervasive Computing*, 1-16.

12. Weiss GM, Hirsh H. 1998. Learning to predict rare events in event sequences. *Proceedings of the Fourth International Conference on Knowledge Discovery and Data Mining*. Menlo Park: AAAI Press. Pp. 359-363.

13. Witten IE, Frank E. 2005. *Data mining: practical machine learning tools and techniques*, 2nd ed. Morgan Kaufmann.

14. Miluzzo E, Lane N, Fodor K, Peterson R., Lu H, Musolesi M., Eisenman S, Zheng X Campbell A. 2008. Sensing meets mobile social networks: The design, implementation and evaluation of the CenceMe application. *The 6th ACM Conference on Embedded Networked Sensor Systems*: 337-350.

15. Jennifer R. Kwapisz, Gary M. Weiss and Samuel A. Moore. Activity Recognition using Cell Phone Accelerometers, *Proceedings of the Fourth International Workshop on Knowledge Discovery from Sensor Data (at KDD-10)*, Washington DC, 10-18.

## Publications

**Courtney Anders** '13 published "Labeled" in the fall 2010 issue of *Contexts*, the quarterly magazine published by the American Sociological Association.

**Julianne Troiano** '11 was a co-author on "The elemental composition of Almahata Sitta," published in a 2010 issue of *Meteoritics and Planetary Science*.

**Gaelle Voltaire** '12 was a co-author on "Rice Weevils and Maize Weevils (Coleoptera: Curculionidae) Respond Differently to Disturbance of Stored Grain," published in a 2010 issue of *Annals of the Entomological Society of America*.

## Competitive Summer Programs

**Reynold Graham** '12 has been accepted into the Public Policy and International Affairs (PPIA) Junior Summer Institute (JSI) at Princeton University for summer 2011.

**Benjamin Marsh** '12 has been accepted into the Albert Einstein College of Medicine Summer Undergraduate Research Program.

**Felicia O'Connor** '11 is conducting research on jury decision making and how the use of technology in the courtroom affects jurors' verdicts via a NSF-REU at Baruch College

**Ricky Barnum** '13, **Kevin Jordan** '12, **Zachary Meinhart** '13, and **Katie Silva** '12 were selected as DAAD RISE scholarship recipients to conduct research in Germany in summer 2011.

## Selected Research Accomplishments of FCRH Students in 2010-2011

FURJ would like to congratulate the following students on their research accomplishments.

Selected achievements provided by the FCRH Dean's Office.

## Presentations

**Sheehan Ahmed** '11 and **Ryan Brennan** '11 are co-authors on "Effect of Spin-orbit Interaction on the Ballistic Transport Properties of Nanowires," presented at the American Physical Society meeting in Dallas, TX in March 2011.

**Stacey Barnaby** '11 presented "Phytohormone-Based Nanoassemblies for Tissue Engineering, Drug Delivery, and Bioimaging" at the 241st American Chemical Society meeting in Anaheim, CA in March 2011.

**Stephen Fox** '11, **Ilya Naoumov** '11, **Emir Ogel** '14, and **Margaret Wolf** '14 will participate in the IGVC Team Showcase at National Robotics Week in Washington, DC in April 2011.

**Stephen Frayne** '12 presented "Investigation of Photocatalytic Behavior of Porphyrin Derivatives Grown on Germania-Titania Nanocomposites as Potential Solar Cell Materials" at the 241st American Chemical Society meeting in Anaheim, CA in March 2011.

**Jennifer Lavalle** '11 presented "The Future of Children's Television Programming: A Study of How Emerging Digital Technologies Can Facilitate Active and Engaged Participation and Contribute to Media Literacy Education" at the New Jersey Communication Association meeting in Paramus, NJ in March 2011.

**Jennifer Lavalle** '11 will present "Children and Power: The Future of Children's Television" at the Eastern Communication Association meeting in Arlington, VA in April 2011.

**Caitlin Meyer** '12 is co-author on "Gender Role Identity and Political Involvement: Femininity, Masculinity, and Gender Differences in Political Interest and Knowledge," presented at the Midwest Political Association meeting in Chicago, IL in April 2011.

**Anne Neuendorf** '12 presented "Errorless Learning with S+ Prompt in Matching-to-Sample Procedure" at the 22nd Greater New York Conference on Behavioral Research in New York, NY in November 2010.

**Anne Neuendorf** '12 and **Peter Sanneman** '12 were co-authors on "Error-Reduction in Matching-To-Sample Learning: Gradually Delayed Removal of the S-Minus," presented at the 18th International Conference on Comparative Cognition in Melbourne, FL, in March 2011.

**Peter Sanneman** '12 presented "Errorless Matching-to-Sample Learning: Gradually Delayed Removal of the S-Minus" at the 22nd Greater New York Conference on Behavioral Research in New York, NY in November 2010.

# Contributing Author Bios

**Stacey Barnaby**, FCRH 2011, is from Monroe, Connecticut. She is a chemistry major. Stacey is currently working on the development of new biomaterials at the nanoscale for targeted applications in tissue engineering and bioimaging under the direction of Dr. Ipsita Banerjee in the department of chemistry. After graduation, Stacey will be attending graduate school to pursue a Ph.D, where she would like to continue her research in the area of bionanotechnology.

**Steven P. Bondi**, FCRH 2011, is from New Hyde Park, New York. He is a mathematics major and a chemistry minor. Steven is currently conducting organic chemistry research in Dr. Shahrokh Saba's lab on amine synthesis and alcohol enantiomeric ratio determination. After graduating, Steven will be attending medical school and pursuing a career in medicine.

**Ryan Brennan**, FCRH 2011, is from Long Island, New York. He is a graduating physics major. Ryan conducted research on energy bands in quantum nanowires and is currently studying the properties of graphene. After graduation, Ryan plans to attend graduate school in the hopes of attaining a Ph.D in physics.

**Jeff Lockhart**, FCRH 2013, is from Phoenix, Arizona. He is a computer science and women's studies major. Jeff is currently conducting research in sensor data mining in the Fordham University computer and information science department, working with professor Gary Weiss. After graduation, Jeff plans to attend graduate school for either computer science or rhetoric.

**Noelle Makhoul**, FCRH 2012, is from Fort Lee, New Jersey. She is a psychology and political science major. After graduation, Noelle plans on attending Officer Candidate School for the United States Army and then later completing a graduate degree.

**Peter Morrissey**, FCRH 2011, is from Omaha, Nebraska. He is a political science major with a minor in Spanish and a concentration in American Catholic studies. Peter is currently conducting research for an

honors senior thesis on the role of democratic party divisions in affecting the outcomes of the last five New York City mayoral elections, working primarily with Dr. Bruce Berg. Peter has been admitted to a masters program at Oxford University in theology and public ethics beginning in the fall of 2011.

**Rachel Rattenni**, FCRH 2014, is from East Hampton, New York. She is a biology major. After graduation, Rachel plans to further her education in science journalism.

**Daniella Rizza**, FCRH 2011, is from Long Island, New York. She is an English major and an Italian minor. She researched Harry Potter and mythology last semester for her honors senior thesis under the guidance of Rev. Martin Chase, S.J. This fall, she plans on pursuing a master's degree in childhood education.

**Nathalie Rochel**, FCRH 2011, is from East Brunswick, New Jersey. She is an art history and English major. She currently interns at The Cloisters, a branch of The Metropolitan Museum of Art. After graduation she will be learning German and plans on going to graduate school to study Medieval art.

**Sarah Sullivan**, FCRH 2012, is from the Bronx, New York. She is a history and Medieval studies major with an Irish studies minor. She is the winner of Fordham University's Institute of Irish Studies Language Scholarship and the Research Assistant of Dr. Rigogne in the history department. After graduation, Sarah plans to pursue history in graduate school.

**Colleen Taylor**, FCRH 2012, is from Sherman, Connecticut. She is an English major, Irish studies minor, and American Catholic studies concentrator. She is currently abroad in Galway, Ireland, studying Irish literature, language, and music. Colleen plans to further her studies of Irish writers and the Irish language in graduate school.



The Fordham Undergraduate Research Journal (*FURJ*) aims to promote scholarly investigation and critical thinking through undergraduate research. As an outlet for undergraduate research, we hope to provide opportunities for student researchers to widely disseminate the results of their efforts. Additionally, by engaging student authors in the review process, we endeavor to encourage more scholarly conversation between students and faculty. Likewise, through our feature articles, we seek to highlight undergraduate research efforts at Fordham and make student research accessible to the larger Fordham community and beyond. As a student-run enterprise, we strive to inspire other undergraduates to become interested in pursuing research opportunities. *FURJ* is committed to publishing undergraduate research of the highest quality and as such, we hope to demonstrate the remarkable talent and accomplishments of Fordham students.